



Bio-behavioral Survey of HIV, Syphilis, HBV, and HCV Prevalence, Drug Use, Sexual Behavior, Knowledge, and Stigma among People who Inject Drugs in Thailand: A Respondent-driven Sampling, November 2022 to March 2023

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Abstract

Objectives: People who inject drugs (PWIDs) are a vulnerable population facing multiple public health challenges. We aimed to estimate the prevalence of sexually transmitted infections (STIs) and bloodborne diseases, and assess drug behavior, sexual behavior, knowledge of STIs, and stigma among PWIDs.

Methods: A cross-sectional survey using respondent-driven sampling was conducted in three regions of Thailand from November 2022 to March 2023. We collected data on HIV, syphilis, hepatitis B virus (HBV), and hepatitis C virus (HCV) testing, drug use and injection practices, sexual behavior, knowledge of STIs, and stigma.

Results: Among 1,015 PWIDs, the prevalence of HIV, syphilis, HBV, and HCV was 8.2%, 3.3%, 6.4%, and 34.8%, respectively. Heroin was the most commonly injected drug, and the age of heroin initiation was 14 years or below. Over 70% reported using a new needle at each use; however, in Chiang Mai Province the rate was 46.0%. Treatment was sought and received by 69.2% of respondents. While 77.3% reported being sexually active, only 32.6% consistently used condoms, and 48.4% reported using drugs before having sex. Screening for HIV and other STIs were 59.9% and 37.3%, respectively. HIV knowledge was low at 44.0%, and less than 10% were aware of pre- and post-exposure prophylaxis. Stigmatization within the family was reported by 33.2% and 14.8% avoided accessing healthcare.

Public Health Recommendations: Our findings indicate that STIs remain a significant issue in Thailand. PWIDs demonstrated suboptimal rates of using clean needles, seeking treatment, and knowledge about prevention practices. Recommendations include strengthening harm reduction, expanding screening, improving prevention education, and enhancing healthcare access.

Keywords: people who inject drugs, sexually transmitted infections, bloodborne diseases, respondent-driven sampling, Thailand



Introduction

In Thailand, there has been a notable increase in the prevalence of people who inject drugs (PWIDs).¹ A survey in Northern Thailand showed that heroin was the most widespread injecting drug (76.8%), followed by methadone (20.7%), and methamphetamines (20.7%).² PWIDs who engage in polydrug use involving various narcotic substances and overdoses have been reported.^{2,3}

HIV and hepatitis transmissions continue to pose significant public health challenges, with drug use contributing to increased vulnerability to these viruses. In many parts of Thailand, PWIDs are particularly vulnerable to HIV infection.^{3,4} Moreover, injection drug use remains the main factor fueling the hepatitis C virus epidemic.^{5,6}

For Thailand, the Ministry of Public Health continuously conducts surveys to estimate the prevalence of STIs and risky behaviors among PWIDs to support the implementation of effective interventions. However, data on the characteristics of injecting drug users, including their knowledge of STIs and stigma experiences remain limited. This study provides valuable insights into disease transmission and risk factors, and facilitates engagement with hard-to-reach PWIDs in the community, enabling access to disease screening and essential healthcare services. The objective of the study was to estimate the prevalence of HIV, syphilis, hepatitis B virus (HBV), and hepatitis C virus (HCV), and assess drug use and injection practices, sexual behavior, knowledge related to STIs, and stigma among PWIDs in Thailand.

Methods

Study Design

We conducted a cross-sectional bio-behavioral survey using a respondent-driven sampling (RDS) method from November 2022 to March 2023. We chose this sampling method because hard-to-reach populations are frequently affected by social stigma, fear of criminal prosecution, and mistrust, which often results in participants being reluctant to disclose sensitive information. We used a modified chain referral network, or snowball sampling technique, specifically designed to address key limitations of chain referral sampling.^{7,8} RDS is well suited for populations with

strong internal social networks, such as PWIDs, and offers a cost-effective, rapid, and practical alternative for sampling hard-to-reach groups compared to conventional methods.⁹

Study Location

The survey was conducted across four strategically selected provinces representing Thailand's capital and major urban hubs: Bangkok and Samut Prakan in the Central region, Chiang Mai Province in the North, and Songkhla Province in the South. Data collected from the Bangkok metropolitan area and Samut Prakan Province were combined and presented as "Greater Bangkok", as PWIDs have been reported to reside and frequently move between these two neighbouring areas. These locations were chosen based on empirical evidence indicating high concentrations of injection drug use, and previous surveys confirmed that these four sites possessed robust social networks that enabled effective recruitment of PWIDs using the RDS sampling method.^{3,4}

Study Population

PWIDs were recruited based on the following predefined inclusion criteria: being Thai or belonging to an ethnic group in Thailand; aged 15 years or more; having injected any drug in the previous six months (determined by self-report during a screening interview); willing to participate and provide informed consent; receipt of a coupon from a study participant or being selected as a seed participant (an initial study participant to begin recruiting other eligible participants within their social network) by community-based organization staff; and being a resident of the study area.

Sampling

Community-based organization (CBO) staff selected initial seeds who possessed moderate to extensive social networks among PWIDs, ensuring diversity in age and gender. Each participant received three recruitment coupons to invite eligible peers. The sampling process began with these seeds and progressed in successive waves—wave one comprised individuals recruited by the seeds, while wave two included those referred by the first-wave participants, and so on. Each subsequent participant was similarly provided with three coupons to continue peer recruitment across additional waves (Figure 1).

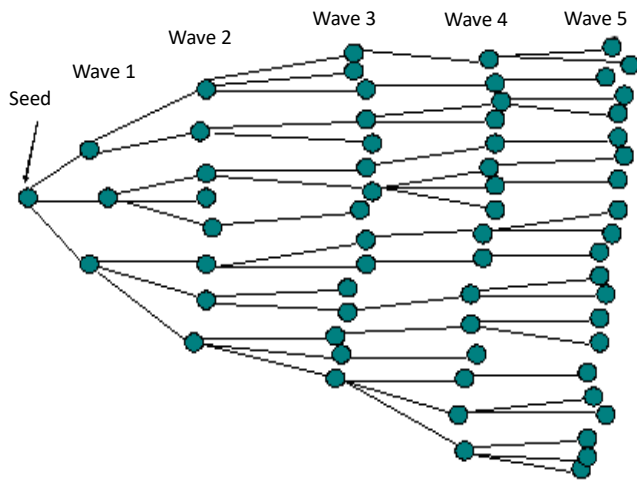


Figure 1. Pattern of the survey using respondent-driven sampling (from the initial seed to wave 5) in Thailand, November 2022 to March 2023.

Sample Size Calculation

The sample size was estimated using the formula for two independent proportions to ensure adequate statistical power to detect potential differences in infection prevalence.^{10,11} The estimated HIV prevalence (P_1) among PWIDs was set at 38%, with the difference in proportions that can occur between network sampling within sample group ($P_2=0.53$) and a significance level of 0.05. The estimated population proportions (P_1 and P_2) were derived from the Asian Epidemic Model.¹² Based on these parameters, the required sample size for this survey was 270 participants per province.

Data Collection

Interviews with recruited individuals who met the eligibility criteria and provided written informed consent were conducted by trained staff in private settings to ensure confidentiality. Each participant first completed a brief screening interview. Staff then conducted a visual examination of participants' bodies, focusing on common injection sites including the arms, hands, legs, and thighs, to identify signs of injection marks.

Staff conducted face-to-face interviews in Thai or, when necessary, a local language with the assistance of an interpreter. The questionnaire was developed based on previous surveillance instruments, covering demographics, drug-use behaviors, sexual behaviors, HIV/STIs testing, knowledge about HIV, and stigma and discrimination experiences, and was administered electronically.³ HIV knowledge was based on the Global AIDS Monitoring indicators and expressed as the percentage of participants who answered all questions correctly.

Following the interview, each participant received counseling and underwent testing for HIV, syphilis, HBV, and HCV infection using screening test kits. Anyone with positive results was referred for confirmatory testing and treatment. All information was securely encrypted and uploaded to the Division of Epidemiology database.

Data Analysis

Data were entered into Microsoft Excel to be cleaned and verified. The dataset was then analysed using the RDS analyst program, and population size estimates from the Asian Epidemic Model was used to adjust for network size.^{12,13} Sampling weights were included in the calculation, adjusting for network size variations to ensure that the estimated proportions represented the population in each study area. Descriptive statistics, weighted percentages, and 95% confidence intervals (CI) were used to characterize the sample, behaviors, and prevalence rates of HIV, syphilis, HBV, and HCV overall and by province. Participant network analysis was conducted using the NetDraw program to visualize the distribution of HIV/STIs infections.^{13,14}

Results

Demographic Characteristics of PWIDs

We recruited 1,015 participants from the four study sites. Males predominated (86.4%), the mean age was 39.6 years, about half were married (49.6%), and 36.7% had a high school education. Most were employed (73.6%), with an average monthly income of less than 10,000 baht (320 USD); 45.9% reported having debt due to inadequate revenue (Table 1). As shown in Figure 2, the network diagrams show the distribution of HIV and other STIs among PWIDs in Greater Bangkok, Chiang Mai Province, and Songkhla Province.

Prevalence of HIV, Syphilis, HBV, and HCV

The overall weighted average HIV infection rate was 8.2%, with 10.5% in Greater Bangkok, 3.6% in Chiang Mai Province, and 10.9% in Songkhla Province. Overall, the average infection rate of syphilis was 3.3% and 6.4% for HBV. The average HCV infection rate was 34.8%, with 29.3% seen in Greater Bangkok, 43.3% in Chiang Mai Province, and 32.5% in Songkhla Province (Table 2).

Hepatitis C demonstrated a more pronounced clustered transmission pattern compared to other infections, which appeared more dispersed. This pattern indicates a higher burden of hepatitis C, particularly in Chiang Mai Province.

Table 1. Socio-demographic characteristics* of people who inject drugs in Thailand, November 2022 to March 2023

Characteristic	Greater Bangkok (n=464) % (95% CI)	Chiang Mai Province (n=280) % (95% CI)	Songkhla Province (n=271) % (95% CI)	Total (N=1,015) % (95% CI)
Gender				
Male	85.8 (81.7–89.9)	80.9 (75.1–86.6)	97.1 (94.2–100.0)	86.4 (83.6–89.2)
Female	14.2 (10.1–18.3)	19.1 (13.4–24.9)	2.9 (0.0–5.8)	13.6 (10.8–16.4)
Age (years)				
Mean (range)	37.4 (17–98)	41.4 (16–71)	41.4 (18–92)	39.6 (16–98)
Median (SD)	37 (12.7)	41 (11.6)	41 (10.5)	40 (12.0)
<25	19.6 (14.6–24.7)	4.8 (2.5–7.1)	7.5 (2.9–12.2)	12.1 (9.4–14.7)
≥25	80.4 (75.3–85.4)	95.2 (92.9–97.5)	92.5 (87.8–97.1)	87.9 (85.3–90.6)
Marital status				
Single	55.5 (49.8–61.3)	12.6 (8.6–16.7)	44.2 (37.6–50.7)	38.3 (34.2–42.4)
Married	36.8 (31.0–42.6)	74.6 (67.3–81.9)	35.2 (28.2–42.2)	49.6 (45.0–54.2)
Widowed/separated	7.7 (4.9–10.5)	12.8 (6.5–19.1)	20.6 (15.0–26.2)	12.1 (9.5–14.8)
Education				
No formal education	3.6 (1.5–5.5)	87.8 (81.3–94.3)	3.6 (1.1–6.1)	32.9 (27.5–38.3)
Primary	28.6 (22.8–34.5)	10.1 (6.6–13.5)	36.7 (30.7–42.9)	23.8 (20.6–27.0)
Secondary	56.0 (48.6–63.4)	2.1 (0.5–3.7)	53.7 (44.5–62.9)	36.7 (32.3–41.1)
Tertiary	11.8 (6.5–17.1)	-	6.0 (1.9–10.1)	6.6 (4.4–8.8)
Employment				
Employed	65.7 (60.2–71.2)	86.7 (82.1–91.4)	68.8 (62.6–75.0)	73.6 (70.1–77.2)
Unemployed	34.3 (28.8–39.8)	13.3 (8.6–17.9)	31.2 (25.0–37.4)	26.4 (22.8–29.9)
Monthly income covers living costs				
Yes, with savings	27.6 (21.0–34.2)	0.2 (0.0–0.4)	19.5 (11.6–28.1)	14.8 (11.2–18.5)
Yes, without savings	43.5 (36.4–50.7)	30.7 (23.9–37.2)	49.2 (40.3–57.7)	39.3 (34.7–43.6)
No, with debts	28.9 (22.8–35.0)	69.1 (62.5–75.9)	31.3 (23.7–38.7)	45.9 (41.2–50.8)

*Weighted percentages based on sampling method. Age is presented as mean (range) and median (SD); percentages and 95% confidence intervals are not applicable. CI: confidence interval. SD: standard deviation.

Table 2. Prevalence* of HIV, syphilis, HBV, and HCV testing among people who inject drugs in Thailand, November 2022 to March 2023.

Disease	Greater Bangkok (n=464) % (95% CI)	Chiang Mai Province (n=280) % (95% CI)	Songkhla Province (n=271) % (95% CI)	Total (N=1,015) % (95% CI)
HIV	10.5 (7.5–13.5)	3.6 (0.7–6.6)	10.9 (7.2–14.8)	8.2 (6.3–10.1)
Syphilis	6.4 (3.7–9.1)	0.7 (0.3–1.7)	1.0 (0.4–1.6)	3.3 (2.0–4.5)
Hepatitis B	2.3 (0.6–4.1)	13.5 (7.9–19.1)	3.3 (1.5–5.1)	6.4 (4.2–8.7)
Hepatitis C	29.3 (23.7–35.0)	43.3 (25.7–60.9)	32.5 (26.3–38.7)	34.8 (30.4–39.2)

*Weighted percentages based on sampling method. CI: confidence interval.

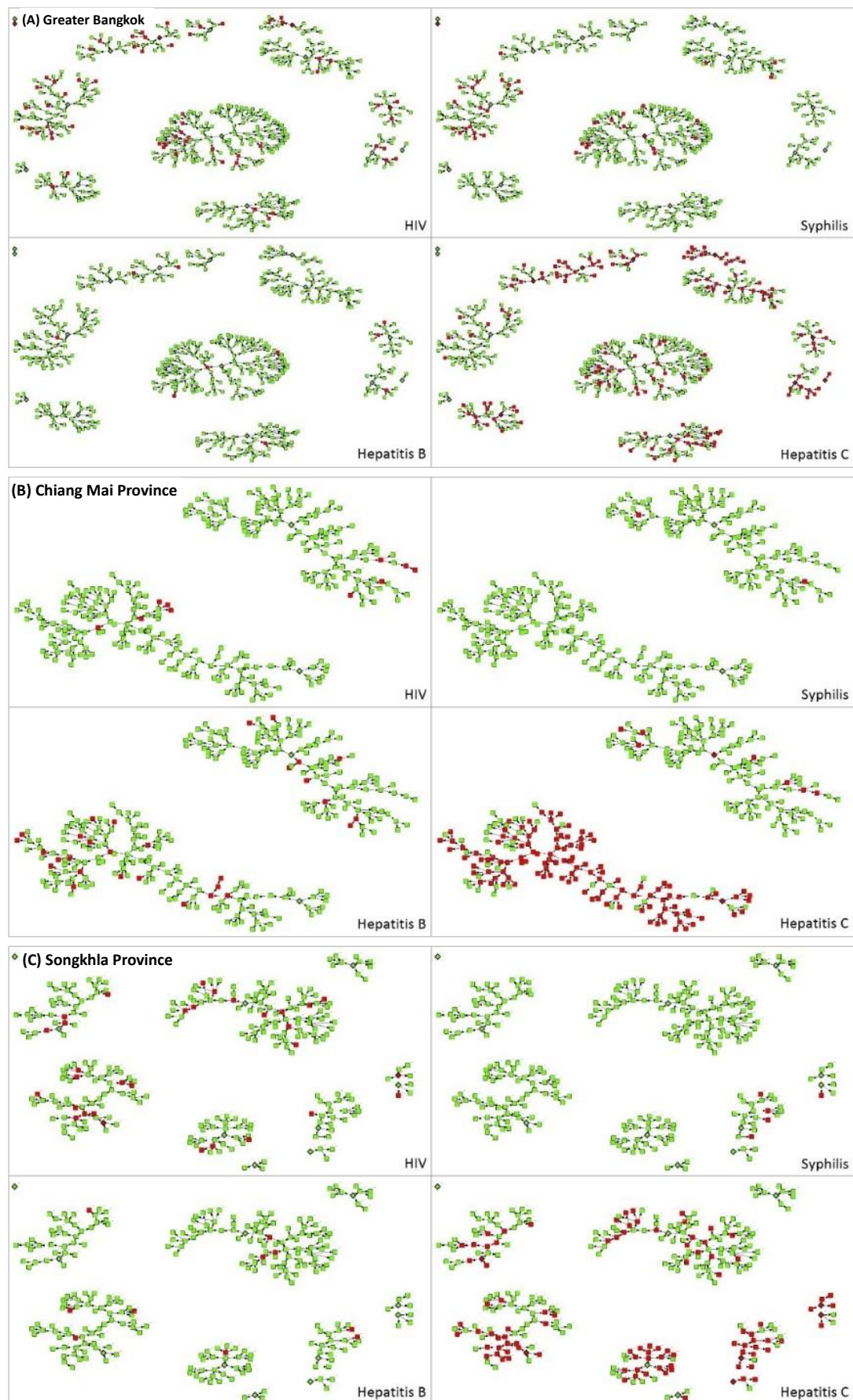


Figure 2. The distribution of HIV, syphilis, hepatitis B, and hepatitis C infections among injecting drug users in Greater Bangkok (A), Chiang Mai Province (B), and Songkhla Province (C) Thailand, November 2022 to March 2023. Red dots denote participants who subsequently tested positive while green dots denote those who tested negative.

Drug Use and Injection Practices

The average age at first injection among participants in Greater Bangkok, Chiang Mai Province, and Songkhla Province was 23.3, 30.4, and 25.6 years, respectively, with the youngest being 12, 11, and 13 years. In the past six months, heroin was the most commonly injected drug among PWIDs in Greater Bangkok (76.7%) and Songkhla Province (89.5%), while in Chiang Mai Province, injectors regularly used methadone (51.9%), followed by heroin (44.4%). The prevalence of mixing drug use was 22.5%, with 14.6%

in Greater Bangkok, 46.9% in Chiang Mai Province, and 12.5% in Songkhla Province.

The prevalence of the use of new needles or syringes was 70.7%, with region-specific rates being 83.6% in Greater Bangkok, 46.0% in Chiang Mai Province, and 84.3% in Songkhla Province. The prevalence of sharing needles was 13.5% in Greater Bangkok, 24.7% in Chiang Mai Province, and 5.7% in Songkhla Province. Overall, 69.2% of PWIDs received medication-based treatment, 54.5% in Greater Bangkok, 90.5% in Chiang Mai Province, and 64.9% in Songkhla Province (Table 3).

Table 3. Prevalence* of drug use and injection practices among people who inject drugs in Thailand, November 2022 to March 2023.

Characteristics	Greater Bangkok (n=464) % (95% CI)	Chiang Mai Province (n=280) % (95% CI)	Songkhla Province (n=271) % (95% CI)	Total (N=1,015) % (95% CI)
Age at first injecting drugs (years)[§]				
Mean (Range)	23.3 (12–98)	30.4 (11–62)	25.6 (13–55)	25.8 (11–98)
Median (SD)	21 (8.2)	29 (11.5)	25 (7.4)	24 (9.6)
Types of drugs injected[†]				
Heroin	76.7 (69.6–83.8)	44.4 (19.7–108.3)	89.5 (84.3–94.8)	69.6 (64.3–74.8)
Marijuana	11.4 (7.8–15.0)	0.6 (0.3–1.4)	9.4 (5.2–13.6)	7.7 (5.5–9.9)
Amphetamines	11.6 (8.2–14.9)	6.2 (2.8–9.6)	20.1 (13.9–26.4)	11.9 (9.2–14.5)
Ice (crystal meth), Ecstasy	22.7 (16.5–29.0)	0.1 (0.1–0.3)	5.1 (2.0–8.2)	12.0 (9.3–14.7)
Methadone	10.0 (6.5–13.5)	51.9 (18.8–85.0)	3.1 (0.5–6.2)	21.3 (16.8–25.9)
Other	0.8 (0.2–1.4)	46.9 (14.6–79.3)	2.0 (0.2–4.2)	15.2 (11.0–19.4)
Used a mixture of drugs[†]				
Yes	14.6 (10.5–18.8)	46.9 (30.6–63.3)	12.5 (8.8–16.2)	22.5 (18.2–26.7)
No	85.4 (81.2–89.5)	53.1 (36.8–69.4)	87.5 (83.8–91.2)	77.5 (73.3–81.8)
Used a new needle/syringe[†]				
Always	83.6 (79.2–87.9)	46.0 (33.5–58.5)	84.3 (80.2–88.6)	70.7 (66.3–75.0)
Occasionally	14.0 (9.8–18.1)	51.3 (38.8–63.7)	14.2 (10.1–18.1)	27.0 (22.6–31.4)
Never	2.5 (0.6–4.4)	2.7 (0.1–5.4)	1.5 (0.4–2.6)	2.4 (1.0–3.7)
Shared a needle/syringe[†]				
Yes	13.5 (10.0–17.1)	24.7 (18.9–30.7)	5.7 (3.5–7.9)	15.9 (13.3–18.4)
No	86.5 (82.9–90.0)	75.3 (69.3–81.1)	94.3 (92.1–96.5)	84.1 (81.6–86.8)
Received medication-based treatment[†]				
Yes	54.5 (45.7–63.3)	90.5 (86.2–94.8)	64.9 (58.2–71.6)	69.2 (64.7–73.8)
No	45.5 (36.7–54.3)	9.5 (5.2–13.8)	35.1 (28.4–41.8)	30.8 (26.2–35.3)

*Weighted percentages based on sampling method. [†]Past 6 months. [§]Age is presented as mean (range) and median (SD); percentages and 95% confidence intervals are not applicable. CI: confidence interval. SD: standard deviation.

Sexual Behaviors and Bloodborne Disease Testing

The past month prevalence of sexual intercourse was 77.3%, with the greatest rate seen in Greater Bangkok (81.4%), followed by Songkhla Province (80.7%) and Chiang Mai Province (68.1%). The estimated prevalence of consistent condom use during sexual encounters was 32.6%, and the rate was particularly low in Chiang Mai Province (7.0%). Consistent partner-specific condom use was highest among

commercial sex customers (64.8%), followed by casual partners (45.0%), commercial sex workers (20.6%), and regular partners (10.5%). Overall, 48.4% used drugs before sex. In the past 12 months, 59.9% of participants had received an HIV screening test, with the highest rate in Greater Bangkok at 77.1%, followed by Songkhla Province (67.7%) and Chiang Mai Province (33.4%). The prevalence of STI screening was 37.3% and 76.0% had been tested for HCV (Table 4).

Table 4. Prevalence* of sexual behaviors and testing for bloodborne diseases among people who inject drugs in Thailand, November 2022 to March 2023.

Behaviour/test	Greater Bangkok (n=464) % (95% CI)	Chiang Mai Province (n=280) % (95% CI)	Songkhla Province (n=271) % (95% CI)	Total (N=1,015) % (95% CI)
Behaviour				
Sexual intercourse[†]				
Yes	81.4 (76.0–87.1)	68.1 (58.9–76.9)	80.7 (72.7–88.5)	77.3 (73.1–81.6)
No	18.6 (12.9–24.0)	31.9 (23.1–41.1)	19.3 (11.5–27.3)	22.7 (18.4–27.0)
Consistent condom use with partner[†]				
Yes	47.1 (38.6–55.2)	7.0 (2.0–11.8)	32.0 (21.3–43.5)	32.6 (26.7–38.8)
No	52.9 (44.8–61.4)	93.0 (88.2–98.0)	68.0 (56.5–78.7)	67.4 (61.7–73.3)
Consistent condom use[†]				
Regular partner	17.7 (11.3–24.0)	0.2 (0.2–0.6)	5.7 (0.3–12.1)	10.5 (6.1–15.0)
Casual partners	49.2 (46.2–98.8)	47.1 (5.3–83.6)	33.5 (14.9–195)	45.0 (30.6–59.3)
Commercial sex customers	71.0 (46.2–98.8)	-	-	64.8 (37.1–94.1)
Commercial sex workers	23.7 (11.1–59.2)	-	-	20.6 (9.9–52.4)
Chem sex[†]				
Yes	43.6 (34.6–51.7)	70.7 (53.7–88.2)	32.1 (19.4–42.9)	48.4 (41.4–55.0)
No	56.4 (48.3–65.4)	29.3 (11.8–46.3)	67.9 (57.1–80.6)	51.6 (45.0–58.6)
Testing				
HIV[§]				
Yes	77.1 (71.9–82.4)	33.4 (25.1–41.7)	67.7 (61.0–74.4)	59.9 (55.4–64.5)
No	22.9 (17.6–28.1)	66.6 (58.3–74.9)	32.3 (25.6–39.0)	40.1 (35.5–44.6)
Sexually transmitted infections (STI)[§]				
Yes	57.5 (51.2–63.8)	15.3 (10.0–20.6)	31.3 (25.7–36.9)	37.3 (33.3–41.5)
No	42.5 (36.2–48.8)	84.7 (79.4–90.0)	68.7 (63.1–74.3)	62.7 (58.5–66.8)
Hepatitis C virus (HCV)[§]				
Yes	74.8 (63.9–87.0)	34.0 (5.5–69.3)	82.5 (67.9–98.7)	76.0 (66.9–86.1)
No	25.2 (13.0–36.1)	66.0 (30.7–105.5)	17.5 (1.3–32.1)	24.0 (13.9–33.2)

*Weighted percentages based on sampling method. [†]Past month. [§]Past 12 months. CI: confidence interval.

Knowledge about HIV/STIs Prevention and Safe Injection Practices

The overall knowledge of HIV was 44.0% with the highest rates seen for Songkhla Province (59.7%) and Greater Bangkok (58.1%), with Chiang Mai Province faring poorly (16.7%). Only 7.3% of PWIDs were aware

of pre-exposure prophylaxis (PrEP) or antiviral medication for preventing HIV. Similarly, 6.5% knew that post-exposure prophylaxis (PEP) could be used to prevent HIV following potential exposure. Finally, 79.6% had ever received education about bloodborne disease prevention and safe injection practices (Table 5).

Table 5. Knowledge* of HIV/STIs prevention and safe injection practices among people who inject drugs in Thailand, November 2022 to March 2023.

Variable	Greater Bangkok (n=464) % (95% CI)	Chiang Mai Province (n=280) % (95% CI)	Songkhla Province (n=271) % (95% CI)	Total (N=1,015) % (95% CI)
Knowledge of HIV				
Yes	58.1 (52.2–64.1)	16.7 (11.8–21.5)	59.7 (53.2–66.4)	44.0 (39.8–48.2)
No	41.9 (35.9–47.8)	83.3 (78.5–88.2)	40.3 (33.6–46.8)	56.0 (51.8–60.2)
Knowledge of pre-exposure prophylaxis				
Yes	13.4 (6.8–19.2)	2.3 (0.5–4.1)	11.7 (3.7–19.8)	7.3 (4.3–9.9)
No	86.6 (80.8–93.3)	97.7 (95.9–99.5)	88.3 (80.2–96.3)	92.8 (90.1–95.7)
Knowledge of post-exposure prophylaxis				
Yes	14.0 (6.8–20.9)	1.1 (0.0–2.0)	10.2 (3.3–17.2)	6.5 (4.0–8.8)
No	86.0 (79.2–93.3)	98.9 (98.0–100.0)	89.8 (82.8–96.7)	93.5 (91.2–96.0)
Received education on bloodborne disease prevention and safe injection practices				
Yes	82.5 (78.4–86.6)	77.2 (70.2–84.1)	77.5 (71.3–83.7)	79.6 (76.4–82.9)
Unsure	8.1 (4.9–11.3)	6.5 (2.9–10.2)	3.5 (1.6–5.5)	6.6 (4.7–8.5)
No	9.4 (6.3–12.5)	16.3 (10.9–21.8)	19.1 (12.8–25.2)	13.8 (11.0–16.6)

*Weighted percentages based on sampling method. CI: confidence interval.

Stigma Experiences

The past 12-month prevalence of experiencing disdainful behaviours such as being ignored, spoken to rudely, or criticized by family members was 33.2%.

Additionally, 11.6% had been threatened or coerced to engage in drug distribution, share injection equipment, or participate in transactional sex, and 14.8% had avoided accessing healthcare due to fear of stigma, violence, and/or police arrest (Table 6).

Table 6. Prevalence* of stigma among people who inject drugs in Thailand, November 2022 to March 2023.

Stigma	Greater Bangkok (n=464) % (95% CI)	Chiang Mai Province (n=280) % (95% CI)	Songkhla Province (n=271) % (95% CI)	Total (N=1,015) % (95% CI)
Experienced disdainful behavior from family members[†]				
Yes	32.1 (26.1–37.9)	33.9 (25.4–42.4)	34.2 (27.1–41.3)	33.2 (29.1–37.3)
No	64.5 (59.3–69.8)	48.2 (41.7–54.7)	65.4 (59.0–71.7)	59.0 (55.1–62.9)
Don't know	3.4 (1.5–5.3)	17.9 (9.2–26.8)	0.4 (0.1–0.9)	7.8 (5.1–10.5)
Coerced or threatened for the benefit of others[†]				
Yes	14.8 (11.0–18.6)	10.4 (6.0–15.0)	6.8 (4.0–9.6)	11.6 (9.1–14.1)
No	83.4 (79.5–87.3)	72.3 (65.3–79.3)	92.3 (89.5–95.2)	81.4 (78.2–84.6)
Don't know	1.8 (0.2–3.4)	17.3 (10.1–24.5)	0.9 (0.2–2.0)	7.0 (4.4–9.5)
Avoided healthcare due to stigma[†]				
Yes	17.1 (12.6–21.4)	14.5 (9.5–19.5)	10.4 (6.8–13.8)	14.8 (12.0–17.6)
No	81.6 (77.4–85.9)	66.8 (60.0–73.6)	88.6 (84.9–92.2)	77.9 (74.5–81.3)
Don't know	1.3 (0.3–2.3)	18.7 (11.4–26.0)	1.0 (0.1–2.1)	7.3 (4.7–9.9)

*Weighted percentages based on sampling method. [†]Past 6 months. CI: confidence interval.

Discussion

This study highlighted a considerable burden of STIs and bloodborne diseases among PWIDs, with an overall infection rate of 8.2% for HIV, 3.3% for syphilis, 6.4% for HBV, and 34.8% for HCV. Despite reporting safer injection and treatment practices, risk behaviors related to drug use and sexual practices persisted. Knowledge of HIV/STIs prevention and uptake of screening services was poor. Stigma and barriers to healthcare also affected access to testing and care services.

The majority of PWIDs in this study were male, aged over 25 years, and laborers with limited education. Nearly half had insufficient income and debt, consistent with studies linking drug-related behaviors to structural factors such as unemployment, poverty, and familial dysfunction. Previous studies have identified correlations between drug-related behaviors and a range of socio-demographic and structural factors, including age, education level, familial dysfunction, unemployment, poverty, drug-related violence, and involvement in gang-related activities.^{15,16} In the present study, many participants were aged less than 15 years when they began injecting drugs. Several factors have been identified as motivations for initiation, including the pursuit of a more intense high, peer influence, and curiosity.^{17,18} Prior research further highlighted the role of peers and social networks in facilitating the transition to injecting drug use by increasing its social acceptability.^{18,19}

The high prevalence of HIV and HCV among PWIDs observed in this study was consistent with global and regional estimates. The risk of HIV acquisition among injectors has been found to be significantly higher than among non-injecting populations.^{20,21} Numerous studies have consistently shown that injection drug use is a primary risk factor for HCV infections.^{5,6,22} Given that sharing contaminated syringes and needles is a highly efficient route of HIV and HCV transmission, these viruses can spread rapidly within this population.^{23,24} Harm reduction efforts should include the provision of sterile injecting equipment through needle and syringe programs alongside the distribution of condoms and lubricants. Strengthening the knowledge and reinforcing effective infection prevention measures within primary healthcare are essential to reduce the risk of bloodborne diseases.^{25,26}

Heroin was identified as the most commonly injected substance. Among the various classes of injectable drugs, opiates, particularly heroin, are the most widely utilized by PWIDs globally.^{18,23} Its relatively low cost has contributed to its widespread accessibility across diverse population groups.²⁷ Furthermore, evidence suggests that heroin, especially when injected, is associated with a higher potential for dependence compared to other psychoactive substances. The drug's profound impact on brain chemistry significantly heightens its addictive potential and presents considerable challenges for users attempting to achieve and maintain sobriety, thereby contributing to its continued use.^{28,29}

The prevalence of sharing needles, syringes, and other injection equipment was notably high in our study, and although the majority of PWIDs in Greater Bangkok and Songkhla Province used clean syringes each time, those in Chiang Mai Province had a notably lower rate. Due to the large area of Chiang Mai Province, injectors residing in remote rural areas, particularly mountainous villages, have more difficulty accessing health information compared with those residing in urban areas.² Injecting drug use is associated with a markedly increased risk of HIV and viral hepatitis transmission, particularly among persons lacking access to sterile injecting equipment and those who engage in sharing such equipment.^{23,24} These observed behaviors highlight gaps in the availability of harm reduction services in certain remote regions.

The survey identified that one-third of PWIDs in Thailand had never received medication-based treatment. Evidence suggests that injectors face significant barriers related to the complexity of the treatment and care continuum, which may limit access to appropriate diagnostic and therapeutic services.^{2,30} However, harm reduction programs, such as needle-syringe programs and opioid substitution therapy, serve as essential gateways to broader healthcare, addiction treatment, and social services.²⁵

Most PWIDs are sexually active; however, the prevalence of unprotected sex among them is high, particularly in Chiang Mai Province. The prevalence of condom use with regular partners was relatively low, and nearly half used drugs before having sex. Some studies identified that both injecting and non-injecting drug use prior to sexual activity were significantly associated with the failure to consistently use condoms.^{31,32} Engaging in sexual intercourse without consistent condom use remained a highly effective route for HIV and sexually transmitted diseases.^{33,34} Among PWIDs, this behavior not only facilitates rapid intra-group spread of the disease, but also poses a risk of transmission to the general population through sexual relationships with non-drug-using persons.³¹

Half of the PWIDs had received HIV screening, and one-third had been tested for STIs. PWIDs in Chiang Mai Province had a relatively low rate of HIV and STIs screening tests compared with the other study areas. Some evidence assessing bloodborne disease screening among injectors had reported low screening rates and poor disease awareness, indicating that many HCV-infected PWIDs were likely unaware of their infection status.^{2,33} This lack of awareness was associated with broader barriers to healthcare access, including police interference and restricted access to healthcare

services. Moreover, due to pervasive stigma and fear of discrimination, many PWIDs are reluctant to disclose their addiction, thereby limiting their access to counseling and testing services for bloodborne infections.^{2,35}

PWIDs had limited knowledge about HIV, especially in Chiang Mai Province. We also found a notably low awareness of PrEP and PEP for HIV prevention before and after engaging in risky behaviors. These findings indicate a serious gap in HIV prevention knowledge among this population. CBO staff and facilities providing medication-assisted treatment and drug rehabilitation programs could serve as effective channels for engaging and educating PWIDs about bloodborne diseases. Strengthening the role of these centers may improve HIV/STIs knowledge and screening rates, thereby contributing to epidemic control efforts.^{36,37}

Over a third of participants experienced stigma in their family. Due to fear of stigma, violence, and police arrest, nearly 15% avoided accessing healthcare. Many studies have identified that injecting drug users often face stigma, discrimination, and criminalization, which worsens their health and compromises their ability to access harm reduction services or hospital care.^{2,38} Moreover, stigma is known to increase the risk of depression, anxiety, and low self-esteem.²²

Limitations

The study has several limitations. First, reaching PWIDs posed significant challenges, as many were reluctant to disclose their status due to concerns about social stigma and the risk of arrest by law enforcement officers. Additionally, some PWIDs belonged to religiously sensitive groups, which created concerns about disclosing personal information. Furthermore, language barriers hindered effective communication, as some participants came from diverse ethnic backgrounds and lacked proficiency in the Thai language. In such cases, CBO staff provided essential support to facilitate communication during participant screening and data collection.

Public Health Recommendations

National harm reduction policies should be strengthened by expanding needle and syringe programs, improving access to medication-assisted treatment, scaling up HIV/STIs screening and linkage-to-care services, and implementing stigma-reduction interventions. Targeted health education programs using community-based and peer-led approaches should be promoted to increase knowledge of HIV

prevention, PrEP/PEP, and safer sexual practices among PWIDs.

Conclusion

People who inject drugs represent a critical subgroup in various aspects of public health. Our findings provide important insights into the prevalence of specific diseases and associated risk behaviors among them. A considerable proportion remain vulnerable to acquiring and transmitting STIs, including HIV, through unsafe practices. PWIDs in Thailand exhibit low levels of using clean needles, medication-supported recovery, condom use, safe sexual practices, and knowledge about HIV prevention. Strengthening harm reduction, expanding screening, improving prevention education, and enhancing healthcare access are essential strategies that support the reduction of bloodborne diseases among PWIDs.

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Author Contributions

Chuthawan Nilphat: Conceptualization, methodology, project administration, data collection, formal analysis, validation, visualization, writing—original draft. **Benjawan Roudreo:** Data collection, formal analysis, validation, writing—original draft, writing—review & editing. **Thitipong Yingyong:** Supervision, project administration, validation. **Supiya Jantaramanee:** Conceptualization, methodology, supervision, project administration, data collection, validation, writing—review & editing. **Panupit Thiengtham:** Conceptualization, methodology, software, data collection, formal analysis, visualization. All authors had read and approved the final version of the manuscript for publication.

Ethical Approval

This study was formally approved as a public health surveillance activity by the Division of Epidemiology, Department of Disease Control, Ministry of Public Health, and was officially exempt from Department of

Disease Control Ethics Committee as it was not considered research. All data were anonymized by excluding personal identifiers, such as names and addresses, and were securely stored with access restricted to the principal staff.

Informed Consent

All participants were fully informed about the study and provided written consent to participate. No identifiable personal information was collected or used, and the data could not be linked back to individual participants.

Data Availability

The data supporting the findings of this study are available from the Division of Epidemiology, Department of Disease Control, Thailand Ministry of Public Health. The data are not publicly available due to privacy and ethical restrictions, but were used under license for this study.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this article.

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Declaration of Generative AI and AI-assisted Technologies in the Writing Process

During the preparation of this work, the authors used generative AI tools to enhance clarity and correct grammatical errors. All content produced by these tools was carefully reviewed and revised by the authors, who accept full responsibility for the accuracy and integrity of the final version.

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