Published in final edited form as:

Am J Drug Alcohol Abuse. 2012 November ; 38(6): 544–550. doi:10.3109/00952990.2012.702171.

HIV Infection Risk among Injection Drug Users in a Methadone Maintenance Treatment Program, Taipei, Taiwan 2007-2010

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Abstract

Background—Taiwan has a growing HIV/AIDS epidemic that has recently shifted to an increase among injection drug users (IDUs). This study aimed to measure the prevalence and incidence and identify correlates of HIV infection among IDUs in a large methadone maintenance treatment program (MMTP) in Taipei, Taiwan.

Methods—Data from intake interviews and HIV testing completed by IDUs upon admission to the Taipei City Hospital MMTP in 2007-2010 were included in this analysis. HIV testing was repeated semi-annually among maintained clients who were HIV-negative at admission.

Results—Of 1,444 IDUs admitted, 85.9% were male, median age was 40 years, and mean years of injecting was 14.3 (range: 1-64). The prevalence of HIV, HCV, and HIV/HCV co-infection was 13.4%, 91.1%, and 13.2%, respectively. In multivariable analysis, HIV infection was associated with sharing syringes during the 6 months prior to admission (OR=14.76, 95% CI 10.31-21.13), homelessness (OR=6.46, 95% CI 1.49-28.00), and lifetime number of MMTP admissions (OR=1.76, 95% CI 1.30-2.38) and times incarcerated (OR=1.10, 95% CI 1.03-1.18). HIV seroincidence was 1.15/100 person-years at risk (95% CI 0.62-8.77/100 PY) among IDUs who were HIV-negative at first admission.

Conclusions—Taiwanese IDUs in MMTP have a high HIV prevalence, which was associated with syringe sharing and other factors related to social marginalization. Our findings highlight the importance of harm reduction programs, including syringe exchange, along with HIV-prevention education.

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Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

Keywords

HIV; hepatitis C virus; Taiwan; injection drug use; methadone; prevalence

Introduction

There are 13.2 million injection drug users (IDUs) globally (1). Seventy eight percent of the IDUs live in developing countries (1), where they are contributing to the epidemic of human immunodeficiency virus (HIV) (2). While sub-Saharan Africa remains the global epicenter, the number of people living with HIV/AIDS has increased in south and east Asia in the last decade (3).

HIV infection was first detected in Taiwan in 1984 among men who have sex with men (MSM). Since then, the number of people living with HIV/AIDS in Taiwan has increased at a rate of approximately 10–20% annually until 2003, by which time heterosexuals made up a substantial proportion of HIV/AIDS cases (41.3%) (4). In 2003, only 2.1% of HIV-positive individuals were IDUs (4). Since 2003, the proportion of newly diagnosed HIV-positive cases attributed to injection drug use increased dramatically to 41.3% in 2004 and 72.4% of all incident HIV cases in 2005 (4). The overall number of HIV infections in Taiwan also increased from 860 in 2003 to 1521 in 2004 and 3381 in 2005 (4). To curb this outbreak, Taiwan's Centers for Disease Control began a harm reduction program in 2006 that offers syringe exchange services and methadone therapy to heroin addicts (4). At the end of 2010, a total of 928 pharmacies or public health centers provided syringe exchange services and a total of 94 methadone clinics offered methadone therapy to heroin addicts throughout the country of Taiwan. Taiwan's HIV epidemic has slowed since then; the overall number of HIV infections in Taiwan decreased from 2918 in 2006 to 1930 in 2007 and 1796 in 2010. However, IDUs still accounted for 32.3% of all reported HIV cases in Taiwan in 2010 (4).

Despite the apparent epidemic of HIV occurring among IDUs in Taiwan, the epidemiology of HIV in this population has not been well studied. Knowledge of the current HIV prevalence and incidence among IDUs is of the utmost importance for determining the best allocation of medical resources and determining appropriate intervention measures. This study sought to estimate the prevalence and incidence of HIV infection and identify correlates of infection among IDUs in a methadone maintenance treatment program (MMTP) in Taipei, Taiwan from 2007 through 2010.

Method

Study setting and Population

We analyzed intake data from all IDUs enrolled in the Taipei City Hospital (TCH) MMTP from 2007 through 2010. The number of IDUs in Taiwan was estimated at 80,000 in 2010; of which only 11,852 (14.8%) had ever been admitted to a methadone program (4). TCH MMTP is the largest methadone clinic in Taipei, serving approximately 90.6% of all MMTP clients since 2007 (4). MMTP clients in Taiwan are required to visit methadone stands at hospitals daily where they receive methadone therapy for free under direct supervision;

those who discontinued therapy for 2 weeks or more must re-enroll and pay US\$100 for biological testing to resume treatment. All MMTP clients that reported a history of injection drug use prior to MMTP admission were included in the study.

This analysis was approved by the Institutional Review Board of TCH and was determined to be exempt from human subjects research by an ethics committee at the University of California, San Diego because all data were provided to the authors after being anonymized.

Data Collection

Clients at TCH MMTP had to undergo “intake procedures” when they enrolled in the treatment program. All MMTP clients were interviewed by MMTP case managers using a standardized intake questionnaire that included patients’ sociodemographic characteristics and substance use histories. Risk behavior data for re-enrollees came from their most recent intake interview.

Sociodemographic variables included number of MMTP admissions, age, sex, city of residence, marital status, sexual orientation, education, employment status, source of most income in the last 6 months prior to MMTP admission, housing status, living condition, and history and frequency of incarceration(s). Substance use histories included age of drug use initiation, syringe sharing in the last 6 months prior to MMTP admission, types of substances used alone and in combination (e.g., heroin, cocaine, amphetamines, ketamine) in the last 6 months prior to MMTP admission, and any alcohol use in the last 6 months prior to MMTP admission. The source of most income prior to the intake assessment was classified into three groups: (1) regular employment; (2) social welfare/family; and (3) others: including savings and friends. Housing status was classified as apartment, hotel, or homelessness (defined as living in shelter or street). Living situation included living with family, living with friends, and living alone.

Biological Variables

All MMTP clients were required to undergo serologic testing for HIV and HCV antibodies, and urine screening for drugs at the time of MMTP admission. Since Taiwanese law prohibits inclusion of HIV status on patients’ National Health Insurance record, all patients were tested for HIV and HCV antibodies at each admission regardless of prior testing history. Additionally, HIV testing was repeated semi-annually among maintained clients who were HIV-negative at admission. Patients who tested HIV-positive were referred to HIV specialists for further evaluation and free antiretroviral therapy if medically indicated.

HIV and HCV Antibody Testing was performed by Kun-Ming Laboratory (Taipei, Taiwan). HIV testing consists of enzyme-linked immunosorbant assay (Genscreen HIV1/2 version 2) followed by Western blot confirmation of reactive samples according to standard protocols. (5) HCV antibody (anti-HCV) testing utilized the chemiluminescence immunoassay (Architect i 2000 version 3.0).(6) Urine screening for drugs consists of the competitive immunochromatography test (Firststep Bioresearch, Inc.).(7)

Statistical Analysis

Prevalence of HIV and interview data were based on the most recent MMTP admission for repeat clients. Variables associated with HIV infection were analyzed using means or medians for continuous measures, and frequencies and percentages for categorical variables. Differences between HIV serostatus groups were examined using Fisher's exact tests for categorical variables, and *t*-tests or Wilcoxon rank-sum tests for continuous variables, depending upon whether or not the data were normally distributed. Logistic regression was used to assess the univariate and multivariate associations of selected factors with HIV seropositivity. All variables found to be significant ($P < 0.10$) through univariate analysis were considered for inclusion in multivariate analysis. Backward stepwise regression was performed to produce the final model that included the factors with $P < 0.05$. Odds ratios (OR) and adjusted odds ratios (AOR) with 95% confidence intervals (CI) were reported to show the strength and direction of these associations.

HIV incidence was estimated from IDUs who were HIV-negative at MMTP admission and HIV-positive on repeat HIV testing, done semi-annually during treatment. Incidence rates were calculated using person-years of follow-up from baseline to midpoint between the last negative and first positive test results.

Analyses were conducted using SPSS version 19.0 statistical software packages (SPSS, Chicago IL, USA).

Results

A total of 1,444 unique IDUs entered the TCH MMTP from 2007 through 2010 and were included in this analysis. Overall, the prevalence of HIV, HCV, and HIV/HCV co-infection was 13.4%, 91.1%, and 13.2%, respectively. The median age of clients was 40 years (IQR= 33-47 years); 85.9% were male; and the mean years of injecting was 14.3 years (range: 1-64). 294 (20.4%) of 1,444 study subjects were admitted to TCH methadone program twice or more. All IDUs included in this study had injected heroin exclusively or with other drugs in the last 6 months prior to MMTP admission.

Compared with HIV-negative IDUs, HIV-positive IDUs had more MMTP admissions (mean: 1.4 versus 1.2 admissions; $P < 0.001$) (Table 1). The groups also differed by housing status and frequency of incarceration ($P < 0.05$). In terms of substance use, HIV-positive IDUs were more likely to have started injecting at an earlier age, report syringe sharing, and amphetamine use in the last 6 months prior to MMTP admission. Compared with HIV-negative IDUs, HIV-positive IDUs were more likely to be anti-HCV-positive. None of the other factors investigated were statistically significant.

Factors associated with HIV seropositivity in univariate analysis ($P < 0.10$) were considered for inclusion in multivariate analysis. Controlling for all other variables in the model (Table 2), HIV infection was associated with sharing syringes in the last 6 months prior to MMTP admission (AOR=14.76, 95%CI 10.31-21.13), homelessness (AOR=6.46, 95%CI 1.49-28.00), and the lifetime number of times admitted to the MMTP (AOR=1.76, 95%CI 1.30-2.38) or being incarcerated (AOR=1.10, 95%CI 1.03-1.18).

Of 1250 IDUs who were HIV-negative at baseline, 236 were retested at least once during semi-annual follow-up. The mean (range) duration of follow-up among the repeat testers was 1.1 (0.3-3) years, contributing a total of 260.3 person-years at risk (PYAR). Among the repeat testers, three HIV seroconversions were detected, giving a crude incidence rate of 1.15 (95% CI 0.62-8.77)/100 PYAR. The small number of events precluded analysis of risk factors for incident HIV infection.

Discussion

To our knowledge, this is the first report on the prevalence, incidence, and correlates of HIV infection among IDUs admitted to MMTPs in Taipei City, Taiwan. Understanding IDUs' risk behaviors is critical for designing effective prevention interventions to curtail the spread of HIV among IDUs as well as from IDUs to their sexual partners and the general population. The prevalence of HIV infection among MMTP clients in Taipei City who inject drugs was high (13.4%). After controlling for duration of drug use and other potential confounders, sharing syringes in the 6 months prior to MMTP admission, homelessness, MMTP recidivism, and greater frequency of incarceration were associated with HIV infection.

This study found that IDUs at TCH MMTP had very high HIV (13.4%) and HCV (91.1%) prevalence. The higher HCV prevalence compared to HIV is similar to other studies of IDUs (8) and reflects higher serum concentrations and longer survival outside the body of HCV compared with HIV (9-11). The high prevalence of HIV and HCV infections among IDUs in this study may be because of the changes in heroin administration modality from smoking to injection in the last decade (12) and the subsequent increase in syringe-sharing behaviors (13, 14). In Taiwan, IDUs are ostracized in society and police harass individuals who possess injection equipment, which could result in more risky injecting behaviors in this high-risk group of drug users (15).

The high HIV prevalence among Taiwanese IDUs found in this study was similar to reports from most other Asian countries. HIV prevalence among IDUs was 10.3% in Malaysia (16), 10.8% in India (17), 12.6% in China (18), and 38.7% in Thailand (19). High prevalence of HIV infection among IDUs in these Asian countries constitutes a serious public health problem deserving increased attention. In 1997, Taiwan responded to the growing HIV epidemic by making HIV care and treatment available to all infected persons, including IDUs, through the national health insurance program (20). By the end of 2010, a total of 94 methadone clinics offered HIV testing to IDUs nationwide and patients were referred to HIV specialists for further evaluation and treatment if infected (4). Consequently, the HIV incidence among IDUs in Taiwan decreased from 3.03/100 PYAR in 2005 to 0.48/100 PYAR in 2008 and 0.15/100 PYAR in 2010 (4).

The well-established risk factor of syringe sharing (21) was strongly associated with HIV infection in this study. Our findings reinforce the Taiwan Center for Disease Control's decision to implement harm reduction programs launched in July 2006 to combat the HIV epidemic in IDUs (4). These efforts included expansion of needle exchange services and providing methadone therapy for IDUs. However, it was estimated that in 2010 only 14.8%

(11,852) of all Taiwanese IDUs had ever been admitted to a methadone program (4). Since enrollment in MMTPs was associated with reducing the use of contaminated injection equipment (22, 23), interventions to increase MMTP admissions are imperative among IDUs.

This analysis found that the proportion of syringe sharing in the last 6 months prior to MMTP admission was only 21.2% among IDUs. Hence, other risky behaviors associated with HIV transmission such as injection paraphernalia sharing and unprotected sex should also be addressed. Since information about a history of injection paraphernalia sharing and sexual behaviors among IDUs in this study were not available, future research is needed to assess the prevalence of these behaviors in Taiwan. Additionally, all possible strategies, including widespread provision of free condoms and sterile injection supplies (including water, syringes and alcohol sponges/swabs for cleaning injection sites), broad dissemination of information on safer injection and educational materials for prevention of blood-borne infections, should be considered as methods to reduce HIV spread in this high-risk group of injection drug users.

This study found that, after controlling for potential confounders including duration of injecting, greater number of MMTP admissions was associated with HIV infection. Logically, those who drop out of treatment and then return are more likely to have gone back to injecting and consequently had greater potential for exposure to HIV than those who remained in treatment. Previous studies found that interruptions to methadone treatment were associated with increased prevalence of injecting drugs and sharing syringes (24, 25), resulting in an increased risk of new HIV infection. Findings such as this reinforce recommendations to provide HIV risk reduction counseling, including messages about safe injecting, to IDUs at the time of MMTP admissions (26, 27).

HIV incidence among IDUs in this study who were HIV-negative at MMTP admission, and underwent repeated HIV testing semi-annually during treatment (1.15/100 PYAR) was 23 times higher than MSM (0.05/100 PYAR) (4), suggesting ongoing HIV transmission among Taipei IDUs. Thus it is imperative to provide education about HIV prevention to IDUs in treatment.

The results of this study should be interpreted in the light of certain limitations. First, since this study was a retrospective analysis, information about sexual behaviors and detailed information about injection behaviors was not available for inclusion in the analysis. Second, all behavioral data were self-reported, and therefore subject to recall bias and socially desirable responding (28). However, while recall bias could affect our findings, the interviews took place before HIV testing so that any misclassification of risk behaviors would be non-differential and result in findings that are biased toward null associations. Third, history of prior MMTP admissions was taken from the medical chart instead of IDUs' self-report. Therefore, if IDUs had been admitted to methadone clinics other than the TCH MMTP, the number of treatment program admissions would be underestimated in our study. However, we cannot conceive of a reason why there would be a difference in this effect by HIV status that would bias the finding of an association between number of treatment admissions and HIV status. Forth, this study cannot determine the cause-effect relationship

between HIV infection and associated risk factors because of the cross sectional analysis. Fifth, although the established factor of homelessness was associated with HIV infection in this study (29), a small number of clients were homeless resulting in wide a confidence interval. Finally, the study population only included IDUs enrolled in the MMTP; therefore, the generalization of the study's findings is limited to IDUs at the methadone programs.

In summary, this study found that Taiwanese IDUs in a MMTP have a high HIV prevalence, which was associated with syringe sharing and other factors related to social marginalization. Our findings highlight the importance of harm reduction programs along with HIV-prevention education. Additional studies are also needed in Taiwan to describe the epidemiology of HIV and HCV infections among IDUs not enrolled in MMTP.

References

1. Aceijas C, Stimson GV, Hickman M, Rhodes T. Global overview of injecting drug use and HIV infection among injecting drug users. *AIDS*. 2004; 18:2295–303. [PubMed: 15577542]. [PubMed: 15577542]
2. UNAIDS. AIDS epidemic update. UNAIDS; Geneva: 2003.
3. World Health Organization. Report on the global AIDS Epidemic. UNAIDS, Geneva; Geneva: 2009. Available at: <http://www.unaids.org/en/>
4. Taiwan Centers for Disease Control and Prevention. [Surveillance of HIV].. [23 January 2012] <http://www.cdc.gov.tw>. [Chinese]
5. Prevention CfDCA. Revised Guidelines for HIV Counseling, Testing, and Referral. *MMWR Morb. Mortal. Wkly. Rep.* 2001; 50:1–58. [PubMed: 11718472]. [PubMed: 11215787]
6. CDC. Guidelines for laboratory testing and result reporting of antibody to hepatitis C virus. *MMWR Morb. Mortal. Wkly. Rep.* 2003; 52:1–16. [PubMed: 12585742].
7. Marc B, Bouchez-Buvry A, Wepierre JL, Boniol L, Vaquero P, Garnier M. Carbon-monoxide poisoning in young drug addicts due to indoor use of a gasoline-powered generator. *J Clin Forensic Med.* 2001; 8:54–6. [PubMed: 16083675]. [PubMed: 16083675]
8. Garfein RS, Vlahov D, Galai N, Doherty MC, Nelson KE. Viral infections in short-term injection drug users: the prevalence of the hepatitis C, hepatitis B, human immunodeficiency, and human T-lymphotropic viruses. *Am J Public Health.* 1996; 86:655–61. [PubMed: 8629715]. [PubMed: 8629715]
9. Paintsil E, He H, Peters C, Lindenbach BD, Heimer R. Survival of hepatitis C virus in syringes: implication for transmission among injection drug users. *J Infect Dis.* 2010; 202:984–90. [PubMed: 20726768]. [PubMed: 20726768]
10. Doerrbecker J, Friesland M, Ciesek S, Erichsen TJ, Mateu-Gelabert P, Steinmann J, Pietschmann T, Steinmann E. Inactivation and survival of hepatitis C virus on inanimate surfaces. *J Infect Dis.* 2011; 204:1830–8. [PubMed: 22013220]. [PubMed: 22013220]
11. Tjotta E, Hungnes O, Grinde B. Survival of HIV-1 activity after disinfection, temperature and pH changes, or drying. *J Med Virol.* 1991; 35:223–7. [PubMed: 1802953]. [PubMed: 1802953]
12. Yu SK, Jiang DD, Chen KT. Drug abuse in Taiwan: A preliminary investigation. *Taiwan Epidemiology Bulletin.* 1996; 12:164–170.
13. Lyu, SY. HIV/AIDS related risk assessment for drug-using parolees. National Science Council; Taipei, Taiwan: 2001.
14. Lee TSH. Prevalence and related factors of needle-sharing behavior among female prisoners. *Journal of Medical Science.* 2005; 25:27–32.
15. Chakrapani V, Newman PA, Shunmugam M, Dubrow R. Social-structural contexts of needle and syringe sharing behaviours of HIV-positive injecting drug users in Manipur, India: a mixed methods investigation. *Harm Reduct J.* 2011; 8:9. [PubMed: 21569478]. [PubMed: 21569478]
16. Mathers BM, Degenhardt L, Phillips B, Wiessing L, Hickman M, Strathdee SA, Wodak A, Panda S, Tyndall M, Toufik A, Mattick RP. Global epidemiology of injecting drug use and HIV among

- people who inject drugs: a systematic review. *Lancet*. 2008; 372:1733–45. [PubMed: 18817968]. [PubMed: 18817968]
17. Mahanta J, Borkakoty B, Das HK, Chelleng PK. The risk of HIV and HCV infections among injection drug users in northeast India. *AIDS Care*. 2009; 21:1420–4. [PubMed: 20024719]. [PubMed: 20024719]
 18. Bao YP, Liu ZM. Systematic review of HIV and HCV infection among drug users in China. *Int J STD AIDS*. 2009; 20:399–405. [PubMed: 20308901]. [PubMed: 19451325]
 19. NAPAC. UNGASS country progress report. National AIDS Prevention and Alleviation Committee; Thailand. Bangkok: 2010.
 20. Cheng SH, Chiang TL. The effect of universal health insurance on health care utilization in Taiwan. Results from a natural experiment. *JAMA*. 1997; 278:89–93. [PubMed: 9214512]. [PubMed: 9214512]
 21. Des Jarlais DC, Diaz T, Perlis T, Vlahov D, Maslow C, Latka M, Rockwell R, Edwards V, Friedman SR, Monterroso E, Williams I, Garfein RS. Variability in the incidence of human immunodeficiency virus, hepatitis B virus, and hepatitis C virus infection among young injecting drug users in New York City. *Am J Epidemiol*. 2003; 157:467–71. [PubMed: 12615611]. [PubMed: 12615611]
 22. Booth RE, Crowley TJ, Zhang Y. Substance abuse treatment entry, retention and effectiveness: out-of-treatment opiate injection drug users. *Drug Alcohol Depend*. 1996; 42:11–20. [PubMed: 8889399]. [PubMed: 8889399]
 23. McCusker J, Stoddard AM, Hindin RN, Garfield FB, Frost R. Changes in HIV risk behavior following alternative residential programs of drug abuse treatment and AIDS education. *Ann Epidemiol*. 1996; 6:119–25. [PubMed: 8775591]. [PubMed: 8775591]
 24. Greenfield L, Bigelow GE, Brooner RK. Validity of intravenous drug abusers' self-reported changes in HIV high-risk drug use behaviors. *Drug Alcohol Depend*. 1995; 39:91–8. [PubMed: 8529537]. [PubMed: 8529537]
 25. Kwiatkowski CF, Booth RE. Methadone maintenance as HIV risk reduction with street-recruited injecting drug users. *J Acquir Immune Defic Syndr*. 2001; 26:483–9. [PubMed: 11391170]. [PubMed: 11391170]
 26. CDC. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health care settings. *Morbidity and Mortality Weekly Report*. 2006; 55:1–17. [PubMed: 16988643]. [PubMed: 16410759]
 27. Paltiel AD, Weinstein MC, Kimmel AD, Seage GR 3rd, Losina E, Zhang H, Freedberg KA, Walensky RP. Expanded screening for HIV in the United States--an analysis of cost-effectiveness. *N Engl J Med*. 2005; 352:586–95. [PubMed: 15703423]. [PubMed: 15703423]
 28. Latkin CA, Vlahov D. Socially desirable response tendency as a correlate of accuracy of self-reported HIV serostatus for HIV seropositive injection drug users. *Addiction*. 1998; 93:1191–7. [PubMed: 9813900]. [PubMed: 9813900]
 29. Kissin DM, Zapata L, Yorick R, Vinogradova EN, Volkova GV, Cherkassova E, Lynch A, Leigh J, Jamieson DJ, Marchbanks PA, Hillis S. HIV seroprevalence in street youth, St. Petersburg, Russia. *AIDS*. 2007; 21:2333–40. [PubMed: 18090282].

TABLE 1

Sociodemographic and substance use characteristics by HIV serostatus among injection drug users in MMTP program in Taipei, Taiwan – 2007-2010.

Factors	HIV (+) (n=194)	HIV (-) (n=1250)	p value	OR (95% CI)
Demographics				
Lifetime MMTP admissions				
Mean (range)	1.40 (1,4)	1.22 (1,4)	<.001	1.76 (1.38-2.25)
Year admitted				
2007	31 (16.0)	237 (19.0)	0.113 ^c	1
2008	52 (26.8)	348 (27.8)		1.14 (0.71-1.84)
2009	57 (29.4)	388 (31.0)		1.12 (0.71-1.79)
2010	54 (27.8)	277 (22.2)		1.49 (0.93-2.40)
Age (years), median (IQR)	39 (32, 47)	40 (33,48)	0.160	0.99 (0.97-1.00)
Gender				
Female	33 (17.0)	170 (13.6)	0.222	1
Male	161 (83.0)	1080 (86.4)		0.77 (0.51-1.16)
City of residence				
Taipei City	191 (98.5)	1215 (97.2)	0.468	1
Other	3 (1.5)	35 (2.8)		0.55 (0.17-1.79)
Marital status				
Unmarried	154 (79.4)	978 (78.2)	0.779	1
Married	40 (20.6)	272 (21.8)		0.93 (0.64-1.36)
Sexual orientation				
Heterosexual	192 (99.0)	1243 (99.4)	0.346	1
Homosexual/bisexual	2 (1.0)	7 (0.6)		1.85 (0.38-8.67)
Education level completed				
Primary school	31 (16.0)	204 (16.3)	0.940	1
High school	159 (82.0)	1013 (81.1)		1.03 (0.68-1.56)
University	4 (2.0)	33 (2.6)		0.80 (0.26-2.41)
Unemployment				
No	75 (38.7)	532 (42.6)	0.311	1
Yes	119 (61.3)	718 (57.4)		1.18 (0.86-1.60)
Source of most income ^a				
Regular employment	105 (54.1)	763 (61.0)	0.060	1
Social welfare/Family	71 (36.6)	399 (31.9)		1.29 (0.94-1.79)
Others	18 (9.3)	88 (7.1)		1.49 (0.86-2.57)
Housing status				
Apartment	189 (97.4)	1238 (99.0)	0.006	1
Hotel	0	7 (0.6)		---
Homelessness	5 (2.6)	5 (0.4)		6.55 (1.88-22.84)
Living situation				
Live with family	137 (70.6)	952 (76.2)	0.300	1

Factors	HIV (+) (n=194)	HIV (-) (n=1250)	p value	OR (95% CI)
Live with friends	31 (16.0)	132 (10.6)		1.63 (1.06-2.51)
Live alone	26 (13.4)	166 (13.3)		1.09 (0.69-1.71)
Lifetime incarcerations				
Median (IQR)	4 (2, 5)	3 (1, 4)	<.001	1.15 (1.09-1.21)
Substance use				
Age at first injection drug use				
>20	125 (64.4)	905 (72.4)	0.026	1
20	69 (35.6)	345 (27.6)		1.45 (1.05-1.99)
Duration of drug use (years)				
Mean (range)	14.4 (1-49)	14.2 (1-64)	0.233	1.003 (0.99-1.02)
Shared syringes ^a				
No	58 (29.9)	1080 (86.4)	<.001	1
Yes	136 (70.1)	170 (13.6)		14.90 (10.53-21.08)
Used amphetamine ^a				
No	86 (44.3)	663 (53.0)	0.025	1
Yes	108 (55.7)	587 (47.0)		1.42 (1.05-1.92)
Used cocaine ^a				
No	189 (97.4)	1202 (96.2)	0.537	1
Yes	5 (2.6)	48 (3.8)		0.66 (0.26-1.69)
Used ketamine ^a				
No	191 (98.5)	1227 (98.2)	0.999	1
Yes	3 (1.5)	23 (1.8)		0.84 (0.25-2.82)
Swallowed sedative drugs ^a				
No	164 (84.5)	1088 (87.0)	0.363	1
Yes	30 (15.5)	162 (13.0)		1.23 (0.81-1.88)
Any alcohol use ^a				
No	173 (89.2)	1117 (89.4)	0.901	1
Yes	21 (10.8)	133 (10.6)		1.02 (0.63-1.66)
Biological marker				
HCV antibody status				
Negative	4 (2.1)	124 (9.9)	<.001	1
Positive	190 (97.9)	1126 (90.1)		5.23 (1.91-14.33)
Urine morphine testing ^b				
Negative	24 (12.4)	106 (8.5)	0.081	1
Positive	170 (87.6)	1144 (91.5)		0.66 (0.41-1.05)
Urine amphetamine testing ^b				
Negative	145 (74.7)	900 (72.0)	0.490	1
Positive	49 (25.3)	350 (28.0)		0.87 (0.61-1.23)

Abbreviations: MMTP, Methadone maintenance treatment program; CI, confidence interval; OR, odds ratio.

^a Refers to the last 6 months prior to the methadone program.

^b At the time of admission to the methadone program.

^c Chi-Square test for trend.

TABLE 2

Multivariable logistic regression analysis of factors associated with HIV seropositivity among injection drug users in Taipei, Taiwan – 2007-2010.

Factors	AOR	95%CI
Sharing syringes ^a	14.76	10.31-21.13
Homelessness ^b	6.46	1.49-28.00
Number of MMTP admissions (per time increase)	1.76	1.30-2.38
Number of times incarcerated (per time increase)	1.10	1.03-1.18

Abbreviations: MMTP, Methadone maintenance treatment program; CI, confidence interval; AOR, adjusted odds ratio.

^aRefers to the last 6 months prior to the methadone program.

^bReference group includes living in an apartment or hotel.