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# Sexual behavior and risks for HIV infection and transmission among male injecting drug users in Yunnan, China

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## Summary

**Objectives—**To analyze the risk factors, particularly sexual behaviors, associated with HIV infection, and to describe the risks for HIV transmission among male injecting drug users (IDUs) in China.

**Methods—**A cross-sectional study of 314 IDUs in Yunnan Province was conducted. Information on demographics, HIV serostatus, and sexual and drug-using behaviors was collected.

**Results—**HIV prevalence among the study subjects was 59.9%. HIV infection was associated with older age (≥27 years), early drug initiation (at ≤20 years of age), and frequent injection (≥once a day). Thirty-seven percent reported multiple sexual partners. Consistent condom use rates were lowest with regular partners (23.8%), followed by 42.5% with casual partners, and 57.3% with female sex workers. Ninety-eight percent of subjects received high 'HIV knowledge' scores. Few of the subjects who needed medical care sought it out.

**Conclusions—**Despite awareness of HIV, needle sharing and unprotected sex persist in the population, and the HIV prevalence is high. Further interventions should not only seek to educate but also to reduce high-risk behaviors.

### Keywords

Injecting drug use; Condom use; Sexual behavior; HIV infection; Transmission



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## Introduction

In terms of the global HIV pandemic, sexual contact is the main route for HIV transmission. About three in four HIV-positive persons are infected through sexual contact, and of these, three out of every four are infected through heterosexual sex.[1] However, until very recently, unsafe injecting practices, as opposed to heterosexual transmission, was the dominant mode of HIV transmission in China.[2,3] In China, from 1985 to 1998, the ratio of infection as a result of heterosexual sex to that of injecting drugs was 6.5:69.4%. In 2007, more new HIV cases in China were found to be as a result of transmission through heterosexual sex as compared to injecting drugs, with a ratio of 37.9:29.4%.[4] Nevertheless, drug injection is still a key mode of transmission in China. It is imperative to study the convergence of these two routes within injection drug user (IDU) populations.

Located in southwest China, Yunnan Province borders the opiate-producing region of Southeast Asia, the 'Golden Triangle', which includes Laos, Thailand, and Myanmar.[5,6] The most commonly used drugs in China include heroin and opium, although amphetamine-type stimulants (ATS) and MDMA (ecstasy) have been gaining popularity in recent years.[7,8] Numerous studies have described the correlation between injection drug use and HIV.[9–12] IDUs in Yunnan were one of the first groups of people to be affected by HIV in China. The proportion of drug users in China injecting drugs increased from 51.3% in 2004 to a median of 64.1% in 2005, perhaps due to the increasing prices of illicit drugs and the cost-effectiveness of injecting drugs.[13,14] As injection drug use has become more widespread in other parts of China, HIV prevalence rates in these areas have also increased rapidly.[8,15]

As of 2005, the HIV prevalence among IDUs in China has been around 6.48%, and over 50% among IDUs in Yunnan.[16] Data from China's 2005 sentinel surveys indicate that 46.8% of IDUs have reported sharing syringes, a dramatic increase from the rate in 2004, which was 38.6%.[13] Although HIV infection through drug-related behaviors is no longer the predominant mode of HIV transmission in China, IDUs still comprised 72.7% of all HIV cases in 2005.[13]

Previous studies in the USA and China have found high rates of multiple sexual partnering among IDUs.[17–19] In China, 30–75% of drug users reported having multiple sexual partners.[20] Previous studies have shown that condom use rates are particularly low with regular partners: 67.2%[21] and 68.1%[22] of IDUs never use condoms with their regular partners, and only 15.94%[23] always use condoms with their regular partners. IDUs use condoms only slightly more often with non-regular partners: 50%[21] and 29.4%[22] of IDUs never use condoms with non-regular partners, and only 13.2%[17] always use condoms with their non-regular partners. It has also been found that IDUs are more likely than non-injecting drug users to have multiple sexual partners and exhibit relatively lower condom use.[19] Because high-risk injecting and sexual behaviors of IDUs make them a 'dual risk' group,[20,24–26] they are considered a key bridge population for spreading HIV from high-risk groups to the general population.[25,27]

The growing size of this population that shares syringes and the strong correlation between unsafe injecting practices and high-risk sexual behaviors make continued study of HIV infection within this group imperative.[19,24,28] In our research, we characterized recent injecting, sexual, and healthcare-seeking behaviors of male IDUs to understand the risk factors for HIV infection. Moreover, an understanding of the risks for further HIV transmission may inform dual risk-reduction interventions targeting such populations.

# Methods

## Study site and participants

Kaiyuan, located in Honghe Prefecture in Yunnan Province, has a population of 2.64 million and a relatively long history of illicit drug use, primarily opium and heroin, in large part due to its close proximity to the Golden Triangle region. Patterns of drug use found in Kaiyuan are characteristic of many cities in Yunnan, and most IDUs in this area are male. Heroin, taken primarily through injection, is the most commonly used drug in Kaiyuan.

A cross-sectional epidemiological survey study was conducted in Kaiyuan from August to September 2007. Participants were recruited from the community and the Kaiyuan drug rehabilitation center. Community IDUs were recruited both directly by outreach workers and through the snowball sampling method, which was used to recruit harder-to-access male IDUs. Those who met the following criteria were selected as study subjects: (1) age over 16 years, (2) had injected drugs in the last 6 months, and (3) could provide informed consent. A total of 314 male IDUs were enrolled in our survey. One hundred and ninety-one subjects were recruited from the community and 123 subjects were recruited from the Kaiyuan drug rehabilitation center.

All subjects from the government-run drug rehabilitation center had been detained by the police to receive compulsory detoxification treatment for one year. Procedures for the selection of subjects within the detoxification center were fair to all detainees, and we took measures to ensure that this portion of the data collection was immune from arbitrary intervention by prison authorities or prisoners. To minimize differences between subjects recruited from the community and those from rehabilitation centers, participants recruited from the latter were limited to those who had been admitted to the center less than two months before the date of our survey. We also performed a Chi-square analysis that showed no significant behavioral differences between the two groups. Three IDUs from the rehabilitation center did not take part in our survey due to health reasons, but all the other IDUs who had entered the rehabilitation center less than two months before, participated in the study.

## Data collection

Our study was approved by the National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention (CDC). The questionnaire used in this research has been examined by experts, and the study was approved by the Institutional Review Board of China CDC.

A list of all eligible IDUs was obtained from the staff of the rehabilitation center, and all of these individuals were recruited. All subjects were informed that the study was voluntary and that there would be no negative consequences for non-response. After providing informed consent, a face-to-face verbal interview was conducted in a private room with a trained staff member, either from the Kaiyuan CDC or China CDC. Staff from the rehabilitation center did not participate in the study and were not present in the room during the interviews, to ensure a non-coercive environment. The standardized questionnaire was administered anonymously and confidentially. The interview included questions about socio-demographic characteristics, sexual behaviors, drug use practices, healthcare-seeking behavior, previous HIV testing, and behavior changes after testing. After each interview, participants were asked to provide blood samples.

## Statistical analysis

All analyses were performed using SPSS version 12.0 (SPSS, Chicago, IL, USA). For univariate analysis, frequencies and medians of all variables and measures were calculated.

Comparisons between groups were performed using the Chi-square or Fisher's exact tests for proportions and the Student's *t*-test for proportional and continuous variables. Relationships between risk factors and HIV infection were analyzed using univariate regression and estimating odds ratios (OR) with a 95% confidence interval (CI). Variables significant in the univariate analysis ($p \leq 0.1$) were included in the multivariate logistic regression analysis. Variables not significant in the multivariate analysis ($p > 0.1$) were eliminated from the model in a stepwise manner. All probability values were reported as two-sided. A *p*-value of <0.05 was considered statistically significant.

## Results

### Demographics of the study population

The mean age of the 314 participants was 35.7 years (standard deviation 6.0), and most of the subjects had not completed the state-required 9 years of education (58.9% had finished middle school and 25.8% had finished elementary school). Most of the participants (87.9%) were from Kaiyuan, and most (79.9%) were ethnically Han. The majority of participants were unmarried and lived alone (55.7%), followed by 15.9% who were divorced, 15.6% who were unmarried but cohabiting with a regular partner, and 11.1% who were married. With regard to employment, 65.9% of subjects were not employed; among those that were employed, 16.9% were short-term labor contractors and 9.6% were truck drivers (Table 1).

### Drug using behavior

Approximately 88.9% (279/314) of all subjects had a history of drug use of more than 6 years, and 74.2% (233/314) of all participants reported a history of syringe sharing. Among these individuals, 43.3% (101/233) reported sharing syringes within the last 6 months. Within the entire sample, 67.8% (213/314) injected drugs one to three times a day on average, as compared to 17.8% (56/314) who injected less than once a day and 14.3% (45/314) who injected more than four times a day.

### Sexual partnering

Self-reported sexual partnerings by the IDUs were categorized into sex with a regular partner (RP), casual partner (CP), or female sex worker (FSW). Of 314 IDUs, 115 reported having had at least two sexual partners (multiple sexual partnering) and 112 reported abstinence, within the last 6 months. Of the individuals with multiple partners, we found varying patterns of diverse sexual partnering, i.e., subjects who had had different types of sexual partners in the past 6 months. Of the 115 subjects who had had sex with more than one type of partner, roughly a quarter (32/115 or 27.8%) had had sex with an RP and CP/FSW, while roughly three-quarters (83/115 or 72.2%) had had sex with at least one CP and/or FSW. The remaining 87/314 (27.7%) subjects reported having had only one sexual partner within the last 6 months. Of these IDUs, 73 (83.9%) had had sex with one RP, 12 (13.8%) had had sex with one CP, and two (2.3%) had had sex with one FSW. Of IDUs with only one partner, 48.3% never used condoms and 33.3% reported consistent condom use. A history of needle sharing was reported in 62.1% (54/87) of IDUs with only one partner and 83.5% (96/115) of IDUs with multiple partners ($p < 0.001$). There was no statistically significant difference in HIV serostatus between the two groups.

FSWs were classified into three groups according to the local price per visit, which was estimated based on the venues at which they worked. Lower-price FSWs were classified as those earning US $4 or less per client visit, middle-price FSWs were those earning between US $4 and $14 per client visit, and higher-price FSWs were those earning more than US $14 per client visit. Lower-price FSW work venues include rented rooms, inns, and street-level, middle-price FSW work venues include hair salons, and the higher-price FSW work venues

include hotels, nightclubs, and karaoke clubs. This classification was also confirmed with local outreach workers and was similar to that of another study.[29]

### Sexual behaviors and condom use by partner type

IDUs with multiple partners appear more than once in the following analysis due to varying behavior patterns with each distinct partner type (RP, CP, and FSW). Of the sexually active subjects, 105 reported having had sex with an RP within the last 6 months. The median frequency of sexual activity with an RP was once every 5 days (within a range of once a day to once every 60 days). About twice as many subjects reported never using condoms with an RP (46.6%), as compared to the number that reported consistent condom use (23.8%). The primary reasons for inconsistent condom use (which includes self-reported rates of occasional, half of the time, most of the time, or never use a condom) included subject belief that the partner was not infected with HIV/sexually transmitted infections (STIs) (46.3%) and subject unwillingness (because of dislike or discomfort during use) to use condoms (28.8%). Of IDUs who reported having had sex with an RP, 29.5% indicated that their RP also used drugs.

One hundred and six IDUs reported having had sex with a casual partner (CP) within the last 6 months. The median number of CPs in the last 6 months was two (range 1–18). For sex with a CP, 42.5% of subjects reported consistent condom use and 31.1% reported never using condoms. The main reason for inconsistent condom use with a CP, as reported by 54.1% of this group, was discomfort or dislike of condoms, and 34.9% of these IDUs reported that their CP also used drugs.

Eighty-two IDUs reported having had sex with an FSW within the last 6 months. The median number of FSWs visited over the last 6 months was three (range 1–45). Close to half (45.1%) of this group of 82 IDUs visited middle-price FSWs, followed by 36.6% who visited higher-price FSWs and 18.3% who visited lower-price FSWs. More than half (57.3%) of this group reported consistent condom use with FSWs, as compared to the 18.3% who never used condoms and 11.0% who used condoms occasionally. Table 2 shows condom use rates, classified by FSW price level.

### Healthcare-seeking behavior

Of all subjects, 17.2% (54/314) reported a history of STI in the last 6 months, but only 40.7% (22/54) of them sought medical treatment. Of those who sought medical care, about a half went to a hospital for treatment; the others went to private clinics or pharmacies to purchase medicine. Among the 54 subjects, 18 (33.3%) had experienced purulent or viscous urethral discharge, 12 (22.2%) had had ulcers or pain in the genital area, 29 (53.7%) had had itching around the genital area, and 28 (51.9%) had had dysuria. Of the subjects who reported STI symptoms but who did not seek medical care (32/54), 71.9% (23/32) had had more than one sexual partner and 43.8% (14/32) were HIV-positive.

### Knowledge of HIV

Fifteen questions in the questionnaire were dedicated to assessing participant knowledge of HIV transmission. Correct answers were given 1 point each and summed to obtain the individual's 'knowledge score', which represents the subject's level of HIV knowledge. Most (98.1%) subjects received scores of more than 8/15 points. Despite a wealth of knowledge, when asked about their attitudes towards HIV infection, 10.5% (33/314) believed that they were not at risk for acquiring HIV. Of these, 18.2% (6/33) had shared syringes with others in the last 6 months and 54.5% (18/33) had had sexual activities with at least one partner.

### HIV prevalence and related risk factors

All 314 IDUs provided blood specimens for HIV testing. The prevalence of HIV was 59.9% (188/314, 95% CI 54.2–65.3). Through univariate analysis, being at least 27 years old (OR 6.2, 95% CI 2.0–19.2), unemployment (OR 1.5, 95% CI 0.9–2.4), age at initiation of drug use of ≤20 years (OR 1.6, 95% CI 1.0–2.6), duration of drug use of more than 6 years (OR 3.3, 95% CI 1.6–6.9), syringe sharing (OR 1.6, 95% CI 0.9–2.6), and injection frequency of at least once a day (OR 1.8, 95% CI 1.0–3.2) were the risk factors for HIV infection among male IDUs. Multivariate logistic regression analysis showed that being at least 27 years old (OR 9.4, 95% CI 2.9–30.4), age at drug initiation of ≤20 years (OR 2.1, 95% CI 1.3–3.5), and injection frequency of at least once a day (OR 1.9, 95% CI 1.0–3.4) were the independent risk factors for HIV infection (Table 3). Further analysis indicated that drug initiation at ≤20 years of age was correlated with a longer duration of drug use and syringe sharing, whereas drug initiation at >20 years of age was correlated with a shorter duration of drug use and no syringe sharing.

## Discussion

The main aim of this study was to provide greater insight into the high-risk behaviors of Chinese IDUs. These high-risk behaviors make them vulnerable to HIV infection while also playing a critical role in making them a potential bridge population to lower-risk groups, such as their non-injecting sexual partners. In light of their dual risk behaviors, we have identified this group as a key target for future interventions, in order to simultaneously tackle prevention of primary and secondary HIV transmission.

Because heterosexual sex has recently become the primary mode of HIV transmission in China, it is imperative to understand how this behavior interacts with other risk behaviors in the present HIV context. Although the major risk factors for HIV infection found among our subjects were associated with high-risk drug using behaviors, the sexual risk behaviors of these IDUs, including high rates of multiple partner sexual behavior and low condom use rates, cannot be overlooked.[30] We found that a total of 115/188 seropositive subjects had had at least one sexual partner in our study. Among these subjects, 66 had had sex with an RP, and 49 did not use condoms consistently. Forty-four had had sex with FSWs, and 19 did not use condoms consistently. Fifty-six had had sex with a CP, and 33 did not use condoms consistently. Both high-risk injecting and sexual behaviors are widespread among this population; understanding the behaviors associated with HIV are vital for designing interventions that appropriately target this dual risk group.

Of all the subjects who reported only one sexual partner within the last 6 months, 16.1% (14/87) had had non-regular partners. Of these, 12 subjects had had sex with one CP at least once, and two subjects had had sex with one FSW at least once. That the partner of IDUs with only one sexual partner may not necessarily be an RP may be easily overlooked. This trend may also be more characteristic of IDU populations than of the regular population. Among our 188 seropositive subjects, 70 (37.2%) had had sex with CP or FSW partners, compared to 45 (23.9%) who had only had sex with an RP. This multiple partner and diversified sexual partnering, places these individuals' sexual partners (a broad range of individuals) at a high risk for HIV infection. Their sexual intercourse with a wider range of sexual partner types, coupled with inconsistent condom use, poses an even larger potential for the mass transmission of HIV to the general population.

Corroborating previous studies, we found that individuals with multiple partners exhibited varying rates of condom use with different partners and the lowest rates with an RP.[21–23,31] This trend is often attributed to trust of partners or awkwardness of initiating condom use within an established relationship. We also examined the sexual behaviors and condom use of the IDUs with each type of partner (RP, CP, FSW) separately. Both high-risk injecting and sexual

behaviors are widespread in this population; understanding the behaviors associated with HIV are vital for designing interventions that appropriately target this dual risk group. Rates of consistent condom use were highest during sex with an FSW (57.3%), followed by CPs (42.5%) and RPs (23.8%). Rates of 'never use a condom' were highest with RPs (46.6%), followed by CPs (31.1%) and FSWs (18.3%). In our study we found that subjects on the whole had a strong awareness of HIV transmission modes and the importance of condoms. Thus, the differential rates of condom use with each partner type or FSW by price level suggest that the IDUs are aware of which sexual partners are 'safer' than others.

Few studies[27,32] have analyzed FSWs as a separate subgroup of IDU sexual partners, as they have often been classified as casual or non-regular sex partners[23,33] or have been excluded from the study. We found that condom use varies with FSWs of different price levels. About 67% of subjects used condoms inconsistently with lower-price FSWs, 70.3% used condoms consistently with middle-price FSWs, and about half used condoms consistently with higher-price FSWs. These results may be due to weaker bargaining positions of lower-price FSWs who do not have the economic means to refuse service to clients who do not wear condoms.[34] On the other hand, IDUs who visit lower-price FSWs may perceive a greater risk of contracting STIs or HIV. These paradoxical trends might explain why subjects generally used condoms inconsistently with lower-price FSWs. However, most subjects reported consistent condom use with higher-price FSWs, most likely because of the greater economic security of these women and their ability to insist on condom use and to refuse service to clients who do not wear condoms.[29,35]

We found syringe sharing to be a risk factor for HIV infection in the univariate analysis. It is a widely accepted fact that needle sharing is a highly efficient route for HIV transmission. Among our subjects who tested positive for HIV, about one-third (61/188) of them had shared needles, posing a threat of transmitting to their needle-sharing partners. Moreover, these IDUs are also at a high risk for passing on HIV to their sexual partners; over half of these seropositive IDUs reported more than one sexual partner, and of these subjects, most reported inconsistent condom use. We also found that the majority of IDUs (59.3%) who reported STI symptoms in the past 6 months did not seek medical treatment; nearly half of these IDUs (43.8%) were HIV-positive and reported low rates of condom use with all sexual partner types. Previous studies have shown that HIV-positive IDUs exhibit fewer high-risk sexual and injecting behaviors than seronegative IDUs. Yet, the continued presence of these behaviors still presents a significant risk for transmission.[36–38] Because these IDUs continue to engage in high-risk sexual behaviors, as evident in low condom use rates and multiple sexual partners, they are at a high risk for transmission of HIV to their sexual partners.

Behavior related to transmission by HIV-infected IDUs is an important area of study in examining the epidemiology of HIV/AIDS in this sub-population. In our study, over 80% of the subjects had never been tested for HIV or had been previously tested and had recently seroconverted. Ten IDUs had been previously tested for HIV and were aware of their positive serostatus. However, these IDUs also reported that they continued to have unprotected sex with multiple sexual partners, even after discovering their HIV-positive results. Education campaigns in educating these IDUs about responsible injecting and sexual behaviors to protect others from HIV infection are greatly needed. Because the other 178 seropositive IDUs had either never been tested or had not recently been tested for HIV, this trend informs us that frequent HIV testing in this population is urgently needed to prevent further transmission.

In our study we found that 35.7% of our surveyed male IDUs reported abstinence within the last 6 months. In our discussion on the high-risk sexual behaviors that make IDUs an important bridge population, it must be taken into account that there is a significant portion of this population that does not engage in any of this high-risk sexual behavior. On the other hand,

over half (42/81) of IDUs in our sample who did not report a history of needle sharing, tested positive for HIV (Table 3), suggesting that they were most likely infected through sex. However, it is important to note that these IDUs may acquire or transmit HIV through high-risk injecting behaviors, even if they do not have any sexual activity, and vice versa.

Interpretation of our findings should take into account several limitations. The cross-sectional nature of our study limits the strength of the associations among risk variables and outcomes. Second, the reliance on retrospective self-reporting introduces the possibility of recall or reporting bias in the dataset. Since we also found a strong awareness of HIV transmission modes and measures to prevent HIV infection in our study population, irresponsible behaviors such as low condom use rates and needle sharing may have been underreported due to social desirability issues. Moreover, due to the small sample size, we were not able to further analyze the differences in condom use rates between the different patterns of multiple sexual partnering, as in Kapadia et al.[17] For example, we could not distinguish between condom use with an RP or a CP for IDUs who had both types of sexual partners. Similarly, we only had a small number of IDUs who visited FSWs. We suggest that future studies seek out a larger number of subjects who have had sex with FSWs, to better analyze the trends in high-risk behaviors in this subgroup.

Of importance is our study of the risks for further HIV transmission from our IDU population. However, because the risk behaviors of our subjects and the IDU status of their sexual partners are self-reported, our understanding of the actual status of further HIV transmission is limited. Previous studies in Yunnan have shown that HIV prevalence among non-IDU spouses of HIV-positive IDUs is high (10–12.5%), suggesting high rates of HIV transmission through sex.[20, 39–41] However, because many of our subjects' sexual partners (29.5% of regular and 34.9% of casual partners) are also drug users, the nature of our study cannot reveal whether transmission occurred through needle sharing or sex. Moreover, without the serostatus of our subjects' sexual or needle-sharing partners, we are unable to verify that further HIV transmission is, in fact, taking place. Because the subjects may have overlapping sexual or injecting partners with one another, it is important to study the social and sexual networks among this group. Because of the complex interaction between sexual and injecting risk behaviors, it is difficult to identify the actual mode of transmission for seropositive IDUs, due to the cross-sectional nature of our study. We suggest that future longitudinal studies investigate how to determine the mode through which these IDUs are actually infected.

In the HIV knowledge tests, 98.4% of IDUs understood that HIV can be transmitted through needle sharing, and 94.9% knew that HIV can be transmitted through sex. However, further examination of their behaviors showed that 74.2% reported having shared needles, and 32.2% reported sharing needles within the last 3 months. This information reveals that the overall understanding of HIV in our subjects is high, but that they do not necessarily carry out what they know to be right. These findings suggest that education campaigns in the region have been effective. However, future efforts must be made to better understand the barriers that these male IDUs encounter in carrying out safer sex and safer injection practices. Future interventions should be designed to close the gap between knowledge and behavior change.

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## Table 1

Socio-demographic characteristics of male injecting drug users (IDUs)

| **Characteristics** | | **Injecting drug users (*N* = 314)** | |
|---|---|---|---|
| | | ***n*** | **%** |
| Age (years) | 16– | 44 | 14.0 |
| | 30– | 210 | 66.9 |
| | 40– | 60 | 19.1 |
| Ethnicity | Han | 251 | 79.9 |
| | Minority | 63 | 20.1 |
| Schooling (years) | 0– | 81 | 25.8 |
| | 6– | 185 | 58.9 |
| | 9– | 48 | 15.3 |
| Relationship status | Single | 175 | 55.7 |
| | Cohabiting | 49 | 15.6 |
| | Married | 35 | 11.1 |
| | Separated | 2 | 0.6 |
| | Divorced | 50 | 15.9 |
| | Widowed | 3 | 1.0 |
| Native place | Kaiyuan City | 276 | 87.9 |
| | Other cities | 38 | 12.1 |
| Employment | Farmer | 10 | 3.2 |
| | Student | 2 | 0.6 |
| | Factory worker | 12 | 3.8 |
| | Truck driver | 30 | 9.6 |
| | Short-term labor contractor | 53 | 16.9 |
| | None | 207 | 65.9 |

**Table 2**

Male IDU condom use with female sex workers of different price levels ($N$ = 82)

| | Lower-price, *n* (%) | Middle-price, *n* (%) | Higher-price, *n* (%) | Chi-square | *p*-Value |
|---|---|---|---|---|---|
| | | | | 6.259 | 0.044 |
| Inconsistent | 10 (66.7) | 11 (29.7) | 14 (46.7) | | |
| Consistent | 5 (33.3) | 26 (70.3) | 16 (53.3) | | |
| Total | 15 | 37 | 30 | | |

IDU, injecting drug user.

**Table 3**

Univariate and multivariate analysis of HIV infection risk factors in injecting drug users ($N = 314$)

| Variables | Total | Positive | OR (95% CI) | *p*-Value | AOR (95% CI) | *p*-Value |
|---|---|---|---|---|---|---|
| Ethnicity | | | | | | |
| Han | 251 | 146 | 0.7 (0.4–1.2) | 0.220 | - | - |
| Minority | 63 | 42 | 1.0 | | | |
| Age (years) | | | | | | |
| >27 | 295 | 184 | 6.2 (2.0–19.2)** | 0.001 | 9.4 (2.9–30.4)** | 0.000 |
| ≤27 | 19 | 4 | 1.0 | | | |
| Schooling (years) | | | | | | |
| ≤6 | 81 | 50 | 1.1 (0.7–1.9) | 0.692 | - | - |
| >6 | 233 | 138 | 1.0 | | | |
| Relationship status | | | | | | |
| Married or cohabiting | 84 | 52 | 1.1 (0.7–1.9) | 0.657 | - | - |
| Other | 230 | 136 | 1.0 | | | |
| Native place | | | | | | |
| Kaiyuan City | 276 | 169 | 1.6 (0.8–3.1) | 0.188 | - | - |
| Other cities | 38 | 19 | 1.0 | | | |
| Employment | | | | | | |
| No | 207 | 131 | 1.5 (0.9–2.4)* | 0.087 | - | - |
| Yes | 107 | 57 | 1.0 | | | |
| Relationship with family members | | | | | | |
| Good | 154 | 98 | 1.7 (0.8–3.5) | 0.183 | - | - |
| Moderate | 125 | 72 | 1.3 (0.6–2.7) | 0.516 | - | - |
| Poor | 35 | 18 | 1.0 | | | |
| Age at initiation of drug use | | | | | | |
| ≤20 | 142 | 94 | 1.6 (1.0–2.6)** | 0.038 | 2.1 (1.3–3.5)** | 0.003 |
| >20 | 172 | 94 | 1.0 | | | |
| Duration of drug use (years) | | | | | | |
| >6 | 279 | 176 | 3.3 (1.6–6.9)** | 0.002 | - | - |
| ≤6 | 35 | 12 | 1.0 | | | |
| Shared syringe | | | | | | |
| Yes | 233 | 146 | 1.6 (0.9–2.6)* | 0.088 | - | - |
| No | 81 | 42 | 1.0 | | | |
| Frequency of daily drug injection | | | | | | |
| ≥1 | 258 | 161 | 1.8 (1.0–3.2)* | 0.051 | 1.9 (1.0–3.4)** | 0.040 |
| <1 | 56 | 27 | | | | |
| No. sexual partners | | | | | | |
| 0 | 112 | 73 | 1.4 (0.9–2.3) | 0.154 | - | - |
| ≥1 | 202 | 115 | 1.0 | | | |
| Visited FSWs in the last 6 months | | | | | | |
| Yes | 82 | 44 | 0.7 (0.4–1.2) | 0.183 | - | - |
| No | 232 | 144 | 1.0 | | | |
| AIDS knowledge score | | | | | | |
| Poor AIDS/HIV knowledge (0–8) | 6 | 2 | 0.3 (0.1–1.8) | 0.328 | - | - |
| Good AIDS/HIV knowledge (≥9) | 308 | 186 | 1.0 | | | |

OR, odds ratio; AOR, adjusted odds ratio; CI, confidence interval; FSWs, female sex workers.

* $0.05 \leq p < 0.1$.

** $p < 0.05$.