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Prevalence of HIV, hepatitis B and hepatitis C and associated risk behaviours among injecting drug users in three Afghan cities

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Abstract

Background—HIV among injecting drug users (IDUs) has been described in Kabul but little data exists for other Afghan cities. We assessed HIV, hepatitis B virus (HBV), and C virus (HCV) prevalence and associated risk behaviours among IDUs in Hirat, Jalalabad, and Mazar-i-Sharif, Afghanistan.

Methods—Consented participants reporting injecting drugs within the previous 6 months completed interviewer-administered questionnaires and testing for HIV, hepatitis C antibody (HCV Ab), and hepatitis B surface antigen (HBsAg). Logistic regression was used to determine characteristics associated with each infection.

Results—Of 623 participants, most (98.7%) were male. Prevalence of HIV, HCV, and HBV was 1.8% (95% CI: 0.88 – 3.2), 36.0% (95% CI: 33 – 41), and 5.8% (95% CI: 3.9 – 7.6), respectively. All HIV cases and highest HCV prevalence were detected in Hirat; HBV prevalence was highest in Jalalabad. Among male IDUs, 62.9% had been imprisoned, of whom 17.2% (n=66) injected in prison. High risk behaviours were common; 30.2% reported needle sharing in the last 6 months, 23.1% reported sex with another male, and 50.4% reported paying females for sex. Behaviours varied significantly by site; generally, Hirat participants reported fewer sexual risk behaviours. Sex with other males was negatively associated with both HBV and HCV in multivariate logistic regression analysis; no injecting behaviours were associated with both HBV and HCV.

Conclusions—While HIV prevalence is low, HCV prevalence and high risk behaviours were common in these populations. Regional variations should be considered in programming to prevent transmission of HIV and viral hepatitis among IDUs in Afghanistan.

Keywords

HIV; injecting drug users; hepatitis C; hepatitis B; Afghanistan

1. Background

Afghanistan is the largest global opium producer, with export routes extending across many of its bordering countries (United Nations Office for Drug Control, 2008; European

Monitoring Centre for Drugs and Drug Addiction, 2008). While most opiates are exported to Europe and the Americas, a market is being established in sites of origin and trafficking. In Afghanistan and several of its bordering countries, including Iran, Uzbekistan, Pakistan, and Tajikistan, prevalence of opium use among adults far exceeds the global average (United Nations Office for Drug Control, 2007). Burgeoning injecting drug use has propagated concentrated epidemics of HIV and viral hepatitis among injecting drug users (IDUs) in countries bordering Afghanistan (Joint United Nations Programme on AIDS, 2008; Stachowiak et al., 2006; Sanchez et al., 2006; Zamani et al., 2005; Achakzai et al., 2006; Kuo et al., 2006).

Afghanistan is a dynamic setting regarding trends in drug use. In the last four years, opium and heroin use are estimated to have increased by 53% and 140% nationally, respectively (United Nations Office for Drug Control, 2009). Contributing factors include insecurity from armed conflict within Afghanistan, extreme poverty, widespread unemployment, and high opium production levels with decreased prices (Hankins et al., 2002; United Nations Office for Drug Control, 2007; Griffin & Khoshnood, 2010). This environment is fostering increasing drug use and increases the risk of explosive epidemics of HIV or viral hepatitis among growing drug user populations. To date, there have been few HIV cases reported in Afghanistan (Knott, 2008). Data from Kabul in 2006 suggested a nascent epidemic among IDUs with high frequency of internal and external migration (Todd et al., 2007). Little is known about IDUs in other cities in Afghanistan, although border cities, representing the first resettlement point for newly repatriated refugees coming from countries with established HIV epidemics, are of particular concern (UNHCR 2006, UNODC 2005). The purpose of this study was to assess the prevalence and correlates of HIV, hepatitis C virus (HCV), and hepatitis B virus (HBV) among IDUs in three Afghan urban centres proximate to neighbouring countries.

2. Methods

2.1 Setting

The three cities in the study were Hirat (pop 349,000), Mazar-i-Sharif (pop 300,600), and Jalalabad (pop 168,600), the largest cities in their regions (Central Statistics Office, 2006). Hirat is 121 km from the Iranian border with Dari (Afghan dialect of Farsi) the most common spoken language. Mazar-i-Sharif is 65 km from the Uzbekistan border and a day's drive from the Tajikistan and Turkmenistan borders, with Dari and Uzbek the predominant languages. Jalalabad is 75 km from the Pakistan border with Pashto the main language. At the time of this study, detoxification programmes operated in all three cities, there was a harm reduction (HR) programme with on-site needle exchange in Hirat only, and none of the cities offered either opioid substitution therapy (OST) or hepatitis B vaccine to IDUs.

2.2 Study Design and Participants

This cross-sectional study was conducted between September 2006 and January 2008 through the Ministry of Public Health-affiliated Voluntary Counselling and Testing Centres (VCT), affiliated HR outreach programmes, and the International Rescue Committee (IRC) offices in each location. Eligible participants were those: reporting injecting drugs

(confirmed through injection stigmata) within the past six months, aged 18 years or greater, and able to provide informed consent. Approval was obtained from the institutional review boards of the Columbia University, University of California, San Diego, the Walter Reed Army Institute of Research, the U.S. Naval Medical Research Unit 3 (NAMRU-3) in Cairo, Egypt, and the Ministry of Public Health (MoPH) of the Islamic Republic of Afghanistan.

2.3 Measures

The questionnaire assessed sociodemographics, travel, incarceration and medical histories, and drug use and sexual behaviours. Drug use behaviours of interest included sharing needles/syringes or injecting “works” (e.g. cotton) ever and in the last six months, duration of injecting, injecting while incarcerated, and conversion from smoking to injecting. Sexual risk behaviours of interest were ever having used a condom, ever having sex with men or boys, and having patronized a female sex worker (FSW) ever and in the last six months. Other transmission routes were also assessed, such as receipt of therapeutic injections.

2.4 Procedures

Potential participants in this convenience sample were recruited by experienced outreach workers or staff members at HR programmes or sites where drug users were known to congregate. Initial recruitment site selection was based on participant and HR worker report, but was modified throughout the study when police or community action resulted in movement of drug users to other areas. There were two study staff working together at each study site, which reduced risk of repeat enrolment. Potential participants were approached and asked if they were interested in participating in a study that would test for HIV and hepatitis, and, if interested, accompanied the recruiter to the local VCT Centre, HR programme office, or study office, based on personal preference. At the enrolment site, trained staff provided further information, obtained informed consent, and administered the questionnaire. The participant was assigned a unique study number required for receiving confirmatory test results. Pre- and post-test counselling and rapid whole blood testing were performed with: Determine HIV 1/2 (Abbott Diagnostics Japan, Tokyo, Japan) for HIV, Standard Diagnostics HCV Ab (Standard Diagnostics, Kyonggi-do, Korea) for hepatitis C virus antibody (HCV Ab), and with Determine HBsAg (Abbott Diagnostics Japan, Tokyo, Japan) for hepatitis B surface antigen (HBsAg). Positive HIV serology was assessed with a second rapid test, HIV (1+2) Antibody Colloidal Gold® (KHB Kehua, Shanghai, China). All positive rapid tests (and, in the case of HIV, any discordant results with two rapid tests) underwent confirmation. HIV was confirmed with Western blot (HIV BLOT 2.2®, GeneLabs Diagnostics, Singapore), performed at the local VCT with quality assurance re-testing at the Afghan Public Health Institute (APHI) Laboratory in Kabul. HCV Ab was confirmed with RIBA (RIBA 3.0 SIA®, Chiron Corporation, Emeryville, CA, USA) at the APHI laboratory. HBsAg was confirmed with polymerase chain reaction (PCR) (Amplicor, Roche Diagnostics, Mannheim, Germany) at the NAMRU-3 laboratory in Cairo, Egypt.

All participants received post-test and risk reduction counselling, a small gift of hygiene items (e.g. razor, soap) of U.S.\$4 value, condoms, and sterile syringes, with referrals for detoxification and, in Hirat, to the HR programme upon request. Though not available at study initiation, antiretroviral treatment was funded and introduced in Afghanistan during

the study period. Supportive care for both HIV and hepatitis was available throughout the study period in urban centres through MoPH facilities and all referrals were made to MoPH facilities. Participants with reactive rapid test results were asked to return in two weeks for confirmatory test results and treatment (syphilis) or referral for care (hepatitis and HIV). Recruitment was conducted for twelve months in all sites. No data were recorded on those declining or ineligible.

2.5 Statistical Analysis

Outcomes of interest were prevalence and correlates of HIV, HCV, and HBsAg. The 95% confidence interval was calculated based on Poisson distribution for HIV and binomial distribution for HBsAg and HCV.

Descriptive statistics were generated, stratified by enrolment site. Continuous variables, such as duration of injecting, were transformed to dichotomous variables at the median. Risk behaviours, such as sharing syringes and injecting works, were reported by frequency; these variables were dichotomized into ever/never. Differences in demographic and risk behaviour variables between sites were assessed with Chi-square test.

Univariable logistic regression was performed to identify potential associations between HIV, HCV, or HBsAg and select demographic and risk behaviour variables, controlled by enrolment site. Variables entered into a multivariable model were associated with HIV, HBV, or HCV infection at the 10% level in univariable analysis or considered of epidemiologic significance. Multivariable models were generated to identify factors independently associated with HBV and HCV infections, using Wald test ($p < 0.05$) to determine which variables were retained, adjusting for site. Multi-co linearity diagnostics among the independent variables were evaluated using the condition index and the proportion of variance (POV). A condition value >15 or a POV >0.5 indicated multi-co linearity. Goodness-of-fit was evaluated with the Hosmer-Lemeshow test. Analysis was performed with Stata 10.0 (Stata Corporation, College Station, Texas).

3. Results

3.1 Sociodemographics & Prevalence of Infection

A total of 623 participants were enrolled (Hirat=340, Jalalabad=96, Mazar-i-Sharif=187). Of these, 615 (99%) were male. Eleven participants (1.8%, 95% CI: 0.88 – 3.2) were HIV-infected, 36 (5.8%, 95% CI: 3.9 – 7.6) were HBsAg-positive, and 223 (36%; 95% CI: 33 – 41) were HCV-infected. All IDU who were HIV-infected were also co-infected with HCV, while none were co-infected with HBV; the prevalence of HIV co-infection was 4.9% among those infected with HCV. There was significant variation between sites in prevalence (Table 1).

Due to the low number of female IDUs ($n=8$) enrolled, all remaining analyses were restricted to male IDUs. Among male participants, most had little formal education, reported current employment, and had lived or worked outside Afghanistan in the last 10 years (Table 2). Civil status, current employment, median monthly income, having lived outside

Afghanistan in the last 10 years, or having ever been incarcerated varied significantly between enrolment sites (Table 2). Age and education level did not vary by site.

3.2 Risk Behaviours

Participants reported injecting drugs for a mean of 3.3 years (IQR: 0 – 4 years), with median age of initiation of 26 years (IQR: 21 – 28 years). Only 7.6% reported having an IDU in the family, which did not vary significantly between sites ($p=0.246$). Duration of injecting varied significantly by site, while age of initiating injecting did not (Table 2). Heroin, alone (68.3%) or in combination with Avil (pheniramine maleate) (20%), was the most commonly injected drug in the last 6 months, with 8.9% reporting a preference for synthetic narcotics like Sosegon (pentazocine). IDUs in Jalalabad had less preference for heroin than IDUs in Hirat or Mazar-i-Sharif (49% vs. 97% and 94% respectively; $p<0.001$). Most participants reported having transitioned from smoking to injecting, though less so in Jalalabad (Table 2). Upon further examination, analyses controlled for the Jalalabad site indicate that those IDUs not transitioning from smoking were less likely to have engaged in several risky injecting practices including sharing needles or syringes in the last 6 months (AOR=0.50, 95% CI: 0.27 – 0.94), aspirating and re-injecting blood (*khoon bozee*) (AOR=0.39, 95% CI: 0.23 – 0.68), and receiving assistance with injecting (AOR=0.36, 95% CI: 0.21 – 0.62).

High-risk injecting practices were common and varied significantly by site (Table 2). Ever sharing either needles/ syringes (47%) or injecting works (e.g. cookers, cotton) (37%) was commonly reported, with sharing of needles more common in Jalalabad and sharing of injecting works more common in Hirat. One-fifth (23%) of participants reported ever having sex with another man or boy, while half (50.4%) had ever paid a woman for sex; sexual risk behaviours were most common in Mazar-i-Sharif (Table 2). Nearly one-fifth (19%) had received a therapeutic injection in the last 6 months and 9.6% had ever sold or donated blood.

3.3 Correlates of HIV Infection

Correlates of HIV infection were restricted to Hirat, since all HIV infections were detected among Hirat participants. No demographic characteristics or risk behaviours were associated with HIV infection (analysis not shown). All HIV infected participants reported having lived or worked outside the country in the last 10 years, but this association was not significant.

3.4 Correlates of HBV infection

Presence of acute or chronic hepatitis B infection was assessed with HBsAg testing and confirmed with HBV PCR; conditions during which screening tests were employed necessitated ambient temperature-stable rapid tests. IDUs earning >3800 Afs monthly and those either sharing syringes or patronizing a female sex worker in the last 6 months were more likely to have HBV, while IDUs who had ever had sex with another male or were ever married were less likely to be infected in site-controlled univariable analysis (Table 3). Higher monthly income and paying an FSW for sex in the last 6 months were positively independently associated while ever having sex with another male was marginally negatively associated with HBV infection in site-controlled multivariable logistic regression analysis. The goodness-of-fit of the model was satisfactory (Hosmer-Lemeshow p -value = 0.28).

3.5 Correlates of HCV Infection

In site-controlled univariable analysis, odds of HCV infection were higher among IDUs who had lived or worked outside Afghanistan in the last decade, ever been incarcerated, shared injecting works or needles and syringes in the last 6 months, or *khoon bozee* (Table 4). Odds of HCV were lower for male IDUs reporting ever having sex with men or boys (Table 4).

In the multivariate model, HCV was independently associated with sharing injecting works in the last 6 months, and prior incarceration. HCV was negatively associated with ever having had sex with another male and with higher monthly income. The model was a good fit of the data (Hosmer-Lemeshow p-value = 0.183). Of note, though having lived or worked outside the country in the last 10 years remained strongly independently associated with HCV following likelihood ratio testing, models inclusive of this variable did not demonstrate goodness of fit.

4. Discussion

This study of three Afghan cities bordering neighbouring countries found low HIV prevalence among IDUs, with Hirat the only city where HIV cases were detected. We attribute this finding to the proximity of Hirat to Iran, where a concentrated HIV epidemic among IDUs is well established, relative to Pakistani cities bordering Afghanistan (Zamani et al., 2006; Razzaghi et al., 2006; Kuo et al., 2006). However, while all HIV-infected IDUs in Hirat had travelled outside the country in the last decade, we cannot attribute HIV acquisition to a specific country due to cross-sectional design. Additionally, participants reported having been refugees in multiple countries; we did not specifically inquire where injecting was initiated.

Several risky injecting characteristics differed significantly by site. Recent sharing of syringes and works was more common in Hirat and may be reflective of newly returned refugees not having access to HR programmes formerly accessed in Iran. During the study period, there was only one needle and syringe programme operating in Hirat. An alternate theory is that sharing occurred within tight enclaves of IDUs gathering in areas like cemeteries due to lack of housing for new refugees, particularly marginalized populations like drug users. These theories assume drug use was established prior to repatriation; alternately, stress related to repatriation may have induced initiation of drug use, including injecting use, and resulted in sharing with more experienced users (Hankins, 2002). This situation may have been exacerbated by forced repatriation of Afghans by the Iranian government, including those held in prisons, in 2007 (Joyce, 2007). The newly detected HIV prevalence of 18% among Hirat IDUs in a separate 2009 study by the MoPH and partners gives weight to this theory (National AIDS Control Programme (NACP), Islamic Republic of Afghanistan, 2010). Following the end of this study (January 2008), civil insecurity has increased substantially within Afghanistan and in neighbouring Pakistan. We did not assess recent migration between countries or within Afghanistan; however, future studies should assess displacement and other effects wrought by conflict to consider impact of increasing insecurity upon rates of drug use in Afghanistan (Hankins, 2002; UNODC, 2009).

Jalalabad deserves comment due to the very different drug use context. Most Jalalabad participants did not actually reside in the city but journeyed there for goods and services or for addiction treatment. Many initiated injecting in heroin processing sites where they “tested” product in house prior to distribution (Personal communication, Dr. Mirwais Nasiry, assistant study manager, IRC Jalalabad). The greater number of IDUs starting drug use with injecting reflects this observation as use may have been at the behest of employers to determine safe dosing for packaging. These small numbers of IDUs geographically isolated from other networks may explain why Jalalabad participants had the lowest HCV prevalence despite high rates of needle sharing, longer duration of injecting, and close proximity to Pakistani cities with high (88.0%) HCV prevalence among IDUs (Kuo et al., 2006). We acknowledge that small site sample may bias these results but the context of use for some Jalalabad participants indicates a different transmission pattern is likely. Further assessment of the drug use context in Jalalabad is warranted, particularly to determine whether network formation and sharing occur in treatment settings as this venue represents a potential site for transmission.

The overall HCV prevalence was similar to that in Kabul in 2006 (36.6%), although site prevalence varied significantly. Hirat had the highest HCV prevalence, with levels similar to those reported (52.0%) among IDUs in Tehran, Iran, in 2004 (Zamani et al., 2007). Overall, recent sharing of injecting works was independently associated with HCV infection. This association has been observed among young IDUs in the United States, IDUs using opioid substitution therapy in China, and IDUs in Croatia but not among IDUs in Hungary (Holtzman et al., 2009; Lee et al., 2008; Medic et al., 2008; Gyarmathy et al., 2009). HCV was also associated with prior incarceration, as described in other settings (Stein & Nyamathi, 2004; Hickman et al., 2007). Higher income was negatively associated with hepatitis C, potentially indicating risk reduction through purchase of new needles, syringes, and injecting works or through injecting networks determined by socioeconomic class, similar to the relationship between income and HIV described in Thailand (Sunthornchart et al., 2008).

Having ever had sex with another male was negatively associated with both hepatitis B and C. We hypothesize that the lower prevalence of HCV Ab (32.3%) among IDU-MSMs may result from differences in injecting networks, but the reason for the negative association with HBV infection is unclear. HBV prevalence was similar to the 6.5% detected among Kabul IDUs (Todd et al., 2007). HBV was not positively associated with any risky injecting behaviour. These findings may be due to immunity to hepatitis B acquired through exposure when injecting was initiated. HBV was also the only pathogen for which a sexual risk behaviour, patronizing FSWs in the last 6 months, was positively associated. This is not surprising, since heterosexual contact is an important risk factor for HBV infection (Leung et al., 2006). This association may also be explained by the relatively higher prevalence of HBV among FSWs and exposure to this risk group in the last six months, reflecting acute infection among this male population (Todd et al., 2010). Higher monthly income was associated with HBV, possibly due to exposures associated with higher socioeconomic status, such as medical care or patronizing a barber, a practice in Pakistan and Afghanistan associated with hepatitis transmission (Bari et al., 2001).

Our findings regarding HBV are limited as we assessed HBsAg only. This marker can indicate either recent/acute infection or chronic infection. Therefore, in the absence of other HBV markers, we are unable to determine when HBV infection was acquired and naturally cleared, almost certainly underestimating the number with prior HBV infection. Further study, using additional HBV markers such as anti-HB surface and anti-HB core, is warranted to more fully explore correlates of infection with HBV among this population with a complex set of exposures to both endemic HBV infection and HBV infection acquired from sexual and parenteral exposures. However, by choosing HBsAg, we are able to comment upon circulating levels of and behaviours associated with HBV for a group of viremic individuals who may transmit the infection, providing important information with regard to prevention programming.

This study has several other limitations. Convenience sampling was used, limiting our ability to generalize findings to the IDU population. A chain-referral sampling methodology (respondent-driven sampling (RDS)) was originally proposed but rejected by one ethical review board due to potential coercion of drug users to initiate injecting by recruiting “seeds”. The concern arose from belief that “seeds” who were unable to find the assigned number of referrals within their own networks would offer to share incentives with non-injectors if they would initiate injecting for the purpose of study entry. This study was the first serologic assessment of IDUs in Afghanistan and some reservations regarding work among vulnerable populations may have diminished as an assessment in the same cities utilizing RDS was performed in 2009 (NACP, 2010). However, we note that, with the exception of Hirat, our findings closely resemble those of the 2009 study, which employed RDS (NACP, 2010). Socially desirable response may have occurred in the interviews, particularly with sensitive behaviours. Analysis of factors associated with HIV was underpowered due to low prevalence, potentially masking some associations. Similarly, there were very few female IDUs enrolled, precluding characterization. The number of female IDUs in Afghanistan is unclear and little is known about this population; however, relatively fewer female drug users partake in injecting and those who do reportedly initiated this activity in Iran (MacDonald, 2008).

In summary, while HIV prevalence was relatively low in these three Afghan cities in 2006–2007, the higher prevalence of HCV and risky injecting and sexual behaviours create a favourable environment for a concentrated HIV epidemic among IDUs. There is great diversity between risk behaviours and HIV and viral hepatitis prevalence by city, likely mediated by cultural differences and potentially proximate bordering countries. The interval increase in HIV prevalence among IDUs in Hirat measured in 2009 and newly-detected HIV prevalence among IDUs in Mazar-i-Sharif suggests that migration plays a substantial role in altering injecting network composition and thereby transmission dynamics in these two cities (NACP, 2010). Alternately, rising HIV prevalence in Hirat may be evidence of an evolving explosive HIV epidemic as in settings like Russia and Pakistan (UNAIDS, 2008; Emmanuel *et al.*, 2009). Of interest, the same trend was not observed in Kabul, a city with greater HR service coverage. HR programming should consider the impact of insecurity and migration on service utilization by making services more prominently known to recent returnees and internally displaced persons. This visibility may be best achieved through introduction of outreach and secondary distribution models currently operating in Kabul to

both Hirat and Mazar-i-Sharif. We optimistically note that HR programming has increased distribution in urban centres outside Kabul since the study, but available funding and relative inexperience of some implementers limit the service spectrum. However, service scale remains an issue as current services for IDUs only cover 17% of all IDUs nationally, which may be exacerbated by the influx of former refugees (NACP, 2010). OST has recently been implemented in a Kabul pilot programme and is urgently needed in Hirat, where potentially the concentrated HIV epidemic may be due to IDUs who received methadone in Iran have now resumed injecting upon return to Afghanistan where OST is not available. Hepatitis B vaccination is not currently included in HR services and we acknowledge the difficulty in maintaining a cold-chain, but this addition should be considered for HR services, particularly those with combined addiction treatment services to ensure completion of at least two injections in the series.

Last, we note that there were substantial differences in drug use practices between the three cities. While a national model for programming is important, particularly for political support of HR, services should have flexibility from donors and government monitors to adjust service delivery and components to the specific needs of the local client population. There has been substantial progress in introduction of HR to Afghanistan but the high HCV prevalence, rapid increase in HIV prevalence in Hirat, and contextual differences in drug use between sites underscore the need for expanding programme scale and services and assessing service delivery approaches tailored to the specific Afghan setting.

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References

- Achakzai M, Kassi M, & Kasi PM (2007). Seroprevalences and co-infections of HIV, hepatitis C virus and hepatitis B virus in injecting drug users in Quetta, Pakistan. *Tropical Doctor*, 37, 43–45. [PubMed: 17326891]
- Bari A, Akhtar S, Rahbar MH, & Luby SP. (2001). Risk factors for hepatitis C virus infection in male adults in Rawalpindi-Islamabad, Pakistan. *Tropical Medicine & International Health*, 6, 732–738. [PubMed: 11555441]
- Central Statistics Organization, Afghanistan – [Census]. Available at: <http://www.cso.gov.af/index.html>. Accessed July 27, 2010.

- Emmanuel F, Archibald C, Razaque A, & Sandstrom P. 2009 Factors associated with an explosive HIV epidemic among injecting drug users in Sargodha, Pakistan. *Journal of Acquired Immune Deficiency Syndrome*. 51, 85–90.
- European Monitoring Centre for Drugs and Drug Addiction, 2008 Technical Data Sheets: Monitoring the Supply of Heroin to Europe. Luxembourg: Office for Official Publications of the European Communities DOI 10.2810/44004
- Griffin N, & Khoshnood K Opium trade, insurgency, and HIV/AIDS in Afghanistan: relationships and regional consequences. *Asia Pacific Journal of Public Health*. 22,159S–167S. [PubMed: 20566549]
- Gyarmathy VA, Neaigus A, Mitchell MM, & Ujhelyi E (2009). The association of syringe type and syringe cleaning with HCV infection among IDUs in Budapest, Hungary. *Drug and Alcohol Dependence*, 100, 240–7. [PubMed: 19058925]
- Hankins CA, Friedman SR, Zafar T, & Strathdee SA (2002). Transmission and prevention of HIV and sexually transmitted infections in war settings: implications for current and future armed conflicts. *AIDS*, 16, 2245–2252. [PubMed: 12441795]
- Hickman M, Hope V, Brady T, Madden P, Jones S, Honor S, Holloway G, Ncube F, & Parry J (2007). Hepatitis C virus (HCV) prevalence, and injecting risk behaviour in multiple sites in England in 2004. *Journal of Viral Hepatitis*, 14, 645–652. [PubMed: 17697017]
- Holtzman D, Barry V, Ouellet LJ, DesJarlais DC, Vlahov D, Golub ET, Hudson SM, & Garfein RS (2009). The influence of needle exchange programs on injection risk behaviors and infection with hepatitis C virus among young injection drug users in select cities in the United States, 1994–2004. *Preventive Medicine*, 49, 68–73. [PubMed: 19410600]
- Joint United Nations Programme on HIV/AIDS (UNAIDS), 2008 Report on the global AIDS epidemic. UNAIDS, Geneva, Switzerland.
- Joyce R Thousands of Afghans forced home from Iran. Reuters News Service, 5 8, 2007 Retrieved 25th July, 2010 from: <http://www.reuters.com/article/idUSSP23521020070508>.
- Kuo I, ul-Hasan S, Galai N, Thomas DL, Zafar T, Ahmed MA, & Strathdee SA (2006). High HCV seroprevalence and HIV drug use risk behaviors among injection drug users in Pakistan. *Harm Reduction Journal*, 3, 26. [PubMed: 16914042]
- Lee KC, Lim WW, & Lee SS (2008). High prevalence of HCV in a cohort of injectors on methadone substitution treatment. *Journal of Clinical Virology*, 41, 297–300. [PubMed: 18191614]
- Leung Y, Chan JI, Yoshida E, Wu HX, & Daly PC (2006). A cross-sectional analysis of acute hepatitis B virus reported to the Vancouver Coastal Health Authority from 2000 to 2003. *Canadian Journal of Gastroenterology*, 20, 471–474. [PubMed: 16858499]
- MacDonald D (2008). Afghanistan Research and Evaluation Unit Briefing Paper Series: Afghanistan's Hidden Drug Problem: The Misuse of Psychotropics. AREU, Kabul, Afghanistan.
- Medi A, Dzelalija B, Sonicki Z, & Zekanovi D (2008). Characteristics of hepatitis C infection in injecting drug users in Zadar County, Croatia. *Collegium Antropologicum*. 32, 697–702. [PubMed: 18982740]
- National AIDS Control Program, Ministry of Public Health, Islamic Republic of Afghanistan. (2010). UNGASS Country Progress Report: Afghanistan. Ministry of Public Health, Kabul, Afghanistan.
- Razzaghi E, Nassirirmanesh B, Afshar B, Ohiri K, Claeson M, & Power R (2006). HIV/AIDS harm reduction in Iran. *Lancet*, 368, 434–435. [PubMed: 16890814]
- Sanchez JL, Todd CS, Bautista CT, Botros BA, Khakimov MM, Giasova GM, Yakubov SK, Abdulaeva M, Saad MD, Graham RR, Carr JK, & Earhart KC (2006). High HIV prevalence and risk factors among injecting drug users in Tashkent, Uzbekistan, 2003–04. *Drug & Alcohol Dependence*, 82 Suppl 1, S15–22. [PubMed: 16769440]
- Stachowiak JA, Tishkova FK, Strathdee SA, Stibich MA, Latypov A, Mogilnii V, & Beyrer C (2006). Marked ethnic differences in HIV prevalence and risk behaviors among injection drug users in Dushanbe, Tajikistan, 2004. *Drug & Alcohol Dependence*, 82 Suppl 1, S7–14. [PubMed: 16769449]
- Stein JA & Nyamathi A (2004). Correlates of hepatitis C virus infection in homeless men: a latent variable approach. *Drug & Alcohol Dependence*, 75, 89–95. [PubMed: 15225892]
- Sunthornchart S, Linkins RW, Natiphisarnwanish V, Levine WC, Maneesinthu K, Lolekha R, Tappero JW, Trirat N, Muktier S, Chancharastong P, Fox K, Donchalernpak S, Vitek C, & Supawitkul S

- (2008). Prevalence of hepatitis B, tetanus, hepatitis A, human immunodeficiency virus, and feasibility of vaccine delivery among injecting drug users in Bangkok, Thailand, 2003 – 2005. *Addiction*, 103, 1687–1695. [PubMed: 18705685]
- Todd CS, Abed AM, Strathdee SA, Scott PT, Botros BA, Safi N, & Earhart KC (2007). Prevalence of HIV, hepatitis C, hepatitis B, and associated risk behaviors among injection drug users in Kabul, Afghanistan. *Emerging Infectious Diseases*, 13, 1327–1331. [PubMed: 18252103]
- Todd CS, Nasir A, Stanekzai MR, Bautista CT, Botros BA, Scott PT, Strathdee SA, & Tjaden J (2010). HIV, hepatitis B, and hepatitis C prevalence and associated risk behaviors among female sex workers in three Afghan cities. *AIDS*, 24 Suppl 2, S69–S76. [PubMed: 20610952]
- United Nations Office on Drugs and Crime (UNODC). (2005). *Afghanistan Drug Use Survey 2005*. Kabul, Afghanistan.
- United Nations Office on Drugs and Crime (UNODC) (2007). *World Drug Report 2007*. United Nations Publications, Slovakia.
- United Nations Office on Drugs and Crime (UNODC) (2008). *Afghanistan Opium Survey 2008: Executive Summary*. Kabul, Afghanistan.
- United Nations Office of Drugs and Crime (UNODC). (2010). *Drug Use in Afghanistan: 2009 Survey Executive summary*. Kabul, Afghanistan.
- Zamani S, Kihara M, Gouya MM, Vazirian M, Ono-Kihara M, Razzaghi EM, & Ichikawa S (2005). Prevalence of and factors associated with HIV-1 infection among drug users visiting treatment centers in Tehran, Iran. *AIDS*, 19, 709–716. [PubMed: 15821397]
- Zamani S, Kihara M, Gouya MM, Vazirian M, Nassirimanesh B, Ono-Kihara M, Ravari SM, Safaie A, & Ichikawa S (2006). High prevalence of HIV infection associated with incarceration among community-based injecting drug users in Tehran, Iran. *Journal of Acquired Immune Deficiency Syndrome*, 42, 342–346.
- Zamani S, Ichikawa S, Nassirimanesh B, Vazirian M, Ichikawa K, Gouya MM, Afshar P, Ono-Kihara M, Ravari SM, & Kihara M (2007). Prevalence and correlates of hepatitis C virus infection among injecting drug users in Tehran. *International Journal of Drug Policy*, 18, 359–363. [PubMed: 17854723]

Table 1.
Blood-Borne Infection Seroprevalence of Injecting Drug Users in Three Afghan Cities. (n=623)

Infectious Agent	Hirat (n=340)		Jalalabad (n=96)		Mazar-i-Sharif (n=187)		p-value
	N	%	N	%	N	%	
HIV	11	3.24	0	0	0	0	0.009*
Hepatitis B	12	3.53	10	10.42	14	7.49	0.019*
Hepatitis C	167	49.12	12	12.50	45	24.06	<0.001**

* Chi-square p-value (Poisson)

** Chi-square p-value (binomial)

Demographic Characteristics and Injecting and Sexual Risk Behaviors of Male Injecting Drug Users in Three Afghan Cities. (n=615)

Table 2.

Feature	Overall (n=615)		Hirat (n=332)		Jalalabad (n=96)		Mazar-i-Sharif (n=187)		p-value*
	N	%	N	%	N	%	N	%	
Age									0.940
26 years	265	43.1%	143	43.1%	40	41.7%	82	43.8%	
>26 years	350	56.9%	189	56.9%	56	58.3%	105	57.2%	
Formal Education									0.198
<6 years	399	64.9%	211	63.6%	70	72.9%	118	63.1%	
6 years	216	35.1%	121	36.4%	26	27.1%	69	36.9%	
Civil Status									<0.001
Never Married	309	50.2%	158	47.6%	35	36.5%	116	62.0%	
Ever Married	306	49.8%	174	52.4%	61	63.5%	71	38.0%	
Current Employment									<0.001
Yes	486	83.7%	284	88.0%	67	88.2%	135	74.6%	
Median Monthly Income (U.S.\$1=50 Afis)									<0.001
3800 Afis	261	42.4%	184	55.4%	15	15.6%	62	33.2%	
>3800 Afis	354	57.6%	148	44.6%	81	84.4%	125	66.8%	
Lived/Worked Outside Afghanistan in Last Decade									<0.001
Yes	523	85.2%	320	96.7%	61	63.5%	142	75.9%	
Ever in Jail									<0.001
Yes	385	62.9%	235	71.0%	28	29.5%	122	65.6%	
Duration of Injection Use									0.050
2 years	347	56.4%	189	56.9%	44	45.8%	114	61.0%	
> 2 years	268	43.6%	143	43.1%	52	54.2%	73	39.0%	
Age Initiated Injecting									0.834
24 years	288	46.8%	159	47.9%	43	44.8%	86	46.0%	
>24 years	327	53.2%	173	52.1%	53	55.2%	101	54.0%	
Changed from Smoking to Injecting									
Yes	537	87.9%	300	90.9%	57	60.0%	180	96.8%	<0.001
Share syringes in last 6 months									<0.001
Yes	180	30.2%	110	34.0%	42	44.7%	28	15.7%	

Feature	Overall (n=615)		Hirat (n=332)		Jalalabad (n=96)		Mazar-i-Sharif (n=187)		p-value*
	N	%	N	%	N	%	N	%	
Share injecting works in last 6 months									
Yes	167	27.2%	123	37.0%	7	7.3%	37	19.8%	<0.001
Ever received assistance from others to inject									
Yes	446	73.0%	214	64.4%	62	66.0%	170	90.9%	<0.001
Ever re-aspirated and injected blood after injecting ("khood bozee")									
Yes	459	74.8%	243	73.2%	65	67.7%	151	81.2%	0.030
Ever injected in jail (of 383 ever incarcerated):									
Yes	66	17.2%	46	19.9%	2	6.9%	18	14.6%	0.141
Ever had sex with men or boys (of 541 ever sexually active):									
Yes	125	23.1%	34	10.2%	24	25.0%	67	35.8%	<0.001
Ever paid woman for sex (of 541 ever sexually active):									
Yes	273	50.4%	126	44.4%	22	28.9%	125	72.3%	
Paid woman for sex in last 6 month (of 541 ever sexually active):									
Yes	56	10.4%	16	4.8%	6	6.3%	35	18.7%	<0.001
Ever used a condom (of 541 ever sexually active):									
Yes	180	33.3%	109	32.8%	15	15.6%	56	31.8%	0.005

P-value by Chi-square test

Table 3.

Correlates of Hepatitis B Infection among Male Injecting Drug Users in Three Afghan Cities by Site-Controlled Logistic Regression (N=615)

Variable	HBV-Uninfected N, (%)	HBV-Infected N, (%)	Adjusted Odds Ratio, 95% Confidence Interval
Age:			0.74, 0.51 – 1.08
26 years	247 (42.7)	18 (50.0)	
>26 years	332 (57.3)	18 (50.0)	
Education:			0.92, 0.41 – 2.08
6 years	375 (64.8)	24 (66.7)	
>6 years	204 (35.2)	12 (33.3)	
Marital Status:			0.63, 0.55 – 0.71
Ever married	292 (50.4)	14 (38.9)	
Never married	287 (49.6)	22 (61.1)	
Employed:	457 (83.9)	29 (80.6)	0.80, 0.42 – 1.50
Monthly Income:			1.99, 1.47 – 2.68
(Afghanis, U.S.\$1=49 Afghanis at time of study)			
3800 Afs	251 (43.4)	10 (27.8)	
>3800 Afs	328 (56.6)	26 (72.2)	
Lived Outside Afghanistan Last 10 Years:			0.50, 0.19 – 1.29
Yes	496 (85.8)	27 (75.0)	
Age Initiated Injecting Use:			0.69, 0.33 – 1.46
25 years	268 (46.3)	20 (55.6)	
>25 years	311 (53.7)	16 (44.4)	
Ever Aspirate & Re-inject Blood:			0.84, 0.35 – 2.00
Yes	434 (75.0)	25 (69.4)	
Share Injecting Equipment last 6 Months:			0.89, 0.31 – 2.55
Yes	158 (27.3)	9 (25.0)	
Share Needles/Syringes Last 6 Months:			1.39, 1.04 – 1.87
Yes	167 (29.8)	13 (37.1)	
Receive Assistance with Injecting:			0.96, 0.43 – 2.12
Yes	420 (73.0)	26 (72.2)	
Duration Injecting Use (years):			0.63, 0.37 – 1.07
<2 years	323 (55.8)	24 (66.7)	
2 years	256 (44.2)	12 (33.3)	
Ever Incarcerated:	362 (62.8)	23 (63.9)	1.05, 0.65 – 1.67
Inject in Prison [*] :	64 (17.7)	2 (9.1)	0.46, 0.09 – 2.47
Receive Therapeutic Injection in Last 6 Months:			1.25, 0.41 – 3.75
Yes	108 (18.7)	8 (22.2)	
Patronize Female Sex Worker in Last 6 Months:			2.12, 1.62 – 2.76
Yes	50 (9.8)	6 (16.7)	
Sex with Men/Boys Ever:			0.62, 0.46 – 0.82
Yes	120 (23.5)	5 (17.2)	

Ever Use Condom: 169 (33.0) 11 (30.6) 1.07, 0.79 – 1.44

Multivariable Analysis:

Variable	AOR	95% CI
Paid Women for Sex Last 6 months	2.24	1.64 – 3.06
Monthly Income>3800Afs	1.74	1.55 – 1.96
Ever Had Sex with Men/Boys	0.61	0.36 – 1.02

* Denominator is number ever incarcerated (N=385)

HBV=hepatitis B virus infection, defined by detectable levels by polymerase chain reaction.

AOR=adjusted odds ratio

CI= confidence interval

Table 4.

Correlates of Hepatitis C Antibody among Male Injecting Drug Users in Three Afghan Cities by Site-Controlled Logistic Regression (N=609)

Variable	HCV-Uninfected N, (%)	HCV-Infected N, (%)	Adjusted Odds Ratio, 95% Confidence Interval
<u>Univariable Analysis:</u>			
Age:			1.07, 0.80 – 1.79
26 years	169 (43.8)	94 (42.2)	
>26 years	217 (56.2)	129 (57.8)	
Education:			1.27, 0.79 – 2.04
6 years	258 (66.8)	128 (57.4)	
>6 years	137 (33.2)	86 (42.6)	
Marital Status:			0.73, 0.53 – 1.01
Ever married	203 (52.6)	100 (44.8)	
Employed:	297 (83.2)	183 (83.9)	1.06, 0.49 – 2.27
Monthly Income:			0.66, 0.41 – 1.06
(Afghanis, U.S.\$1=49 Afghanis at time of study)			
3800 Afs	148 (38.3)	108 (48.4)	
>3800 Afs	238 (61.7)	115 (51.6)	
Lived Outside Afghanistan Last 10 Years:			2.81, 1.13 – 7.01
Yes	313 (81.1)	205 (92.3)	
Age Initiated Injecting Use:			0.95, 0.66 – 1.38
25 years	179 (46.4)	207 (53.6)	
>25 years	106 (53.6)	117 (46.4)	
Ever Aspirate & Re-inject Blood:			1.70, 1.17 – 2.46
Yes	274 (71.2)	180 (80.7)	
Share Injecting Equipment last 6 Months:			1.94, 1.21 – 3.11
Yes	85 (22.0)	79 (35.4)	
Share Needles/Syringes Last 6 Months:			1.52, 1.06 – 2.18
Yes	99 (26.7)	78 (35.6)	
Receive Assistance with Injecting:			0.99, 0.62 – 1.59
Yes	280 (73.1)	162 (73.0)	
Duration Injecting Use (years):			1.66, 0.95 – 2.90
<2 years	235 (60.9)	108 (48.4)	
2 years	151 (39.1)	115 (51.6)	
Ever Incarcerated:	220 (57.1)	160 (72.4)	1.97, 1.32 – 2.92
Inject in Prison [*] :	33 (15.1)	32 (20.1)	1.42, 0.67 – 3.00
Receive Therapeutic Injection in Last 6 Months:			0.67, 0.38 – 1.21
Yes	81 (21.0)	34 (15.2)	
Patronize Female Sex Worker in Last 6 Months ^{**} :			1.07, 0.56 – 2.04
Yes	35 (10.2)	21 (10.8)	
Sex with Men/Boys Ever ^{**} :			0.73, 0.65 – 0.82

Yes	86 (25.1)	38 (19.7)	
Ever Use Condom:	114 (33.2)	65 (33.5)	1.07, 0.79 – 1.44

Multivariable Analysis:

Variable	AOR	95% CI
Share injecting equipment last 6 months	1.83	1.25 – 2.69
Ever incarcerated	1.79	1.16 – 2.77
Ever had sex with man/boy	0.69	0.58 – 0.82
Medina Income>3800 Afs	0.76	0.60 – 0.97

* Denominator is number ever incarcerated (N=385)

** Denominator is those ever sexually active (N=537)

HCV=evidence of prior hepatitis C virus infection, defined by reactive RIBA assay.