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## Prospects for ending the HIV epidemic among persons who inject drugs in Haiphong, Vietnam

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### Abstract

**Background**—To examine the prospects for “ending the HIV epidemic” among persons who inject drugs (PWID) in Haiphong, Vietnam. Reaching an incidence of < 0.5/100 person-years at risk (PY) was used as an operational definition for “ending the epidemic.”

**Methods**—A respondent driven sampling study of 603 PWID was conducted from September to October 2014. Current heroin use (verified with urine testing and marks of injection) was an eligibility requirement. A structured questionnaire was administered by trained interviewers to obtain demographic, drug use, and risk behavior data; HIV counseling and testing and HCV testing was also conducted. Two methods (by assuming all new injectors were HIV negative at first injection and by slope of prevalence by years injecting) were used for estimating HIV among persons injecting for < 5 years (“new injectors”). Comparisons were made to the HIV epidemic among PWID in New York City and modeling of the HIV epidemic in Can Tho province.

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**Results**—HIV prevalence was 25% in 2014, down from 68% in 2006 and 48% in 2009; overall HCV prevalence in the study was 67%. Among HIV seropositive PWID, 33% reported receiving antiretroviral treatment. The great majority (83%) of subjects reported pharmacies as their primary source of needles and syringes and self-reported receptive and distributive syringe sharing were quite low (< 6%). Estimating HIV incidence among non-MSM male new injectors with the assumption that all were HIV negative at first injection gave a rate of 1.2/100 person-years (95% CI –0.24, 3.4). Estimating HIV incidence by the slope of prevalence by years injecting gave a rate of 0.8/100 person-years at risk (95% CI –0.9, 2.5)

**Conclusions**—The current HIV epidemic among PWID in Haiphong is in a declining phase, but estimated incidence among non-MSM new injectors is approximately 1/100 person-years and there is a substantial gap in provision of ART for HIV seropositives. Scaling up interventions, particularly HIV counseling and testing and antiretroviral treatment for all seropositive PWID, should accelerate the decline. Ending the epidemic is an attainable public health goal.

### Keywords

HIV; Persons who inject drugs (PWID); Vietnam; Respondent driven sampling (RDS); Sex workers; Men who have sex with men (MSM)

### Introduction

“Combined prevention and care” for HIV, including needle/syringe programs (NSP), medication-assisted treatment (MAT) for substance use disorders and antiretroviral treatment (ART) for HIV infection, has dramatically reduced HIV transmission among persons who inject drugs (PWID) in a number of high-income settings. Examples include Amsterdam (Van den Berg, Smit, Van Brussel, Coutinho, & Prins, 2007), France (Desenclos, 2005), Vancouver (Montaner J., 2012) and New York City (Des Jarlais, et al., 2007). HIV infection has not been eliminated in these areas, but HIV prevalence and incidence have been reduced to sufficiently low levels that one may conclude that the “epidemics” of HIV among PWID in these locations have ended. For the purposes of this paper, we consider an HIV incidence of less than 0.5/100 person-years (PY) at risk to be the “end of an HIV epidemic” among PWID. This value is derived from a recent review of HIV incidence in high-income settings with combined prevention for PWID. HIV incidence in these settings ranges from 0.01 to 0.3/100 PY (Des Jarlais 2016). There were no sites in which HIV transmission was completely eliminated, but it appears that combined prevention can reduce HIV transmission among PWID to a very low endemic level (< 0.5/100 PY), thus “ending an HIV epidemic.”

Whether these prevention successes can be replicated with PWID (and with other high-risk populations, such as MSM and commercial sex workers) in resource-limited settings is a critical question for HIV prevention. There is considerable evidence that NSP (Des Jarlais, Feelemyer, Modi, Abdul-Quader, & Hagan, 2013) and MAT for opiate dependence (Feelemyer, Des Jarlais, Arasteh, Abdul-Quader, & Hagan, 2014) can be effective in resource-limited settings. Such settings, however, typically have multiple barriers to implementation/scaling up of combined prevention and care for PWID. In addition to the lack of financial resources, there is often a lack of appropriately trained health workers, and severe stigmatization of both injecting drug use and HIV infection. The severe

stigmatization may keep policy leaders from providing the needed interventions, keep healthcare workers from appropriately implementing interventions, and keep PWID from utilizing the interventions that are available.

In this report, we examine the prospects for ending the HIV epidemic among PWID in Haiphong, Vietnam through 1) a review of public policy for prevention of HIV among PWID in Vietnam, and 2) data from a recent respondent driven sampling (RDS) study of PWID in Haiphong, with a focus on “new injectors” (persons injecting for < 5 years) to estimate HIV incidence.

## Methods

### Policy Analysis

The policy analysis was based on a thorough review of relevant legal and policy documents, which we identified through interviews with key informants in government agencies and civil society organizations and searches of a comprehensive database of Vietnamese legal documents (THƯ VIỆN PHÁP LUẬT, 2015).

### RDS study

**Subject Recruitment**—Respondent driven sampling (RDS) (Heckathorn DD., 1997) was used as the primary method of recruiting participants. In general, we followed standard RDS procedures for recruiting and training “seeds,” aiming for a diverse group of with different ages, genders, and HIV statuses. The seeds were recruited by the peer support group members, participated in all study procedures, and were then instructed on how to recruit new study participants using the RDS coupons. The study name, logo and research site were printed on the RDS coupons. We were particularly interested in recruiting MSM-ID and FCSW-ID, as they might be at very high risk of acquiring HIV and at high risk of transmitting HIV to persons who do not inject drugs. We set targets of at least 30 MSM-PWID and 30 FCSW-PWID. These targets represent oversampling for MSM-PWID and FCSW-PWID at more than twice the estimated percentages of these groups in the overall PWID population in Haiphong. We included 3 seeds each from community support group (Virgin Flowers for FCSWs, White Sands for MSM, and Friendship Arms for PWID) among the initial 9 seeds. We encouraged the seeds from Virgin Flowers and White Sands (and their subsequent recruits) to recruit other MSM-PWID and other FCSW-PWID. The RDS procedures did not produce the desired oversampling of MSM-PWID and CSW-PWID, so that additional MSM-PWID and FCSW-PWID had to be recruited directly by the specific groups in the field.

**Eligibility criteria**—Persons were eligible to participate in the study if they were 18 or older, capable of giving informed consent, and had injected drugs in the past month. Staff visually inspected participants’ arms for indications of injecting and an on-site urine test was used to confirm recent drug use.

**Questionnaire**—After eligibility had been confirmed and written informed consent obtained, a structured interview lasting approximately 40 minutes was administered by a

trained interviewer. The questionnaire was based on instruments previously used by the research team, with adaptation and pre-testing for use in Haiphong. Drug use and sexual behavior questions covered the three months prior to the interview.

**HIV and HCV counseling and testing**—After completing the interview, each participant received counseling and testing for HIV and HCV. HIV antibody and HCV antibody testing were conducted at the laboratory of the Haiphong Provincial HIV/AIDS Center using Alere Determine 12.0 (Abbott) and HCV ELISA 3.0 (SD Bioline). HIV confirmation tests were done according to the National guidelines and used HIV1/2 3.0 rapid test (SD Bioline) plus the MUREX HIV Ag/Ab Combination test (Diasorin).

**Estimating HIV incidence among “new injectors”**—The questionnaire included items for age of first injection and date of birth. These items and the date of the interview permitted us to calculate the length of time since first injection for all participants. We used two methods for estimating HIV incidence among participants who had begun injecting less than 5 years before the time of their interview (“new injectors”). This cutoff point was used so that we would have sufficient numbers of new injectors to examine possible differences by gender/sexual behavior. First we assumed that all new injectors were HIV negative when they began injecting, and that HIV seropositive new injectors became infected halfway between the date of first injection and the date of the interview. The total number of HIV seropositive new injectors would then represent the number of incident HIV infections among these new injectors. The total time at risk would be the total years injecting for the HIV seronegative new injectors plus one half of the total years injecting for the HIV seropositives. The assumption that all participants would be HIV seronegative at the time of first injection might be questionable for participants at high risk of acquiring HIV through sexual transmission—MSM and FCSW. We thus restricted this estimate of HIV incidence to male participants who did not report any MSM behavior.

The second method for estimating HIV incidence among new injectors was to calculate the slope of the HIV prevalence by years injecting among the new injectors using ordinary least squares (OLS) regression. With an assumption of no differential loss of HIV seropositives and HIV seronegatives to the injection population during the short time period of being a new injector, the increase in prevalence by years injecting would correspond to the incidence (again, this estimation was restricted to male participants who did not report MSM behavior).

**Honoraria**—Each participant received VND 150,000 (Vietnamese dong, approximately US \$ 7.50) plus VND 50,000 (approximately USD\$2.50) for each peer they successfully recruited. These honoraria included compensation for time and effort to participate in the study and for expenses to travel to the study site. Participants received an additional VND 50,000 (approximately USD\$2.50) for transportation to return to the study site to obtain their HIV and HCV test results.

**Data Analyses**—The RDS Analysis Tool (RDSAT) (Volz, Wejnert, Degani, & Heckathorn, 2010) and STATA (STATA Corp, 2012) were used for data analysis.

**Ethics Committee/Institutional Review Board Approvals**—The study was reviewed and approved by the Institutional Review Boards of the Haiphong University of Medicine and Pharmacy and Mount Sinai Beth Israel.

## Results

### Policy context

The prospects for ending the HIV epidemic among PWID in Haiphong need to be considered within the evolving drug use and HIV policy frameworks in Vietnam. There are approximately 200,000 (PWID) in Vietnam and this is the focal population for the HIV epidemic in the country (UNODC, 2013).

The history of this legal and policy framework comprises two strands: one related to harm reduction programs for HIV prevention among PWID and the other related to substance use treatment. From 2002 to 2008, these two legal and policy strands appeared to develop in contradictory directions (T. M. Hammett, et al., 2008). The former became more progressive as reflected in the country's HIV/AIDS law of 2006 and its implementing decree 108 in 2007 and increasingly widespread implementation of needle/syringe and peer outreach programs with support from the government and police, many of which showed positive results (Theodore M. Hammett, et al., 2012). At the same time, substance use “treatment” was becoming more repressive as the view of drug use as a “social evil” and moral failing solidified and the related system of compulsory drug rehabilitation/detention centers for “06 centers” derived from the re-education centers of the 1970s expanded (T. M. Hammett, et al., 2008). At its peak in about 2008, there were more than 120 “06” centers with more than 100,000 residents. There were 169,000 admissions to 06 centers from 2006–2010 (Amon, Pearshouse, Cohen, & Schleifer, 2013). The regimen employed in the “06” centers – brief and ‘crude’ detoxification, “moral education,” and labor – has no basis in evidence, proved highly ineffective with relapse rates in excess of 90% after release from the centers, and violates human rights (Amon, Pearshouse, Cohen, & Schleifer, 2014; Watch, 2011).

In 2008, the repressive strand of substance use treatment policy began to change (Vuong, Ali, Baldwin, & Mills, 2012). Pilot methadone maintenance programs were begun in Ho Chi Minh City and Haiphong (MOH Decisions 5073 and 5076 [2007]). These pilot programs revealed positive results in terms of relapse rates, health care utilization, quality of life, family re-integration, life stability, and cost-effectiveness (Nguyen, Nguyen, Pham, Vu, & Mulvey; Tran B.X., 2013). Consequently, the government committed to a large and fairly rapid expansion of the methadone program to 30 provinces and 245 clinics, with an optimistic target of 80,000 clients by 2015. Thus far, the methadone program has been largely dependent on donor support, primarily from PEPFAR, but recently instituted patient co-payments of 10,000 Vietnamese Dong (VND) (approximately \$0.50) per day to partially defray the cost. In addition, enrollment requirements for documentation of residence and police certification of status as registered drug users pose problems for many PWID who would like to access methadone treatment (Decree 96 [2012]).

A number of other laws and policies on substance treatment have been adopted in recent years (Kamarulzaman & McBrayer, 2015). Drug use was decriminalized (Law Amending

Penal Code, 2009). The 2012 Law on Handling Administrative Violations ended compulsory detention of sex workers in “05 centers” and required court decisions to commit PWID to 06 centers. In 2013, the Prime Minister officially approved (Decision 2596/QD-TTg, December 27, 2013) a Renovation Plan developed by the Ministry of Labor, Invalids, and Social Affairs (MOLISA) with input from other ministries, civil society organizations, and other stakeholders that explicitly recognized drug addiction as a chronic, relapsing condition with both biological and psychosocial causation and committed to a transition away from the system of 06 centers to a system based on voluntary, community-based, and evidence-based substance use treatment. The numbers of 06 centers and residents has already been reduced. By 2015, there were 15,500 total residents in 95 centers.

Still, the legal and policy frameworks on drug control and drug treatment in Vietnam remain inconsistent (Vietnam, 2013). Much of the punitive policy based on “social evils” and compulsory detention, such as the Law on Drug Prevention and Control (2000, revised in 2008) remains on the books despite the recent adoption of more progressive approaches. Also, an upsurge in street crime in Ho Chi Minh City thought to be perpetrated by PWID led the government in October 2014 to re-institute summary commitment to centers in the absence of a court decision. More than 400 individuals without residence documentation have been sent to “social centers” pending a court determination as to whether they should be further committed to 06 centers. (Resolution 77/2014/QH13; Resolution 98/NQ-CP, December 26, 2014). Clearly, progress toward a new evidence-based system of substance use treatment in Vietnam will continue to be halting and subject to periodic setbacks.

### **The local situation in Haiphong**

In our estimation, Haiphong has generally been in the lead in the movement towards evidence-based substance use treatment and HIV prevention in Vietnam, partly due to the involvement of community based organizations that played a major role as a critical stakeholder of interventions among PWID. Despite this policy evolution in favor of harm reduction, “06” Centers for drug users and “05” Centers for commercial sex workers still exist in Haiphong. As noted above, a methadone maintenance pilot program was begun in Haiphong in 2008, and there are now 11 methadone maintenance treatment clinics with approximately 3,200 patients in the city, for an estimated 6,000 to 10,000 PWID (Around 7500 are registered with authorities). Needle/syringe programs, including syringe exchange and pharmacy sales of injection equipment to drug users were implemented in 2005. Currently, the great majority of PWID obtain injection equipment through purchasing at pharmacies (over 97%)(PSI Vietnam/Metrics, 2013). ART is offered free of charge to all HIV seropositive persons with CD4 cell counts <350 cells/mm<sup>3</sup> at 13 in clinics in Haiphong and currently serves approximately 4800 HIV positive persons (USAID, 2012).

### **New ART guidelines and goals**

Vietnam has recently issued new guidelines for ART. All HIV seropositive members of “key populations” (PWID, MSM and commercial sex workers) should be offered ART regardless of their CD4 cell counts (Ministry of Health, 2015) and Vietnam has adopted the 90-90-90 goals for the provision of ART.

## RDS study

**Characteristics of the total sample**—603 participants were recruited between September and October 2014; 581 through respondent driven sampling and 22 additional MSM and FCSW participants through direct recruiting by staff. Table 1 presents the demographic characteristics, drug use and sexual behaviors, and HIV and HCV prevalence for the entire sample. The sample was predominantly non-MSM male, had a mean age of 37 years, all were currently using heroin (an eligibility criterion), and pharmacies were the predominant source of new injection equipment. With the exception of unsafe sex (defined as less than consistent condom use) with a primary partner, frequencies of self-reported injecting risk behaviors and sexual risk behaviors were quite low.

Table 2 shows the increasing HIV and HCV prevalence by years injecting for the total sample. The mean number of years injecting was 9, with a median of 8 years. The HIV prevalence was relatively low among persons who had begun injecting over the last five years while the HCV prevalence was significantly higher.

**HIV and HCV prevalence among new injectors**—Table 3 shows demographic characteristics, risk behavior, HIV and HCV prevalence for the 178 participants who reported that they had first injected less than 5 years prior to the study interview. The HIV prevalence among new injectors was  $9/178 = 5.1\%$ , well below the 25% for the total sample while HCV prevalence was 43%, which was also lower than the 67% for the total sample. Note that the new injectors comprised a very substantial proportion (30%) of the total sample. As with the sample as a whole, the frequencies of self-reported injecting risk behaviors and sexual risk behaviors were low.

There were substantial differences in HIV prevalence among non-MSM male new injectors (2/136, 1.5%), MSM new injectors (3/21, 14%), and female new injectors (4/21, 19%). The difference in HIV prevalence between non-MSM male new injectors and the combined MSM and female new injectors (6/39, 15.4%) was highly significant ( $p = 0.004$  by Fisher's exact test).

We estimated injecting-related HIV incidence among non-MSM new injectors using the two methods described above. As MSM-PWID and female new injectors may have acquired HIV through sexual transmission, we excluded them from these estimates. Dividing total number of HIV seropositive new injectors by total years of injecting among HIV seronegatives plus one half of years injecting among HIV seropositives, the estimated HIV incidence was 1.2/100 person-years at risk (95% CI  $-0.24, 3.4$ ). By the slope of prevalence by years injecting, the estimated HIV incidence was 0.8/100 person-years at risk (95% CI  $-0.9, 2.5$ ). These two estimates of HIV incidence among non-MSM male new injectors are quite consistent.

Given the very modest number of MSM and female new injectors (18 MSM-PWID new injectors and 21 female PWID new injectors), we were not able to estimate HIV incidence for these groups. However, since HIV prevalence was considerably higher in these groups (15.4% for combined MSM and FCSW new injectors) than for non-MSM male new injectors (2.2%), it is likely that HIV incidence is much higher among MSM and FCSW new



injectors than among non-MSM male new injectors and it is also likely that some MSM and FCSW were HIV seropositive before they began injecting.

## Discussion

Haiphong experienced a high HIV seroprevalence epidemic among PWID in the early to mid-2000s. Integrated Bio-Behavioral Surveys (IBBS) of PWID in Haiphong, documented an HIV prevalence of 66% in 2006 and 48% in 2009. In the present study, we observed an HIV prevalence of 25% (95% CI 22%, 30%) among PWID in Haiphong. This suggests a “declining epidemic,” with greater loss of HIV seropositives—due to death, disability or cessation of injecting—than new HIV infections in the population of persons actively injecting drugs. Entry of HIV seronegative persons into the injecting population would also contribute to a decline in HIV seroprevalence.

A more detailed comparison of the present study with the 2009 IBBS in Haiphong may be useful. First, several methodological differences should be noted. The IBBS used time-location sampling rather than the RDS employed in the present study. The IBBS included only male PWID, while the present study included female PWID. The IBBS had sample sizes of 300 each, while the RDS study had a sample of 603. The 2009 study did have a category of “new injectors,” but used a different definition of “new injector” (injecting for < 2 years), and found only 17 “new injectors,” and but did not present HIV prevalence for this group. Thus, it is not possible to compare HIV prevalence and estimated incidence among “new injectors” in the present study to prevalence and estimated incidence among “new injectors” in the 2009 IBBS.

Despite these differences there are several interesting comparisons of the 2009 IBBS study to the present study. First, there is a clear reduction in HIV prevalence from 48% in the 2009 IBBS to 25% in this RDS study. This would appear to be a continuation of the decline in HIV prevalence from the 66% observed in the 2006 IBBS.

There is also a pattern of low rates of reported injecting risk behavior. Among the 300 PWID recruited from Haiphong province in the 2009 IBBS, 21% reported sharing syringes in the previous 6 months, which was the lowest by far among PWID in the 12 provinces included in the survey. The reported injecting risk behavior among subjects in the RDS study was quite low, with 5% reporting receptive sharing and 3% reporting distributive sharing. Social desirability bias may figure in these reports of injecting risk behavior, but the low rates of injecting risk behavior are consistent with declining HIV prevalence overall and the low HIV prevalence (2.2%) and low estimated incidence (approximately 1/100 PY) among non-MSM male new injectors in the RDS study.

The mean years injecting in the 2009 IBBS was 7.4 years compared to 9 years in the RDS study. The fact that HIV prevalence declined substantially while the average time at risk (years injecting) increased modestly suggests reduction of HIV seropositives in the active injecting population. Death or disability due to HIV related illness and entry of HIV seropositives into methadone treatment (and cessation of injecting) would be plausible mechanisms for the reduction of HIV seropositives in the active injecting population.

Despite the methodological differences, the comparison of the 2009 IBBS and the 2014 RDS study does indicate a “declining HIV epidemic” in the active drug injecting population in Haiphong.

HCV prevalence was 67% for the PWID in our sample, and 43% among new injectors. These levels are much higher than the HIV prevalence among PWID in Haiphong (25% and 5% for all PWID and new injectors respectively). As Vietnam has expanded access to and use of antiretroviral medication to reduce infectiousness of HIV positive persons, thereby reducing the rates of transmission of the virus, blood-borne HCV transmission continues to be problematic. New direct acting antiviral agents (DAA) can help to reduce further HCV transmission, but this treatment has not expanded in Vietnam in conjunction with expanded ART treatment. While the IBBS 2009 did not report HCV prevalence among PWID or new injectors, a study published by Nadol et al reported HCV prevalence from stored samples of male PWID tested of HIV as part of the 2009 IBBS, with HCV prevalence of 75.8%, slightly higher than the 67% reported for our PWID sample (Nadol, et al., 2015). This data indicate that HCV prevalence has reduced slightly from the previous IBBS participants but still remains much higher than HIV prevalence.

Table 4 presents an historical comparison of the HIV epidemics among PWID in Haiphong and in New York City (Ahmed, Long, Huong, & Stewart, 2015; Des Jarlais, et al., 2000; National Institute of Hygiene and Epidemiology, 2011). Both cities experienced very high prevalence epidemics, with prevalence exceeding 50% in the peak years. Both cities then implemented HIV prevention measures and saw declines in their epidemics. The prevalence and incidence data in Table 4 suggests that Haiphong is behind New York City in “ending the epidemic” among PWID. This is consistent with the current state of interventions for PWID in the two cities. Both cities have needle/syringe programs (exchange and pharmacy sales) that provide good access to sterile injection equipment and both cities have large methadone maintenance treatment programs (with methadone treatment positions for about 25% of heroin injectors). The major difference in current prevention and care services is that New York City has conducted more HIV counseling and testing (98% of PWID have been tested versus 75% in Haiphong) and since 2011 New York City has had a policy to provide ART for all HIV seropositives (New York City Department of Health and Mental Hygiene, 2011) while Vietnam adopted a policy of providing ART to members of “key populations” (including PWID) four years later in 2015 (Organization, 2015).

Kato and colleagues (Kato, et al., 2013) modeled HIV prevention for Can Tho province, Vietnam. Like Haiphong, Can Tho has a concentrated HIV epidemic focused in PWID. Kato concluded that maintaining the 2011 level of interventions in Can Tho would reduce HIV incidence to < 0.001/100 PY for the adult population by 2050 but that scale up of combined interventions (HIV counseling and testing, immediate ART for HIV seropositives, methadone maintenance for persons with opiate use disorders, enhanced condom distribution) for key populations (PWID, MSM, commercial sex workers) would produce HIV incidence <0.001/100 PY by 2025 and would be cost saving by 2029.

Thus, both the historical comparison with New York City and the modeling of a similar concentrated HIV epidemic in Can Tho province suggest that maintaining current

interventions in Haiphong would lead to an “end of the HIV epidemic” among PWID in several decades, but that further scale up of interventions would reduce the time to the end of the epidemic by a decade or more. Given the current high coverage for access to sterile injecting equipment and methadone treatment, scaling up HIV counseling and testing and providing ART to all HIV seropositive PWID would be the highest priority. Reaching the 90-90-90 goals (UNAIDS, 2014) for provision of ART for HIV seropositive PWID should create a Treatment as Prevention environment for PWID and greatly reduce HIV transmission within this population.

The high HIV prevalence among the FCSW and MSM new injectors in this study is also of concern. These FCSW and MSM new injectors may have higher prevalence due to greater sexual risk (higher HIV prevalence among their sexual partners), greater injecting risk (including more HIV seropositives in their injecting networks) and/or less access to HIV prevention services. Additional research to understand the high HIV prevalence among these groups is needed, followed by focused interventions to address the reasons for the higher observed HIV prevalence. In addition, there is significant potential for heterosexual transmission from HIV seropositive male PWID to their non-injecting female sexual partners. Individual and couples counseling on sexual risk reduction, communication and disclosure of HIV status should be expanded and improved (Theodore M Hammett, et al., 2015).

Several limitations of this study should be noted. First, our analysis of prospects for ending the epidemic among PWID in Haiphong is based primarily upon data from the recent RDS survey. Future surveys will be needed to monitor actual progress towards ending the epidemic. Second, the self-reported rates of injecting risk behaviors and sexual risk behaviors were quite low, and may reflect some degree of social desirability bias. Third, our classification of “new injectors” was based on a question for age at first injection. Recall error for this question would have caused misclassification of new injectors. The relatively high HIV prevalence among MSM new injectors and female new injectors suggests an increasing importance of sexual transmission among PWID in Haiphong. We did not have large enough numbers of MSM and FCSW new injectors to estimate HIV incidence for these groups. Finally, while there was HIV prevalence data available from previous IBBS surveys that we used to compare to the HIV prevalence from our sample of PWID, we were not able to evaluate the same trends in HCV prevalence for all previous IBBS studies as this data was not collected, and we were only able to make comparisons to 2009 IBBS data among male PWID participants.

Predicting the future of HIV transmission among PWID in Vietnam requires considerable caution. Policies towards injecting drug use are still in flux, and international donor support is being reduced. Stigmatization of drug use and of HIV and HCV infection persists. Nevertheless, it is apparent that the HIV epidemic among PWID in Haiphong is in a declining phase, and that further scale up of interventions, particularly HIV counseling and testing and provision of ART to all seropositive PWID, should greatly accelerate the decline and that an end to the epidemic among PWID in Haiphong is an attainable public health objective. This will require new strategies to increase the coverage of HIV testing among PWID and to ensure good linkage to care, and good adherence to ART. Provision of direct

acting antivirals (DAA) for HCV infection can help reduce spread of infection and should also be implemented and scaled up in Haiphong, along with strategies to ensure high uptake and adherence to treatment regimens.

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## References

- Ahmed T, Long TN, Huong PT, Stewart DE. Drug injecting and HIV risk among injecting drug users in Hai Phong, Vietnam: a qualitative analysis. *BMC Public Health*. 2015; 15:32. [PubMed: 25631330]
- Amon JJ, Pearshouse R, Cohen J, Schleifer R. Compulsory drug detention centers in China, Cambodia, Vietnam, and Laos: health and human rights abuses. *Health and Human Rights*. 2013; 15:124–137. [PubMed: 24421160]
- Amon JJ, Pearshouse R, Cohen JE, Schleifer R. Compulsory drug detention in East and Southeast Asia: evolving government, UN and donor responses. *International Journal of Drug Policy*. 2014; 25:13–20. [PubMed: 23830970]
- United Nations. , editor. UNODC. World Drug Report 2013. Vienna: 2013.
- Des Jarlais DC, Arasteh K, McKnight C, et al. Consistent Estimates of Very Low HIV Incidence Among People Who Inject Drugs: New York City, 2005-2014. *American journal of public health*. 2016; 106(3):503–8. [PubMed: 26794160]
- Des Jarlais DC, Feelemyer J, Modi S, Abdul-Quader A, Hagan H. High coverage needle/syringe programs for people who inject drugs in low and middle income countries: a systematic review. *BMC Public Health*. 2013; 13:53. [PubMed: 23332005]
- Des Jarlais DC, Kling R, Hammett TM, Ngu D, Liu W, Chen Y, Binh KT, Friedmann P. Reducing HIV infection among new injecting drug users in the China-Vietnam Cross Border Project. *AIDS*. 2007; 21(Suppl 8):S109–114. [PubMed: 18172378]
- Des Jarlais DC, Marmor M, Friedmann P, Titus S, Aviles E, Deren S, Torian L, Glebatis D, Murrill C, Monteroso E, Friedman SR. HIV incidence among injection drug users in New York City, 1992–1997: evidence for a declining epidemic. *American Journal of Public Health*. 2000; 90:352–359. [PubMed: 10705851]
- Desenclos J. Surveillance of infectious diseases: principles and organisation in France in 2005. *Médecine et Maladies Infectieuses*. 2005; 35:232–244. [PubMed: 15907609]
- Feelemyer J, Des Jarlais D, Arasteh K, Abdul-Quader AS, Hagan H. Retention of participants in medication-assisted programs in low- and middle-income countries: an international systematic review. *Addiction*. 2014; 109:20–32. [PubMed: 23859638]
- Hammett TM, Des Jarlais DC, Kling R, Kieu BT, McNicholl JM, Wasinrapee P, McDougal JS, Liu W, Chen Y, Meng D, Doan N, Huu Nguyen T, Ngoc Hoang Q, Van Hoang T. Controlling HIV Epidemics among Injection Drug Users: Eight Years of Cross-Border HIV Prevention Interventions in Vietnam and China. *PloS One*. 2012; 7:e43141. [PubMed: 22952640]
- Hammett TM, Phan S, Nguyen P, Kieu B, Dang S, Nguyen D, Kling R, Oanh KTH. Female Sexual Partners of Male People Who Inject Drugs in Vietnam Have Poor Knowledge of Their Male Partners' HIV Status. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2015; 68:562–567. [PubMed: 25559591]
- Hammett TM, Wu Z, Duc TT, Stephens D, Sullivan S, Liu W, Chen Y, Ngu D, Des Jarlais DC. 'Social evils' and harm reduction: the evolving policy environment for human immunodeficiency virus prevention among injection drug users in China and Vietnam. *Addiction*. 2008; 103:137–145. [PubMed: 18028519]
- Heckathorn, DD. *Social Problems*. Ewing: University of California Press; 1997. Respondent-Driven Sampling: A New Approach to the Study of Hidden Populations.

- Kamarulzaman A, McBrayer JL. Compulsory drug detention centers in East and Southeast Asia. *International Journal of Drug Policy*. 2015; 26:S33–S37. [PubMed: 25727259]
- Kato M, Granich R, Bui DD, Tran HV, Nadol P, Jacka D, Sabin K, Suthar AB, Mesquita F, Lo YR. The potential impact of expanding antiretroviral therapy and combination prevention in Vietnam: towards elimination of HIV transmission. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2013; 63:e142–e149. [PubMed: 23714739]
- Ministry of Health. Document No. 3655 BYT-AIDS on applying revised HIV/AIDS treatment criteria. Vietnam: Provincial Department of Health; 2015.
- Montaner, J.; L, VD.; Yip, B.; Day, I.; Gustafson, R.; Tarríos, R.; Kerr, T.; Wood, E.; Harrigan, R.; Brunham, R.; Krajden, M.; Gilbert, M.; Ogilvie, G.; Hogg, R.; Nakagawa, B.; Daly, P.; Kendall, P. International AIDS Conference. Washington D.C.: 2012. Expanded HAART coverage is associated with decreased HIV/AIDS morbidity and HIV new diagnoses: an update on the ‘treatment as prevention’ experience in British Columbia, Canada.
- Nadol P, O’Connor S, Duong H, Le LV, Thang PH, Tram TH, Ha HT, McConnell MS, Partridge J, Kaldor J, Law M, Nguyen TA. Findings from integrated behavioral and biologic survey among males who inject drugs (MWID) – Vietnam, 2009–2010: evidence of the need for an integrated response to HIV, hepatitis B virus, and hepatitis C virus. *PLoS One*. 2015; 10:e0118304. [PubMed: 25692469]
- National Institute of Hygiene and Epidemiology, United States Agency for International Development (USAID). Results from the HIV/STI Integrated Biological and Behavioral Surveillance (IBBS) in Vietnam. Ministry of Health; 2011.
- New York City Department of Health and Mental Hygiene. Recommendation to Expand Antiretroviral Therapy to All Persons Living with HIV Frequently Asked Questions (FAQ) for Healthcare Providers. New York City Department of Health and Mental Hygiene; 2011.
- Nguyen T, Nguyen LT, Pham MD, Vu HH, Mulvey KP. Methadone maintenance therapy in Vietnam: an overview and scaling-up plan. *Advances in Preventive Medicine*. 2012 2012.
- WHO. , editor. World Health Organization. Maximizing the Treatment and Prevention Potential of Antiretroviral Drugs: Early Country Experiences Towards Implementing a Treat-All Policy. Geneva: 2015.
- USAID. , editor. PSI Vietnam/Metrics. 2012 Behavioral Survey among Male Injecting Drug Users Summary Report. Hanoi: 2013.
- STATA Corp. Stata 12. College Station; Texas: 2012.
- THƯ VIỆN PHÁP LUẬT. Legal Documents: THƯ VIỆN PHÁP LUẬT Retrieved 02/08/2015. [from <http://thuvienphapluat.vn/en/index.aspx>].
- Tran BX, Nguyen LT. Impact of methadone maintenance on health utility, health care utilization and expenditure in drug users with HIV/AIDS. *International Journal of Drug Policy*. 2013; 24:e105–e110. [PubMed: 23937854]
- UNAIDS. 90-90-90 An ambitious treatment target to help end the AIDS epidemic. Joint United Nations Programme on HIV/AIDS. 2014
- USAID, FHI., PEPFAR, Vietnam Authority of HIV/AIDS Control, Hai Phong Provincial AIDS Center, Can Tho Provincial AIDS Center, Institute of Social and Medical Studies (ISMS). Enrollment and Retention in HIV Care and Treatment Services in Vietnam; Facilitators and Barriers for People Living with HIV. 2012
- Van den Berg C, Smit C, Van Brussel G, Coutinho R, Prins M. Full participation in harm reduction programmes is associated with decreased risk for human immunodeficiency virus and hepatitis C virus: evidence from the Amsterdam Cohort Studies among drug users. *Addiction*. 2007; 102:1454–1462. [PubMed: 17697278]
- USAID. , editor. Health Policy Initiative Vietnam. HIV/AIDS, Drug Control, and Drug Treatment in Vietnam. Hanoi: 2013.
- Volz, E.; Wejnert, C.; Degani, I.; Heckathorn, D. Respondent-Driven Sampling Analysis Tool (RDSAT). Ithaca, NY: Cornell University; 2010.
- Vuong T, Ali R, Baldwin S, Mills S. Drug policy in Vietnam: A decade of change? *International Journal of Drug Policy*. 2012; 23:319–326. [PubMed: 22206713]

Human Resource Watch. The Rehab Archipelago: Forced Labor and other Abuses in Drug Detention Centers in Southern Vietnam. Human Resource Watch. 2011

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### Highlights

- We assessed prospects for ending the HIV epidemic among persons who inject drugs in Haiphong Vietnam
- HIV prevalence declined from 68% in 2006 to 25% in 2014 among persons who inject drugs
- Self-reported injecting “risk behavior” was quite low
- Estimated HIV incidence among persons who recently (<5 years) began injecting drugs was 1/100 person-years at risk
- The greatest gap in combined prevention and care services was in the low coverage of ART among HIV seropositive PWID. Scaling up ART for HIV seropositives should greatly accelerate the decline in the HIV epidemic. Ending the HIV epidemic among PWID in Haiphong is an achievable public health goal

**Table 1**

Demographic characteristics, drug use and sexual behaviors and HIV among PWID in Haiphong, Vietnam, 2014

	N (%)
Gender: total (%)	603 (100)
Female	61 (10)
Non-MSM Males	496 (82)
MSM	45 (7)
Drug injection characteristics: total (%)	603 (100)
Heroin (alone)	602 (~100)
Heroin (with other drugs)	3 (<1)
(Meth)Amphetamine	3 (<1)
Receptive sharing	32 (5)
Distributive sharing	19 (3)
Sexual risk behaviors	603 (100)
Unsafe sex with primary partner	172 (29)
Unsafe sex with casual sex partner	15 (2)
Exchanged sex for money	75 (12)
Avg. Age(SD)	37 (8)
HIV serostatus	603 (100)
HIV seropositive	152 (25)
HCV seropositive	403 (67)

\* Gender subgroups do not add up to total due to one transgender subject



**Table 2**

HIV and HCV status by years injecting among PWID, Haiphong, Vietnam, 2014

<b>Years injecting</b>	<b>HIV- N (%)</b>	<b>HIV+ N (%)</b>	<b>HCV- N (%)</b>	<b>HCV + N (%)</b>
All	451 (74.79)	152 (25.21)	200 (33.17)	403 (66.8)
< 1 year	44 (97.78)	1 (2.22)	37 (82.22)	8 (17.78)
1–2 years	62 (93.94)	4 (6.06)	37 (56.06)	29 (43.94)
3–4 year	63 (94.03)	4 (5.97)	28 (41.79)	39 (58.21)
5–6 years	59 (84.29)	11 (15.71)	23 (32.86)	47 (67.14)
7–10 years	83 (69.17)	37 (30.83)	34 (28.33)	86 (71.67)
11+ years	140 (59.57)	93 (40.49)	39 (16.81)	193 (83.19)

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**Table 3**

Demographic characteristics, drug and sexual behaviors and HIV among new injectors, Haiphong, Vietnam, 2014

	N (%)
Gender: total (%)	178 (100)
Female	21 (12)
Non-MSM Males	139 (78)
MSM	18 (10)
Drug injection characteristics: total (%)	178 (100)
Heroin (alone)	178 (100)
Heroin (with other drugs)	0 (0)
(Meth)Amphetamine	0 (0)
Receptive sharing	14 (8)
Distributive sharing	7 (4)
Sexual risk behaviors	178 (100)
Unsafe sex with primary partner	64 (36)
Unsafe sex with casual partner	7 (4)
Exchanged sex for money	31 (17)
Avg. Age(SD)	33 (8)
HIV and HCV serostatus	178 (100)
HIV seropositive	9 (5)
HCV seropositive	76 (43)

**Table 4**

Historical Comparison of HIV infection among PWID in New York City, US, and Haiphong, Vietnam

Year	New York City HIV Prevalence	Haiphong HIV Prevalence
1992	60%	
1998	25%	
2006	13% *	66%
2009	10% *	48%
2014	6% **	25% ***

\* Estimated HIV incidence among all PWID = 1/100 PY

\*\* Estimated HIV incidence among all PWID = 0.1/100 PY

\*\*\* Estimated HIV incidence (new injectors) = 1/100 PY, incidence among MSM and female new injectors likely to be much higher. Estimated incidence among long-term injectors not available