
**THE SYNDEMIC EFFECTS OF INTIMATE
PARTNER VIOLENCE, SUBSTANCE USE, AND
DEPRESSION ON HIV RISK AMONG
INDONESIAN WOMEN WHO INJECT DRUGS:
FINDINGS FROM THE *WOMEN SPEAK OUT* STUDY**

Thesis submitted in partial fulfilment of the degree of Doctor of Philosophy in Social
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ABSTRACT

Background: Women who inject drugs face vast disparities in health outcomes relative to their counterparts in the general population, most notably in HIV. Intimate partner violence (IPV) victimisation has a detrimental individual effect on women's HIV risk behaviour. Furthermore, IPV often co-occurs with substance use and poor mental health among women in high-income countries, but little is known about the cumulative and interactive effects of these conditions on women's HIV risk behaviour in low- and middle-income countries. This thesis applied an ecological approach guided primarily by syndemics theory to understand influences on women's HIV behavioural outcomes. It examined associations and mechanisms linking IPV, substance use, and depression, with HIV sexual and injecting risk outcomes in the first quantitative study of Indonesian women who inject drugs, the Perempuan Bersuara (Women Speak Out) study.

Methods: This study combined community-based participatory approaches and extensive formative research with quantitative survey methods. 731 women, ≥ 18 years of age, and injecting illicit or illegal drugs in the preceding year were recruited using respondent-driven sampling (RDS) from urban settings in Greater Jakarta and Bandung, Indonesia. Network characteristics of the sample were assessed using the RDS software package for Stata 14. Data were analysed using multivariate logistic regressions, marginal effects models, and interaction analyses on the additive and multiplicative scales. The study was conducted in collaboration with the Indonesian Drug User Network.

Results:

Paper 1: Past-year IPV victimisation doubled the odds of engaging in one or more sexual HIV risk behaviours (i.e. unprotected sex at last intercourse, sexually transmitted infection (STI) symptomatology, multiple sexual partners, and survival sex work). Furthermore, several covariates were associated with higher odds of sexual risk behaviour: self-reported HIV-positive status, non-injection crystal methamphetamine use, low educational attainment, younger age, and being single. Co-occurrence of psychological, physical and/or injurious, and sexual forms of IPV had cumulative effects: sexual risk behaviour was reported by 62% of women who did not experience any form of IPV, but increased to 89% among those exposed to all three forms.

Paper 2: Past-year IPV elevated women's odds of receptive syringe sharing. These effects remained after controlling for socio-demographic confounders. Two covariates, injecting illicit pharmaceuticals (vs heroin only) and housing instability and/or homelessness, also remained associated with receptive syringe sharing in multivariate analyses.

Paper 3: More than 1 in 4 women experienced concurrent IPV, depressive symptoms, and crystal methamphetamine use. All three exposures had independent negative effects on HIV sexual risk outcomes. In combination, these conditions had cumulative, interactive, and synergistic effects on women's sexual risk behaviours. The co-occurrence of all three factors produced a 4-fold increase in rates of survival sex work, 5-fold increase in STI symptomatology, and a 7-fold increase in inconsistent condom use. Furthermore, the joint effect of depressive symptoms and crystal methamphetamine use together was greater than the product of the estimated effects of each exposure alone on STI symptomatology,

indicating an interaction on the multiplicative scale. Statistically-significant positive additive interaction was detected between IPV victimisation and crystal methamphetamine on inconsistent condom use; depression and crystal methamphetamine on STI symptomatology and on survival sex work; and IPV and depression on STI symptomatology and survival sex work.

Conclusion: This thesis provides new evidence of the individual and cumulative effects of IPV, methamphetamine use, and depression on HIV risk outcomes among Indonesian women who inject drugs. The interaction analyses are the first to empirically test the assertion that these co-occurring conditions interact synergistically to increase drug-using women's HIV risk. This thesis furthers our understanding of how syndemics function within women who inject drugs to produce health disparities, and, as such, contributes to the problem theory for HIV risk behaviour in this population. The findings of this study have great public health significance and important implications for future longitudinal research, interventions, and policy.

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NOTES ON THE CANDIDATE'S RESEARCH ROLE

This doctorate is based on data from the first epidemiological study of HIV risk among women who inject drugs in Indonesia, the Perempuan Bersuara (Women Speak Out) study.

The survey was designed and led by the D.Phil candidate, working in collaboration with Oxford University's Social Policy and Intervention Department and the Indonesian Drug User Network, and with input from a diverse range of academic, governmental, and community-based partners in Indonesia and internationally. The Indonesian Drug User Network, established in 2006, works across 19 provinces in Indonesia to increase access to HIV prevention interventions and to reduce stigma against people who use drugs.

The candidate managed all aspects of the study development and implementation. Starting in November 2012, the candidate drafted the study protocol and the questionnaire instrument, including developing methods, scales, and measures. Study instruments, measures, and constructs for this study were devised by this candidate in collaboration with the HIV and AIDS Research Centre at Atma Jaya University in Jakarta, the National AIDS Commission, and with the meaningful involvement of women who inject drugs. Following approval from the ethics committees at Oxford and Atma Jaya universities, the candidate applied for a foreign research permit from the Indonesian government. In 2013, the project was reviewed by the Indonesian Ministry of Research and Technology and an official research permit was granted. The candidate subsequently registered the project with the Ministry of Internal Affairs, as well as with national and provincial police, as required by Indonesian law. During D.Phil year 1 and part of year 2, the candidate also led on developing multiple grant applications to finance the Perempuan Bersuara study. Financial support was secured from: Canadian Institutes of Health Research, Pierre Elliott Trudeau

Foundation, UNAIDS Indonesia, The Asian Network of People Living with HIV, the Australian Agency for International Development, and the Australian Injecting and Illicit Drug Users' League.

Between September 2013 and January 2014 (D.Phil Year 2), the candidate established a community advisory group of women who inject drugs and a team of four research assistants and peer community leaders to help conduct formative research and piloting, and facilitate active peer engagement in study management. Formative research included mapping and observation of drug use 'hotspots' and other areas where female drug users would likely gather, in-depth interviews with key informants, and focus group discussions. The aim of formative research was to help the research team optimise implementation details that would lead to a successful survey and inform initial recruit selection.

Guided by formative research, the candidate led further revisions of the questionnaire instrument and related study tools, referral letters, and forms. This included translation and back translation and piloting of study instruments in Bahasa Indonesia. Furthermore, multiple consultations with women who inject drugs who formed the study's Community Advisory Group were conducted in Jakarta and Bandung, Indonesia. Once finalised, the questionnaire tools were coded and programmed to be delivered via tablets. The candidate self-trained in mobile data collection and subsequently led the conversion of the questionnaire to the digitised version required for mobile devices using the open-source platform Open Data Kit. Between June and August 2014, the candidate designed and implemented a series of three-day training sessions on data collection using mobile devices, interview techniques, ethics, and health and safety for a team of seven peer fieldworkers.

From September 2014 to June 2015, this candidate coordinated data collection for the 731 interviews conducted as part of this study. The political and legal situation in Indonesia during fieldwork was very challenging, leading to a number of delays. In January 2015, the Indonesian government launched an aggressive anti-drug initiative, which translated into targeted, daily raids by law enforcement agencies in many of the catchment areas of the study. This led to a number of disruptions and to slower recruitment. As such, the fieldwork timeline was extended to June 2015 to facilitate recruitment of the desired sample size.

Upon return from fieldwork, between late 2015 and early 2016, the candidate cleaned the dataset and self-trained in data analysis for respondent-driven sampling data in Stata. The candidate conducted analyses and presented data at key meetings and consultations with UNAIDS, National AIDS Commission, Ministry of Health, and the Indonesian Commission on Violence Against Women, and disseminated widely at the local, national, and international levels.

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CHAPTER 1. INTRODUCTION AND BACKGROUND¹

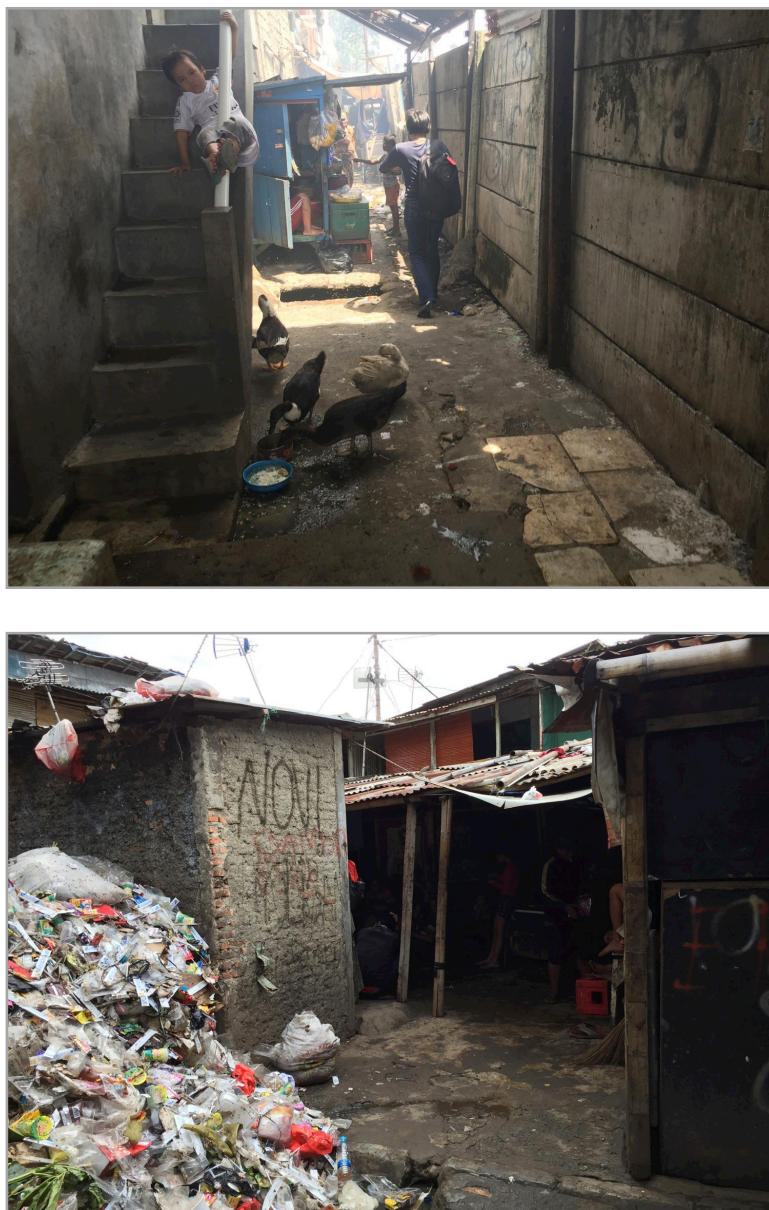


Figure 1.1: Urban study sites in West Jakarta (top) and East Jakarta (bottom)

¹ Images depicting fieldwork scenes are provided at the start of each chapter. All photographs are taken by the author and have been reproduced with permission from all individuals who appear in them. Unless otherwise stated, the appearance of individuals throughout this document gives no indication of their drug use or HIV status.

1.1 Introduction

Globally, women who inject drugs² experience significant health disparities, particularly in human immunodeficiency virus (HIV). According to the World Health Organisation, a health disparity refers to a preventable population-specific difference in health status or access to health care which systematically and negatively impacts less advantaged groups (Dehlendorf et al. 2010; WHO 2017). Relative to their male counterparts and to women in the general population, women who inject drugs shoulder a disproportionate burden of HIV (Roberts, Mathers, and Degenhardt 2010; Larney et al. 2017; Des Jarlais, Feelemyer, Modi, Arasteh, and Hagan 2012).

Women's elevated vulnerability to HIV tends to occur alongside multiple co-morbidities. HIV frequently clusters together with intimate partner violence (IPV) victimisation,³ substance use, and poor mental health among marginalised female populations in the United States (U.S.) (Meyer, Springer, and Altice 2011). Combined, these intertwined health problems have heightened detrimental effects on women's health (Gilbert et al. 2015). However, extant evidence on health inequalities among substance-using women is limited in other geographical settings, especially in low- and middle-income countries.⁴ In

² All uses of the term "drug" or "substance" refer to substances controlled under the international drug control conventions (i.e. illegal), and/or to regulated/prescription-only substances used without a prescription (i.e. illicit). Alcohol is not included in this definition because it is a legal substance and is outside the scope of the present study. Due to scientific and legal ambiguities regarding the distinction between terms such as "drug use", "drug misuse" and drug abuse", the neutral terms "drug/substance use and/or consumption" are used in this thesis.

³ The World Health Organisation defines intimate partner violence as physical violence (i.e. slaps, punches, kicks, assaults with a weapon), sexual violence (i.e. rape, coercion and abuse, use of physical force, verbal threats and harassment to have sex, unwanted touching or physical advances), psychological violence (i.e. belittling, intimidation, withholding of resources), and any violence (a combination of physical, sexual, and psychological violence by a current or former intimate partner).

⁴ This thesis uses World Bank income category classifications comprising of low-, lower-middle-, upper-middle, and high-income countries, based on estimates of gross national income (GNI) per capita.

particular, HIV is one of the most pressing, but least researched, health concerns among women who inject drugs in Asia. This thesis examines health disparities among women in a lower-middle income setting in Asia by empirically investigating their aetiology and elucidating the processes by which they are sustained and propagated. Specifically, the three manuscripts that comprise this doctoral thesis aim to address this research gap by conducting the first large-scale, epidemiological study of HIV risk among women who inject drugs in Indonesia. The thesis applies a syndemic theoretical framework to understand whether and how adverse health and psychosocial conditions accumulate and intersect to exacerbate women's HIV risk. This knowledge is essential for better understanding the HIV epidemic and its determinants in this highly-marginalised population, and developing appropriate responses.

1.2 Women, injecting drug use, and HIV: global prevalence and regional impact in Asia

Despite over three decades of HIV prevention efforts, the global share of HIV infections shouldered by women is increasing. In 2016, women accounted for 52% of the 37 million people estimated to be living with HIV globally, compared with 46% in 1999 (UNAIDS 2016, 2000). Women from key populations are disproportionately affected by HIV compared with other women of similar age (Degenhardt et al. 2013). A key population is a sub-population that has an elevated risk of contracting HIV in certain situations and contexts compared with the general population (WHO 2013b). People who inject drugs are one such at-risk group. Relative to the general population, people who inject drugs are 28 times more likely to be infected with HIV, with one in five injectors globally living with the virus (UNODC 2017).

An estimated one third of the 16 million people who inject drugs worldwide are female, and this proportion is rising (Larney et al. 2015). Meta-analytic evidence from 14 countries with concentrated HIV epidemics among injecting populations shows that women who inject drugs experience significantly higher HIV rates than male injectors, although the overall effect size was modest (Des Jarlais, Feelemyer, Modi, Arasteh, and Hagan 2012). Based on data from 30 countries, pooled HIV prevalence was 13% among women who inject drugs, compared with 9% among men who inject drugs (UNAIDS 2014a). Relative to other regions, Asia⁵ is home to the largest absolute numbers of women who inject drugs and amphetamine-dependent women globally – 1.5 million and 2.4 million, respectively – yet no interventions to reduce HIV risk behaviours in this population have been tested in the region (Larney et al. 2015). Among countries with sex-disaggregated data, HIV prevalence among samples of women who inject drugs ranges from 6% in China, to 30% or higher in Indonesia, Malaysia, Philippines, and Thailand (Larney et al. 2015).

The heightened risk of HIV infection among drug-using women is driven by both sexual risk-taking and unsafe drug-using practices (Roberts, Mathers, and Degenhardt 2010). Among the most common drug-related HIV risks is the sharing of contaminated needles and syringes (Lorvick et al. 2006). Sexual risk behaviours associated with HIV transmission among drug-involved women include engaging in unprotected vaginal and anal sex (Deiss et al. 2012; Wang et al. 2009; Patterson et al. 2008) with regular or casual partners and sex-

⁵ Asia refers to approximately 42 countries and jurisdictions that make up the South-East Asia and Western Pacific regions, based on World Health Organisation geographical classifications. Indonesia, the which is the focus of this thesis, is part of South East Asia sub-region, which includes an additional 10 states (Bangladesh, Bhutan, Democratic People's Republic of Korea, India, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, Timor-Leste). To maintain consistency and relevance in relation to World Bank income categories, Australia, Brunei Darussalam, Japan, New Zealand, and Singapore are not included in the area defined as “Asia” in the context of this thesis.

trading clients (Sherman and Latkin 2001), sexual concurrency, and trading sex for money, drugs, shelter and/or basic needs (Shannon et al. 2015).

Persistent HIV infection disparities among women pose a considerable public health challenge, since HIV is associated with several adverse health outcomes. Among women who inject drugs, these include greater sexual and injecting risk behaviours, increased AIDS-related mortality, and lower engagement in treatment and care as compared to drug-using men (Roberts, Mathers, and Degenhardt 2010; Schafer et al. 2012) and to their age-matched counterparts in the general population (Mathers et al. 2013). In order to design and test appropriate interventions, we must first understand the correlates and mechanisms for HIV transmission risk in this population.

It is important to note that global and regional estimates on HIV and drug use, including those presented here, are limited by several gaps. First, data on women who inject drugs in general are extremely limited, particularly in low- and middle-income countries. Typically, this is because many countries do not collect such data. When data on women who inject drugs are collected, sample sizes of women who inject drugs included in national HIV surveillance are often too small to allow for sufficiently-powered statistical analyses. As a result, many countries choose either not to disaggregate data by sex, opting instead to report overall estimates for people who inject drugs that combine data from both males and females, or drop data on women who inject drugs from analyses altogether. The poor visibility of women, pervasive criminalisation of drug use, and differential treatment based on gender contribute to the underrepresentation of women in research (Larney et al. 2015; Iversen et al. 2015). Therefore, given current limitations in the data, it is likely that the

elevated HIV risk faced by women who inject drugs is much greater than the existing estimates suggest.

1.3 The accumulation of health disparities among women who inject drugs

Women who inject drugs also experience disparities in rates of other health and psychosocial outcomes, particularly intimate partner violence (IPV) victimisation. Several studies in the U.S. have found that exposure to IPV is more prevalent among women who inject drugs vis-à-vis women in the general population. Rates of past-year IPV victimisation range from 20% to 57% among clinical and community-based samples of female drug users, which is two to five times higher than prevalence rates among U.S. general female populations (El-Bassel et al. 2011; Moore et al. 2008).

Similarly, research on mental health disparities in U.S. samples of substance-using women indicate that their lifetime rates of psychological distress and major depressive disorder are higher than rates among women in the general population (Bassuk et al. 1998; Kessler, Berglund, and Demler 2005). In samples of persons dependent on heroin from a range of high-income countries, the prevalence of depression ranges between 16% and 44% (Havard et al. 2006; Teesson et al. 2005; Rodriguez-Llera et al. 2006), and is twice as high among women than men (Sordo et al. 2012; Torrens, Gilchrist, and Domingo-Salvany 2011).

Together, the clustering of substance use, HIV, IPV victimisation, and poor mental health can cumulatively worsen women's health. Research in the U.S. has documented increases in drug-involved women's adverse health outcomes with the number of exposures to these co-morbidities (Illangasekare et al. 2013; Sullivan, Messer, and Quinlivan 2015; Loeliger et al. 2016). It has been suggested that this set of adverse health outcomes, particularly their

coexistence and interaction, may also be driving the HIV epidemic among women who inject drugs in low- and middle-income countries, but little empirical research exists to support this assertion outside of the U.S. (Azim, Bontell, and Strathdee 2015; Gilbert et al. 2015). Within Asia, the present study focuses on Indonesia, which is experiencing a rapidly-escalating HIV epidemic among women.

1.4 National epidemiological, policy, and programmatic context

1.4.1 Drug use in Indonesia

Indonesia, a predominantly Muslim archipelago nation comprising approximately 17,000 islands, is home to the fourth largest population in the world. With its permeable borders, 56,716 kilometers of coastline, and strategic entry point into South East Asia, Indonesia is a key destination and transshipment point for narcotic drugs trafficking from other parts of South East Asia, Africa and the Middle East (Nasir 2010). In the past decade, it has also developed into a manufacturing hub for amphetamine-type stimulants⁶ and cannabis (UNODC 2016).

Recent economic and political instability have also contributed substantially to Indonesia's vulnerability. In 1998, after 32 years of military dictatorship, General Suharto was ousted from power. The social upheaval that followed the fall of Suharto's regime, coupled with the financial crisis of 1998 – 2000, provided a fitting context for the expansion of the illicit drug trade and drug consumption. With 60% of national resources going toward paying off

⁶ Amphetamine-type stimulants is an umbrella term used to refer to amphetamines, including methamphetamine and crystal methamphetamine, and to a group of drugs that are chemically similar to amphetamines and have amphetamine-like stimulant effects (e.g. dexamphetamine, ephedrine, and methylenedioxymethylamphetamine, also known as "ecstasy").

a foreign debt of approximately US\$162 billion, the proportion of people living below the poverty line rose from 13% in 1997 to more than 35% in 1999 – 2000, and basic health and education services were neglected (Irwanto 2006). The effect of the economic crisis was particularly acute on the urban poor. In the face of unemployment and absence of economic opportunity, many turned to drug use and to the sale, distribution, and production of illicit drugs. Although Indonesia transitioned from autocratic rule to become the world's largest democracy, post-1998 governments have not been successful in establishing the rule of law and reining in pervasive corruption (Irwanto 2006). Indonesia's drug trade and the subsequent rise of illicit drug consumption have been sustained by the military and law enforcement's complicity in drug trafficking (Aspinall and van Klinken 2010). Consequently, although the use of heroin had temporarily waned during the 1980s, it re-emerged in full force in the late 1990s.

1.4.1.1 Data sources on drug use

There are two main sources of drug-related data in Indonesia. The first source is the National Narcotics Agency, which has collected data on rates of substance use in the general population and population estimates of drug users since 2004. The National Narcotics Agency produces estimates on the prevalence of different types of substances and drug use severity based on general household surveys. According to the latest published figures, there are 4 million people who use drugs⁷, among whom over 1 million are women (National Narcotics Agency 2014). Low-grade heroin (*putaw*) was used by approximately 96,000 people in the previous year, among whom about 22,000 (23%) were

⁷ The National Narcotics Agency included the following substances in the definition of "drugs" used for this estimate as part of its 2014 survey: cannabis (*ganja*), hashish, heroin (*putaw*), ecstasy (*inex*), crystal methamphetamine (*sabu*), cocaine, LSD, and illicit pharmaceuticals, largely in the opiate and benzodiazepine class of substances, used without a prescription (i.e. valium, xanax, rohypnol, nipam).

female. Amphetamine-type stimulants, including ecstasy and crystal methamphetamine (crystal meth), the most widely used drug in Indonesia, were consumed by more than 1.3 million people, among whom 294,000 (23%) were women. An estimated 67,000 people injected drugs (no sex-disaggregated estimate is reported for individuals who inject) (National Narcotics Agency 2014). However, caution must be exercised when interpreting these data, since general household surveys may not adequately capture problematic drug users, particularly persons who inject drugs (Johnson 2014). Underreporting of illicit and illegal behaviours is common in household surveys due to fear of legal repercussions (UNAIDS and WHO 2010), especially in countries with punitive drug legislation such as Indonesia. Furthermore, the validity of National Narcotics Agency estimates has been criticised due to the lack of differentiation between different types of drugs, frequency and patterns of their use (Irwanto et al. 2015).

The second source of data related to injecting drug use is the Ministry of Health. The Ministry of Health produces prevalence and population estimates of key populations at risk of HIV. Population estimates for people who inject drugs were conducted in 2008, 2012, and 2016. The latest population estimate, from 2016, remains unpublished. The last published figures from 2012 estimated the total number of people who inject drugs to be 74,326 (61,901 – 88,320) (Ministry of Health 2012). These estimates are produced using multiplier methods, which rely on multiple sources of data, including existing data from programmes that work with persons who use drugs (i.e. drug treatment, needle syringe services) and representative surveys of the population whose size is being estimated (Ministry of Health 2014). Multiplier methods are preferable to household surveys and to enumeration methods, especially when the population's sampling frame is uncertain or

when the population is difficult to reach (UNAIDS and WHO 2010). However, a key limitation of these data is the lack of disaggregation by sex. Throughout this thesis, Ministry of Health population estimates are used to report on HIV and injecting drug use indicators. Where data from the Ministry of Health are not available (e.g. population estimates for users of amphetamine-type stimulants), National Narcotics Agency data sources are used instead.

The next two sections describe the emergence and epidemiology of HIV among the highest-risk segment of drug users in Indonesia – those who inject drugs. The first section focuses on the increasing burden of HIV borne by women, and explores the multiple vulnerabilities faced by female injecting drug users. This is followed by a summary of the national policy and programmatic context within which the present study took place.

1.4.2 Epidemiology of HIV in Indonesia

Indonesia's first case of acquired immune deficiency syndrome (AIDS), caused by untreated infection with the human immunodeficiency virus (HIV), was registered in 1987. Eight years later, the first AIDS case was registered among people who inject drugs. Since then, injecting drug users have shouldered an increasing proportion of the country's HIV and AIDS burden (Mesquita et al. 2007). Between 2006 and 2011, Indonesia experienced a 10-fold increase in the cumulative number of HIV cases, from 7,195 in 2006 to 76,879 in 2011, with people who inject drugs accounting for the greatest proportion of incident cases in the years leading up to the height of the epidemic in 2008. That year, a national survey found that more than half (52.4%) of all people who inject drugs were living with HIV (Indonesian National AIDS Commission 2009). By 2015, national HIV prevalence among this group decreased to 28.8% (Ministry of Health 2015), due in part to high AIDS- and

overdose-related mortality rates, and to expanded distribution of sterile injecting equipment and provision of opioid substitution therapy, which reduce risk behaviours that lead to HIV transmission (WHO, UNODC, and UNAIDS 2012). However, the declining national HIV prevalence in this group masks wide regional and local variations. HIV rates among people who inject drugs in many urban centres, such as Jakarta, the main research location of the present study, remain well above the national average (43.6%) (UNAIDS 2014a).

Indonesia now faces the fastest growing HIV epidemic in Asia, and women are increasingly affected (UNAIDS 2014a). By 2016, there were approximately 690,000 (range 600,000–790,000) people living with HIV, up 96-fold since 2006. This represents the third largest number of people living with HIV in the region, behind China and India (UNAIDS 2017). While male injecting drug users drove the onset of the epidemic, women now comprise a growing segment of people living with HIV – from 34.4 % in 2008 to 42.3 % in 2013 (Ministry of Health 2014).

The heightened proportion of women infected with HIV may be related to the changing nature of the epidemic. Several studies have predicted the transition from a concentrated to a more generalised HIV epidemic due to the sexual behaviour of key populations, as has also been observed in Indonesia (Pisani et al. 2003; Morineau et al. 2012; Magnani et al. 2010) and in international settings such as China, Argentina, Brazil, and Ukraine (Des Jarlais, Feelemyer, Modi, Arasteh, Mathers, et al. 2012). These predictions are consistent with national estimates, which confirm that HIV cases associated with unsafe injecting drug use decreased from 50% in 2007 to 19 % in 2011, while cases associated with heterosexual transmission increased from 42% to 71% (Indonesian National AIDS Commission 2012).

Although injecting drug use currently accounts for fewer new HIV infections, the growing use of amphetamine-type stimulants (ATS) is being recognised as an important factor for the sexual transmission of HIV (Neverndorff and Praptoraharjo 2015). National bio-behavioural surveillance further suggests that in 2015, people who inject drugs experienced the highest rates of HIV risk behaviour as compared to other groups at high risk of HIV, such as men who have sex with men, transgender individuals, and female sex workers. Specifically, people who inject drugs not only had the lowest past-year rates of condom use compared with other groups, but their levels of past-year condom use consistency actually declined, from 14% in 2011 to 2.5% in 2015 (Ministry of Health 2015). Similarly, rates of condom use at last sexual intercourse among injectors dropped, from 56.3% in 2011 to 17.9% in 2015.

Women who inject drugs may be at the epicenter of this epidemiological shift. Particularly, they may be bridging the epidemic to a wider population. Women are estimated to comprise about 11% of all people who inject drugs in Indonesia, but precise sex-disaggregated population estimates are not available (Pinkham, Stoicescu, and Myers 2012). Despite their smaller numbers compared with their male counterparts, Indonesian women who inject drugs face elevated vulnerability to HIV through both unsafe injecting and high-risk sexual practices (Habsari et al. 2007; Sari and Nurmaya 2009; Spooner et al. 2010). In 2009, the only year for which sex-disaggregated estimates are available, national HIV prevalence among women who inject drugs was 57.1%, compared with 52.1% among male injectors (Indonesian National AIDS Commission 2009).⁸ Due to data limitations, it is

⁸ Statistical significance for these estimates was not reported. The reliability of the estimates is additionally limited by the small number of women who inject drugs included in the 2009 national bio-behavioural surveillance study (n = 54) which may not be representative of the overall female injecting drug user population, nor allow for sufficient power to detect statistical significance.

difficult to say whether HIV rates among female injectors continued to exceed HIV rates among their male counterparts. A notable limitation of the existing data is its focus on male injecting drug users. The proportion of female drug injectors as part of subsequent surveillance surveys in 2011, 2013, and 2015 only made up 1 – 8% of sample sizes, limiting the ability to make inferences. As a result, sex-disaggregated analyses have remained unreported or discarded from analyses altogether. In view of the fact that injecting drug use is a highly stigmatised activity and an illegal act with harsh penalties (Lai, Asmin, and Birgin 2013), reaching people who use drugs in Indonesia is challenging. Recruiting sufficient numbers of women who inject drugs into surveys is particularly difficult because women are more stigmatised and discriminated against by health services, the general community, peers, and family (Spooner et al. 2010). This gendered stigma drives women away from services, and leads them to restrict their social circle, thus making them harder to reach (Spooner et al. 2015). Consequently, little is known about women who inject drugs in Indonesia, despite indications that they may be more susceptible to HIV transmission compared with their male counterparts. The lack of research on women who inject drugs, combined with their elevated vulnerability, point to an urgent need to better understand the drivers of their HIV-related injecting and sexual risk behaviours.

In the absence of national, sex-disaggregated quantitative data, harm reduction program data and qualitative evidence confirm Indonesian drug-using women's heightened vulnerability to HIV. Program data are collected by government harm reduction service providers annually by administering surveys to persons who access needle syringe programmes across the country. In 2012, the last year for which such data were disaggregated by sex, approximately 1 in 5 (22%) women injecting drugs and living with HIV

reported sharing needles and syringes in the preceding week, compared with 7% of male HIV-positive injecting drug users who shared needles and syringes during the same period (Blogg 2012).

Moreover, qualitative evidence points to a gendered HIV sexual risk among substance-using women (Sari and Nurmaya 2009; Habsari et al. 2007; Saktiawati et al. 2013; Stigma Foundation 2010; Lazuardi et al. 2012). For example, in qualitative interviews with 19 women who inject drugs in Central Java, Saktiawati and her colleagues (2013) detected low rates of condom use and little negotiating power among women. Specifically, women reported that in situations where they felt at risk of HIV infection through unprotected sex, their priority was the preservation of trust and consideration of the partner's wishes, rather than personal risk aversion (Saktiawati et al. 2013). This consideration applied to all types of intimate partners (i.e. steady, casual, and transactional/commercial). A 2007 study among 52 female injecting drug users recruited from seven cities documented the practice of *turbo* (*tukar body*, literally "trading one's body"), a form of transactional sex between women and drug dealers performed in exchange for drugs (Habsari et al. 2007). This practice, viewed as commonplace in Indonesia's drug-using community (Habsari et al. 2007), creates an unequal power dynamic and limits women's capacity to negotiate safer sexual behaviours, especially if women and/or their sexual partners are under the influence of drugs. In relationships where both partners use drugs, *turbo* may be encouraged by women's partners to help procure drugs for both parties as part of a gendered division of labour (Sari and Nurmaya 2009). These studies suggest that women who inject drugs in Indonesia experience multiple potential HIV vulnerabilities. However, the lack of rigorous

research with adequate sample sizes limits the ability to understand these risks and their etiology.

This section summarised the emergence and characteristics of the HIV epidemic in Indonesia, with a focus on the elevated risks faced by women. It showed that despite the elevated vulnerability to HIV among women who inject drugs, little is known about the drivers of HIV risk behaviour in this group. The next section addresses the policy and programmatic context that shape interventions for this population, with a focus on the Indonesian context.

1.4.3 National policy and programmatic context in Indonesia

1.4.3.1 National policy context

The intersection of substance use and HIV in Indonesia exists within a highly punitive legal environment. Indonesia has ratified all three United Nations (UN) conventions on drug control.⁹ The country's subsequent drug laws, enacted in 1997, adopt severe sanctions to govern the supply and demand of controlled drugs, including the death penalty for certain drug trafficking offences. In 2009, faced with growing concern over the rapidly expanding HIV epidemic driven primarily by injecting drug use, the Indonesian government passed a new law to oversee the use and supply of drugs, Narcotics Law no. 35 (Republic of Indonesia 2009). Several institutions, whose mandates span the criminal justice and health systems, are charged with implementing the new drug law. Among these is the National Narcotics Agency, an influential, independent, and quasi-judicial body responsible for prevention,

⁹ These include UN Single Convention on Narcotic Drugs (1961), the UN Convention on Psychotropic Substances (1971) and the UN Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances (1988).

interdiction, and treatment and rehabilitation activities. The Indonesian National Police shares drug interdiction responsibilities with the National Narcotics Agency and focuses on drug-related arrests. Also related to this effort is the Ministry of Justice and Human Rights, which is responsible for interventions inside the prison system.

While the new drug policy introduced measures that addressed drug consumption from a health-focused perspective, it maintained a primarily punitive approach. In conjunction with Government Regulation no. 25/2011, the new law introduced requirements for people who use drugs over the age of 18 and their families to report themselves to designated institutions for mandatory treatment and rehabilitation, or face fines and imprisonment. While officially aimed at extending the provision of drug dependence treatment, in practice, the compulsory registration system has resulted in the increased prosecution of drug users and has been plagued by charges of corruption and human rights violations (Wirya and Misero 2016). For instance, Law no. 35 provides judges with discretionary powers to impose drug dependence treatment as an alternative to imprisonment for people who use drugs. However, since the law failed to distinguish between those who use and those who traffic drugs, it has not been implemented uniformly. This has led to continued high rates of imprisonment of people arrested on personal possession charges (Lai, Asmin, and Birgin 2013). As of February 2016, there were nearly 70,000 men and women incarcerated for non-violent drug-related crimes, representing nearly 40% of all prisoners in Indonesia (Ministry of Law and Human Rights 2016). Injecting drug use has been widely documented in Indonesian prisons, as has high HIV prevalence associated with unsafe injecting (UNAIDS 2013).

Furthermore, the lack of clarity in Indonesian drug law on penalties for possession of

various amounts of substances and on whether possession of injecting paraphernalia such as needles and syringes is prohibited by law, means that prosecutors have broad scope to use drug paraphernalia as evidence for prosecution and to apply harsh sentences. Persons charged under the 2009 law are often expected to bribe the police, the attorney general, and the courts in order to avoid heavier sentences – a practice known as the “peace way” (Stoicescu and Cook 2013). Numerous human rights violations committed by the police against people who use drugs have been documented in recent years, including police-perpetrated physical and sexual violence, neglect of the right to health, and disproportionate punishment, with women bearing a heavier burden of abuse and violence than men (Davis, Triwahyuono, and Alexander 2009; Sari and Nurmaya 2009; Open Society Foundations 2012).

1.4.3.2 National programmatic context

Alongside the enactment of punitive drug policies, the Indonesian government has since 2003 allowed for the provision of HIV-focused health services, including harm reduction programs (Mesquita et al. 2007). In 2004, the “Sentani Commitment”, an agreement between key stakeholders to provide access to antiretroviral treatment, needle syringe programmes, and opioid substitution therapy in six priority provinces, was launched by the newly-formed National AIDS Commission (Morineau et al. 2012). This commitment was further confirmed and scaled-up in Indonesia’s National AIDS Strategy 2007 – 2010 and the National Strategic Plan for 2010 – 2014 (Indonesian National AIDS Commission 2014). At the national level, responsibilities for implementing drug- and HIV-related health programmes are divided among the National AIDS Commission, Ministry of Health, Ministry of Social Affairs, and the National Narcotics Agency. The National AIDS Commission, an

independent body attached directly to the Presidential Cabinet, is responsible for formulating HIV-related policies, guidance, and monitoring HIV trends. The Ministry of Health is responsible for implementing the national response to HIV, including harm reduction services, through local community health centres (*puskesmas*), and for conducting national HIV surveillance. Although the primary focus of the National Narcotics Agency is drug demand and supply reduction, the agency is also responsible, along with the Ministry of Social Affairs, for operating drug treatment and rehabilitation centres. Moreover, non-governmental organisations have played an important role in harm reduction and other HIV prevention service implementation.

Although Indonesia has implemented evidence-based harm reduction interventions to address HIV among people who inject drugs, scale-up and uptake of such interventions has been uneven. For instance, although the number of sites distributing sterile needles and syringes has increased steadily, coverage figures indicate that 2016 national coverage levels equalled 44 needles and syringes per year per person injecting drugs – one of the lowest coverage rates in Asia (Stone 2016). By contrast, UN guidelines suggest that coverage levels should reach 200+ syringes per person injecting drugs per year in order to have a measurable impact on reducing HIV at the population level (WHO, UNODC, and UNAIDS 2012). Despite the availability of free antiretroviral treatment for HIV in Indonesia, access to such treatment for people who inject drugs is limited due to the lack of appropriate follow-up, high drop-out rates, and frequent treatment stock-outs (Stone 2015). Despite high rates of HIV testing and counselling among people who inject drugs, only 6% of people injecting drugs and living with HIV are receiving antiretroviral treatment (Stone 2014).

Existing programmes may be even more limited in scale, coverage, and accessibility for women who inject drugs. Qualitative research in Indonesia indicates that uptake of harm reduction services among women is low because substance-involved women face multiple barriers to access. These include stigma and discrimination from their families, communities, and health service providers (Sari and Nurmaya 2009; Spooner et al. 2015), low levels of knowledge and awareness about women's reproductive and sexual health needs among drug-service providers (Stigma Foundation 2010), unequal relationship power dynamics and control by male partners (Lazuardi et al. 2012; Saktiawati et al. 2013), violence perpetrated by both intimate and non-intimate partners (Habsari et al. 2007), punitive laws and fear of arrest (Davis, Triwahyuno, and Alexander 2009), and lack of female-friendly harm reduction programmes that include childcare, specialised, women-specific services, or couples-based programs (Spooner et al. 2010; Pinkham, Stoicescu, and Myers 2012).

The uneven coverage and availability of HIV interventions is largely a result of political decentralisation and of continued criminalisation enshrined in Indonesia's drug policies. As part of Indonesia's post-1998 democratisation, a process of decentralisation of power and budgets, and consequently decentralisation of responsibilities on public policies and governance, was initiated (Mesquita et al. 2007). The aim of these reforms was to improve the responsiveness and accountability of governments at the district and local levels, but it has also posed challenges to the efficient operation of the public health system. In the area of drug control, the National Narcotics Agency and the Ministry of Health have encountered difficulties in ensuring the consistent implementation of laws and policies across Indonesia's 33 provinces, and in developing collaborative working relationships

between law enforcement and health ministries at all levels of government (Lai, Asmin, and Birgin 2013). This has led to nationwide inconsistency in the enforcement of laws by police and judicial authorities, and the uneven availability and quality of drug- and HIV-related services (Nasir 2010).

In conclusion, Indonesia has applied an ambivalent approach to drug use: the government has enacted harsh drug laws, while simultaneously supporting the development of health-focused interventions for people who inject drugs. The criminalisation of people who use drugs under Indonesia's drug laws, combined with systemic corruption within the criminal justice system, have posed obstacles to the implementation of effective HIV prevention interventions among this population. Instead, existing policies often drive people who inject drugs into increasingly marginal environments due to fear of arrest. These obstacles are magnified for women who inject drugs, considerably limiting their uptake of existing HIV-related health and support services.

1.5 Conceptual and theoretical framework

1.5.1 Conceptual framework

Systematic reviews have highlighted the potential for existing interventions to promote successful HIV prevention among drug-using women (Hardee et al. 2014; Gupta, Ogden, and Warner 2011; Blankenship et al. 2015; Wechsberg et al. 2015). Although targeted interventions that address the HIV vulnerabilities of women who inject drugs are urgently needed, the evidence base to guide the design of such interventions is weak, especially in low- and middle-income countries (Blankenship et al. 2015). The development phase of any intervention must be substantiated by existing literature, which can in turn inform a theory of change, as well as process and outcome measures (Medical Research Council 2006). Formulating a robust theory of change requires a clear problem theory grounded in an analysis of risk factors and pathways between these factors (Craig et al. 2008; Blankenship et al. 2015). The aim of this doctoral study, the Perempuan Bersuara study, is to contribute towards defining the problem theory needed to guide further longitudinal research and, ultimately, intervention development, for women who inject drugs in Indonesia. The study aims to do so by exploring potential patterns of associations between theory-informed factors and women's behavioural HIV risk outcomes.

The study methodology uses an ecological theoretical framework which recognises the cumulative and interacting effects of multi-level influences on women's HIV risk behaviour (Auerbach and Smith 2015). Within an ecological conceptual framework, this study uses syndemics theory (Singer 1996, 2006; Singer et al. 2017) and the social-ecological model (Baral et al. 2013) to guide the exploration of factors that potentially co-occur and interact

to heighten women's HIV risk behaviour. Such risk factors may function in different spheres or levels of a woman's life, such as individual, relational, or social/structural. These risk factors may also interact between and across different domains.

1.5.2 Theoretical foundations for behavioural HIV research

Traditional approaches to HIV prevention among people who inject drugs have largely focused on individual-level risk factors and theories of behaviour change (Kippax 2012). A recent systematic review of observational and intervention studies on HIV risk among women who use drugs found that few studies used a theoretical framework at all (26/69, 38%) (Auerbach and Smith 2015). Among studies that were theory-informed, the most common theories were variants of individual-level social-cognitive theories. Only a few studies (13/69, 19%) went beyond factors operating at the individual level to articulate how dynamics at the social and structural levels heightened women's vulnerability to HIV. Such approaches are grounded in the assumption that individuals have sufficient autonomy to mitigate their HIV risk (e.g. by using condoms or not engaging in otherwise risky sexual practices, and by obtaining clean needles and syringes for injection). Rhodes (2002), citing Diclemente and Peterson (1994), argues that this depiction of risk reduction results from the dominance of concepts of "reasoned action", "rational decision-making", and "self-efficacy" in shaping early HIV prevention research (Diclemente and Peterson 1994; Rhodes 2002). Central cognitive-behavioural theories that have dominated HIV behavioural studies include, but are not limited to, Social Cognitive Theory (Bandura 1986), Theory of Reasoned Action (Fishbein and Ajzen 1975), and Health Belief Model (Becker 1974). These theories suggest that behaviour change occurs primarily at the individual-level, shaped by factors such as knowledge, attitudes, beliefs, and intentions. This promotes a perspective of

behavioural risk-taking as a product of calculative, rational, and context-free risk assessment (Rhodes 2002). Based on this perspective, rational behaviour is viewed as synonymous with risk avoidance, while individuals engaging in risk behaviour may be characterised as irrational or dysfunctional (Rhodes et al. 2005). This depiction places the responsibility and blame of risk-taking almost wholly on the individual. In doing so, it masks contextual pressures on decision-making and power inequalities related to risk negotiation, which may be related to gender, material, and/or economic inequality (Kippax 2012; Wechsberg et al. 2015).

The limitations of the individual-focused theoretical approaches outlined above suggest that a more nuanced approach is needed in relation to the exploration of HIV-related health disparities among drug-using women. Auerbach (2015) argues that HIV risk resides not just at the individual behavioural level but also at the relational and social-structural levels. Indeed, accumulating research from high-income countries, largely the U.S., has shown that HIV risk among women who inject drugs stems as much from the different contexts in which drug use occurs as it does from the HIV transmission-related behaviours of individual women (Wechsberg et al. 2015). Physical, social, cultural, economic, and political environments can create, shape, and perpetuate different HIV risk behaviours (Strathdee et al. 2015). When applied to the current aim of this thesis – understanding health disparities among women who inject drugs – an individual-focused depiction of risk behaviour obscures the multiple HIV risk dynamics that may limit women's autonomy. These dynamics can include gender-related power and relationship inequalities, social norms tolerating male sexual dominance and violence, and limited economic opportunities for women (Wechsberg et al. 2015). For substance-involved women, the interaction of

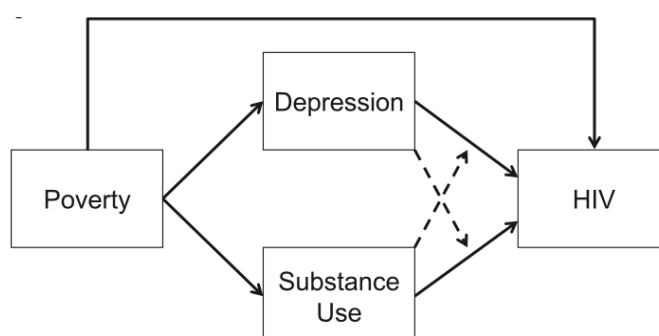
gender-related power dynamics and drug use can heighten vulnerability to HIV, while inhibiting the ability to mitigate personal HIV risk (Auerbach and Smith 2015). For instance, U.S. research has found that male sex partners and/or drug dealers may control both access to and administration of drugs, by procuring and holding the drugs and injecting equipment and/or by directly injecting women (Strathdee et al. 2015). Furthermore, women may need to adhere to certain restrictions in exchange for access to drugs, resources for shelter and safety, and to avoid arrest and prosecution (Auerbach and Smith 2015). Such circumstances can create a dependency on both the substance and on the persons controlling it. Furthermore, women who use and inject drugs are disproportionately affected by violence, related mental health challenges (i.e. depression and post-traumatic stress disorder) and the social stigma associated with these experiences (Miller 1999; Roberts, Mathers, and Degenhardt 2010). Combined, these multi-level factors can have direct and indirect impacts on women's ability to negotiate safer behaviours and engage with HIV prevention interventions (El-Bassel and Strathdee 2015).

Therefore, to better understand the direct and indirect mechanisms that exacerbate HIV risk, the effects of risk factors existing in various spheres of a woman's reality must be understood. The possibility that these factors co-occur, interact, and reinforce each other must also be considered. Thus, the theoretical framework for this study emphasises the importance of identifying theory-informed risk factors and environmental influences in informing HIV prevention research and interventions for drug-involved women in Indonesia. In identifying factors which both exacerbate HIV risk behaviour and are viable areas of intervention, there is potential to decrease negative health outcomes within this population.

1.5.3 Syndemics: an approach to understanding the cumulative and interactive effects of health disparities

As shown in the previous sections, the risk of HIV transmission and acquisition increases for drug-involved women who experience multiple, co-occurring disparities (Meyer, Springer, and Altice 2011). The cumulative and potentially interactive effects of two or more co-morbidities in a population have been described together as a “syndemic” (see Figure 1.2) (Singer 2006). The concentration and interaction of afflictions, and their contribution to excess burden of health adversity in a given population, tends to occur and be sustained in geographical or temporal contexts of inequality, stigmatisation, and structural violence (Tsai et al. 2017; Singer et al. 2017). Syndemics theory has been applied to better understand health disparities in several populations, largely in the U.S. These include men who have sex with men (MSM), female sex workers, women attending emergency departments, women in drug dependence treatment, and people living with HIV (Tsai and Burns 2015).

Figure 1.2: Simple model of syndemics depicting synergistic interactions between psychosocial conditions, reproduced from Tsai et al. 2015



The concept of syndemic conditions that interact to amplify disease burden was first articulated by Singer (1996) in relation to low-income, urban women in the U.S. In the late

1980s and 1990s, urban, low-income populations of colour experienced an AIDS crisis of epidemic proportions (Gonzalez-Guarda, Florom-Smith, and Thomas 2011). It became clear that studying HIV and AIDS in isolation of other diseases and environmental conditions provided a distorted view of the multitude of phenomena affecting the urban poor. While HIV transmission was a primary component of the crisis, analyses determined that there was a broader constellation of afflictions that influenced and sustained it. These included, but were not limited to, substance use, suicide, homicide, tuberculosis, hepatitis, and sexually-transmitted infections (Singer 2006). Furthermore, these afflictions were supported and reproduced by social and structural factors such as high rates of unemployment, poverty, homelessness, health care inequality, racism, and domestic as well as street violence.

The syndemic framework has been empirically tested to understand HIV risk among men who have sex with men in the U.S., and provides a useful example. In one of the first empirical studies testing the conceptual assumptions of syndemic theory, Stall and his colleagues demonstrated that poly-drug use, IPV, childhood sexual abuse, and depression frequently co-occurred among men who have sex with men, and were reinforced by rampant discrimination and homophobia (Stall et al. 2003). The same study additionally found that men with a greater number of psychosocial problems were more vulnerable to HIV. Subsequent studies furthered our understanding of how syndemics function to produce health disparities within populations of men who have sex with men by testing for interactions among multi-level risk factors. Crucially, the impact of certain types of adversity on HIV risk may be obscured if syndemics are not taken into account. For instance, Herrick (2011) found that poverty, lifetime homelessness, and stressful life events did not,

by themselves, have a significant impact on unprotected anal intercourse among men who have sex with men. However, when taking syndemic co-occurrence and interaction of these factors into account, the indirect impact of these socio-economic adversities significantly predicted unprotected anal intercourse with a higher estimated coefficient than any of the factors alone (Herrick 2011).

Drawing on this example and on Singer's original conceptualisation (Singer 1996, 2006), two key aspects of syndemic theory must be considered in empirical investigations: (1) the co-occurrence of disparities in a given population (*disease concentration*); and (2) the interaction of disparities to produce mutually detrimental effects on health at the population and individual levels (*disease interaction*). In public health, interaction refers to the extent to which the joint effect of two or more risk factors on an outcome differs from the independent effects of each of the risk factors (Ahlbom and Alfredsson 2005). There are two distinct concepts of interaction that are relevant for the syndemic framework and referred to throughout this thesis: (i) statistical interaction, and (ii) causal interaction, also known as biologic or additive interaction (Andersson et al. 2005).

Statistical interaction is a model-dependent concept, which may be computed on both the multiplicative and additive scales (Rothman, Greenland, and Lash 2008). It is considered to be present on the multiplicative scale when the joint effect of two or more risk factors on an outcome differs from the product of the individual effects of each factor (Ahlbom and Alfredsson 2005). This form of statistical interaction may be calculated by including a product term for the exposures hypothesised to interact in a multiplicative statistical model, such as logistic regression. It is said to be present on the additive scale when the joint effect of two or more risk factors differs from the sum of the effects of individual

factors (Kalilani and Atashili 2006). The latter can be calculated, for example, using a marginal effects model showing whether the probabilities of the outcome under different exposure combinations correspond to the actual effects of the exposures on the outcome (VanderWeele and Knol 2014).

Additive interaction – not to be confused with the notion of predicted probabilities computed using a marginal effects model – is a property of causality, and was proposed by Rothman in 1974. It is defined as the interdependent action of two or more factors to produce an augmented (*synergistic*) or a reduced (*antagonistic*) effect (Rothman 1974). Measures of additive interaction, and corresponding 95% confidence intervals, can be calculated using both risk ratios and odds ratios, and are further described in Chapter 7 (Kalilani and Atashili 2006). It has been argued that additive interaction, as opposed to multiplicative interaction, is a more robust way to statistically approximate the underlying causal mechanisms (Kalilani and Atashili) (Berrington de Gonzalez and Cox 2005).

Indeed, there are several considerations that support the study of interactions within a syndemic framework. First, on a practical level, there may be limited resources to develop and implement interventions, especially in low- and middle-income settings. Assessments of additive and multiplicative interaction can help identify the most affected sub-groups of a given population that would benefit most from intervention (VanderWeele and Knol 2014). Second, in some circumstances, it may not be possible to intervene directly on a particular factor, but if we could identify an interdependent factor that could be more amenable to intervention, it may eliminate a portion or all of the effect of the primary factor (Knol et al. 2011). Third, empirical assessments of interactions may provide added insight into modifiable mechanisms for an outcome (VanderWeele and Knol). For example,

additive interaction between two factors may be detected for an outcome where both factors are present, but would not occur at all if just one factor was present, as was empirically shown in Herrick's study with men who have sex with men, described above. Thus, analyses of additive interaction could detect a potential mechanism that requires two or more specific causes to operate. This insight has utility for HIV interventions because it suggests that in the presence of interaction, a single-component intervention targeting either condition A or B would suffice because eliminating either one of conditions would in turn preclude the outcome from occurring (Tsai et al. 2017). It also suggests that interaction can be present on one scale but absent on another (or, as a third possibility, be present on both scales) (VanderWeele and Knol 2014). Therefore, both types of interaction are valuable for understanding patterns of association and interpreting the public health relevance of findings.

For drug-involved women, empirical studies investigating which syndemic factors are important, and the processes by which they operate, remain limited. However, the pervasive disparities in IPV, HIV, and mental health experienced by substance-using women in conjunction with HIV provide an indication of where one may begin investigating such processes in this population. Syndemic theory is especially appropriate for the study of HIV risk among women who inject drugs in Indonesia because it provides a useful theoretical framework for understanding risk factors and their interactions. Qualitative evidence from Indonesia suggests that this population experiences multiple connected disadvantages, such as pervasive gender-based violence¹⁰ and mental health challenges. These factors

¹⁰ The World Health Organisation defines violence against women as any act of gender-based violence that results in, or is likely to result in, physical, sexual, or psychological harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life. The term "gender-based violence", as articulated by the United Nations General Assembly, incorporates

exist within a context of elevated stigma, limited economic opportunities, low access to HIV prevention services, high unemployment, criminalising policy contexts, and unequal power relationships (Habsari et al. 2007; Spooner et al. 2015; Stoicescu 2016; Li, Hershow, et al. 2014).

Thus, following syndemics theory, this study will examine whether IPV increases women's HIV risk because of cumulative negative effects resulting from its co-occurrence with substance use and mental health challenges. Specifically, this study will explore the possibility that 1) IPV alone increases negative health outcomes; 2) IPV co-occurs with depression and substance use to contribute to a cumulative experience of health disadvantage, and 3) these risk factors may interact with one another to produce excess health adversity among women who inject drugs.

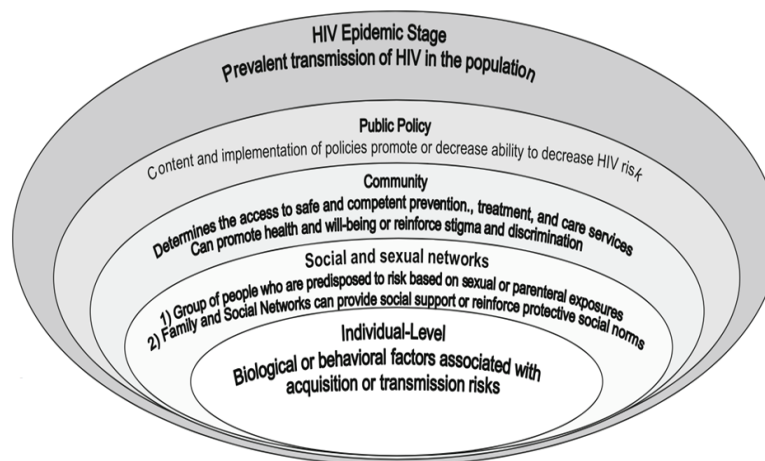
1.5.4 Further theoretical considerations: the social-ecological model

In determining a theoretical framework for this study, it was also useful to draw on additional theoretical paradigms that move beyond an individual-level focus. In addition to syndemic theory, this thesis also drew on the modified social-ecological model to inform the broad conceptual framework and guide the selection of potential confounders. In response to an emerging paradigm shift in public health from behavioural to ecological approaches (Rhodes 2002), Baral proposed a modified social-ecological model, illustrated in Figure 1.3, to conceptualise a layered understanding of HIV vulnerability (Baral et al. 2013). Akin to syndemics theory, the social-ecological model starts with the premise that the responsibility for reducing drug-related HIV risks, and the focus of interventions

several forms of violence, including childhood sexual abuse, intimate partner violence, non-partner assault, and trafficking. This thesis focuses on one form of gender-based violence, namely "intimate partner violence."

targeting their amelioration, is not on individuals alone, but also on social and structural factors which may interact with individual-level risk behaviours to influence and reproduce such behaviours. The social-ecological approach posits that social and structural factors are the primary determinants of HIV vulnerability (Baral et al. 2013). Although proximal individual-level risks – primarily, the sharing of injecting equipment and unprotected sexual intercourse – are necessary in mediating HIV acquisition and transmission, the social-ecological model envisions these risks being encapsulated by social, economic, organisational, and political inequities at the population level. Social and structural factors are also more actionable in relation to interventions and more applicable to policy, as compared with individual-level risks (Baral et al. 2013).

Figure 1.3: Modified social-ecological model for HIV risk in vulnerable populations, reproduced from Baral et al. 2013



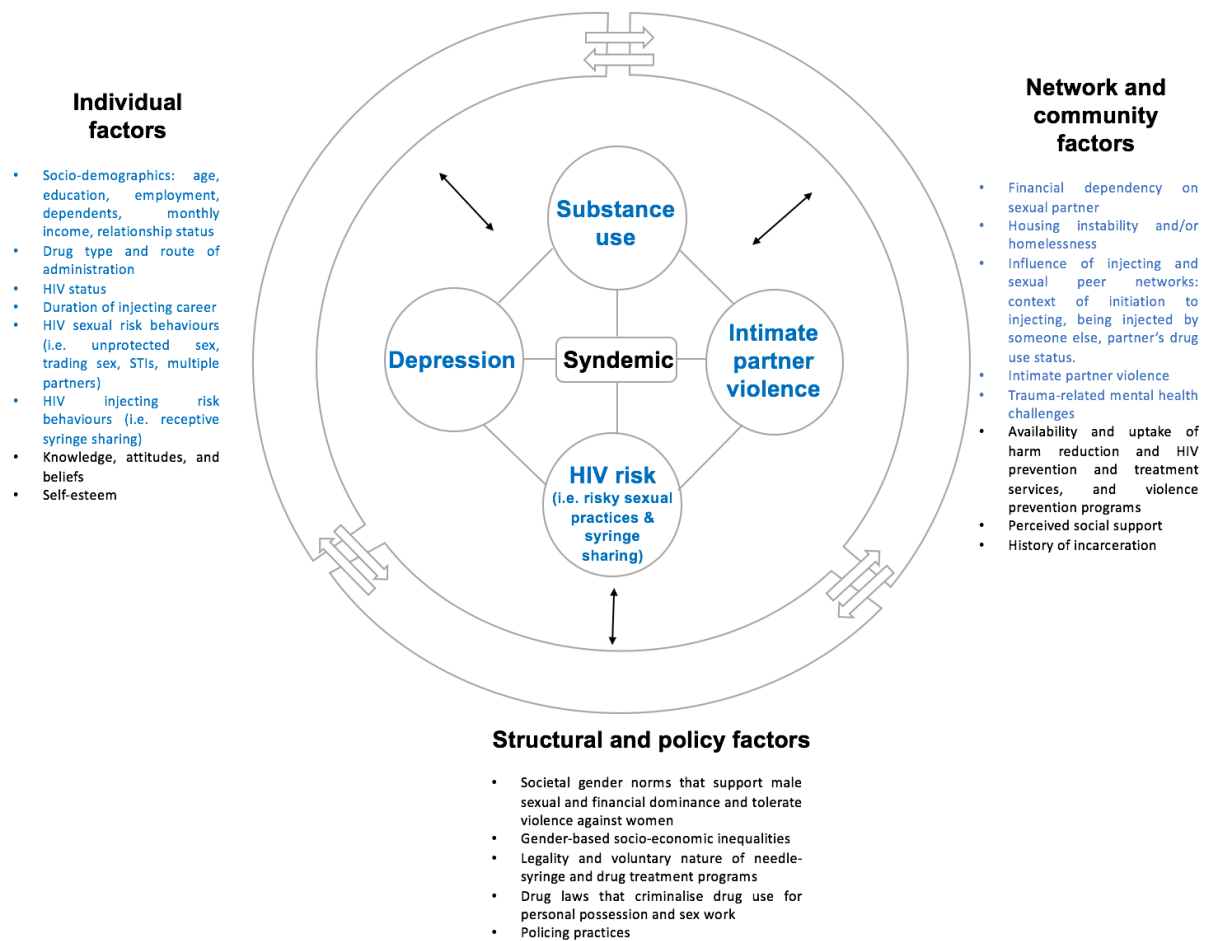
The social-ecological model situates individual HIV infection risks within wider network, community, and public policy contexts, as well as HIV epidemic stage, for a total of five main “layers” of risk. *Individual* factors are biologic or behavioural characteristics associated with vulnerability to acquire or transmit infections. Social, injecting, and sexual *network* factors comprise interpersonal relationships including dyadic, familial, social,

sexual, and drug-using relationships that influence health and health behaviours. In relation to drug-using female populations, network factors that may support the production of HIV risk may include survival sex work, trauma-related mental health challenges, and intimate relationship dynamics and power structures. *Community* environments can include network ties, social and gender norms, relationships between organisations and groups, and can also comprise communities along cultural, economic, religious, or geographic lines. For women who inject drugs, community factors may include gender-based violence, urban or neighbourhood deprivation and disadvantage, physical and social injecting environments (i.e. shooting galleries, public spaces), and level of provision and uptake of harm reduction services and antiretroviral treatment. *Laws and policies* of states may shape the risk of marginalised and other populations by enabling or impeding the financing or implementation of HIV prevention interventions. In Indonesia, policing practices, drug policies that criminalise people who use drugs and those who engage in sex work, and social and economic inequities in relation to gender could be considered under this category. Finally, the *stage of the HIV epidemic* within the country, region and the community being studied determines the risk of disease acquisition for the individual. For instance, in the case of people who inject drugs in Indonesia, the risk of unprotected sexual intercourse and syringe sharing would be considered high given the disproportionate burden of HIV infection, high viral load, and low access and uptake of antiretroviral treatment within this population. Furthermore, the potentially increasing influence of crystal meth on HIV-related risky sexual practices in Indonesia (Neverndorff and Praptoraharjo 2015) must also be considered in relation to studies of HIV risk.

1.5.5 Proposed theoretical model for this study

This thesis combines a social-ecological approach to HIV vulnerability more broadly, with the theory of syndemics, which has been applied to marginalised, drug-involved women more specifically. These two theoretical frameworks look beyond individual-level factors to broader social-structural influences that facilitate risk. Furthermore, these theoretical approaches suggest that to understand the probable mechanisms influencing HIV risk among drug-involved women, we must consider not only factors occurring in silos at different analytical levels, but also their potential accumulation and interaction to produce excess health adversity across different levels or domains. The final theoretical model for this doctoral study is illustrated in Figure 1.4. The proposed model includes additional factors specific to the unique experiences of women who inject drugs. Hypothesised factors are informed by the aforementioned theories, guided by the literature review in Chapter 2 and by formative research conducted by this candidate in Indonesia (Chapter 3). Factors tested as part of this thesis are shown in blue. Factors not tested as part of this doctoral study, but identified as potentially relevant for future analyses beyond this thesis, are shown in black. Factors specific to women who inject drugs that form the main focus of this study – poor mental health, substance use, and IPV victimisation – are displayed at the centre of the model.

Figure 1.4: Proposed model for syndemic processes among Indonesian women who inject drugs



These factors are drawn from multiple levels, and are hypothesised to act syndemically and/or synergistically on women's HIV risk. Individual factors that could influence HIV risk include substance use-related factors, including drug type and method of drug administration (e.g. injecting, oral administration), and theory-informed socio-economic factors such as education, employment, housing instability, and marital status. Social network and/or community factors that may shape women's HIV risk behaviours were added to take into account the unique vulnerabilities of women who inject drugs, and include: financial dependency on a sexual partner, perceived social support, context of initiation to drug injecting, the drug use status of women's intimate partners, and the

structure of injecting and sexual networks. Structural and policy factors include societal gender norms, legality of certain types of HIV prevention programmes such as needle and syringe interventions, and punitive drug policies.

1.6 Research aim and questions

The aim of the present study is to elucidate syndemic predictors of HIV risk behaviours among women who inject drugs in Indonesia. The main research question of this study is: what are the associations and mechanisms linking the syndemic conditions of IPV, depression, and substance use and HIV risk behaviour outcomes (i.e. sexual and injecting risk behaviours) among women who inject drugs in Indonesia? This question is sub-divided into several aims, according to the three manuscripts included in this thesis, as follows:

Paper 1: Intimate Partner Violence and HIV-related Sexual Risk Behaviour Among Women Who Inject Drugs in Indonesia: A Respondent-Driven Sampling Study (Chapter 5)

1. To investigate associations between different forms of IPV victimisation (i.e. psychological, physical/injurious, and sexual) and HIV-related sexual risk behaviours;
2. To test whether the co-occurrence of multiple IPV types has additive effects on sexual risk behaviours among women who inject drugs.

Paper 2: Intimate Partner Violence and Receptive Syringe Sharing Among Women Who Inject Drugs in Indonesia: A Respondent-Driven Sampling Study (Chapter 6)

1. To explore associations between different forms of IPV (i.e. psychological, physical/injurious, and sexual) and receptive syringe sharing among women who inject drugs in Indonesia.

Paper 3: The Synergistic Effects of Intimate Partner Violence, Substance Use, and Mental Health on HIV Sexual Risk Behaviour Among Women Who Inject Drugs: Findings from The Perempuan Bersuara Study in Indonesia (Chapter 7)

1. To determine whether IPV co-occurs with depression and crystal meth use;
2. To evaluate associations between depression, IPV, and crystal meth, and three key HIV-associated sexual risk behaviours;
3. To assess the potential additive effects of aggregate exposure to multiple conditions on women's HIV sexual risk behaviours;
4. To test whether depression, IPV, and crystal meth use interact to exacerbate women's HIV-related sexual risk behaviours.

1.7 Overview of thesis structure

This doctoral research responds to a critical evidence gap on the HIV risk behaviours of women who inject drugs in Indonesia. It aims to extend our understanding of syndemic factors that may co-occur and interact synergistically to exacerbate HIV risk. The findings contribute to the limited existing literature on women who inject drugs in low- and middle-income countries. The thesis is organised in 8 chapters, with the main empirical work comprising three stand-alone papers (Chapters 5 – 7), as required by the D.Phil-by-publication track at the Department of Social Policy and Intervention. Two of these papers (Chapters 5 and 6) are in the revise-and-resubmit stages in high impact journals, and one (Chapter 7) is being prepared for submission to a peer-reviewed publication.

Chapter 1: Introduction and Background has aimed to contextualise the thesis by outlining the epidemiological and policy contexts in which the research study has taken place. The

chapter summarises extant global and regional data on health disparities, most notably HIV, among women who inject drugs, reviews the national epidemiological, policy, and programmatic context in which the study took place, and introduces the study's conceptual and theoretical frameworks. The final part of this chapter has provided an overview of this study's research aims and questions.

Chapter 2: Literature review is a comprehensive review which synthesises global literature on the associations between IPV, and co-occurring mental health problems and substance use, and HIV outcomes among women. The review prioritises systematic review and meta-analytic evidence, with a focus on drug-involved women, and emphasises evidence from Asia. 17 reviews were identified, 13 of which included global literature and 4 U.S.-only studies. The majority of studies identified were geographically clustered in the U.S., with limited evidence among women in low- and middle-income countries. No quantitative studies were conducted in Indonesia. While the review found evidence for the clustering of multiple disparities to produce additive effects on HIV risk, no studies to date have empirically tested whether the interaction of these factors produces excess HIV risk among drug-using female populations.

Chapter 3: Methodology describes the research design and methods used for conducting the cross-sectional study on which the empirical papers were based. It includes a detailed account of community-based participatory approaches, formative research, and respondent-driven sampling survey methods applied. The chapter ends with a discussion of fieldwork and ethical challenges experienced during data collection.

Chapter 4 summarises findings on the social network characteristics of the 731 women who participated in the study. The second portion of the chapter assesses potential biases related to study design on the final recruited sample.

Chapter 5 (Paper 1) examines associations between different forms of past-year IPV victimisation (i.e. psychological, physical and/or injurious, and sexual) and engagement in one or more HIV-associated sexual risk behaviours (i.e. condom use at last sexual intercourse, STI symptomatology, multiple sexual partners, and survival sex work) among women who inject drugs in Indonesia. It also assesses potential additive effects of polyvictimisation of different dimensions of IPV victimisation on sexual risk behaviours.

Chapter 6 (Paper 2) investigated whether different types of IPV victimisation were associated with increased odds of receptive syringe sharing among Indonesian women who inject drugs.

Chapter 7 (Paper 3) represents the first empirical analysis to quantify the assertion that syndemic conditions interact synergistically to increase HIV risk behaviours among women who inject drugs. This paper explored (a) whether IPV co-occurred with other health disparities (i.e. depression and crystal meth use), and whether these factors were independently associated with HIV risk; (b) whether there were additive effects of simultaneous exposure to these conditions on women's HIV sexual risk behaviours; and (c) whether these factors interacted on the multiplicative and/or additive scales to exacerbate HIV sexual risk.

Chapter 8: Discussion and conclusion begins with a summary of the main aims and findings of the thesis. This is followed by discussion of the study's limitations, strengths, and

implications for policy, practice, and directions for future research. Dissemination strategies used and plans for further dissemination are summarised. The chapter ends with a brief conclusion section.

A full list of appendices, including ethics approvals and quantitative data collection tools, is referred to throughout the thesis and provided in a separate document.

CHAPTER 2. LITERATURE REVIEW: SYNDOMIC ASSOCIATIONS AND MECHANISMS AMONG WOMEN



Figure 2.1: Women take part in a community consultation in Jakarta, January 2016

2.1 Introduction

Chapter 1 presented an overview of study aims, background, rationale, and theoretical framework. The present chapter details the findings of a review of commonly occurring risk factors for HIV amongst women who inject drugs. The review was conducted to understand the existing literature on syndemic processes and the mechanisms by which they elevate HIV acquisition and transmission among substance-involved women, and to guide the study design and analytical approach undertaken in the thesis. It is important that the choice of factors tested are informed by a sound theoretical framework and supported by existing evidence (Auerbach and Smith 2015). Here, the syndemics framework presented in Chapter 1 (figure 1.4) is used to inform the scope of the present review.

2.2 Parameters of the review

2.2.1 Objectives of the review

The objective of this review was to assess existing literature on the correlates of HIV risk behaviour among women who inject drugs. The research questions addressed under this objective are: (a) which syndemic risk factors are associated with HIV risk behaviour for women who inject drugs?; and (b) what are the mechanisms linking these syndemic factors with HIV risk behaviour?

In light of the limited empirical evidence regarding risk factors for HIV among women who inject drugs in Indonesia identified in the initial search, this review focused on global research which is quantitative and explores syndemic factors influencing HIV risk outcomes amongst a range of female samples. It paid particular attention to factors which are measurable, modifiable, theory-informed, and relevant to the current study.

2.2.2 Inclusion/exclusion criteria

2.2.2.1 Types of studies

A selective rather than exhaustive search strategy was used, prioritising systematic reviews and meta-analytic evidence of quantitative research addressing syndemic associations and mechanisms for HIV risk outcomes in women. Narrative literature reviews that included mixed-methods research were included. This comprised systematic reviews and meta-analyses of intervention studies, case-control studies, randomised controlled studies, cross-sectional studies, and cohort studies. The review focused on drug-using and other women at high risk of HIV infection, with particular attention given to assessing the

evidence base in Asia. Because initial searches revealed a dearth of quantitative studies on women who inject drugs in Indonesia, published and unpublished qualitative literature from Indonesia was also reviewed.

2.2.2.2 Study population

The review focused on females aged 18 years and over, concentrating on women from at-risk and vulnerable populations, particularly women who inject drugs. At the time of reviewing (2014, updated July 2017), research on syndemic disparities among women who inject drugs remained limited. In low- and middle-income countries, the evidence gap on women who inject drugs was even more pronounced. In light of the limited available literature amongst this group, this review also considered quantitative literature that reflected the experiences of other female populations, including low-income women, women living with or at risk of contracting HIV, female partners of male injecting drug users, sex workers, and victims of domestic violence. In an effort to elicit female-focused studies, studies with samples that were only male or male-inclusive focusing on substance users as a unified group with no distinct attention to women, were excluded. For studies that also included men, only results for the female participants are described here.

2.2.2.3 Measures and definitions

Outcome measures considered included: a) HIV infection where HIV serostatus was confirmed by a laboratory test or medical records; b) HIV-associated high-risk sexual practices either as a primary or secondary outcome; and c) any form of HIV-associated high-risk injecting practices. High-risk sexual practices comprised: unprotected sex (at last intercourse and/or inconsistent condom use) with any type of sexual partner, transactional sex, having multiple sexual partners, having sex whilst intoxicated, sexually transmitted infections, or a composite measure of two or more of these outcomes as defined by each study. High-risk injecting practices included sharing (i.e. lending and/or borrowing) needles or syringes for drug injection, as well as sharing any other drug paraphernalia used for drug preparation, such as mixing spoons, straws/pipes, or filters. Reports in both English and Bahasa Indonesia were reviewed by this author to allow for publications from Indonesia to be included. Additionally, special attention was paid to studies investigating the relationships between IPV victimisation and HIV, since IPV is one of the most commonly co-occurring disparities alongside HIV in drug-involved women (Gilbert et al. 2015).

2.3 Reviewing and search strategy

This review draws on both published and unpublished literature published between 2000 to 2017. Keyword searches for published data were made of electronic databases, online publications, and conference abstracts. Details of the reviewing search strategy are summarised in Table 2.1. This candidate additionally sought unpublished data from grey literature through web searches on Google and Google Scholar, and personal email requests to academics. The latter strategy yielded an additional 4 studies. In addition,

reference lists of seminal articles were hand-searched. Searches were performed in the titles, subject, abstract, and as keywords or subject-word headings of all manuscripts in the aforementioned databases using combinations of the key search terms displayed in Table 2.1.

Table 2.1: Reviewing search strategy

Search dates	Search 1: 4 April, 2014 Search 2: 7 July, 2017
Databases	<i>Electronic databases:</i> PubMed/MEDLINE, Embase, EBSCO (PsycINFO and CINAHL), Web of Science, Ovid, ProQuest, the Cochrane and Campbell databases, JBI Database of Evidence Based Practice, and the PROSPERO register of systematic reviews. <i>Online publications:</i> UNAIDS, UNODC, CDC, World Health Organisation, Harm Reduction International, and governmental and non-government publications in Indonesia, including those from the Department of Health, National Narcotics Agency, and National AIDS Commission. <i>HIV and substance use conference abstracts:</i> global conferences including International AIDS Conferences, International Harm Reduction Conferences; regional conferences such as the International Congress on AIDS in Asia and the Pacific; and national conferences in Indonesia such as the National AIDS Summit. <i>Web:</i> Google, Google Scholar
Search string	women, girls, HIV, AIDS, sexually transmitted infections (STIs), sexual risk behaviour, condom use, unprotected sex, syringe sharing, needle sharing, drug paraphernalia sharing, substance use/abuse, injection drug use, heroin/cocaine/methamphetamine use, gender based violence, sexual violence/assault, intimate partner violence/abuse, domestic violence, forced/coerced sex, syndemic, interaction, synergy, synergism.

2.4 Results of the review

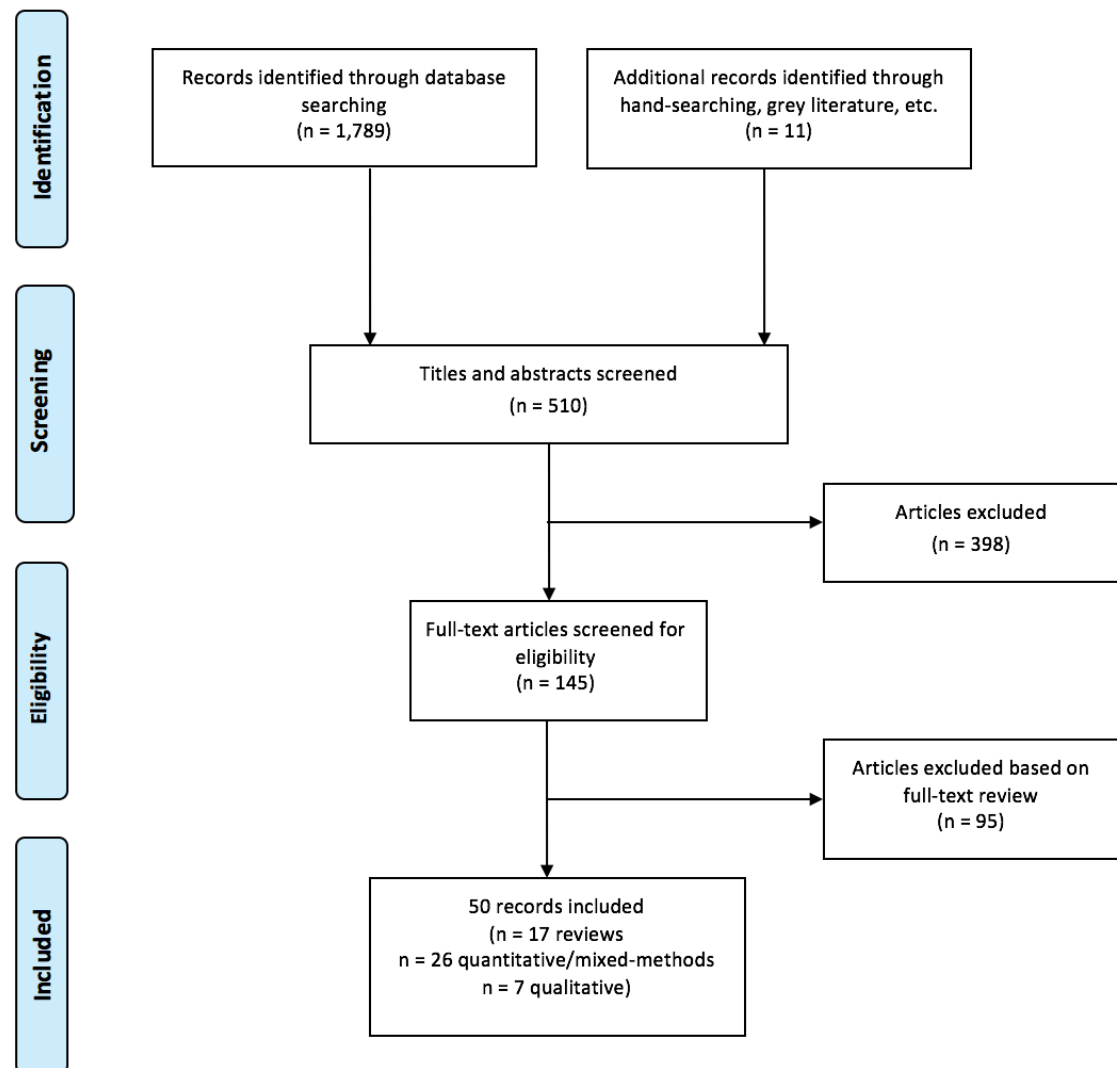
The results are reported in two sections: (1) overview of included studies, and (2) key findings from the review. Section 1 is further sub-divided into two portions that highlight characteristics of global literature and studies focusing on Asia. Section 2 is sub-divided into three parts describing (a) associations between syndemic factors and HIV outcomes; (b) mechanisms linking syndemic factors and HIV outcomes; and (c) qualitative research from Indonesia.

To help guide the study design and analytical approach undertaken in this thesis, several study characteristics were extracted from existing literature and reported in the tables below (Tables 2.2, 2.3, and 2.4). First, data on the geographical scope, study design, sample characteristics, main findings, and key recommendations of included studies were extracted to assess (a) whether the research questions addressed by this study have been answered by previous studies, (b) whether these questions were specifically addressed in relation to women who inject drugs, and (c) the extent to which findings were generalizable. The quality of the literature was assessed using standardized critical appraisal checklists, including the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher et al. 2009) and the Strengthening the Reporting of Observational Studies in Epidemiology (Vandenbroucke et al. 2007) statements. Second, information on the selection and construction syndemic factors, HIV-related outcome measures, and statistical test specifications used in the analyses conducted by previous studies was extracted to inform the selection of measures and constructs for this study, and to determine appropriate statistical tests.

2.4.1 Overview of included studies

Figure 2.1 shows the flow diagram for included studies. Results from different database searches were merged, resulting in 1,789 records. Grey literature searches, hand-searches of references of included studies, and personal emails to selected researchers elicited an additional 11 records. After de-duplication, this candidate reviewed 510 titles and abstracts, and the full text documents for 145 results. A total of 50 records were included in this review. Of these, 46 were published studies and 4 were grey or unpublished literature, including 1 unpublished dissertation presenting findings from a cross-sectional study (Batchelder 2012), 1 conference presentation comprising a systematic review and meta-analysis (Watts 2012), and 2 unpublished qualitative studies (Habsari et al. 2007; Spooner et al. 2010). Of the 50 records, 17 were reviews of quantitative and/or mixed-methods literature, 13 of which included global literature and 4 U.S.-only studies. Globally, 13 quantitative and/or mixed-methods studies explored associations and mechanisms linking co-occurring conditions and HIV outcomes among female populations, including drug-using women. In addition, the review identified 13 quantitative studies in Asia that assessed associations between IPV and HIV risk among women. There were no quantitative studies conducted with women who inject drugs in Indonesia.

Figure 2.2: Flow diagram for identifying included studies



2.4.1.1 Global literature

A total of 17 reviews were identified that focused on the syndemic associations and mechanisms for HIV risk among global female populations. Summary characteristics and findings of included reviews are presented in Table 2.2. All reviews were published between 2000 and 2017. Overall, 12/17 (71%) reviews focused mainly on the co-occurrence and links between IPV and HIV, while 5/17 (29%) reviews looked at associations between two or more syndemic exposures and HIV outcomes. In relation to study design, 12/17 (71%) were literature and/or narrative reviews, and 5 were systematic reviews and/or meta-analyses which followed a pre-specified review plan, such as a critical appraisal checklist to assess the quality of included studies. Cross-sectional studies made up 66% – 95% of studies in reviews that reported the study design of included literature. In terms of geographic scope, there was a substantial focus on U.S. literature, to the exclusion of other regions. 13/17 (76%) reviews included global literature and 4/17 (24%) comprised U.S.-only studies. The majority of studies identified in the international reviews were also geographically clustered in the U.S., followed by sub-Saharan Africa. Studies conducted in low- and middle-income countries in other world regions were scarce. Female samples studied were largely drawn from the general population, as evidenced by the focus of 11/17 (65%) reviews. Only 5 reviews included studies with vulnerable female populations, including women living with HIV, substance-involved women, and women recruited from shelters, emergency rooms, and the criminal justice system. Drug-involved women were explicitly discussed as a high-risk population in only 4/17 (24%) of the reviews, only 1/17 (6%) of which was solely focused on women who use and/or inject drugs (Gilbert et al. 2015).

Table 2.2: Characteristics of reviews exploring associations between syndemic factors and HIV risk among women (n = 17)

Author/year	Geographical scope of included studies	No. & design of included studies	Samples	Results	Key recommendations
<i>Part a) reviews exploring associations between IPV and HIV among women</i>					
1. Maman et al. 2000 (narrative review)	US and Sub-Saharan Africa: US (14), Rwanda (2), South Africa (1), Zaire (1), Kenya (1)	19 studies (17 cross-sectional, 2 prospective)	Women, with a focus on vulnerable women, including women living with HIV, and women recruited from emergency rooms, prenatal care, HIV clinics, homeless shelters, and low-income housing.	Forced sex was indirectly related to HIV risk. This indirect risk between forced sex and HIV risk behaviours (i.e. exchange of sex for money, unsafe intravenous drug use, etc.) occurred in an underlying context of deprivation that characterise women's lives, such as poverty, low educational status, and poor job and housing opportunities.	More complex models that explore a range of moderating and mediating relationships are needed to help describe the causal pathways between sexual violence and HIV risk behaviours. More cross-cultural studies are needed to determine whether physical violence is a stronger determinant of condom use in societies with more traditional gender norms and relatively low status of women.
2. Gielen et al. 2007 (narrative review)	US	35 studies (23 cross-sectional, 8 longitudinal, 4 intervention studies)	Adult women, with a focus on specific subpopulations of women, such as abused women in shelters and female substance users	Most studies suggested that subgroups of the female population, including substance-using women, were highly vulnerable to overlapping health problems, in comparison with women in the general population.	There is a critical need for studies that (a) examine the causal pathways and cumulative effects of the syndemic issues of violence, HIV, and substance abuse in women's health and (b) develop and evaluate interventions that target IPV victims at risk for HIV.
3. Coker 2007 (narrative review)	Global: US (46), Norway (1), Australia (1), India (1), China (1), multiple low- and middle-income countries (1)	51 observational studies	Women with male intimate partners	Physical and sexual IPV were consistently associated with sexual risk-taking behaviours, including inconsistent condom use, multiple sexual partners, and sexually transmitted infections.	Further research is needed to better understand the mechanism(s) by which physical, sexual, and psychological IPV affect sexual health and risk.
4. Campbell et al. 2008 (narrative review)	Global: US, several countries in Sub-Saharan Africa, Ukraine, Bangladesh	71 studies of empirical, quantitative research	Females aged 12 years and older in heterosexual relationships, including general population samples, and samples of women at elevated risk of HIV	Available evidence supported three key mechanisms through which women's HIV risk is increased via IPV: forced sex with an infected partner; limited or compromised negotiation of safer sex practices; and increased sexual risk-taking behaviours.	Although similar risk factors for HIV and IPV have been identified among women globally, significant differences exist in the quantity and quality of research conducted across settings. Future epidemiological studies should target low- and middle-income countries with widespread and emerging HIV epidemics.

5. Stockman et al. 2012 (narrative review)	Global: 5 countries, including US (12), South Africa (3), Tanzania (3), Uganda (2), India (1)	21 empirical or mixed-methods studies with a quantitative component	Women who reported male intimate partners	The majority of included studies supported an association of coerced/forced sexual initiation with HIV risk behaviours and HIV seroconversion in countries where there was high prevalence of HIV among women.	It is crucial to work towards addressing the complex interplay between coerced/forced sexual initiation, sexual IPV and HIV risk, especially in low- and middle-income countries.
6. Watts 2012* (systematic review and meta-analysis) *conference presentation	Global: US, Sub-Saharan and East Africa, India (1).	35 studies, describing 41 datasets with a total of 121,479 participants. Of these: 3 prospective, 3 case-control, 35 cross-sectional.	Any population, but most included studies with women	Violence was both a cause and consequence of HIV infection. Prospective studies showed an association between physical and/or sexual IPV and incident HIV in South Africa, as well as between sexual IPV & HIV in Uganda and sexual violence & STI in India. Cross-sectional data analysis found less consistent findings. It remained unclear how generalisable findings were across different epidemic settings.	Future research should take advantage of opportunities within ongoing intervention trials with HIV outcomes to include questions on violence. More work is needed to better inform the pathways between IPV & HIV in order to inform effective programmes.
7. Dillon et al. 2013 (narrative review)	Global: high-income countries (55), low- and middle-income countries (20)	75 studies, both quantitative and mixed-methods	Studies with populations women recruited in various settings, including community samples, shelters, primary healthcare, emergency department, mental health facilities, educational, and court system settings.	IPV was associated with increased risk of STIs, including HIV.	There is a need to better understand the long-term implications of (a) different forms of IPV, (b) the cumulative impact of experiencing multiple types of IPV, and (c) cumulative intensity/severity of IPV.
8. Kouyoumdjian et al. 2013 (narrative review)	Global: North America (45), Africa (44), Asia (9 - India-8; Papua New Guinea-1), South America (2)	101 quantitative, mixed methods, and qualitative studies	Any population at risk of HIV, including women.	In most studies, the association between experiencing IPV and HIV infection was positive and statistically significant across settings. There was evidence that this relationship is bidirectional, and occurred via both causal and non-causal mechanisms.	Future studies should measure and analyse data on different forms of IPV as related to HIV infection risk. Studies should also assess more recent exposure periods, focusing not only on lifetime exposure, and explore which mechanisms lead from IPV to HIV infection.
9. Li, et al. 2014	Global: 16 countries, including	28 studies (19 cross-sectional, 5	Women aged 15 years or older from the general	There was a moderate statistically significant association between	There is a need for high-quality follow-up studies conducted in different

(systematic review)	US (8), South Africa (4), East Africa (10), India (3), Brazil (1) and multiple low- and middle-income countries, including Dominican Republic, Haiti, India, Kenya, Liberia, Malawi, Mali, Rwanda, Zambia, and Zimbabwe (2)	cohorts, and 4 case-control studies) involving 331,468 individuals.	population, in any form of sexually intimate relationship with a male partner	IPV and HIV infection among women. Pooled results of cohort studies indicated that physical IPV [pooled RR (95% CI): 1.22 (1.01, 1.46)] and any type of IPV [pooled RR (95% CI): 1.28 (1.00, 1.64)] were significantly associated with HIV infection among women. Pooled results of cross-sectional studies demonstrated significant associations with HIV infection among women exposed to physical IPV [pooled OR (95% CI): 1.44 (1.10, 1.87)]; combination of physical and sexual IPV [pooled OR (95% CI): 2.00 (1.24, 3.22); and any type of IPV [pooled OR (95% CI): 1.41 (1.16, 1.73)].	geographical regions of the world, and among individuals of diverse racial/ cultural backgrounds, and varying levels of HIV risks.
10. Phillips et al. 2014 (narrative review)	US	23 studies (19 cross-sectional, 4 intervention studies)	Studies of women and girls of any age.	There was a strong correlation between violence, especially IPV, and HIV, among women in the US.	Prospective studies are needed to determine causality and temporal associations.
11. Maxwell et al. 2015 (systematic review and meta-analysis)	Global: US (6), Nicaragua (1), Bolivia (1), India (1), South Africa and Zimbabwe (1).	12 studies (10 included in the meta-analysis): 9 longitudinal studies, 1 case-control study	Studies of women and girls of any age.	Women's experience of IPV was associated with a significant reduction in the odds of using contraception (n = 14,866; OR: 0.47; 95% CI: 0.25, 0.85; I2 = 92%; 95% CII2: 87%, 96%). In the three studies that examined women's likelihood of using male condoms with their partners, experience of IPV was associated with a significant decrease in condom use (OR: 0.48; 95% CIOR: 0.32, 0.72; I2 = 51%; 95% CII2: 0%, 86%).	Sexual, physical, and psychological forms of IPV may have differential effects on women's use of contraception; additional research should consider including estimates of the association between different forms of IPV and reproductive health outcomes.
12. Bergmann et al. 2015 (systematic review)	US	42 studies (40 cross-sectional, 2 longitudinal)	Studies of women and girls of any age.	Most studies found a positive relationship between IPV and decreased condom use.	Additional qualitative and longitudinal research is needed to improve the understanding of dynamics in relationships with IPV and determine causality between IPV, intermediate

					variables (e.g., contraceptive use negotiation, sexual relationship power dynamics, reproductive coercion), and condom use.
<i>Part b) reviews exploring relationships between ≥2 syndemic factors and HIV among women</i>					
1. Meyer et al. 2011 (narrative review)	US	21 studies (6 general population surveys, 11 cohorts, 4 cross-sectional)	Women from the general population, women living with HIV or at high risk of HIV, and women in the criminal justice system	Substance abuse played pivotal role in perpetuating cycles of IPV, maintaining power imbalance within relationships, heightening HIV-associated sexual risk-taking behaviours, and moderating the relationship between abuse and healthcare decision making. Substance abuse was likely also intertwined with psychologic reactions to violence.	Future studies should attempt to analyse more completely and prospectively these experiences of abuse by using both qualitative and quantitative methods of research. Future studies will require use of consistent definitions, including those for violence, drug use, and mental illness.
2. Mason et al. 2014 (narrative review)	Global: US (30), Spain (1), Australia (2), England (1), Canada (1)	35 studies (research design not reported)	Women of any age	Associations were identified among IPV, mental health, and substance use; between IPV and poor mental health; and between IPV and substance use. These relationships were often bi-directional.	Integrated services where problems are recognised as being inter-related hold promise of alleviating the negative effects of these syndemic mechanisms.
3. Gilbert et al. 2015 (narrative review)	Global: US and Sub-Saharan Africa	75 studies, prioritising meta-analytic epidemiological and intervention studies	Women and girls who use drugs	Available evidence was largely clustered in the US and to a lesser extent, Sub-Saharan Africa. Some regions, including Central and South America, the Caribbean, Central Asia, and Southeast Asia, remain largely or completely unrepresented in the literature. Although a continuum of evidence-based interventions has emerged that may be integrated into the continuum of HIV interventions, most integrated models do not focus on women who use drugs and none have resulted in reductions in unsafe injection behaviours.	There is an urgent need for research to understand how the syndemic is playing out among women in underrepresented countries with injection-driven epidemics. The lack of systematic surveillance of different types of gender-based violence continues to impede the mapping of GBV with HIV and drug use epidemics. Most studies focus on physical and sexual IPV and have not focused on psychological IPV. Finally, further research is needed to identify structural, psycho-pharmacological, and behavioural interventions that address syndemic mechanisms among drug-using women.

4. Mitchell et al. 2016 (narrative review)	Global , with focus on Sub-Saharan Africa	113 articles	Any female population, with a focus on women living with HIV	There was strong evidence that risk of IPV is heightened in HIV-infected women, and that experiencing IPV and/or HIV is linked to a higher likelihood of experiencing mental health problems. High rates of IPV were also frequently found to be geographically co-located with HIV and mental health epidemics.	Future research is needed to develop integrated interventions encompassing communities and individuals, involving healthcare, social services, and law enforcement, with the aim of implementing policy change. The longer-term health effects of these interventions will need to be tested in controlled studies.
5. Tsai et al. 2015, updated in 2017 (systematic review)	Global: US (53), Other (8) Studies focused on women: US (10)	71 articles (60 published journal articles, 6 dissertations, and 5 conference abstract): 56 cross-sectional, 15 longitudinal.	Any population, including women (10 studies)	10 studies (14%) focused on women. Most frequently studied psychosocial problems were mental health (62), substance abuse (61), and violence (50); most frequently studied outcomes were HIV transmission risk behaviours (45) or HIV infection (11). To test the disease interaction concept, most studies used additive associations language, but few conducted empirical tests of additive or multiplicative interaction.	More research is needed to better understand the role of syndemics in sustaining health disparities among vulnerable populations in regions outside the US. Future studies should assess the extent to which diseases interact, either at the level of populations or individuals, to amplify HIV risk.

Further to the reviews described above, an additional 13 studies were identified that addressed two or more syndemic factors in relation to HIV outcomes among female populations in international settings. Summary characteristics of extracted studies are provided in Table 2.3. Of these, 12 were published articles and 1 was an unpublished dissertation (Batchelder 2012). Most studies were based on a cross-sectional design (11/13, 85%), with only two reporting analyses conducted during the course of longitudinal follow-up (Oldenburg, Perez-Brumer, and Reisner 2014; Koblin et al. 2015). In relation to geographical scope, 11/13 (85%) studies empirically assessed syndemic concentration and/or interaction of factors in female populations in the U.S. Studies from other world regions (i.e. Nepal, South Africa) were rare (2/13, 15%). Female populations studied included: women living with or at risk of contracting HIV, Hispanic/Latina women, African American girls in a juvenile detention facility, young women in the general population, female sex workers, and substance-involved women. No study focused specifically on women injecting drugs. Although most studies measured substance use as a syndemic condition (10/13, 77%), definitions of substance use varied widely across studies, and spanned several recall periods ranging from lifetime to past month use. The most frequently studied syndemic health problems were related to:

- Violence victimisation, most commonly IPV (10/13, 77%);
- Substance use (10/13, 77%); and
- Mental health, specifically depressive symptoms (10/13, 77%).

Other syndemic conditions tested included: binge drinking, financial hardship (e.g. living below the poverty line; low individual monthly income), childhood sexual abuse, homelessness and/or housing instability, incarceration, residential mobility, low social

support, immigrant status, low educational attainment, household food insecurity, post-traumatic stress disorder, suicidal ideation or history of suicide attempts, unemployment, and lack of health insurance. The most frequently studied HIV-associated behavioural outcomes among women included:

- STI history or symptoms (9/13, 69%);
- Condomless vaginal/anal sexual intercourse (8/13, 62%);
- Multiple sexual partners (8/13, 62%); and
- Transactional sex (6/13, 46%).

Additional outcome measures tested in included studies consisted of: low perceived susceptibility to HIV; partner's risk for HIV and STI history; self-reported HIV status; incident HIV infection; early sexual debut; substance use during the most recent sexual intercourse; and composite HIV transmission risk scales comprising several of these sexual risk behaviours. All studies included in the review employed regression models to test the syndemic concentration concept espoused by syndemics theory. The most frequently used specification to test the concentration of health and psychosocial problems was the "syndemic count variable," i.e., sum score corresponding to the total number of syndemic exposures, used in 11 of 13 studies (85%). However, despite the use of language related to "synergy," "interaction," and "intersection" in the majority of studies, only one study included a product term in a multiple regression model to test for multiplicative interaction (Oldenburg, Perez-Brumer, and Reisner 2014). None of the included studies calculated measures of additive interaction, suggesting that this aspect of syndemics theory remains empirically untested in female drug-using populations. This thesis aims to address this important gap in its final paper (Chapter 7).

Table 2.3: Summary of empirical studies testing syndemic exposures on HIV outcomes among women globally (n = 13)

Author/year	Country	Study sample and design	Syndemic exposures & outcome measures	Statistical test specification	Results
1. Sibley et al. 2011	US	Cross-sectional analysis of data collected through an online survey in 2009 from 134 female adult film actresses	<i>Exposures:</i> History of childhood sexual abuse or IPV during adulthood; any illicit substance use in the past year or binge drinking in the past month; probable depression (PHQ8 ≥ 10) <i>Outcomes:</i> History of transactional sex; ≥ 4 sexual partners in the past month; low perceived susceptibility to HIV	Total number of syndemic exposures (out of 4), specified as a continuous and categorical variable	In multivariable logistic regressions, the number of syndemic exposures was significantly associated with low perceived susceptibility to HIV, multiple sex partners, and transactional sex (AOR ranges: 1.60-1.65). When specified as a categorical variable, having 4 syndemic exposures was associated with multiple sex partners (AOR=11.61) and transactional sex (AOR=10.66).
2. Batchelder et al. 2012	US	Cross-sectional analysis of baseline data collected from 620 women living with or at risk for HIV in New York City	<i>Exposures:</i> History of childhood sexual abuse, physical abuse during adulthood; illicit substance use in past 6 months; depression (mean 20-item CES-D score); self-perceived financial hardship <i>Outcomes:</i> 5-item HIV transmission risk behaviour scale	Total number of syndemic exposures (out of 5), specified as a categorical variable	In multivariable logistic regression models, the number of syndemic exposures had a statistically significant association with HIV transmission risk behaviour (AORs range 1.51-1.94).
3. German et al. 2012	US	Cross-sectional analysis of baseline data collected in 2005-2007 from 635 high-risk, sexually active women in Baltimore participating in an HIV prevention randomised controlled trial	<i>Exposures:</i> Homelessness, incarceration, and residential mobility in the past 6 months; total income in the past 30 days ($\leq$ \$500) <i>Outcomes:</i> Any use of heroin or cocaine in the past 6 months; ≥ 1 sexual partner, any transactional sex, any physician-diagnosed STI in the past 90 days.	Total number of syndemic exposures (out of 4), recoded to reflect stability and specified as a categorical variable; latent syndemic factor identified using latent class analysis	In multivariate logistic regressions, the number of stability exposures had a statistically significant negative association with illicit drug use, multiple partnering, and transactional sex (AORs ranged from 0.36 to 0.59) but not STI diagnosis. Latent class analysis revealed a two-class model, with membership in the "high stability" class negatively associated with all 4 outcomes (AORs ranged from 0.25 to 0.55).
4. Gonzalez-Guarda et al. 2013	US	Cross-sectional analysis of data from 548 women recruited from community-based settings in from South	<i>Exposures:</i> Education, time in the US, acculturation, stress, and family support <i>Outcomes:</i> Syndemic factor variable comprising exposure to: risk for HIV measured as partner's	Factor model of substance abuse, intimate partner violence, risk for	The model explained 61% of the variance in the Syndemic Factor variable. There was a large positive relationship between the Syndemic

		Florida, identifying as Hispanic or Latino, between the ages of 18 and 50, and reporting sexual activity in the past three months	risk for HIV and STI history; depressive symptoms measured using CES-D, substance abuse in the past 3 months, and lifetime exposure to abuse, community violence, and partner violence.	HIV/sexually transmitted infection, and depression using structural equation modelling.	Factor and Hispanic Stress, and a small inverse relationship between the Syndemic Factor and familism. Women with high Hispanic Acculturation and low U.S. Acculturation scored lower on the Syndemic Factor than Integrated/Bicultural women.
5. Pitpitan et al. 2013	South Africa	Cross-sectional analysis of baseline data collected in Cape Town, South Africa from 560 women enrolled in a longitudinal HIV prevention study	<i>Exposures:</i> History of child abuse, physical or sexual IPV as an adult, or illicit substance use; history of problem drinking, determined by 4-item CAGE ≥ 2 or 10-item Alcohol Use Disorders Identification Test ≥ 8 ; household food insecurity (8-item Household Food Insecurity Access Scale >6) in the past 30 days; symptoms of depression (20-item CES-D ≥ 16) and post-traumatic stress (17-item Post Traumatic Stress Disorder Checklist >50) <i>Outcomes:</i> History of STI or HIV diagnosis; percentage of condomless acts of vaginal or anal intercourse in the past 4 months (among 376 sexually -active women)	Total number of syndemic exposures (out of 7)	In a structural equation model, the number of syndemic exposures did not have a statistically significant association with STI/HIV diagnosis ($\chi^2=3.33$; $P=0.068$). In a multivariable linear regression model, the number of syndemic exposures had a statistically significant association with the percentage of condomless sex acts ($b=0.11$, $P=0.025$).
6. Oldenburg et al. 2014	US	Longitudinal analysis of data collected in 2001-2005 from 34,427 men and women participating in Waves 1 and 2 of the National Epidemiological Survey on Alcohol and Related Conditions	<i>Exposures:</i> Twelve-month diagnosis of major depressive disorder, substance use disorder, or alcohol use disorder prior to Wave 1; any physical or sexual IPV in the 12 months prior to Wave 2, with participants who reported having no partner coded as not experiencing IPV; living below the U.S. poverty line <i>Outcomes:</i> Self-reported incident HIV infection between Waves 1 and 2	Total number of syndemic exposures (out of 4), with two-way product term between syndemic exposures and poverty	In a multivariable logistic regression, the number of syndemic exposures had a statistically significant association with incident HIV infection (AOR=1.46; 95% CI, 1.30-1.65). The product term between the syndemic variable and poverty was statistically significant ($P<0.001$), with a larger association between syndemic exposures and HIV infection observed among persons living below the poverty line (AOR=1.96; 95% CI, 1.57-2.44) compared to persons living above the poverty line (AOR=1.21; 95% CI, 1.07-1.36).
7. Fasula et al. 2015	US	Cross-sectional study conducted in a juvenile detention facility with 188	<i>Exposures:</i> Emotional, physical, and sexual abuse; pregnancy coercion; substance abuse; depression; and post-traumatic stress disorder	Total number of syndemic exposures (out of	The number of syndemic exposures had a statistically significant association with all 4 outcomes.

		African American girls aged 13- 17 years who reported any lifetime vaginal intercourse	<i>Outcomes:</i> Early sexual debut; condomless sexual intercourse; multiple sexual partners; self- reported STI	7), specified as a continuous variable	
8. Martinez et al. 2015	US	Secondary analysis of data on 2,753 adolescent girls participating in the 2011 U.S. Youth Risk Behaviour Surveillance Survey	<i>Exposures:</i> Self-reported use of alcohol, tobacco, or other substances; experience of interpersonal violence; symptoms of depression, suicidal ideation, or history of suicide attempt during the prior 12 months <i>Outcomes:</i> Self-report of ≥ 2 sexual partners during the prior 3 months, condomless sexual intercourse during the most recent sexual encounter, any substance use during the most recent sexual encounter	Total number of syndemic exposures (out of 3), specified as a continuous variable and weighted by severity	In multivariable logistic regression models, the number of syndemic exposures had a statistically significant association with multiple partners (AOR=1.23, $P<0.01$), condomless sex (AOR=1.13, $P<0.05$), and substance use during sex (AOR=2.03, $P<0.001$).
9. Koblin et al. 2016	US	Longitudinal study conducted from 2009-2012, with 799 high-risk HIV-negative women in 3 U.S. cities	<i>Exposure:</i> Any illicit substance use, heavy alcohol use, or incarceration in past 6 months; IPV; low educational attainment; current unemployment, low income, housing instability, and lack of health insurance <i>Outcomes:</i> Multiple sexual partners, condomless anal sex, vaginal/anal sex while intoxicated, transactional sex, and STIs	Total number of syndemic exposures (out of 9), specified as a continuous variable; number of different levels of syndemic exposure (individual, dyadic, structural)	In multivariable GEE logistic regression models, the total number of syndemic exposures had statistically significant associations with all of the outcomes (AORs ranged from 1.19 to 1.91), as did the number of different levels of syndemic exposures.
10. Batchelder et al. 2016	US	Secondary analysis of baseline data collected in the Bronx, New York, from 620 midlife women with or at-risk for HIV participating in a cohort study of menopause	<i>Exposures:</i> Self-reported lifetime history of child sexual abuse, violent victimisation during adulthood, illicit substance use in the prior 6 months, perceived financial hardship, and symptoms of depression (20-item CES-D ≥ 23) <i>Outcomes:</i> Composite sexual risk score based on a 6- month recall window (condomless sex with multiple sexual partners, any condomless transactional sex, and any unprotected intercourse with a non-primary partner)	Total number of syndemic exposures (out of 5), specified as a categorical variable	In a multivariable Poisson log- linear regression model, the number of syndemic exposures had a statistically significant association with sexual risk (AORs range: 1.13-1.72). Of the product terms that were assessed, a statistically significant interaction was observed between substance use and violent victimisation (AOR=1.27; 95% CI, 1.06-1.53).
11. Deuba et al. 2016	Nepal	Cross-sectional study conducted in Nepal with 610 female sex workers	<i>Exposures:</i> Condom use self-efficacy, social network size, perceived social support, HIV transmission risk behaviour, client refusal to pay for services rendered	Total number of syndemic exposures (out of 5), specified as a	In multivariable logistic regression models, the number of syndemic exposures had a statistically significant association with

			<i>Outcomes:</i> Condomless intercourse with most recent client	categorical variable censored at ≥ 3	condomless intercourse; the predicted probability of condomless intercourse increased from 0.12 among study participants reporting 1 syndemic condition to 0.38 among those reporting ≥ 3 syndemic conditions.
12. Martinez et al. 2017	US	Secondary analysis of data on 772 Latina women (of 1,233 total participants) enrolled in a randomised controlled trial conducted in New York	<i>Exposures:</i> Self-reported substance use and experience of intimate partner violence (recall windows not specified), and 20-item CES-D <i>Outcomes:</i> Self-reported STI (recall window not specified), condomless intercourse with most recent sexual partner, multiple sexual partners in the prior 6 months, all evaluated at 1 year postpartum	Total number of syndemic exposures (out of 3) at baseline, specified as a continuous variable and weighted by severity	Bivariate analyses showed syndemic score (OR=1.40) and severity (OR=1.68) were significant predictors for multiple sex partners STIs. Syndemic severity remained significant in multivariate analyses for multiple sex partners (OR=1.53). Higher syndemic severity also predicted greater odds for multiple partners (OR=2.40) among immigrant women.
13. Tsuyuki et al. 2017	US	Cross-sectional analysis of data from a sample of 481 high needs substance-using, HIV-infected people in South Florida, including HIV-infected heterosexual men, heterosexual women, and men who have sex with men	<i>Exposures:</i> Syndemic factor was developed using substance use disorder (past year), violent victimisation (lifetime physical, sexual, and emotional violence), and mental health variables (scales assessing depression and anxiety in past year), and stress in past 90 days).	Syndemic latent variable comprising substance use disorder, violence, mental health problems	In confirmatory factor analysis, heterosexual women had a larger syndemic factor mean than MSM, indicating that the syndemic burden was greater among heterosexual women than heterosexual men and men who have sex with men: [(1) heterosexual men—AIC = 3175.75, BIC = 3219.11, log-likelihood= -1572.88, (2) MSM—AIC = 3674.49, BIC = 3720.43, log-likelihood= -1822.25, (3) heterosexual women—AIC = 4490.03, BIC = 4538.73, log-likelihood= -2230.01.]

2.4.1.2 Studies in Asia

There was a dearth of studies assessing syndemic associations and mechanisms among women in Asia. A total of 13 articles investigated associations between IPV and HIV among female samples in the Asia region, with the majority of studies (11/13, 85%) being conducted in South Asia (Table 2.4). Among identified studies, 7/13 (54%) took place in India, and one each in Thailand, Papua New Guinea, Nepal, Bangladesh, and China. There were no quantitative studies with women who inject drugs identified in Indonesia. All studies identified were based on a cross-sectional design; 7 used national population-level data to conduct secondary analyses. None of the studies used experimental or quasi-experimental designs, placing all at some risk of bias. The majority of studies (9/13, 69%) assessed associations among general female populations. Vulnerable female groups at high-risk of HIV were investigated in only 5 studies. These included substance-involved women at a drug detoxification centre in Thailand (Srirak et al. 2005), women living with HIV in India (Gupta et al. 2008; Chakraborty et al. 2016), sex workers in Thailand (Decker et al. 2010), and female partners of male injecting drug users in India (Solomon et al. 2011).

With the exception of one study of 400 female partners of male injecting drug users in India (Solomon et al. 2011), all studies in Asia (12/13, 92%) reported a statistically significant positive association between IPV and one or more HIV-related outcomes. The most frequently studied form of IPV was physical IPV (9/13, 69%), followed by sexual IPV (8/13, 62%), combined sexual and physical IPV (3/13, 23%), and any IPV (1/13, 8%). Psychological IPV was assessed by only one study (Lewis, Maruia, and Walker 2008). Several recall windows were assessed: lifetime IPV (8/13, 62%), past-year IPV (3/13, 23%), and past week IPV (1/13, 8%). Definitions of IPV also varied: investigator-designed questionnaires were

used in 10/13 (77%) of studies; the rest used the Conflict Tactics Scale (Strauss, Boney-McCoy, and Sugarman 1996).

The most frequently studied outcomes in studies in Asia were HIV sexual transmission risk behaviours (10/13, 77%), laboratory-confirmed HIV and/or STI transmission (8/13, 62%), or a combination of both prevalent HIV infection and behavioural outcomes. No studies in Asia assessed the relationship between IPV and unsafe injecting practices. Of studies investigating laboratory-confirmed HIV infection, all looked at prevalent HIV infection, rather than incident HIV infection during the course of longitudinal follow-up. The most commonly studied HIV transmission risk behaviours included: STI diagnosis history and/or STI symptoms (6/13, 46%), condom use at last vaginal/anal intercourse (4/13, 31%), transactional sex (2/13, 15%), condom use consistency (2/13, 15%), multiple sexual partners (2/13, 15%), and having sex with a high-risk partner (i.e. person living with HIV and/or injecting drug user) (1/13, 8%).

This review identified only one study in Asia that empirically tested the syndemic effects of two or more health or psychosocial factors on HIV risk outcomes (Deuba et al. 2016). Deuba and her colleagues conducted a cross-sectional study of 610 female sex workers in Nepal, and found that concurrent exposure to low condom use self-efficacy, low perceived social support, and client refusal to pay for services rendered had additive effects on sexual risk behaviour. Specifically, condomless sex with the most recent client was reported by 12% women with 1 syndemic condition, but increased to 38% among those with ≥ 3 conditions. The study did not assess the interactive effects of these factors.

Table 2.4: Summary of studies testing associations between IPV and HIV transmission risk among women in Asia (n = 13)

Author/year	Country	Objective	Study sample and design	IPV & HIV-related measures	Results	Limitations
1. Parish et al. 2004	China	To assess prevalence, correlates of IPV, and associations between IPV and several negative health outcomes	Secondary analysis of nationally- representative probabilistic sample of 1,665 women and 1,658 men aged 20–64 who had a sexual partner with they had been for at least one month at time of interview	<i>IPV</i> : lifetime physical violence only, measured using investigator-designed questionnaire <i>Sexual risk</i> : having recent genito-urinary symptoms; having a history of STIs; testing positive for chlamydia	In multivariate analyses limited to women, having ever been hit was associated with increased risks of experiencing almost every adverse health outcome tested, including having had recent genito-urinary symptoms (risk ratio 2.2), with the exception of testing positive for chlamydia (risk ratio 0.4).	*Definitions of IPV and sexual risk limited to physical IPV *Only lifetime IPV measured *Did not use standardised, validated measures *No analyses completed on vulnerable sub-populations of women
2. Srirak et al. 2005	Thailand	To investigate risk factors for HIV infection among women admitted for 21-day inpatient drug detoxification	Cross-sectional, convenience sample of 200 women at a drug detoxification centre in Chiang Mai	<i>IPV</i> : lifetime sexual abuse by an intimate partner, measured using researcher-derived questions <i>HIV risk</i> : laboratory-confirmed HIV test results; ever trading sex for money; history of STIs; history of having sex with a high-risk partner (living with HIV and/or injecting drugs)	In multivariate analyses, ever experiencing sexual abuse was independently associated with HIV infection (OR=10.2). Results of associations between abuse and other HIV risk outcomes were not reported.	*limited measure of IPV: sexual abuse only, and lifetime only *several HIV behavioural risk factors were measured, but results not reported
3. Silverman et al. 2008	India	To assess the relationship between experiencing IPV and the occurrence of HIV infection	Nationally representative, probabilistic sample of 28, 139 married Indian women who provided IPV data and HIV test results	<i>IPV</i> : lifetime IPV conceptualised as physical violence with or without sexual violence, and further categorised as physical violence only vs physical and sexual violence combined, measured using a modified version of the Conflict Tactics Scale <i>HIV</i> : laboratory-confirmed HIV test results	In adjusted models, women experiencing both physical and sexual violence from husbands demonstrated elevated HIV infection prevalence vs those not experiencing IPV (0.73% vs 0.19%; adjusted OR, 3.92; 95% CI, 1.41-10.94; $P = .01$). Physical IPV alone was not associated with risk of HIV infection.	*Definitions of IPV limited to physical and sexual IPV only *Only lifetime IPV measured *No analyses completed on vulnerable sub-populations of women

4. Gupta et al. 2008	India	To examine factors related to HIV risk among currently or previously-married Indian women	Cross-sectional sample of 459 HIV positive (n=216) and negative (n=243) women recruited from general hospitals in urban and rural areas in New Delhi and Chennai	<i>IPV</i> : lifetime physical violence only, measured using researcher-derived questions <i>Sexual risk</i> : condom use consistency in the past 6 months, extramarital sex, use of condoms in extramarital relationships	Physical violence was associated with lack of condom use in extramarital relationships (OR=2.34; p<0.05), and negatively correlated with condom use consistency with the steady partner in the past 6 months (OR=0.42, p<0.05).	*Definition of IPV limited to physical IPV only *Definition of IPV limited to lifetime IPV only *Use of non-standardised measures of sexual risk
5. Lewis et al. 2008	Papua New Guinea	To test associations between different forms of domestic violence and women's HIV status.	Cross-sectional sample of 415 women who accessed antenatal and voluntary counselling and testing services across four provinces of Papua New Guinea.	<i>IPV</i> : lifetime physical violence, emotional/verbal abuse, and sexual abuse, measured using researcher-derived questions. <i>HIV</i> : laboratory-confirmed HIV and STI test results; transactional sex	Physical, emotional, and sexual abuse were strong indicators of HIV risk, being significantly associated with both HIV positive status, and with the presence of STIs. Associations between IPV forms and transactional sex was not reported.	*Definition of IPV limited to lifetime IPV only *No analysis conducted on sub-groups of vulnerable women
6. Decker et al. 2008	Bangladesh	To assess associations of intimate partner violence (IPV) with women's STI symptoms	Cross-sectional analysis of population-based sample of married couples (n = 2865) sampled via the Bangladesh Demographic Health Survey	<i>IPV</i> : Husband's past-year IPV perpetration, assessed using researcher-derived questions, and conceptualised as physical IPV only, sexual IPV only, both physical & sexual IPV, and any IPV. Husbands' reports of IPV perpetration served as proxy for wives' IPV victimisation, as no assessment of female IPV victimisation was available. <i>Sexual risk</i> : Women's STI symptoms were assessed using syndromic approach of 7 symptoms in previous 6 months	IPV demonstrated an independent effect on vaginal irritation with discharge (adjusted OR 1.34) and vaginal discharge with odour (adjusted OR 2.08), after accounting for STI exposure (i.e., husbands' recent STI). In adjusted analyses, women who experienced past-year physical violence were at 34% increased risk for vaginal itching or irritation with discharge, while women exposed to sexual violence were over twice as likely to have experienced vaginal discharge with odour.	*No measure of psychological IPV included *No confirmatory measure of IPV from women themselves; unclear reliability of proxy of IPV perpetration *No analysis conducted on sub-groups of vulnerable women

7. Decker et al. 2009	India	To examine whether wives' HIV infection risk based on husbands' HIV infection varies as a function of IPV exposure	Cross-sectional analysis of nationally representative sample of 20,425 husband- wife dyads that provided both IPV data and HIV test results	<i>IPV</i>: lifetime physical and sexual IPV victimisation, measured using modified version of the Conflict Tactics Scale <i>HIV</i>: laboratory-confirmed HIV test results	IPV appeared to function both as a risk marker and as a risk factor for HIV among women. Husband's HIV infection was associated with increased HIV risk among wives; this risk was elevated sevenfold in abusive relationships in adjusted models (AOR =7.22; 95% CI 1.05, 49.88).	*only two forms of IPV measured *IPV measure only based on lifetime exposure *no subgroup analysis of vulnerable women
8. Decker et al. 2010	Thailand	To investigate the role of violence as it relates to sexual risk and self-reported STI symptoms among female sex workers	Cross-sectional sample of 815 female sex workers	<i>IPV</i>: Physical and sexual violence was assessed for the week prior to the survey, via researcher-derived items <i>Sexual risk</i>: anal sex, condom non-use, condom failure, client condom refusal, STI symptoms using a syndromic self-reported assessment of 5 common symptoms	Compared with their non-victimised counterparts, FSWs exposed to recent violence were at greater risk for recent condom failure (19.6% vs. 12.3%, ARR 1.92, 95% CI 1.24, 2.95) and client condom refusal (85.7% vs. 69.0%, ARR 1.24, 95% CI 1.14, 1.35). In analyses adjusted for sexual risk, violence was related to both STI symptoms collectively (ARR 1.11, 95% CI 1.02, 1.21) and genital lesions as an individual STI symptom (ARR 1.78, 95% CI 1.20, 2.66).	*lack of validated, standardised measures of IPV
9. Ghosh et al. 2011	India	To investigate correlates of HIV transmission among sexually-experienced women	Cross-sectional analysis of population-based sample of 52,853 women, including 27,556 husband and wife pairs	<i>IPV</i>: Lifetime sexual IPV only, measured using researcher-derived items <i>HIV</i>: laboratory-confirmed HIV test results, condom use with regular partners, unprotected anal sex.	Suffering sexual violence was significantly associated with HIV transmission (AOR = 2.63). Abused women were significantly less likely to have used condoms with their intimate partners, had unprotected anal sex, and were more likely to have HIV.	*only one form of IPV measured *lack of standardised, validated measures for IPV *unclear sexual risk measures

10. Solomon et al. 2011	India	To determine prevalence and risk factors for HIV, hepatitis B and C among female partners of male drug injectors	Convenience sample of 400 female partners of injecting drug users in Chennai, India	<i>IPV</i> : lifetime sexual IPV, measured using an investigator-designed questionnaire <i>HIV</i> : laboratory-confirmed HIV test results	HIV infection was not associated with lifetime experience of sexual violence in unadjusted samples.	*only sexual IPV was measured *lack of standardised, validated measures for IPV
11. Spiwak et al. 2013	India	To test the association between IPV and STIs in a national sample of women	Cross-sectional analysis of population-based sample of 24,862 ever-married women between the ages of 20 and 49	<i>IPV</i> : past-year physical IPV was measured using investigator-designed questionnaire <i>HIV</i> : doctor-confirmed HIV status, self-reported STI symptoms in past year	Women exposed to past-year physical IPV were at increased odds for STI in multivariate analyses (AOR=1.65, p <0.01).	*only one IPV type measured *lack of standardised, validated measures for IPV *no sub-analyses on vulnerable sub-populations of women
12. Chakraborty 2016	India	To examine the associations between IPV and HIV status among married women	Cross-sectional study of 199 married couples (99 couples with 1+ HIV-positive partner, and 100 couples in which neither partner was HIV-positive) in Belgaum, Karnataka.	<i>IPV</i> : any past-year physical & sexual violence, any lifetime IPV assessed via investigator-designed questionnaires <i>HIV</i> : self-reported HIV status confirmed by medical records	Women living with HIV were three times more likely to face past-year sexual violence compared with HIV-negative women.	*only certain forms of IPV were measured *no validated, standardised measures were used either for HIV or for IPV
13. Shrestha et al. 2016	Nepal	To examine associations between IPV and HIV risk among married women	Cross-sectional analysis of subsample of 3,048 married women from nationally-representative, population-based survey	<i>IPV</i> : sexual and physical IPV measured by short form of the Conflicts Tactics Scale <i>HIV risk</i> : multiple sexual partners, condom use at last sexual intercourse, ability to refuse sex when they did not want to, ability to negotiate condom use.	Women who experienced physical violence from their husband were more likely to have a history of STIs in the past 12 months, have multiple sex partners, and not use a condom during their last sexual intercourse. Exposure to sexual IPV was significantly associated with having history of STIs in the past 12 months, inability to refuse having sex, and inability to negotiate condom use with their partner during intercourse.	*no assessment of effects of psychological IPV *no analyses on subpopulations of vulnerable women

2.4.2 Key findings

2.4.2.1 Associations and mechanisms linking syndemic processes and HIV

This section focuses on findings related to the most commonly studied syndemic associations and mechanisms for HIV in quantitative literature, as identified by the present review: substance use, IPV, and mental health. The research reviewed here suggests that there are multiple, bidirectional, and intersecting mechanisms linking these factors among female populations, including those who use drugs.

First, substance use is a key mechanism linked to HIV transmission and acquisition. Injection and non-injection drug use have had a major impact on the course of HIV epidemics and have been identified as key sustaining factors for HIV acquisition and spread (Vickerman and Watts 2003; UNAIDS 2014a). Injecting drug use may lead to HIV infection through the lending and borrowing of needles and syringes for drug injection (Public Health Agency of Canada 2012). Epidemiological studies that investigated the risk of HIV transmission associated with needle and syringe sharing have all found a positive relationship. For instance, in cohort studies conducted in North America, persons who shared needles and syringes were 1.5 to 5.9 times more likely to seroconvert than those who did not share (Bruneau et al. 2001; Miller 1999). In addition, several observational studies have shown an epidemiological link between sharing drug preparation equipment (e.g., sharing water, cookers, or filters) and HIV transmission (Public Health Agency of Canada 2012). Furthermore, existing research suggests that women are more likely to share injecting paraphernalia than men (Roberts, Mathers, and Degenhardt 2010; Strathee et al. 1997; Sherman, Latkin, and Gielen 2009). Accidental percutaneous exposure to a contaminated needle or syringe (e.g. from a sharps bin) also poses a risk of

transmission (Bruneau et al. 2001).

Moreover, non-injecting drugs, particularly stimulants such as crystal meth, may be an important factor contributing to HIV infection among female injecting populations (Strathdee and Stockman 2010). The use of methamphetamine and amphetamine-type stimulants is growing around the world – especially in South East Asia, the most affected region globally. Methamphetamine has been causally associated with HIV infection (Drumright, Patterson, and Strathdee 2006). The pathway for this risk is most often indirect, as stimulant users tend to engage in frequent, high-risk sexual practices with multiple sex partners (Strathdee and Stockman 2010). Stimulant use can facilitate HIV transmission through unprotected sex while under the influence of drugs, and by heightening sexual activity and impairing judgement in risky situations (Stahlman et al. 2013; Santos Cruz et al. 2013). A meta-analysis assessing the risk of HIV acquisition by type of drug in 15 international studies, including from Asia, identified higher HIV sexual risk in cohorts that used stimulants compared with users of other drug types (Incidence Rate Ratio = 3.0; 95% CI = 2.2–4.1) (Tavitian-Exley et al. 2015). It is important to note that drug use categories are rarely mutually-exclusive. Existing research shows that there is a high degree of mixing or “bridging” between injecting and non-injecting populations, which can facilitate HIV transmission via overlapping social and sexual networks (Strathdee and Stockman 2010).

Secondly, studies identified significant associations between using different drugs, including opiates and stimulants, and experiencing IPV, and vice versa (El-Bassel et al. 2003; Brewer, Haggerty, and Catalano 1998; Kilpatrick et al. 1997; Capaldi et al. 2012). For example, in a probability sample of 3,003 U.S. women, Kilpatrick and her colleagues (1997)

found that after controlling for background factors, women's drug use doubled their odds of experiencing a violent assault, whilst new assaults, in turn, doubled women's risk of drug use in the subsequent year. Furthermore, a longitudinal study of women in methadone treatment in the U.S. found that women who reported IPV at wave 2 were three times more likely to report heroin use at wave 3 than their counterparts who did not report physical and sexual IPV (El-Bassel et al. 2005). Several mechanisms may explain these relationships. First, the psycho-pharmacological effects of drugs can influence IPV perpetration. A recent systematic review confirmed that drug use (i.e. heroin, stimulants, marijuana) tends to intensify feelings of paranoia, jealousy, and irritability, as well as impair judgement; these effects in turn increase the likelihood of IPV perpetration and decrease the ability to use condoms (Choenni, Hammink, and van de Mheen 2017). Furthermore, research suggests that in situations where women's intimate partners provide them with drugs, there is an expectation from partners to have sex in return (Gilbert et al. 2000). A woman's refusal to have sex or attempt to negotiate condom use under these heightened expectations may trigger further aggression from her partner, especially if he is under the influence of drugs himself or experiencing withdrawal (Braitstein et al. 2003). Second, substance use can impair cognitive and motor abilities, making it more difficult for women to recognise risky situations (Norris, Nurius, and A. 1996) and negotiate condom use or safer injecting behaviours during such encounters (El-Bassel et al. 2000). For instance, women frequently using stimulants have reported experiencing difficulties discerning when their partners' words or actions begin to escalate to a threatening or dangerous level (Miller, Gold, and Mahler 1991). Third, many women who use drugs engage in transactional sex for money or drugs, which may occur in perilous, inequitable circumstances where coercive sex is common and ability to negotiate condom use is minimal (Shannon et al.

2008; Gu et al. 2014). Fourth, women may use drugs in the aftermath of abuse to self-medicate and cope with the emotional and physical pain of experiencing IPV (Simonelli, Pasquali, and De Palo 2014; World Health Organization 2013).

Thirdly, the majority of studies identified in this review that explored risk factors for HIV in general and at-risk female populations focused on the links between IPV and HIV. The extant literature indicates that there is a robust positive association between IPV and HIV transmission among women (Li, Marshall, et al. 2014). Specifically, a meta-analysis combining 28 cohort, case-control, and cross-sectional studies among women in 16 countries found a moderate statistically significant association between IPV and HIV infection (pooled ORs 1.41–2.00) (Li, Marshall, et al. 2014). In their international review of 101 studies, Kouyoumdjian et al. (2012) found that this relationship is bidirectional, and linked by both direct and indirect causal pathways. In particular, sexual IPV can facilitate direct transmission of HIV via forced sexual intercourse with a male intimate partner living with HIV (Dunkle and Decker 2013). Such direct transmission can occur because violent sexual intercourse tends to increase the occurrence of vaginal trauma such as lacerations and abrasions, which turn heighten the risk of contracting HIV and other STIs (WHO 2005). Reviewed evidence also shows that HIV transmission risk is higher in the presence of other STIs (Dunkle and Decker 2013; Pettifor et al. 2004). With regard to indirect transmission of HIV as a result of IPV, a link has been demonstrated between experiencing IPV and elevated sexual risk behaviours, including having multiple sexual partners, engaging in transactional sex, experiencing STI symptoms, and using condoms inconsistently. Included studies conducted in low- and middle-income countries show that women who experienced IPV were two to three times more likely to engage in transactional sex and six times more likely

to report inconsistent condom use, compared with women who were not exposed to IPV (Dunkle and Decker 2013; Pettifor et al. 2004). Moreover, a meta-analysis of global data suggests that physical IPV alone increases risk for HIV by 28% – 52% among different populations of women, including some samples of drug-using women (WHO 2013a; Li, Marshall, et al. 2014). Physical IPV operates indirectly by creating a context of fear and submission and making it difficult for women to negotiate safer sex (Gilbert et al. 2015). Negotiating safer behaviours becomes even more challenging if either women or their intimate partners are under the influence of drugs. Research exploring independent effects of psychological IPV – which includes verbal, controlling, isolating, and dominating behaviours – on HIV is scarce (Gilbert et al. 2015). However, evidence from a longitudinal cohort of women in Uganda suggests that verbal IPV creates a similar dynamic of fear and submission as physical IPV, and exerts comparable effects to physical and sexual IPV (Kouyoumdjian et al. 2013).

Although studies included in the reviews largely addressed sexual HIV risk outcomes, there was also evidence of an indirect relationship between women's exposure to IPV and unsafe injecting drug use. This relationship was explicitly discussed in 2/17 (12%) of included reviews (Maman et al. 2000; Gilbert et al. 2015). In particular, IPV has been found to facilitate HIV transmission by elevating unsafe injecting practices such as needle/syringe sharing and borrowing (Wagner et al. 2009; Strathdee et al. 1997; Braitstein et al. 2003). The same mechanisms that heighten the risk of contracting sexually-transmitted HIV appear to also elevate women's injection-related HIV risk. Namely, IPV can create a dynamic of control, fear and submission that inhibits women's ability to negotiate safer

injecting behaviours, especially in situations where the perpetrator is also a source of drugs (Maman et al. 2000).

Fourthly, this review found strong evidence for the role of mental health in both perpetuating and mediating relationships between substance use, IPV, and HIV. Depressive disorders are the second leading cause of disease burden in adult women worldwide (Ribeiro et al. 2008). Depression plays a key role in perpetuating HIV transmission among women because it often co-occurs with and has mutually-reinforcing relationships with both substance use and IPV. Meta-analytic evidence combining 16 longitudinal studies provides clear evidence of an association between IPV and incident depressive symptoms in women, with 12 of 13 studies showing a positive direction of association and 11 reaching statistical significance (Devries et al. 2013). The same meta-analysis also detected an association in the reverse direction between depression and incident IPV. IPV-related trauma is the main mechanism through which IPV likely causes subsequent depression, since traumatic events can lead to stress, fear, and isolation, which in turn may lead to depression (Hyde, Mezulis, and Abramson 2008). Mental health challenges can also play a role in increasing women's substance use and in inhibiting their ability to discern and navigate risky situations (Devries et al. 2013).

Fifthly, the clustering of these afflictions (i.e. substance use, depression, IPV, and HIV) has been shown to interact to form a syndemic – a set of co-occurring conditions that together can compromise a woman's well-being. This review confirms that such clustering occurs disproportionately among women who inject drugs, and that women in low- and middle-income countries are particularly affected (Gilbert et al. 2015). It is notable that all studies included in this review, with one exception (Solomon et al.), reported statistically

significant associations between one or more syndemic conditions and one or more HIV risk outcomes. Tests of interaction between risk factors among drug-using women remain limited in global literature to date. However, there is indication that, if confirmed, such tests could provide an informative locus of effective intervention for reducing negative health outcomes among vulnerable women.

2.4.2.2 Qualitative literature in Indonesia

This thorough literature search identified no quantitative research with women who inject drugs in Indonesia. In the absence of quantitative studies, published and grey qualitative literature in Indonesia was reviewed. This review identified 7 eligible manuscripts describing qualitative research. Among these, 4 were peer-reviewed journal articles, all referring to the same dataset (Lazuardi et al. 2012; Spooner et al. 2010; Saktiawati et al. 2013; Spooner et al. 2015), and 3 were unpublished manuscripts of studies undertaken by non-governmental organisations (Sari and Nurmaya 2009; Neverndorff and Praptoraharjo 2015) or governmental institutions (Habsari et al. 2007).

Identified studies addressed various aspects of drug-using women's experiences. Since this thesis focuses on women's HIV transmission risk and associated syndemic factors, only findings related to these experiences were extracted and summarised. Table 2.5 describes study characteristics of the 7 manuscripts and selected findings related to HIV sexual and injecting risks, mental health, and violence.

Table 2.5: Summary of qualitative studies with women who use and inject drugs in Indonesia (n = 7)

Author/year	Sample & design	Selected findings
1. Habsari et al. 2007	Focus group discussions and in-	• Gender-based physical, sexual, emotional, and economic violence was widespread in the illicit

	depth interviews with 193 drug-involved persons from 8 cities in Indonesia, including: 52 women who use/inject drugs, 62 female partners of men who inject drugs; and 79 men who inject drugs.	drugs market, and was perpetrated by women's intimate partners, drug dealers, law enforcement officers, and health workers. • Risky sexual behaviour was more likely in drug-involved relationships, as women were expected to procure drugs as part of gendered division of labour, which often involved transactional sex. • Several women reported pain during intercourse and irritation in vaginal area following sex or sex under the influence of drugs. • Among the subgroup of women using/injecting drugs (N=52), 15.4% had a past STI diagnosis, 63.5% had STI symptoms, 67.5% reported depression, and 23.1% had attempted suicide.
2. Sari et al. 2009	Focus group discussions and in-depth interviews in Jakarta with 25 women actively injecting drugs; 25 men actively injecting drugs; 24 health workers with community-based organisations and service providers; 12 governmental and/or donor representatives	• Emotional, physical, and sexual forms of violence from both intimate partners, and from the police, were frequent. • Subsequent IPV-related trauma appeared to fuel women's drug use, leading to further health and economic problems. • Women felt they were often "lower" than men not only within society at large, but also within illicit drug networks. This perceived inequality was seen to be a result of cultural and social factors and elevated stigma against women involved with substance use. • Male partners often controlled women's movements and their access to HIV services; dependence on male partners was exacerbated by women's limited economic opportunities.
3. Spooner et al. 2010	In-depth interviews in three cities in Central Java (Yogyakarta, Solo, Salatiga) with 19 women who injected drugs in the preceding month	• Women experienced double stigma associated with being female and using drugs from health services, the general community, friends and family; their response was to hide their drug use and to restrict their social circle to their partner and (mostly male) peers who also inject drugs. • Most of the women had shared needles in the previous 6 months; several reported having casual and transactional partners, and condoms were not routinely used. • Women's contact with harm reduction services, was not frequent and was often indirect (via male friends or partners) as the women did not want to be identified as a drug user.
4. Lazuardi et al. 2012	In-depth interviews in three cities in Central Java (Yogyakarta, Solo,	• Drug-using women's engagement in HIV-risk behaviour in Indonesia often happened in the context of intimate relationships.

	Salatiga) with 19 women who injected drugs in the preceding month	• Male partners played a significant role in the initiation of drug use, the provision of drugs, injecting behaviour and in the constitution of women injectors' social networks.
5. Saktiawati et al. 2013	In-depth interviews in three cities in Central Java (Yogyakarta, Solo, Salatiga) with 19 women who injected drugs in the preceding month	• Women valued maintaining relationship "harmony" above their own needs, even when they felt they were at risk of HIV. • Drug-using women often acquiesced to their partners' wishes around condom use and other sexual practices, in order to avoid potential conflict and aggression from partners.
6. Spooner et al. 2015	In-depth interviews 19 women who injected drugs in the preceding month from three cities in Central Java (Yogyakarta, Solo, Salatiga)	• The stigmatisation of drug use, particularly of drug use by women, in Indonesia has contributed to significant shame, isolation from mainstream society. • This in turn appeared to contribute to high rates of sharing injecting equipment with friends and with intimate partners.
7. Neverndorff et al. 2015	Focus group discussions in three Indonesian cities (Jakarta, Medan, Makassar) with 38 participants (14 women, 24 men, 1 transgender) who actively used crystal meth in the past month.	• Crystal-meth use appeared to play a significant role in enabling and prolonging intercourse, particularly for women in sex work. • Some women reported injury to the vagina as a result of using meth during sexual intercourse. • Condom use was largely inconsistent, and several respondents noted a lack of perceived risk related to sexual HIV transmission. • Sexual networks of female meth users were diverse, with many reporting multiple and different types of intimate partners.

Qualitative evidence suggests that substance-using Indonesian women experience high vulnerability to HIV via both high-risk sex and high-risk drug use. In a multi-city qualitative study of 52 female drug users and injectors, 15% of the women had a past STI diagnosis, and 64% had STI symptoms at the time of interview (Habsari et al. 2007). In drug-involved relationships, risky sexual behaviour is more likely since women are often expected to procure drugs as part of a gendered division of labour which often involves women engaging in transactional sex with drug dealers in exchange for drugs and other favours. This exchange occurs in highly unequal contexts where women's ability to negotiate

condom use is limited (Habsari et al. 2007). Female participants in a study of crystal meth users reported that they often use crystal meth to cope with transactional sex with a high number of partners and prolonged sexual encounters. Several women also reported vaginal injury as a result of aggressive and prolonged intercourse (Neverndorff and Praptoraharjo 2015).

This risk is doubled in relation to unsafe injecting practices. Spooner et al. (2010) documented widespread needle sharing and low access to HIV prevention services among injection drug-using women in Central Java. Access to services for women was infrequent and indirect (via friends or male partners), as women did not want to be identified as a drug user and risk facing stigma, discrimination, and abuse (Saktiawati et al. 2013).

Although some women attempted to avoid gendered discrimination in relation to health services and law enforcement, they could not escape it at home. Existing studies point to relationship power differentials and partner-perpetrated abuse against substance-using Indonesian women, which could be compounding their HIV vulnerability. For instance, Habsari et al. documented widespread verbal, sexual, and physical violence against women perpetrated by both intimate and non-intimate partners (Habsari et al. 2007). Women have also reported that in situations where they felt at risk of HIV infection whilst in an abusive relationship, their priority was not protection against acquiring HIV. Instead, women tended to normalise the abuse they received. Women sought to avoid conflict out of fear of provoking further aggression from their partners, and a desire to “preserve harmony” and “maintain their relationship,” traits traditionally associated with female gender roles in Java (Lazuardi et al. 2012).

The literature further suggests potential links between violence, mental health, drug use. A central theme cited by women in relation to their experiences of abuse was the presence of mental health problems and substance use. In Habsari's multi-city study (2007), nearly two-thirds of drug-using women had depressive symptoms and 1 in 4 women had recently attempted suicide. In Sari and Nurmaya's 2009 study, women reported using drugs to cope with IPV-related trauma. In this way, women's experiences of violence, trauma, and drug use potentially reinforced one another, creating a vicious circle of risk framed by dependency on intimate partners and limited economic opportunities.

To summarise, qualitative and anecdotal literature on women who inject drugs in the Indonesian context, whilst not focused on HIV risk only, provided helpful indications of potential factors which were particular to this group. Existing research suggested that women who inject drugs in Indonesia engage in risky sexual and injecting behaviours and experience abuse victimisation. These experiences can produce long-lasting trauma, which may manifest in the form of depression and other mental health challenges. Due to cultural factors and to pervasive stigmatisation, many women do not seek care and support for their experiences, which may in turn increase their risk for HIV infection and further victimisation (Lazuardi et al. 2012; Sari and Nurmaya 2009).

2.5 Discussion

Empirical research on syndemic risk factors for HIV among women who inject drugs remains limited. Worldwide, 17 reviews were found, 13 of which included global literature and 4 U.S.-only studies. 13 studies that assessed associations between IPV and HIV risk were identified in Asia (11 in South Asia; 2 in the Western Pacific region). Only one study,

from Thailand, assessed these relationships as they related to drug-using women, and found a significant association between sexual abuse victimisation and prevalent HIV infection (Srirak et al. 2005). Internationally, there were 13 studies (11 in the US, 1 in South Africa, 1 in Nepal) that went beyond associations between these two factors to explore additive effects of co-occurring conditions on women's well-being. One tested synergism via a product term (i.e. multiplicative interaction), and none tested additive interaction. There were no quantitative studies conducted with drug-involved women in Indonesia.

The variability of studies in terms of design, female populations, measures, and instruments, makes comparison of studies and meta-analysis challenging. Although three meta-analyses were identified (Watts 2012; Maxwell et al. 2015; Li, Marshall, et al. 2014), these were largely conducted with population-based female samples, and none focused specifically on studies with drug-involved women. Among research that addressed drug-involved women specifically, most studies to date have been conducted in health care or drug treatment settings. As such, existing data may not generalise to female injecting drugs users in community settings. More longitudinal studies of syndemic factors among women who inject drugs are necessary. These can improve our understanding of the temporality of HIV transmission for drug-involved women and the mechanisms that sustain and perpetuate HIV risk. In the absence of longitudinal data among women who inject drugs, cross-sectional studies that apply probability-based sampling methods, such as respondent-driven sampling, can offer solutions to numerous challenges found in commonly-used sampling methods with hard-to-reach populations. Despite limitations, there is value in comparing the evidence available from existing studies of drug-involved women with broader evidence on syndemics among female samples drawn from the

general population. Many of the risk factors identified in studies of HIV risk amongst drug-using women were supported by broader behavioural research among women, or studies with other vulnerable groups such as sex workers and women living with HIV. These similarities also allowed corroboration of study findings from the scarce literature of syndemic factors among women who inject drugs with studies from broader literature.

Furthermore, existing studies point to significant heterogeneity in relation to HIV-related outcomes. A limited number of studies assessed incident HIV infection measured during the course of longitudinal follow-up studies, or prevalent HIV infection confirmed by laboratory results. The majority of studies used behavioural outcomes as proxies for HIV transmission. Reliable proxies for HIV risk that have been consistently associated with HIV transmission among drug-involved women include: multiple sexual partners, sexual concurrency, trading sex, condom use consistency, sexually-transmitted infection symptoms, and receptive syringe sharing (Gilbert et al. 2015). In relation to HIV behavioural outcomes, nearly all studies identified as part of the present review focused on sexual risk. Only two reviews explicitly addressed injection-related risk behaviours (Gilbert et al. 2015; Maman et al. 2000). Additional research is needed to explicate the links between IPV and injection-related risk. Future studies should assess and, test, laboratory-confirmed HIV incidence and prevalence, or if this is not possible, should test reliable proxies for sexual and injection-related HIV transmission risk. In relation to HIV outcomes, this thesis used literature-informed behavioural HIV risk proxies guided by the findings of this review.

Further methodological discrepancies included the use of non-standardised measures for IPV. The majority of studies identified did not use standardised scales and measures validated on populations in Asia; instead, most applied investigator-designed

questionnaires. The use of newly-created instruments in studies of health outcomes among drug-involved women hinders the possibility of comparison across studies. There is a clear need for consistent measures that are validated on Asian female populations, which are appropriate for use by non-clinically trained interviewers (Meyer, Springer, and Altice 2011). There are further limitations in relation to IPV constructs. Many studies included in this review focused on lifetime history of violence, which can include other forms of gender-based violence, as well as abuse that occurred in childhood and adulthood. This definition and its broad time-frame obstruct the ability to isolate the effects of recent violence perpetrated by an intimate partner. In addition, there remains significant inconsistency in the forms of IPV assessed as predictors, with most studies assessing sexual and/or physical IPV or their combination, and only one study in Asia addressing the effects of psychological IPV. Since sexual, physical, and psychological forms of IPV may have different effects on women's HIV risk (Maxwell et al. 2015), future studies need to consider associations between disaggregated forms of IPV and HIV outcomes. In response to this gap in existing literature, the present study assessed recent violence victimisation time-frames (i.e. up to a year prior), clearly defined partner-perpetrated violence using a standardised, validated instrument, and tested the effects of disaggregated forms of IPV to ensure more precise analyses.

Crucially, there remain significant geographical gaps in epidemiological research on syndemic factors driving HIV risk among women who inject drugs. The majority of studies identified were conducted in the US, and to a lesser extent, Sub-Saharan Africa. There is a dearth of evidence in low- and middle-income countries with injection-driven epidemics,

despite these countries being home to a significant proportion of the world's drug-using and injecting women (Larney et al. 2015).

Despite these limitations, a pooled approach to findings does reveal some patterns. There is strong evidence across studies and settings, including from Asia, that IPV is associated with HIV infection, that this relationship is bidirectional, and that it is linked by a number of key syndemic mechanisms. Furthermore, this review revealed that despite using language related to synergy and interaction, none of the reviewed studies in Asia calculated measures of multiplicative and additive interaction between factors. Therefore, future studies have an opportunity to extend scholarship on HIV vulnerability by conducting these additional computations. Paper 3 (Chapter 7) of this thesis responds directly to this limitation by testing the concentration and interaction of syndemics among a community-drawn sample of women who inject drugs.

2.6 Summary and conclusion

This chapter has reviewed research on IPV, co-occurring factors, and HIV risk among women. A range of studies, using various methodologies and conducted in varied settings, provide largely consistent findings of heightened HIV risk associated with syndemic factors among drug-involved women. Based on findings from this review, women who inject drugs appear to be at elevated risk of HIV, and this risk often coincides with multiple co-existing health and psychosocial problems. Several mechanisms link these health conditions, including bidirectional and potentially synergistic pathways. It is important that future research elucidates which factors and mechanisms are most relevant for HIV risk in this population. This will allow for a stronger evidence base for future longitudinal research, interventions, and policies. The findings of this review support a syndemic framework hypothesis (as discussed in Chapter 1) of greater HIV risk arising from the clustering and interaction of certain risk factors.

This review showed potential risk factors in multiple domains within a woman's life, which may act syndemically and synergistically on women's well-being (Singer et al. 2017). This includes factors at the individual, network, and community levels (Baral et al. 2013). The literature review described in the present chapter informed factors to be tested in empirical and analytical stages of this research (Chapters 5 to 7). Not all the factors identified in this review were measured: factors were prioritised based on theoretical relevance, measurability and applicability to policy. The relevance of these factors was confirmed and added to during the formative research stage, which also helped to identify further locally-relevant confounders. The methodology for the full study is reported in the following Chapter 3.

CHAPTER 3. METHODOLOGY



Figure 3.1: Women pilot the study questionnaire using mobile-assisted technology, June 2014

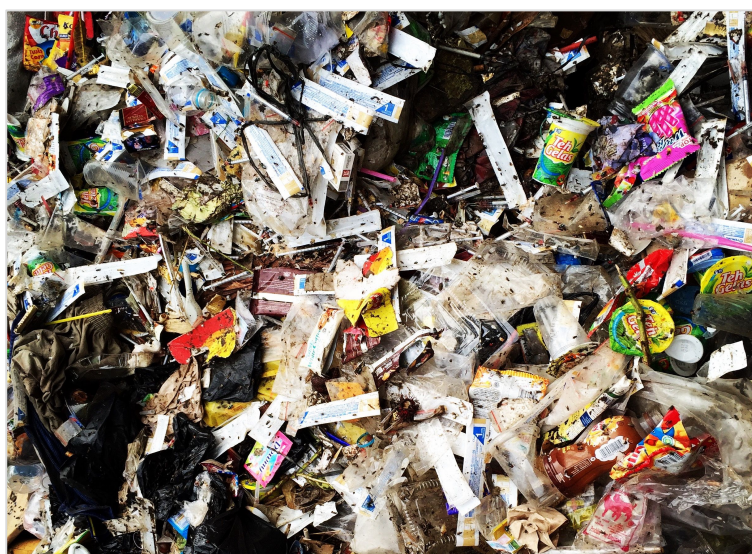


Figure 3.2: Discarded used needles and syringes on a street at a field site in East Jakarta

3.1 Introduction

This chapter starts by summarising the formative research, community-based participatory approach, and consultation process conducted to inform the quantitative Perempuan Bersuara survey. It then details the study's quantitative methodology, including the respondent-driven sampling (RDS) recruitment method, measures, analysis, and ethical considerations.

3.2 Research setting

The Perempuan Bersuara study was conducted in urban and peri-urban locations in Indonesia's Greater Jakarta and West Java provinces (Figures 3.1 and 3.2). These areas were selected for both epidemiological and pragmatic reasons. Firstly, the study areas are home to a large socially and economically heterogeneous population. The primary study site, the Greater Jakarta Metropolitan Area (hereafter, "Greater Jakarta"), combines the capital, Jakarta, and its surrounding municipalities Bogor, Depok, Tangerang, and Bekasi. Greater Jakarta is Asia's most populous metropolitan region, being home to over 30.2 million inhabitants with a high population density of 14,464 people per square kilometre (Statistics Indonesia 2010). The second study site, Bandung, the capital of West Java province, is located approximately 140 kilometres south east of Jakarta. With 8.5 million inhabitants, the Greater Bandung area (hereafter, "Bandung") is Indonesia's second largest metropolitan area. The inner zone of each mega-urban region, which comprises the traditional administrative boundaries of the city (i.e. Jakarta and Bandung), consists of highly-urbanised settlements characterised by slums co-existing with luxury developments. The outer zone, which comprises surrounding districts and municipalities, consists of peri-

urban settlements. Within these regions, the majority of participants in this study resided in urban settlements characterised by substantial socio-economic inequity (Adair 2005).

Figure 3.3: Map of Indonesian provinces

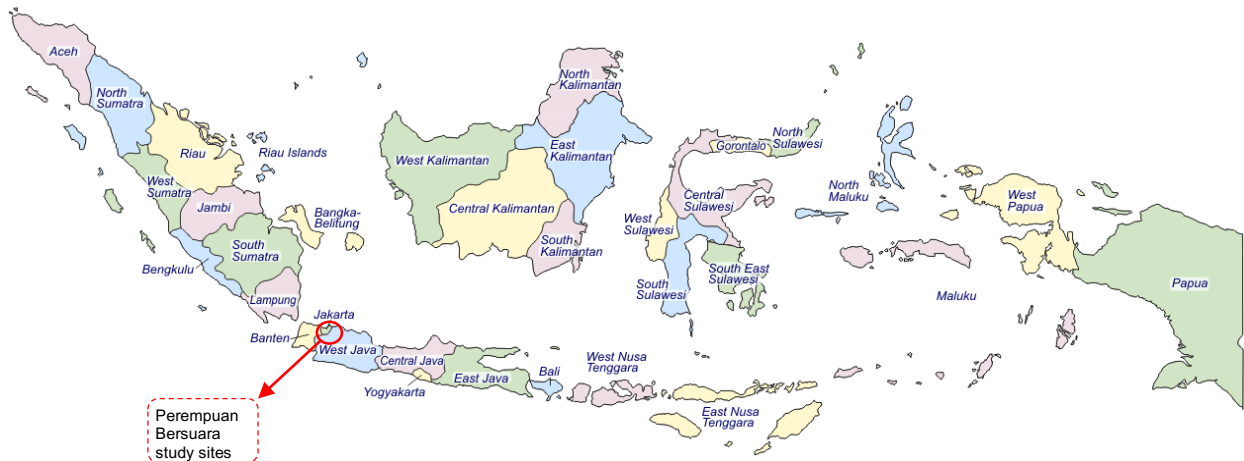
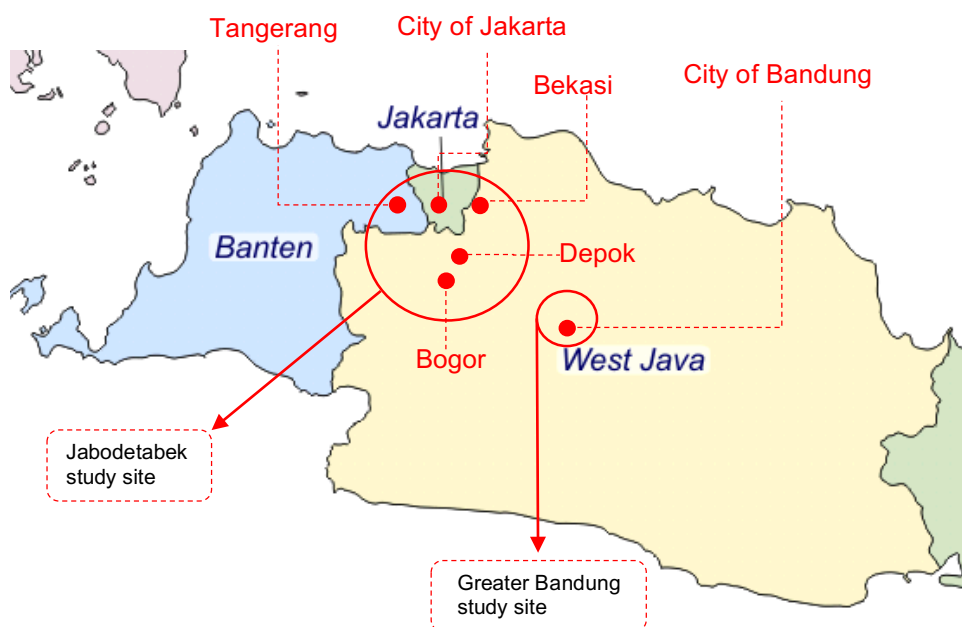


Figure 3.4: Map of Indonesia's Greater Jakarta and Bandung metropolitan areas and approximate location of Perempuan Bersuara study sites



Secondly, Greater Jakarta and Bandung are home to two of the three areas with the largest numbers of people who inject drugs and the highest HIV rates among injectors in the country (Ministry of Health 2015, 2012).¹¹ In 2012, 7,245 and 13,391 people who inject drugs resided in Greater Jakarta and West Java respectively, comprising a total population of 20,636 drug injectors across the two provinces (Ministry of Health 2012). Of these, 68.4% (4,958) of drug injectors in Jakarta and 36% (4,900) in West Java were living with HIV (Ministry of Health 2012). Since existing population and HIV prevalence estimates are not sex-disaggregated, it was not possible to estimate the number of women injecting drugs or the proportion living with HIV. However, by situating the research in areas with a high concentration of injecting drug users, the study sought to increase the likelihood of recruiting women who inject drugs.

3.3 Research team and collaborating partners

3.3.1 Research team

The study was led by this candidate as a joint collaboration by academic, policy, and community partners. These included Oxford University's Department of Social Policy and Intervention (UK), Atma Jaya University's HIV and AIDS Research Centre (Indonesia), the Indonesian National AIDS Commission, and the Indonesian Drug User Network. This section describes the various stakeholders and outlines their roles in the project.

¹¹ With 11, 951 estimated injecting drug users, East Java province has the second highest number of people who inject drugs in the country after West Java. However, Greater Jakarta, the province with the third highest injecting drug use and HIV prevalence rates in the country, was selected instead due to its (1) rising HIV rates among drug injectors compared with decreases in other urban centers, suggesting a high prevalence of high-risk behaviours among this population, and (2) relative geographical proximity to West Java, in the context of limited financial resources for staff travel during the study.

3.3.1.1 Core research team

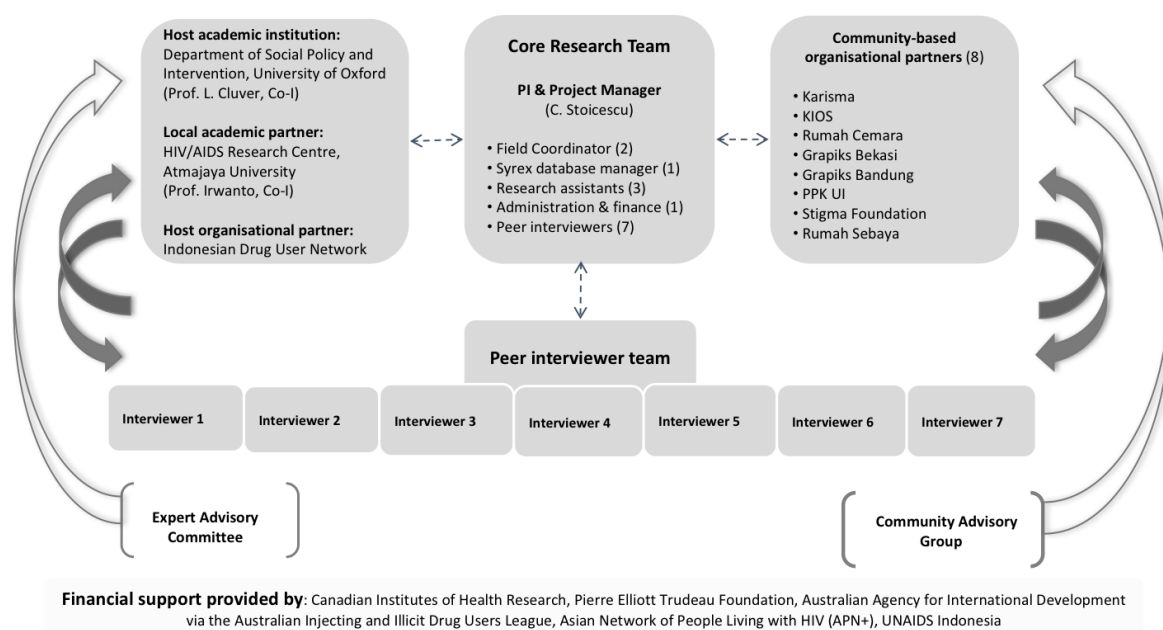
Figure 3.3 illustrates the structure of the research team for the Perempuan Bersuara study. The study was devised and coordinated by this candidate, in close collaboration with international and national academics, policy-makers, and community-based organisations, and with the active involvement of the community of women who use drugs. For the purpose of this study, collaboration was defined as an ongoing process whereby committed stakeholders are involved in the design, implementation, analysis, and dissemination of a project and invest different resources to help ensure a successful outcome (Brown et al. 2005). By taking an approach of active and ongoing intra-sectorial collaboration and meaningful participation of the drug user community, this study aimed to ensure the optimal policy impact and community relevance of its findings.

The multidisciplinary research team included international and national stakeholders from Oxford University's Department of Social Policy and Intervention (this candidate, PI and Project Manager; Dr Lucie Cluver, co-I and DPhil supervisor), Atma Jaya University's HIV and AIDS Research Centre (Prof Irwanto, co-I), and the Indonesian Drug User Network (S. Atyasasmi, Program Manager). The diverse members of the research team provided a range of expertise central to the study's focus, including: (1) conducting ethical research with vulnerable, stigmatised, and hard-to-reach populations in resource-limited settings; (2) managing and working as a part of an international collaboration; and (3) applying participatory community approaches to research. All members of the research team provided project oversight and ongoing feedback during planning, implementation, analysis, and dissemination. The research team also comprised 14 fieldworkers with lived experience of drug use, who were recruited, trained, and managed by this candidate, with

support from the host organisational partner. They were closely involved in all aspects of research design, piloting, data collection, interpretation of findings, and dissemination.

3.3.1.2 Field team

Figure 3.5: Organogram of the Perempuan Bersuara research team in 2014 – 2015



The field team comprised 14 female staff, including 2 field coordinators, 3 research assistants, one database manager, one finance and administration coordinator, and 7 peer interviewers.

In order to address the challenges associated with recruiting women who inject drugs, this study used female ‘peer’ interviewers. Involving peers in research is a valuable means of building rapport and trust with participants, which in turn enhances the validity and reliability of self-reported data (Souleymanov et al. 2016; Elliott, Watson, and Harries 2002; Brown et al. 2005). A recent review of community-based research with people who use drugs found that peer-driven recruitment and representation was integral to generating

large and diverse samples (Souleymanov et al. 2016). In the context of this study, peers were defined as women with current or former lived experience of drug use or injecting, and/or who had close contact with, and were trusted by, the female drug-using community.

Interviewers were recruited through a public application process promoted both online and in hard copy through institutional and community-based partners, as well as via local and national HIV, drugs, and development sector mailing lists and social media. Peer candidates were prioritised, but the application process was open to all qualified female applicants with extensive work experience with people who use drugs in community settings. Applications were assessed by a team consisting of this candidate and two Indonesian Drug User Network representatives. Selected candidates were interviewed by the candidate and the Drug User Network focal point for this study in March – April 2014. Successful applicants (n = 7) were female native speakers of Bahasa Indonesia.

Peer interviewers received three series of rigorous training sessions totalling two weeks. Training sessions were tailored to the needs and experiences of team members, and addressed RDS research methods, interviewing techniques, data collection procedures using mobile-assisted technology, referral protocols, safety measures, and ethical-legal research norms surrounding HIV and drug research. The training sessions also included an overview of study aims, and practical role-play sessions with feedback and discussion. All processes and procedures followed standards and protocols of the Indonesian national and provincial Departments of Health, National AIDS Commissions, and international community-informed guidelines for working with drug-using peers in the context of research (Jürgens 2008; AIVL 2003). To provide capacity building, regular support to the

peer interviewers, and to ensure quality control, monthly refresher training sessions on administering the questionnaire were led by this candidate. Capacity building needs assessments were held with the team at regular intervals prior to, during, and after data collection, and support was provided as needed. Additionally, individual evaluation, training, and mentoring sessions were held regularly with team members as needed and appropriate.

The peer interviewer team was supported by two field coordinators, one finance and administration manager, and four student research assistants. Support staff assisted with various logistical aspects of data collection, interviewer training, coordination meeting logistics, administration, and the production and translation of information briefs for service providers and policy makers. The research assistants reported directly to the PI/project manager.

3.3.2 Research partnerships

This research project involves multiple stakeholders, including local community-based organisations providing health and support services in the drug and HIV sectors, Indonesian governmental partners, local researchers, and the community of women who inject drugs. The nature of these partnerships is summarised below.

3.3.2.1 Community-based organisations and networks

Seven non-governmental, community-based organisations (CBOs) and two community-led networks (Indonesian Drug User Network and Indonesian Positive Women Network) provided input and support on study logistics, initial recruit (“seed”) selection, research instruments, data collection and dissemination strategies. The CBOs were: Kios Atma Jaya,

Karitas Sani Madani (Karisma) Foundation, Stigma Foundation, Rumah Cemara, Grapiks Foundation, Rumah Sebaya, and Rumah Singga Peka. The Indonesian Drug User Network acted as the main community host of the study, and was involved in all design and practical aspects of the study. The seven CBOs and the Positive Women Network provided additional support and offered resources to the study by providing safe spaces for conducting interviews, and facilitating referral systems between the research team and service providers. As most collaborating CBOs also provided low-threshold harm reduction and HIV services, this collaboration facilitated access to services and direct knowledge transfer between the field team and the organisations. CBOs were located across the two main sites where the study was conducted. This section describes the scope of each collaborating community partner and their contributions to the study.

The Indonesian Drug User Network is a network of 25 self-organised drug user organisations operating across 19 provinces in Indonesia. The network was established in 2006 to address violations of human rights towards people who use drugs, and improve access to health care for this population. The secretariat of the network is based in South Jakarta and has 12 staff. As the main community partner on the study, the network provided a main study office based at its secretariat, as well as administrative and logistical support for grant development, study planning, financial management, data collection, and dissemination. Active engagement in the study by the drug user-led network was crucial in gaining access to and building trusting relationships with the female drug user community.

The Indonesian Positive Women Network, established in 2006, brings together women living with HIV from 23 provinces. The Positive Women Network work to enhance the knowledge and skills of women living with HIV related to sexual and reproductive rights

and health, and improve access to HIV and gender-based violence related health services. The Positive Women Network supported the study's development in the planning and dissemination stages through participating in grant development, engaging in formative research, linking the research team with women with lived drug use experience who were also living with HIV, and participating in community consultations on study logistics.

Kios Atma Jaya started as a semi-independent non-governmental organisation in 2002 under the auspices of Atma Jaya University's HIV and AIDS Research Center. The organisation provides a one-stop HIV service targeted at people who inject drugs that encompasses a needle-syringe exchange, peer support groups, outreach and distribution of harm reduction materials to drug hotspots in North Jakarta, West Jakarta, and Tangerang, legal assistance with drug-related cases, low-threshold, cost-free HIV counselling and testing, and basic health check-ups. In the context of this study, Kios supported logistical planning for seed identification and participant recruitment; established referrals to HIV prevention, treatment, and support services for study participants in its catchment areas; recommended female peers as potential members of the community advisory committee; and provided input on the study instruments and sampling methodology.

Karitas Sani Madani (Karisma) Foundation is a community-based non-profit organisation that operates a range of programs focused on minimising drug use related-harms and providing HIV services in Central and East Jakarta. The organisation was established in 2001 by people whose lives were affected by drug dependence. In addition to operating a drop-in centre for information, education, and counselling on drug-related HIV issues in East Jakarta, Karisma also manages a live-in drug treatment centre. At the time of study

planning, Karisma was developing a program for children and female partners of people who use drugs. It is hoped that this research will inform the development of some aspects of this program. In the context of this study, Karisma provided support for using mobile devices to collect data, suggestions for potential members of the community advisory committee, input on study instruments, a safe space for conducting interviews, logistical planning, and dissemination support.

Stigma Foundation was founded in 2005 by former injecting drug users and people living with HIV in South Jakarta. Stigma focuses on helping people who inject drugs live safer, healthier, more productive lives through community organising, advocacy, and networking. They are the first organisation to develop an outreach program for female injecting drug users in Indonesia. Stigma's late founding director, Sekar Wulan Sari, was closely involved in the initial phases of planning and design for the current study, and its current staff members retain a strong focus on gender within their programming. Stigma provided referrals to potential members of the community advisory committee, feedback on study tools, a space for conducting interviews in South Jakarta, and support for dissemination.

Rumah Cemara was founded in 2003 by five recovering drug users in Bandung, West Java. Rumah Cemara focuses on providing peer-driven interventions to improve the quality of life of people living with HIV and people who use drugs. They provide outreach, a community-based drug treatment centre, needle and syringe programme, referrals to HIV treatment, addiction counselling, and case management. Rumah Cemara supported formative research and study implementation in the Bandung study site. They advised on the recruitment process for peer interviewers, provided a space for conducting interviews in Bandung, assisted with logistical planning for seed identification, and supported

dissemination of findings in West Java.

Grapiks Foundation was founded in 2004, when it initiated one of the first harm reduction programs aimed at reducing blood-borne transmission of HIV in Bekasi, Greater Jakarta, and Bandung, West Java. Grapiks provides outreach and peer support to people who inject drugs, needle and syringe programming, counselling in prisons, voluntary HIV testing, and referrals to broader HIV treatment and care. For this study, Grapiks supported the recruitment process for peer fieldworkers, provided a space for conducting interviews as needed, and assisted with logistical planning and dissemination in Bandung and Bekasi.

Rumah Singga Peka is a non-profit organisation founded in 2010 in Bogor, Indonesia by individuals with lived experience of drug use, assisted by professional counsellors and social workers. The organisation operates a community-based drug treatment programme, and provides addiction counselling, life skills training, harm reduction materials, and employment training. Rumah Singga Peka is the main project partner in Bogor, West Java. Peka supported the recruitment process for peer fieldworkers in this area, provided a space for conducting interviews, assisted with logistical planning for seed identification and participant recruitment in Bogor, and provided feedback on the study instrument.

Rumah Sebaya was originally founded in Bekasi, Greater Jakarta in 2008 as an amalgamation of five support groups for current and former prisoners, women living with HIV, methadone users, and former drug users. Currently, Rumah Sebaya continues to focus on providing support for the most marginalised segments of society, through small grants for economic development, referrals to health services, support groups, and capacity building. Rumah Sebaya supported this project by hosting the peer interviewer from Bekasi, providing a safe, confidential space for interviews, and providing input on the study

instrument.

3.3.2.2 Advisory groups

This candidate coordinated regular consultations with two advisory groups prior to and as part of formative research, and during study implementation and dissemination. The Community Advisory Group comprised of six female injecting drug users who were recommended by collaborating CBOs across the study catchment areas. This group met approximately six times throughout the duration of the study to advise on community involvement in the research, provide feedback on the study questionnaire, advise on study logistics, assist with the interpretation of study findings post-analysis, and devise a dissemination strategy. Participatory engagement by the community of women using drugs included broader involvement than consultations with the community advisory group, as described further in section 3.3.3. The Scientific Review Committee comprised international and local academics, policy-makers and experts in the sectors of gender, HIV, and substance use (see Table 3.1). Members included Indonesian government partners, who participated in an advisory capacity in study planning since the beginning of the project.

Table 3.1: Scientific Review Committee members

	Name	Affiliation
1.	Dr Riza Sarazvita	Director, Sub-Directorate of Substance Abuse Management & Prevention, Ministry of Health
2.	Dr Siti Nadia Wiweko	Director, Sub-Directorate of AIDS & Sexually Transmitted Infections, Ministry of Health
3.	Professor Budi Utomo	Professor, University of Indonesia Department of Public Health, and Advisor to the National Narcotics Agency
4.	Syafirah Hardani	Coordinator of the Gender Taskforce, National AIDS Commission
5.	Dwi Faiz	Country Director, UN Women

6.	Margaretha Sitanggang	Country Director, UN Population Fund
7.	David Bridger	Senior Advisor on Gender and Human Rights, UNAIDS
8.	Suzanne Blogg	Monitoring and Evaluation Manager, HIV Cooperation Program for Indonesia, The Australian Agency for International Development
9.	Asmaul Khusnaeny	Commissioner, National Commission on Violence Against Women
10.	Professor Ignatius Praptoraharjo	Senior researcher, HIV and AIDS Research Centre, Atma Jaya University & Faculty of Medicine, Gadjah Mada University

The aims of the Scientific Review Committee were: (a) to provide a platform for researchers, policy makers, and other decision-makers working in relevant fields to engage with the development and implementation of the research study; (b) to establish a quality control mechanism and ensure the highest scientific standards in the planning and execution of the research; (c) to ensure that the proposed research was locally relevant. The Scientific Review Committee provided feedback on documents circulated electronically, including research tools and ethical aspects of the study. In addition, this candidate met with selected advisory group members in person to solicit in-depth input. This included: providing feedback on the scientific rigour and local relevance of its outputs by forwarding key data and/or resources; advising on external enquiries on technical issues related to their area of expertise; facilitating contact between the Perempuan Bersuara research team and relevant local contacts, particularly in relation to service referrals; and advising on the strategic dissemination of the research findings. Additionally, members of the committee contributed technical input on study instruments, and provided meeting space and administrative support as needed during data collection and dissemination. Participation in the Scientific Review Committee was voluntary.

3.3.3 Community-based participatory research approach

The Perempuan Bersuara study combined RDS methods (described in detail in upcoming section 3.4.2) with community-based participatory approaches throughout all stages of the research process. Participatory research is a collaborative approach where multiple stakeholders, including those who are the focus of studies, programs, and policies, are equitably involved in all stages of the research process (Horowitz, Robinson, and Seifer 2009). In the context of drug- and HIV-related studies, this approach developed, in part, as a response to the historical objectification and exploitation of research participants, especially those from marginalised groups, by researchers (Jürgens 2008). It also served as a strategy for addressing and compensating for the limitations of traditional sampling methods around reaching ‘hidden’, marginalised populations and generating community-relevant findings (Souleymanov et al. 2016). The main premise of the participatory approach is that knowledge generated through research – including skills, capacities, and research findings – should not only contribute to academic literature and inform policy; it should also prompt social change by being useful to communities, organisations, and participants (Greenwood and Levin 2007). By merging RDS with techniques drawn from community-based participatory research, this study aimed to address challenges related to the recruitment of female drug users into research, enhance the quality of community engagement, and improve the validity and utilisation of research findings (Tiffany 2006).

Compared with other sampling methods, RDS is particularly amenable to the integration of participatory approaches because it utilises participants’ social networks and actively engages participants in recruitment. Although RDS was originally conceived as a sampling methodology to recruit hidden and hard-to-reach populations, an inadvertent

consequence was the provision of a central role for disenfranchised and stigmatised people that capitalised on their strengths and abilities (Heckathorn et al. 1999). The involvement of peers in the RDS sampling process opened up opportunities for broader dialogue on data integrity, informed consent, and the overall aims of the research (Tiffany 2006), as well as for further engagement in other aspects of the research process. Synthesising the two approaches from the outset, as suggested by Tiffany (2006), ensures both the relevance of the research aims to community stakeholders and optimal validity and utilisation of results.

In the context of this project, the community of women who inject drugs was engaged in various roles ranging from grant development and budget decision-making, to study design, formative research, data collection, interpretation of findings, and knowledge dissemination. Proven effective strategies for implementing community-based, participatory collaborations were drawn from existing HIV and drug-related literature, particularly as related to research with drug-using women (Brown et al. 2005; Salmon, Brown, and Pederson 2010; Perez and Treadwell 2009; Shannon et al. 2007). Table 3.2 provides a summary of the participatory approaches applied at each stage of the Perempuan Bersuara research process, listed with their observed benefits.

Table 3.2: Community-based participatory research approaches applied in the Perempuan Bersuara study¹²

Research phase	Participatory research approaches	Observed benefits
1. Grant development and funding	- Academic partners from Oxford University and drug-using community partners led by the Indonesian Drug User Network co-developed grant proposals, made joint decisions regarding budgets, and allocated equitable division of funds based on actual contributions to the project.	- Access to broader, more diverse range of funding opportunities outside of academic granting bodies (e.g. Canadian Institutes of Health Research) that included governmental/international and community donors (e.g. UNAIDS, Asian Network of People Living with HIV, Australian Injecting and Illicit Drug Users League); - Adequately-funded research enhanced local capacity and sustainability; - Increased accountability of both parties, and more equitable power dynamics between research beneficiaries and academics.
2. Study design	- Framing of research questions and processes were determined in collaboration with community stakeholders; - Academic and community partners planned research together, developed shared mission and decision-making structure, and formed team with > 50% representation of women with lived drug use experience.	- Greater community interest, support for, and sense of ownership for the project; - Improved quantity, quality, validity, and reliability of data; - Built capacity of drug user community by providing opportunities for dialogue and education in relation to data integrity, informed consent, ethical considerations, and overall research design and management.
3. Formative research and piloting	- Diverse members of community of women who inject drugs (n=39) participated in 3 focus group discussions on appropriateness of RDS method for this population, selection of initial recruits (seeds), ethical considerations, and acceptability of research in the female drug-using community;	- Novel approaches to recruitment, retention, and increased community buy-in: participants wanted to be part of the study; - Increased relevance of research questions and field procedures, as these incorporated not only existing evidence and methodologic feasibility, but also

¹² Framework adapted from Horowitz et al. (2009) and Tiffany (2006).

	- Community members and seeds participated in co-designing, piloting, and translating study instruments into appropriate, local terminology; - Women who use drugs participated in three consultations as equal partners alongside other stakeholders such as researchers, service providers, and policy-makers.	community priorities, acceptability, context, cultural factors, and local knowledge; - Challenges related to data collection logistics were anticipated in advance and minimised; Identified and built directly on existing community knowledge, capabilities, and strengths to inform research implementation; - Research instruments reflected both scientific rigour and community priorities; - Questionnaire used culturally-appropriate vocabulary easily understood by participants, and included community-driven questions, thus increasing local relevance of findings.
4. Data collection	- Women with lived experience of drug use led not only on interviewing, but also formed an integral part of team management.	- Greater reach and access to the most marginalised members of the target group; - Minimisation of unequal power dynamics between senior researchers and peer interviewers; - Increased trust and rapport between interviewers and participants, thus minimising interviewer bias and facilitating better reporting of illicit, illegal, intimate, or otherwise sensitive questions; - Improved quantity, quality, validity, and reliability of data.
5. Analysis and interpretation	- Formal meetings organised with community stakeholders to guide data analysis and interpret preliminary findings.	- More accurate and culturally appropriate interpretation of findings; - Statistical analyses are supplemented with community-driven analytic questions and local relevance of findings.
6. Dissemination	- Community and research stakeholders devised and implemented dissemination plans jointly;	- Enhanced relevance and usefulness of data for all partners involved;

	- Community and academic stakeholders were co-authors and co-presenters at national and international conferences and forums; - Community stakeholders were provided with adequate support and training to participate in the activities and forums above (i.e. members of the peer fieldworker team were trained on abstract writing and presentation skills; mentored on abstract submission; and given the opportunity to co-author journal articles).	- Fulfilled fundamental ethical responsibility of sharing research findings with participants and community in accessible ways; - Community and academic partners gained expertise through collaborative writing and presenting; - Research, writing, and presentation capacities of community stakeholders while disseminating to diverse audiences (i.e. researchers, their own communities, and policy-makers) were improved; - Joint dissemination resulted in both traditional dissemination avenues (i.e. journal publishing, conference papers, policy briefs) being supplemented with more accessible materials for the community and their families (i.e. report combining key findings with photography; photo exhibitions, and opportunities for community to speak and interact directly with policy-makers when presenting research findings).
7. Sustainability and knowledge translation	- Sustainability built into project from its inception through ongoing needs assessments, capacity-building, and inclusion of community partners in all aspects of the study process; - Community and academic partners mobilised community to use findings to advocate for policy change, enhance local resources, and improve local service provision post-study; - Academic and community partners successfully mobilised funding after study completion and developed women-focused program within the Indonesian Drug User Network that used research findings as a baseline to inform program development.	- Improved sustainability, dissemination, replication, policy impact, and research more likely to lead to tangible health and community benefits; - Strengthened research and program development capacity of all involved; - Community partners benefited directly as a result of capacity gained in the research; these benefits included securing funding, applying for ethical approval, and implementing a quantitative bio-behavioural peer driven intervention on hepatitis C; hiring a women's program coordinator to develop a community-driven programmatic agenda informed by research findings; and seed funding for a new

		women-focused policy advocacy program at the organisation; - Additional funds, research, and employment opportunities were secured for community members post study completion.
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3.4 Fieldwork procedures

This section focuses on fieldwork procedures conducted in preparation for and during the quantitative RDS study. It covers the duration from the inception of the study in January 2013, to June 2015, which marked the end of quantitative data collection. It first details pre-study formative research, followed by quantitative data collection and management processes. Fieldwork procedures were coordinated by this candidate.

3.4.1 Formative research

Formative research is designed to contribute to the study planning process, and is essential for ensuring successful study outcomes (Simic et al. 2006). Formative research can contribute to RDS planning by providing insight into the target populations' social network properties, establishing contact with the target community, identifying useful initial recruits (seeds), measuring survey acceptability, and informing subsequent survey logistics (Johnston et al. 2010). In the context of the Perempuan Bersuara study, the aims of formative research were:

- (1) to determine whether women who inject drugs in Greater Jakarta and Bandung were sufficiently socially-networked to allow for the use of RDS as a sampling method;
- (2) to identify sub-populations of interest and select sub-categories for initial recruits (seeds);
- (3) identify individual seeds;
- (4) to define logistical issues (e.g. appropriate incentives, staffing; safe and acceptable interview locations and availability); and
- (5) to inform instrument development and design.

For this study, formative research was conducted in accordance with the U.S. Centres for Disease Control and Prevention's *Guidelines for Conducting Formative Research for Respondent-Driven Sampling Among Injecting Drug Users and Sex Workers* (Johnston 2008). Led by this candidate, the team employed multiple qualitative methods, including mapping and observation of 'hotspots' where the target community gathers in the study catchment areas; four focus group discussions (n = 39) and in-depth interviews (n = 9) with women actively injecting drugs; and key informant interviews and consultations with policy-makers, service providers, community-based organisations, and peer networks (n = 36) (the latter are summarised in Appendix 1). Table 3.3 below presents an overview of formative research methods and key insights gathered.

Table 3.3: Overview of formative research conducted to inform the quantitative respondent-driven sampling study¹³

Domain	Sample questions	Methods	Contributions to study design
1. Network properties - Do target population members form a social network? - Do target population members have a large social network of women that they know, who know them, with the same characteristics, i.e. active injecting in past year (i.e. 'degree')? - Do the target population members form diverse social network ties? - What is the structure of the social network? Are there cliques/sub-groups, and if so, are there potential bridges that could facilitate their inclusion in the research?	- Do you know or spend time with other women who inject drugs? - How many women do you know who also know you, that currently inject drugs, are 18 years or older, they live in city A? How many of these women have you seen in the past month? - Please tell me about how do women who inject drugs interact with each other (what activities do they do together?) - What subgroups of female injectors are you aware of (e.g., older vs. younger; engaged in sex work; injecting different types of drugs)? - Do you know women who inject who work in/are from other parts of the city/ how mobile are women who inject drugs?	- Focus group discussions with women - In-depth interviews with women - Key informant interviews (i.e. community-based organisations, service providers, key population networks, academics, policy-makers) - Mapping of community hotspots - Observational visits to hotspots	- Since other studies have faced challenges recruiting women who inject drugs due to their limited social networks, it was essential to determine in advance whether this population had adequate in-group ties to maintain RDS recruitment; - Policy-makers and service providers indicated that women had weak social networks ties, and that population was small, hard-to-reach; to address this risk, the team devised a contingency plan for converting the RDS sample to a convenience sample should recruitment be unproductive; - Community had different perspective: female peers generally had sufficiently large degrees (>3), but suggested that many women do not socialise in the same way as male drug users (i.e. women do not tend to congregate in identifiable 'hotspots' in the same way that their male counterparts do; some stay at home and know only a few other injectors). This indicated that the population existed, but remained invisible to policy-makers and were not being reached by services in large numbers; - This stage identified several sub-groups of women who inject drugs, which may have slightly different social circles and needs: women who inject drugs and sell sex, women who inject illicit pharmaceuticals (vs heroin), women on methadone who still actively inject, concentrations of different cliques in distinct areas. These sub-categories subsequently informed seed selection. - Women were generally not mobile over large areas. Their mobility was mostly limited within one or two city areas or key hotspots, and was often related to drug availability.

¹³ Formative research scope and questions were adapted from Johnston et al. (2010) and Johnston (2008).

2. Acceptability of RDS - Are target population members willing to participate in an RDS survey?	- Would you (or your peers) be willing to participate in this study? Why or why not? - What seems most/least interesting about this survey? Would you be willing to recruit your peers into this research study? - How many referrals out of three could you give to your peers that they would actually redeem? - What might prevent your peers from participating in the survey? - Will you (or your peers) participate if the survey includes fingerprinting [for confidentiality reasons]? - How would you encourage a friend to join the study, especially one who is reluctant?	Focus group discussions with women In-depth interviews with women Key informant interviews (i.e. community-based organisations, service providers, key population networks, local researchers)	- Women were interested in participating in the study, and willing to recruit up to three peers; however, they were concerned about stigma, confidentiality, and risk of arrest. They were not willing to provide fingerprinting due to fear of confidentiality breaches by the police and potential legal penalties. Women also indicated that they would be more willing to participate if the interviewers “came to them,” rather than having to travel to a fixed interview site. This concern was partly due to many women being dependent on male partners to accompany them to travel, which could compromise women’s participation and confidentiality. These concerns were later considered when developing study design and ethical protocols, and led to the decision to not use fingerprinting. - Local researchers and community-based organisations raised concerns about previous snowball sampling studies conducted at fixed sites which were raided by the police. Key informants suggested mobile interviewing, which was subsequently taken up by the researchers. - Trust in partner organisations affiliated with the study was important: women more willing to participate if they knew study was co-run and hosted by the drug user network, rather than a government agency or university researchers.
3. Seed selection - How do we find good seeds? - If there are cliques, can your seeds access bridges to include them?	- Can you think of any women actively injecting drugs who would make good seeds (describe seeds)? - Do you know different types of women who inject drugs (e.g., who are diverse in terms of age, income, risk, HIV status, etc.)? - What would be the best way to locate female peers to be seeds for our study? Are there groups that	Focus group discussions with women In-depth interviews with women Key informant interviews with key population network, community-based partner organisations	- Women were keen to provide suggestions on appropriate seeds and to potentially act as seeds themselves; - Initial conversations around seed selection led to a broader three-day formal consultation including female peers, the interviewer team, community-based organisations, the drug user network, and service providers. - The consultation included a presentation of insights gained during formative research, and a mapping of specific seeds heterogeneous by age, risk behaviours, HIV status, location, and sub-group from each study site.

	work closely with and are trusted by population members? - Have other outreach programs or research studies used female peers to contact other population members? Can you help us contact your female peers?		
4. Study logistics <i>Incentives</i> - What is the appropriate incentive given the target population and country context? <i>Interview locations and hours/days</i> - During which hours and days and under which circumstances would women participate in a survey? <i>Staffing</i> - Who are appropriate staff and when can they work? <i>Referrals</i> - What would be the most appropriate way to refer peers to the study and under what circumstances (e.g. using text message/phone, in-person referral, fixed/mobile location)?	- Do you think_____ (local currency or item of monetary value) is sufficient to encourage women to participate in a survey? - About how much would transport cost to get to the survey site? What hours/days are most convenient for women to participate? - Is it convenient for women to get around in this city? How can women get to the survey site? Is it easy for target population members to get here on public transport? - Do you think women are willing to be interviewed at the same survey site during the same hours? What type of sites would be most comfortable for women to go to and be interviewed? - Describe the type of person with whom you would feel most comfortable answering personal questions? - Do most of your peers read? What kinds of information should be included on referral coupons?	Focus group discussions with women In-depth interviews with women Key informant interviews with key population network, community-based partner organisations, local researchers	- Women and key informants suggested that cash equivalent incentives would not be appropriate/ethical for this population, based on previous research experience and women's material needs. Instead, informants advised on appropriate cash amounts that were in line with rates provided by organisations when asking women to participate in research. - Women were not willing to travel to fixed study sites due to fear of stigma and potential contact with law enforcement. Many women also expressed that it would be challenging for them to arrange public or other transport due to lack of childcare or other responsibilities, and in some cases, due to dependence on their male partners to transport them. Decisions were made by the research team that referrals would be done by phone/text between the recruit and the interviewer. - Women advised that they would be more comfortable participating if the interviewers came to their homes, or if the interview was conducted in a mutually-agreed safe space such as the offices of a trusted NGO. The research team based subsequent budget decisions on these suggestions: additional transport funds were allocated to interviewers to support their travel; and safe interview sites were pre-identified for each study area. - Female drug users who also engaged in sex work required greater flexibility in terms of hours: they preferred evening interviews in locations close to their place of work, just before clients start to arrive.

			- Female peers were unanimously preferred as interviewers, relative to male peers and female non-peers. - Most women had basic literacy skills and were able to read. Upon reports of a minority of cases where women had limited literacy, the research team included both written and verbal informed consent in its ethics protocol.
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3.4.2 Quantitative survey sampling strategy

This section outlines the methodology and fieldwork logistics of the quantitative RDS survey.

3.4.2.1 Population

Participants were eligible to participate in the study if they were:

- Female;
- Aged 18 years or older;
- Lived in one of the study catchment areas (Greater Jakarta or Bandung); and
- Injected an illegal and/or illicit drug not prescribed by an authorised health care provider in the last 12 months before the interview.

Only women in community settings were considered for this study; participants were not eligible if they were in prison or other closed settings (e.g. police detention; in-patient drug treatment centres) at the time of data collection. Definitions for the target population were determined with consideration of standardised indicators outlined in the “Technical Guide for Countries to Set Targets for Universal Access to HIV Prevention, Treatment and Care for Injecting Drug Users,” a reference document utilised by governments to inform national surveillance on populations at high risk of HIV (WHO, UNODC & UNAIDS 2012). In making decisions regarding the selection criteria for participants, definitions on the time period during which a participant reports recent (i.e. past 12 months) and current (i.e. past month) drug injection were matched to those in previously validated questionnaires used in the Ministry of Health’s routine Integrated Biological and Behavioural Survey.

3.4.2.2 Sample size calculation

Determining optimal sample size requirements is necessary for the successful design and implementation of a study and for assuring adequate power to detect statistical significance during data analysis. Sample size calculations for an RDS study are not significantly different than those used by other complex surveys with hard-to-reach populations. The standard method for determining the required sample size for complex surveys is to first calculate the sample size required for a simple random sample, and then adjust it by the design effect, which indicates the complex sampling method's efficiency compared with simple random sampling (Wejnert et al. 2012). Sample size requirements for this study were calculated using an open-source online statistical tool – <http://statulator.com/SampleSize/ss1P.html> – which computes sample sizes for cross-sectional studies and enables adjustment based on design effect (Dhand and Khatkar 2014). The computation required the following information: level of confidence, expected proportion of the factor of interest, margin of error, and design effect.

Salganik evaluated a bootstrap method for approximating the design effect of RDS estimates needed to reach a level of precision similar to a simple random sample (Salganik 2006). Based on Salganik's procedure, it is recommended that the minimum sample size in RDS studies should be double that of a simple random sample, which is consistent with a fairly conservative design effect of 2 or higher. As this recommendation is also in line with guidance from the U.S. Centres for Disease Control (Johnston 2008), this study used a design effect of 2 for its sample size calculation.

The size of the study sample was computed to estimate the prevalence of key measures with a precision of 5%. Given the lack of available data on the expected prevalence of HIV risk behaviours (i.e. condomless sex and receptive syringe sharing) among women who

inject drugs in Indonesia, laboratory-confirmed HIV prevalence among people who inject drugs, which includes aggregated estimates for both males and females, was used to compute the minimum sample size value for the study. The latest published national HIV prevalence estimate amongst people who inject drugs was 36.4% (Indonesian National AIDS Commission 2012). Therefore, assuming that 36% of the target population lives with HIV, with 5% absolute precision, 95% confidence, and a design effect of 2, a minimum sample size of 709 is required.

3.4.2.3 Recruitment and data collection

Between September 2014 and June 2015, a total of 731 women were recruited using RDS, a chain-referral method that applies a mathematical model to the resulting sample to compensate for non-random recruitment biases (Heckathorn 1997). Sampling hidden populations such as those involved in illicit or illegal activities is challenging because such populations are difficult to access and/or unwilling to participate in research efforts. Traditionally, studies with these populations have relied on non-probabilistic convenience sampling methods such as snowball sampling. However, convenience sampling produces biased samples because it over-represents participants with greater social connections and under-represents those with fewer social connections. Since its introduction in 1997 by Douglas Heckathorn, RDS has been increasingly recognised as an efficient and robust means to sample hard-to-reach populations at risk for HIV. RDS improves upon traditional convenience sampling methods by incorporating a systematic referral procedure with statistical methods that adjust for potential recruitment biases (Heckathorn 2011). In this sense, RDS methods are based not upon selecting participants from an existing sampling frame, but from the social network of existing members of the sample (Salganik and

Heckathorn 2004). RDS studies must collect two additional pieces of information: the recruiter of each sample member and the number of relationships that each sample member has in the population of interest (“degree”). At the analysis stage, this information is used to make less biased inferences about the social network connecting the population, and to estimate the prevalence of a specific characteristic (e.g. HIV risk behaviour) (Salganik 2006). Since its introduction in 1997, over 460 RDS studies in 69 countries have been conducted with hidden or hard-to-reach populations (White et al. 2015).

To initiate RDS recruitment, a diverse group of 20 initial seeds were purposively selected by the research team. The selection of these initial recruits was informed by extensive formative research, including mapping of hotspots where women inject drugs, key informant interviews with local harm reduction service providers and community-based organisations, and consultations with the Community Advisory Group. Thorough planning around seed selection was important, as these initial participants must have special attributes that ensure effective recruitment. For instance, the most productive seeds tend to have large social networks, are respected and known by members of the target population, are able to convince others to participate in the study, and have some interest in the study goals (Johnston et al. 2008). To increase the representativeness of the sample, selected seeds were heterogeneous in terms of age, place of residence, preferred drug type, levels of risk behaviour, socio-economic status, and known HIV status. Seeds were treated as any other participant (i.e. screened, interviewed, etc.) and were required to meet the eligibility requirements set up at the outset of the study (Johnston and Sabin 2010). Following standard RDS practice (Abdul-Quader et al. 2006), seeds were asked to refer up to three peers to the study, who in turn enlisted other recruits in a chain-referral

fashion. Waves of recruitment continued until the desired sample size was reached.

In response to the formative research finding that women would face multiple challenges attending interviews at a fixed site – as is standard practice in RDS studies – this study used mobile-site interviewing (Platt, Luthra, and Frere-Smith 2015; Johnston 2008). Potential participants were provided with referral coupons that requested that they contact the research team by phone or text message to arrange an interview at a location convenient for them. This ensured that participants did not have to travel to an interview site, which addressed concerns around costs and distance that could potentially deter women's participation.

As part of the RDS process, participants received a primary incentive of 75,000 Indonesian Rupiah (~USD \$5) for participating in the interview and a secondary incentive of 25,000 Indonesian Rupiah (~USD \$2) per eligible peer recruited. All participants who completed the interview received a directory of available HIV and sexually-transmitted infection testing and treatment services, legal advice, and IPV support services in the area. Each recruit was given a unique identifier and recorded in SyrEx2, an automated database management system developed by and used by drug service providers (Alliance for Public Health 2011). In the context of RDS, SyrEx2 provides various functions, including the ability to track recruitment referral chains and to record information on incentives paid/pending.

Data were collected from participants using Open Data Kit (ODK), an open-source application with cloud infrastructure that facilitates data collection on mobile devices, as well as data transfer, storage, and retrieval on a secure project server (Hartung et al. 2010). A systematic review of 171 articles employing mobile-assisted data collection concluded that mobile field technology is an efficient tool that provides accurate results, reduces

errors and biases, and is highly adaptable for use across low- and middle-income settings (Şahin and Yan 2013). Mobile-assisted data collection has previously been piloted with injecting populations in Jakarta and Bandung by two of the collaborating CBOs on this project, Karisma and Rumah Cemara. In field pilots in Indonesia, mobile-assisted data collection was found to improve data accuracy by removing the need for secondary data entry, and by allowing immediate quality monitoring once new data from the field were captured on the project server (Otto 2013). Additional benefits included improved mobility, as tablets were easily transported by field interviewers. In addition, the use of mobile data collection improved confidentiality via password-protected access and data encryption, which ensured that completed questionnaires were not accessible to individuals external to the field team, even if the tablets were lost or stolen. A key advantage of tablet-assisted data collection was the reduced participant burden, which was achieved through built-in skip-patterns and careful question selection and phrasing. This candidate self-trained in coding, programming, and operating ODK, and subsequently conducted extensive piloting and training with peer interviewers. Screenshots of the XLSForm tool used to code the questionnaire instrument for use with the ODK Collect application and examples of the coded questionnaire are provided as part of Appendix 2.

This study used 7-inch Lenovo® IdeaTab A1000T tablets operating on an Android platform. The choice of mobile device was informed by previous pilots conducted in Indonesia, ethical considerations for the study, extensive consultation with the research team, collaborating CBOs, and the Community Advisory Group, and costs. Previous pilots in Indonesia found that mobile phone screens were too small to retain the attention of participants, and appeared to increase interviewee fatigue (Otto 2013). As such, it was

recommended that devices with a minimum 5-inch screen be used for data collection. In addition, feedback from collaborating CBOs and our Community Advisory Group pointed to the importance of considering the appearance and value of a particular device in the field as not to place interviewers at additional risk of theft or aggression. Based on these considerations, the team decided on the Lenovo® A1000T model, an inexpensive, easy-to-use tablet that was not expected to draw attention in the field, with a screen large enough to comfortably display longer multiple choice and Likert scale questions. A protocol for tablet use, storage, and data retrieval was drafted by this candidate in consultation with ethical guidelines, project partners, and the Community Advisory Group (see Appendix 3). This protocol was discussed in detail during the interviewer training sessions, and reinforced throughout the course of data collection. Following each interview, peer interviewers recorded process and health service referral-related information in a reflection form, which was subsequently discussed at the weekly coordination meetings. This allowed for the candidate to have additional information on referrals, data quality, and details that facilitated addressing ambiguous or inconsistent answers. Reflection form data were particularly crucial in triangulating any inconsistencies in interview data.

3.4.2.4 Addressing risk of repeat enrolment

Duplication of respondents is a concern in any research survey (Johnston 2008). It is important to establish process and analytical mechanisms to prevent repeated participation in RDS surveys (Abdul-Quader et al. 2006). Formative research suggested that fingerprinting would not be acceptable to this population due to confidentiality concerns. Thus, to prevent the same participant from participating in the study more than once, physical marks and characteristics such as tattoos, piercings, noticeable scars, or

birthmarks were recorded during the recruitment process by interviewers, stored in the SyrEx2 electronic database, and destroyed following study completion. These no-cost measures have been used successfully in previous RDS studies (Semaan et al. 2010), including in studies with similar populations in Indonesia (Iskandar et al. 2010), to prevent repeat recruitment. Since this study had multiple study sites, the database was updated and accessible to the interviewer team daily. The team also took additional precautions, including limiting all waves from a particular seed to a single interviewer (Johnston 2008). The team experienced two cases of attempted double enrolment during data collection for this study. In both cases, available biometric information was successfully used to identify the participant attempting to enrol twice. Both participants were denied entry into the study for the second time, and the rules of study participation and reasons for denying them double enrolment were thoroughly explained.

3.4.2.5 Data management

One of the main advantages of mobile-assisted data collection is that it integrates data collection, entry, editing, coding, and cleaning into a streamlined process. Mobile-assisted interviewing instantly transmits participant responses to a server where the data are automatically captured, thus minimising data entry errors (Hartung et al. 2010). Every effort was made to maintain participants' confidentiality. As data were entered into the tablet during the interview process for this study, no identifying features such as names or birthdates were used. All participants were assigned a unique code by which they were identified for storage and analysis purposes. The full SyrEx database was accessible only to the PI and database manager. Electronic data were stored on a password-protected, encrypted remote server within the secure ODK Aggregate platform. Furthermore, access

to the data was limited to the PI and associated researchers on the team. Subsequently, during analysis and dissemination, data were only reported in an anonymised version. No individual identifying information was disclosed in reports, publications, or presentations. Each tablet with anonymised data was also backed up at the main project office. In this way, data were protected from both server failure and confidentiality breaches.

Furthermore, data were validated regularly and merged as the study progressed. Data consistency and quality was monitored throughout fieldwork in several ways:

1. Routine field visits by this candidate and field coordinator were undertaken weekly to confirm compliance with the research protocol, and ensure that any concerns were identified and addressed immediately. In addition, this candidate speaks and writes fluent Bahasa Indonesia, which was a key advantage for ensuring effective field monitoring and feedback with fieldworkers.
2. The PI and field coordinator checked the consistency of each questionnaire instantly, as uploaded by fieldworkers following each interview to the online ODK server based in a locked room at the host organisation's secretariat office. This feature of ODK data collection enabled the research team to flag any inconsistencies instantaneously and approach the interviewer for clarification. In cases where inconsistencies, missing data, and/or typos affected the clarity of an answer, interviewers resolved any concerns with the participants within one week of the interview.
3. Regular coordination meetings were held weekly with the peer interviewer team at the main project office. Coordination meetings were used as an opportunity to debrief on fieldwork successes and challenges, identify any emerging concerns, and monitor

data collection progress, including addressing any inconsistencies. One-on-one meetings with each interviewer were held bi-monthly to assess personal goals and challenges in the field.

3.4.2.6 Data cleaning

Following data exports from the ODK server, the quantitative dataset was converted and imported into Stata 14 (StataCorp, College Station, TX). The dataset was cleaned by this candidate between August 2015 and December 2015. Mobile-assisted data collection produces better data quality than paper-based questionnaires, since the design software allows for logical rules and controls to be established. Moreover, this candidate crosschecked variables and discussed any discrepancies with research assistants to establish consistency. Consequently, due to the skip patterns designed into the ODK application, as well as regular data quality and validation checks, missing data were < 1% on the full questionnaire, and 0% on variables analysed as part of this thesis.

3.5 Quantitative questionnaire and measures

3.5.1 Questionnaire development and piloting

The development of the data collection tools and procedures for this thesis was informed by a rigorous review of existing studies, formative research, community priorities, and consultations with the scientific and community advisory committees. As PI and project manager, the candidate was responsible for drafting the questionnaire tool and accompanying information and consent forms in English. Key considerations when selecting scales and constructs were their psychometric properties, whether they had been validated in Indonesia, or, if not applicable, whether they had previously been used in

Indonesia or other low- and middle-income contexts, and whether they have been validated with similar populations.

The questionnaire translation, piloting, and adaptation process was coordinated by this candidate, and conducted in accordance with World Health Organisation guidelines (World Health Organization 2017). The process consisted of forward-translation, expert and community panel back-translation and review, pre-testing and field piloting, and production of the final version of the instrument. The full version of the English questionnaire is provided in Appendix 2, along with screenshots of the tablet-administered format. The aim of the translation and piloting process was to achieve a cross-culturally and conceptually-equivalent version of the English instrument, rather than linguistic or literal equivalence.

First, two research assistants familiar with terminology of the drugs and HIV sector, who were familiar with English but whose mother tongue was Bahasa Indonesia, produced the first translation. This version was reviewed and back-translated by a bilingual expert panel comprised of members of the Scientific Review Committee and the Community Advisory Group. The goal at this stage was to identify and resolve any unclear or inappropriate phrasing or concepts from the original translation. Between January 2014 and April 2014, this candidate worked with the research team to pre-pilot the baseline questionnaire with participants from the Community Advisory Group. Two subsequent consultations with the research team were held to finalise the Bahasa Indonesia version of the questionnaire and ensure that the phrasing was appropriate to the context and the community targeted.

Between May and August 2014, two pilot trials of the questionnaire were conducted with members from the Community Advisory Group and the peer interviewer team. The first pilot (n = 12) was conducted using paper questionnaires to identify items related to respondent comprehension, interest, fatigue, and acceptability, and collected process data which allowed the research team to assess the length and level of comprehension of each section. Sample feedback forms used to guide the piloting process are provided in Appendix 4. Changes from the first pilot were documented and integrated into the next version of the questionnaire, and coded for use with mobile devices. The second pilot (n = 12) tested the tablet-administered questionnaires for any pending content and comprehension issues, as well as test ease of use of the mobile devices, tablet functionality, skip patterns in the ODK app, and data transfer and storage capabilities. Any outstanding issues identified in the second pilot were used to adapt and finalise the questionnaire.

3.5.2 Measurement

The selection of measures for this study was informed by the literature review, formative research, and extensive consultation with the advisory committees. Table 3.4 summarises the measures used in each of the papers included in this thesis. Measures and scales used in this thesis are described in more detail below and within the methods section of each paper (Chapters 5 – 7). The questionnaire instrument included various measures related to injection drug-using women's experiences at the personal, interpersonal, societal, and structural level; however, only selected measures relevant to the present thesis are reported in detail. This section starts with a description of the outcome measures used, followed by details on explanatory variables, and the various measures used as a basis for a confounder analysis in papers 1, 2, and 3.

Table 3.4: Overview of measures used and analyses conducted in this thesis

Paper title	Analysis strategy	Outcome measures	Explanatory variables	Potential confounders
1. Intimate partner violence and HIV-related sexual risk behaviour among women who inject drugs in Indonesia: a respondent-driven sampling study	• Respondent-driven sampling population proportions and 95% confidence intervals • Logistic regressions • Marginal effects models	• HIV-related sexual risk behaviours, measured as engaging in one or more of the following behaviours/proxies: (1) unprotected sex at last vaginal and/or anal intercourse; (2) multiple sexual partners; (3) sexually-transmitted infection symptomatology, and (4) survival sex work, all in previous 12 months.	• Past-year intimate partner violence victimisation, using disaggregated IPV scales for psychological, physical and/or injurious, and sexual intimate partner violence	• Age • Survey city • Relationship status • Employment status • Education level • Housing status • Individual monthly income • Having any dependent children or other dependents in household • Financial dependency • Self-reported HIV status • Past-year crystal methamphetamine use.
2. Intimate partner violence and receptive syringe sharing among women who inject drugs in Indonesia: a respondent-driven sampling study	• Respondent-driven sampling population proportions and 95% confidence intervals • Logistic regressions	• Receptive syringe sharing in the past month	• Past-year intimate partner violence victimisation, using disaggregated IPV scales for psychological, physical and/or injurious, and sexual intimate partner violence	• Age • Survey city • Education level • Employment status • Relationship status • Individual monthly income • Housing status • Having dependent children or other dependents in the household

				• Self-reported HIV status • Age of injecting initiation • Duration of injecting career • Type of substance injected in previous year • Intimate partner's injecting drug use status • Injected drugs together with intimate partner
3. Syndemic health problems and HIV risk behaviour among women who inject drugs: findings from a respondent-driven sampling study in Indonesia	• Respondent-driven sampling population proportions and 95% confidence intervals • Logistic regressions • Marginal effects models • Interaction on the multiplicative scale: product terms • Interaction of the additive scale: relative excess risk due to interaction (RERI); attributable proportion due to interaction (AP); synergy index (S).	• Sexual HIV risk behaviour, defined using three key behaviours associated with HIV infection among women who inject drugs: (1) inconsistent condom use; (2) sexually transmitted infection (STI) symptomatology; and (3) survival sex work.	• Any past-year intimate partner violence victimisation (aggregate scale) • Past-year crystal methamphetamine use • Depressive symptoms (CESD-R ≥ 16)	• Age • Survey city • Relationship status • Employment status • Education level • Housing status • Individual monthly income • Having any dependent children or other dependents in the household • Self-reported HIV status.

3.5.2.1 Outcome measures

The primary outcome for this thesis is HIV-related risk behaviour. This outcome included, *sexual risk behaviour* and *injection risk behaviour*, which were analysed either as separate constructs (papers 1 and 2) or as composite measures (paper 3). The outcomes were computed as follows:

HIV-related sexual risk behaviours

Condomless sex at last intercourse was derived from the 2014 UNAIDS Global AIDS Progress Reporting Indicator Registry (UNAIDS 2014b). The measure includes both vaginal and anal intercourse, steady and casual partners, and paid and unpaid sex. Participants were first asked if they were sexually-active (n = 728; 99.6%). This was followed by a question asking if participants had sex in the previous 12 months (n = 669; 91.9%). Among those who had, the following yes/no question was asked, “Think about the last time you had vaginal and/or anal sex with any sexual partner (i.e. steady, casual, and/or transactional) Did you use a condom the last time you had sex?” Participants who responded in the negative were coded as having had condomless sex at last intercourse. The reference category included women who used a condom at last sexual intercourse and women who did not engage in sexual intercourse in the previous year. Systematic review evidence shows that condomless sex at last intercourse is the most commonly used measure of condom use in HIV research in low- and middle-income countries (Fonner et al. 2013). Previous research has shown that the trend in condom use and non-use during the most recent sex act generally reflects the trend in consistent condom use (Younge et al. 2008; Fonner et al. 2013). In particularly conservative and/or religious communities such as Indonesia, where condom use often has negative connotations (e.g. a sign of infidelity)

, questions using a shorter timeframe recall period may result in increased accurate self-report of condom use (Younge et al. 2008).

Inconsistent condom use is the second most common measure of condom use in HIV research in low- and middle-income countries (Fonner et al. 2013). The condom use consistency measure was adapted from the UNAIDS Indicator Registry (UNAIDS 2014b). Participants were first asked if they had sex in the previous 12 months. Among those who have, sequential questions were asked about condom use with several types of partners (i.e. steady, casual, and/or transactional). Response choices included “every time,” “most of the time,” “sometimes,” or “never.” This measure was based on reporting less than 100% condom use for vaginal and/or anal sex in the previous 12 months with any or all types of partners. Specifically, consistent condom users were defined as those who reported using condoms “every time,” while inconsistent users as those reporting anything less than consistent use (i.e., “most of the time,” “sometimes,” or “never”). This conservative manner of defining consistency is preferred since response choices for “some” condom use can be imprecise and thus likely to represent inconsistency (Hoppe et al. 2008). For analyses conducted as part of this thesis, the reference category for this measure also included women who did not have sexual intercourse in the previous year.

Multiple sexual partners was similarly derived from the UNAIDS Indicator Registry (UNAIDS 2014b). This measure includes steady, and/or transactional casual partners, as well as serial monogamous relationships and concurrent sexual relationships. Participants were first asked if they were sexually-active, and if so, whether they had sex in the previous year. Among those who had, a question was asked about the total number of sexual partners that the participant engaged in vaginal and/or anal sex with in the previous year. This

included steady, casual, and transactional partners. Participants reporting ≥ 2 partners were coded as having multiple sexual partners. The reference category included women who reported < 1 sexual partners in the preceding year, and women who were not sexually-active.

STI symptomatology was measured using participant self-report of easily recognised symptoms, following WHO guidelines on syndromic diagnosis of STIs (WHO 2003; Vuylsteke 2004). Participants who were sexually active and who reported two or more of six symptoms at the time of interview (i.e. “burning sensation and/or discomfort when urinating,” “itching, irritation and/or discomfort in the genital area,” “discomfort and/or pain during sexual intercourse,” “sores, blisters and/or ulcers on or in the vagina,” “unusual vaginal discharge, such as pus or a thick and/or sticky liquid from the genital area,” and/or “lower abdominal pain”) were coded as having “STI symptoms”. The reference category included women with < 2 STI symptoms and women who were not sexually active.

Survival sex work was assessed by asking women whether they traded sex for any reason in the previous year (yes/no). Those who responded in the affirmative were further asked whether they traded sex for one or more of the items listed. The multiple choice of items included “money,” “drugs,” “luxury items” (e.g. phones or jewellery), “basic needs” (shelter, food, or other subsistence needs), “other (specify)”. Based on this question, survival sex work was coded as the exchange of sex for drugs, shelter, or other commodities as a means of basic subsistence in the previous 12 months.

HIV-related injecting risk behaviours

Injecting risk behaviour was indicated by ***receptive syringe sharing***. Receptive syringe sharing was measured using four items from the Blood-Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ), which captures the frequency of injecting, sexual and other skin penetration risk practices in the previous 30 days (Fry and Lintzeris 2002). The instrument has been previously validated with men and women who inject drugs in Indonesia (Iskandar et al. 2010; Wijoyo, Sarasvita, and Rachman 2014), and is used extensively by service providers (Wijoyo, Sarasvita, and Rachman 2014). Receptive syringe sharing items were selected in favour of broader measures of skin-penetration practices (e.g. sharing cookers or filters) because receptive syringe sharing practices represent a greater volume of blood, thus potentially presenting a higher risk of infectiousness compared with other contaminated equipment (Hudgens et al. 2001). Items included in the receptive syringe sharing construct included: “In the last month, how many times have you injected with another person’s used needle/syringe?”; “In the last month, how many times have you injected with a needle/syringe after another person has already injected some of its contents?”; “In the last month, how many times have you received a needle-stick/prick from another person’s used needle/syringe?” and “In the last month, how many times have you re-used a needle/syringe taken out of a shared disposal/sharps container?”. Internal consistency for the receptive syringe sharing construct used in this sample was $\alpha = .81$. To achieve a higher sensitivity of the measure, affirmative responses (i.e., never, once, twice, 3-5 times, 6-10 times, more than 10 times) were dichotomised to “any” or “no past-month receptive syringe sharing”. The latter category included both women injected drugs but did not engage in receptive syringe sharing, and women who did not inject drugs in the preceding month.

3.5.2.2 Explanatory variables

Intimate partner violence was assessed using the psychological, physical, injurious, and sexual subscales of the Revised Conflict Tactics Scale (CTS2) short form by Strauss et al. (Strauss, Boney-McCoy, and Sugarman 1996; Strauss and Douglas 2004). The CTS2 has been cross-culturally validated in more than 17 countries, including several low- and middle-income countries in Asia (Strauss 2004a). It is the most widely-used measure assessing IPV victimisation in community and clinical samples of drug-using women (El-Bassel et al. 2007; Gilbert et al. 2000; Wu et al. 2003). For this sample, the CTS2 had a high internal consistency of $\alpha=.87$. Questions in the CTS2S instrument ask respondents to indicate how often each event took place within a particular referent period (Strauss 2004b). Sample items from each of the subscales include: psychological aggression (“My partner insulted or swore or shouted or yelled at me”); physical assault (“My partner punched or kicked or beat-me-up”); physical assault with injury (“I went to see a doctor or needed to see a doctor because of a fight with my partner”); and sexual coercion (“My partner used force, like hitting, holding down, or using a weapon, to make me have sex”). Participants were asked about violence perpetrated by a steady intimate partner (i.e. any partner with whom the participant had a close emotional and/or sexual relationship with for 3 or more months) in the preceding 12 months, as defined by the WHO. This comprised any formal partnerships, such as marriage, as well as informal partnerships including co-habiting, dating, and other intimate relationships (World Health Organization 2013). For this thesis, responses to items on each of the subscales were dichotomised into any versus no past-year IPV victimisation.

Depressive symptoms were measured using the Revised Centre for Epidemiologic Studies Depression (CESD-R) scale (Radloff 1977). The CESD-R has been validated and used widely across low- and middle-income settings, including in Indonesia (Li, Hershow, et al. 2014;

Van Dam and Earleywine 2011). The instrument measures symptoms of depression in the previous two weeks, as defined by the American Psychiatric Association Diagnostic and Statistical Manual, fifth edition. Possible scores for the 20-item scale range from 0 to 60, with a cut-off score of 16 or above indicating the presence of clinically-significant depressive symptoms. For this sample, the internal consistency of the CESD-R was $\alpha = 0.90$. Responses to each of the 20 questions were summed, combined, and dichotomised as either < 16 or ≥ 16 .

3.5.2.3 Socio-demographic and background variables

Guided by the literature review and formative research, the following socio-economic and background information was collected as basis for a confounder analysis. Using items modelled on the Indonesia Population Census (Statistics Indonesia) and Integrated Biological and Behavioural Surveillance (Ministry of Health), women were asked their ***age***, ***relationship status***, ***employment status***, ***level of education***, ***individual monthly income***, ***and whether they had any dependent children in the household or other dependents*** for whom they were responsible. ***Individual monthly income*** was classified as being either below or above the mean national income in Indonesia, i.e. IDR 3.8 million/USD 285 (Statistics Indonesia 2013). ***Financial dependency*** was assessed by asking participants about the main source ($>50\%$) of their monthly income. Women were characterised as financially dependent if they indicated that their main source of income was from intimate partner(s). ***Housing status*** was assessed by asking participants about their current living arrangements and dichotomised into “stable housing” vs “unstable housing/homeless”. Women were coded as “unstably housed/homeless” if they lived on the street or in temporary or transitional accommodation, such as a friend’s home. They were coded as

“stably housed” if they lived in their family home, rental house/apartment, and rental long-term single-room accommodation (*kos-kosan*). Participants also provided self-reported data on drug-related factors. These included ***age of injecting initiation, duration of injecting, substance(s) used in the previous year, substance(s) injected in the previous year, intimate partner’s injecting drug use status, and whether women usually injected drugs together with an intimate partner***. Participants were also asked whether they had knowledge of their ***HIV status***.

3.6 Ethical considerations

3.6.1 Ethical and regulatory compliance

There is an extensive body of international literature on ethical concerns in conducting research with highly vulnerable and marginalised groups, such as women who use illegal and/or illicit drugs. The ethical guidelines for this study were informed by several sources. These include the ongoing academic debates on the ethics of reimbursing drug users for public health research involvement (Ritter, Fry, and Swan 2003; Fry et al. 2006; Fisher et al. 2013), literature on the individual's ability to provide capable, voluntary, informed consent (Carter and Hall 2008) and the obligation of researchers to safeguard sensitive clinical information pertaining to illegal/illicit behaviour status (Craig et al. 2008). In considering ethical issues, the research team made use of Oxford’s Central University Research Ethics Committee (CUREC) guidelines and protocols to frame the research concept, prepare documentation with regard to recruitment, training and administration of interviews, respond to participants experiencing distress, and record details and make referrals in case of adverse events. Particularly, the research team referred to protocol no.

MSD/IDREC/2006/P4.1 covering studies involving the administration of interviews incorporating questions concerning current and past psychiatric symptoms, experience of traumatic events, and questions concerning illegal drug use, as well as to guidelines no. MSD/IDREC 1.1, 2.1 and 4.1 covering best practice to appropriately respond to participants in distress and to store data collected for research purposes.

Given that this study took place in Indonesia, this candidate additionally referred to a number of local sources to inform ethical guidelines. These include the 'Decree on health research and development no. PP 39/1995' (1995) implemented by the National Committee on Health Research Ethics, Ministry of Health, and 'Decree of the Minister of Health of Indonesia no. 562/MENKES/SK/V/2007' (2007). These country-specific documents were supplemented by regional and international guidelines, such as the Joint United Nations Programme on HIV/AIDS (UNAIDS)'s guidance on the "Ethical engagement of people who inject drugs in HIV prevention trials" (2010), the Australian Injecting and Illicit Drug Users' League (AIVL)'s "Statement on ethical issues for research involving injecting/illicit drug users" (2003), and the Canadian HIV/AIDS Legal Network's "Nothing About Us Without Us: Greater, Meaningful Involvement of People Who Use Illegal Drugs" (2005).

Ethical protocols for this study were approved by the Central University Research Ethics Committee at University of Oxford, United Kingdom (Ref no: SSD/CUREC2/13-23) and the Ethics Agency of Atma Jaya University in Jakarta, Indonesia (Ref no: 1114/III/LPPM-PM.10.05/11/2013). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable

ethical standards. The ethical approval letters for this study are included in Appendices 5 and 6.

In addition to academic ethics boards, the study protocol has been peer-reviewed by the Indonesian Ministry of Research, Technology, and Higher Education in accordance with Government Regulation no. 41/ 2006, and an official research permit was approved as of July 2013. The project was officially registered with the Ministry of Home Affairs, Ministry of Law and Human Rights, and the National Police. Copies of relevant police permits and Ministry of Research and Technology registration for this study are supplied in Appendix 7.

3.6.2 Informed consent

Written informed consent was obtained from each participant in this study. The consent forms clarify the purpose and aims of this study, clearly explain the nature of the research to be conducted, explain limits to confidentiality in the context of illegal and illicit activities, and provide explicit statements regarding participants' rights to opt-out at any point. The consent form contains a disclaimer making it clear that the researchers can be forced to disclose records should they be subpoenaed. In the preamble to the interview, interviewers explained that participants should not refer to themselves or other people by full name, nor did they have any obligation to use their real name at any point during the research process.

In order to ensure fully informed, voluntary consent, all participants were provided with information sheets describing the study in plain language in Bahasa Indonesia. This statement was read and discussed verbally by the interviewer to ensure that each participant had the necessary information to be able to give informed consent, regardless

of her literacy level. All explanations were appropriately worded in plain language and using terminology common among drug users in Indonesia. The participant's right to decline participation or withdraw from the study at any time was thoroughly explained. Study information sheets and informed consent forms for participants are attached in Appendix 8.

All research participants had to be capable to provide their own consent in order to be deemed eligible to participate in this study. According to the UK Mental Capacity Act Code of Practice (2005), a person who lacks capacity refers to an individual who "lacks capacity to make a particular decision or take a particular action for him or herself at the time the decision or action needs to be taken" (Office of the Public Guardian 2013). In the context of this study, there were potential situations where a participant's ability to make a decision was affected by the influence of alcohol or drugs. In such cases, the Code of Practice reflects that "a person who lacks capacity to make a decision for themselves at a certain time may be able to make that decision at a later date." The study anticipated this concern by providing thorough training to fieldworkers on recognising visible signs of distress and intoxication, and allowing the participant the option to consider participation in the study at a later date, within 1 – 7 days. The team did not interview any participants who lacked capacity or were otherwise unable to provide fully informed consent.

In addition, contact information for seeking free advice, counselling and accessing HIV, viral hepatitis, and sexual and reproductive health services, was included in a directory of existing services in the area provided to all participants. Strict confidentiality was maintained, except where participants requested assistance or service referrals. In the case that information disclosed suggested that a participant was at risk of significant harm (e.g.

severe violence) the interviewer discussed concerns with the participant and offered service referrals. Researchers maximised opportunities for referral by providing all participants with a local directory of HIV/STI testing and counselling, legal aid, and other support services. Interviewers explained to participants what existing services they could access for free and how to do so. During data collection for this study, 65 referrals were made to HIV testing services, 20 referrals to STI testing, 19 referrals to community-based drug treatment services, 11 referrals to community-based legal aid services, and 10 referrals to support services related to IPV victimisation.

3.6.3 Risks and benefits of participation

3.6.3.1 Risks to participants

The research team made all possible attempts to ensure that the principles of anonymity and confidentiality were thoroughly implemented during the course of the research in order to protect participants, and avoid any undue distress to participants. Because it was not legally possible to provide an absolute assurance of confidentiality, special measures were taken to avoid placing participants at risk and ensure they fully understood potential risks:

- 1) Quantitative interview materials were presented and written in a language and style piloted and developed together with the Community Advisory Group and peer research team. This ensured that materials were easy to understand and use, and that language and presentation that may make participants uncomfortable was avoided.
- 2) The peer-driven sampling methodology used for this study reduces the risk that sampling may expose participants to unknowingly disclosing illegal or stigmatising

events. Since RDS requires recruitment via participants' social networks, participants individually recruit those whom they already know from the target population and whom they wish to share information with. The potential adverse effect of unwanted disclosure is reduced, since peer-to-peer recruitment does not convey new information about drug use or HIV risk (Semaan et al. 2010).

- 3) In order to protect the confidentiality of all participants and reduce any unintended disclosure and subsequent stigmatisation, interviews were conducted in private settings chosen by the participants, without any recorders or other individuals present.
- 4) To minimise risk and maximise opportunities for accessing support services, where possible, interviews were held in community health clinics that offer HIV prevention programs for people who use drugs, such as needle-syringe exchange, methadone maintenance therapy and HIV voluntary counselling and testing. The research team mapped potential interview sites that were safe and confidential with guidance from collaborating organisations and from formative research.
- 5) In cases where participants reported significant risk of harming themselves (i.e. risk of suicide), our protocol indicated that they would be referred to counselling services at community health clinics and hospitals, with whom our research team established a relationship prior to the start of the study. No such referrals were required during the course of this study.

3.6.3.2 Benefits to participants

There were indirect benefits to participants. Participants had the opportunity to share their experiences with well-trained, attentive female peers in a safe and comfortable

environment. Formative research with members of the target population in Jakarta, Indonesia suggested that female drug users welcomed the opportunity to be around other women and confidentially discuss challenging issues that they may have concerns discussing with partners, family, and peers. Furthermore, formative research found that many women enjoyed the time away from partners who were often controlling, while they clearly understood that the research will not benefit them directly.

Participating in the interview and learning about available free health services in the area was also cited as a benefit of the research on interviewer feedback forms. This provided women a channel for accessing services and asking questions about intimate or sensitive topics in an informal setting. Additional indirect benefits to participants included the research goals of informing government policy on gender and drug use for the benefit of female drug users, in addition to providing a baseline for potential longitudinal data and eventual intervention development on injection drug-using women.

3.6.3.3 Risks to the research team

To minimise any potential risks that may arise from working with populations that use drugs in poor urban areas, all fieldworkers and research staff were trained in safety and first aid, including training to manage drug overdose. No field team member was required to conduct interviews in any situation or with any participant with whom they felt unsafe or uncomfortable. In addition, key gatekeepers such as community clinic staff and law enforcement officers in the areas where the study was conducted were briefed about the methods and purpose of the research in advance to reduce suspicion and mistrust, and gain support for the study.

Moreover, some peer fieldworkers carried harm reduction materials such as sterile drug

paraphernalia for distribution to clients, in order to reduce the sharing of injecting materials and associated blood-borne virus transmission. Although carrying needles and syringes is not prohibited by either Drug Law no. 35 (2009) nor its predecessor, Law no. 22 (1997), law enforcement officers at times use such materials as evidence of drug use and subsequent arrest. In order to minimise the possibility of fieldworkers getting arrested, each peer interviewer carried a copy of the police permit for the study, along with the full contact information of the project manager and research team members. Moreover, to anticipate contact with law enforcement, role-plays and vignettes addressing police interference in interviews, appropriate replies in case of questioning, searching, and arrest were included in interviewer trainings and discussed at regular intervals during the data collection process. In addition, prior to being interviewed, all participants were asked whether they carried any illegal or illicit substances on their person, and if so, were asked to dispose of these in a separate location for the duration of the interview.

During the course of data collection, three peer fieldworkers came into contact with the police while interviewing a participant. They were searched for any illicit substances (none were present), and subsequently brought to the local police station for questioning. In all cases, police targeted the interviewer-participant pair because the participant was known to the police as a person using drugs. This situation was exacerbated by Indonesia's launch of a punitive anti-drug campaign beginning in January 2015, which saw an increase in drug-related law-enforcement activity. In each case, appropriate protocol was followed by the fieldworkers (i.e. they showed their police study permit and contractual documents, as well as identification papers confirming their identification as research staff; and they immediately informed the project manager and the legal support officer at the Indonesian Drug User Network). All fieldworkers were released without further intervention from

project staff.

Furthermore, we anticipated the possibility that peer fieldworkers' emotional well-being may be compromised by experiencing vicarious trauma resulting from the disclosure of participant distress or violence. This was a particular concern for peer fieldworkers, who may be reminded of their personal experiences and triggered through the interview process. Moreover, some research staff felt distressed that they could not intervene directly when a participant disclosed experience of trauma, abuse or other severe harms due to confidentiality concerns. Several sources of support for the research team were made available in this regard. First, service referral information and support channels were clearly communicated to the participant both before and, if required, following the interview, in order to reduce the sense of helplessness and assist staff to cope with their limited ability to intervene directly with participants. In addition, community (in the case of the field team) and university (in the case of the principal investigator) counselling services were available in case team members required psychological debriefing and support. A monthly group counselling session was organised with a registered psychologist specialising in drug dependence issues (G. Anindita). This provided an opportunity for peer fieldworkers share field experiences, monitor emotional distress, and address any emerging concerns. During the first of such sessions, peers expressed interest in being given more opportunities to relax together in an environment outside of work. As such, this candidate and the field coordinator organised regular self-care outings for the team that included meals and leisure activities, and where possible, weekend team-building trips outside of the city.

3.6.4 Reimbursement for participation

There is substantial literature on the ethics of providing cash incentives to participants in drug-related research. Studies have documented negative attitudes among some researchers toward people who use drugs, including views that they are selfish, irresponsible, unable to make sound judgements, and unable to make a meaningful contribution to the community (Borchert and Rickabaugh 1995; Ross and Darke 1992). These prevailing stereotypes can sometimes be used to justify non-cash reimbursement. Although providing cash reimbursement is standard public health practice (Fry et al. 2006), it presents particular challenges in relation to individuals engaged in illegal and/or illicit activities (Ritter, Fry, and Swan 2003). While it is important to consider complexities regarding the amount of reimbursement, researchers have an ethical imperative to treat drug users as other groups of potential research participants by considering the information they provide and the time they spend valuable (Bell and Salmon 2010; Souleymanov et al. 2016; Fry et al. 2006; AIVL 2003; Fisher et al. 2013). This principle was confirmed and encouraged by formative research with the community of drug-using women and consultations with the Community Advisory Group. Based on these consultations, community members unanimously indicated that cash reimbursement was the only type of incentive that female injecting drug users would accept to participate in research, given the highly-stigmatised context in which they live.

It is the ethical responsibility of researchers to balance the local equivalent of payment for time, out of pocket expenses and inconvenience, with consideration of what amount might constitute an 'inducement'. Central to the issue of research participant reimbursement is that of the inducement value of providing monetary reimbursement to drug injecting

research respondents, where inducement via financial incentive could impair the voluntary character of participation and render informed consent invalid. The amount must be neither an inducement, nor a tokenistic gesture that devalues the importance of the participant's involvement (Ritter, Fry, and Swan 2003). To determine an appropriate amount for participant reimbursement, extensive consultations were held with the Scientific Review Committee and Community Advisory Group, local researchers, and collaborating organisations. Based on these consultations, it was established that while cash payment for this study should cover a person's time and travel expenses, it should not be so much that it entices the participant to participate in research that they would not otherwise engage with. In this study, reimbursement reflected payment for any out-of-pocket expenses, such as travel and time only.

3.7 Fieldwork challenges

This candidate made every effort to anticipate and prepare for fieldwork challenges or ethical entanglements by conducting risk assessments in advance of data collection, and monitoring ongoing issues during weekly coordination meetings with the field team. However, the project presented the research team with a number of challenges during implementation. Starting in January 2014, this candidate led the process of developing a field manual in Bahasa Indonesia that documented fieldwork issues as they occurred, along with solutions devised by the research team. Since then, study research assistants (N. Firdausya and K. Kartikasari) have updated the field manual on a regular basis. The field manual is available upon request in Bahasa Indonesia, and selected relevant points are summarised below.

3.7.1 Participatory research with peer fieldworkers

Meaningful participation of the female drug-using community was an integral part of the research process at all stages of this study. Active community participation in research can benefit the data collection process by decreasing interviewer bias, improving data validity, and producing community-relevant findings that have greater practical and policy applicability. The benefits of engaging people with lived experience also extend to reduction of stigma in the broader community, increased social support networks, and increased societal tolerance of otherwise taboo behaviours (Souleymanov et al. 2016). However, the active involvement of women who use and/or inject drugs in research as equal partners also presented specific challenges, and required additional efforts and funds to ensure that all parties benefited equally. This included negotiating complicated power dynamics, unequal access to resources, the need for additional support, and capacity building. The section below describes these issues in more detail.

3.7.1.2 Complex power dynamics

Previous community-based participatory research studies have indicated that careful negotiation of power dynamics between academic researchers and community members, as well as among community stakeholders, is crucial (Tiffany 2006). Despite previous experience working with people who use drugs prior to the start of the D.Phil, this candidate had to develop a “trusted” presence in the drug user community. This was particularly important given that the project was hosted by a network of people who use drugs whose prior experience of research was one of exploitation and objectification. Developing a productive and equitable collaboration with the community where both parties benefit required overcoming stereotypes, treating all persons with dignity, and

acknowledging different stakeholder agendas at the outset.

Unequal access to resources in the context of the research project was one such key issue, and was discussed frankly with community stakeholders. Community organisation partners were actively involved in grant development since the project's inception and subsequently secured a portion of funds for study implementation, which was then allocated collaboratively. The conversations around allocation of funds were sometimes challenging, and required additional time as compared with more traditional grant proposals. In all instances, communication between partners and the creation of common standards of practice was of utmost importance, and proved to be a lengthy, ongoing, and iterative process (Souleymanov et al. 2016).

3.7.1.3 Capacity building

An integral component of conducting inclusive, participatory research with women who use drugs is supporting capacity-building in the community (Salmon, Brown, and Pederson 2010). This can take the form of employment, salaries, recognition, training, opportunities to participate in decision-making, and other types of support. This study aimed to provide such opportunities by hiring women with lived experience of drug use, compensating them based on the host organisation's standards, training them, and supporting them to play an active role in guiding, developing, and conducting the research. The perspective and knowledge gained by the broader research team from the peer interviewers ultimately enhanced the team's capacity to ask meaningful research questions, and to consider the local context and community dynamics. In turn, the research training provided to peer interviewers provided them with additional skills and income, thus enhancing their capacity for engaging in future research, organisational development, and community action.

Regular needs assessments and evaluations allowed peers to identify barriers and articulate areas where they needed or wanted additional training. In fact, several members of this study's peer research team went on to use the skills gained in this study to become project managers, field coordinators, interviewers for subsequent research projects implemented by the Ministry of Health and the National AIDS Commission. Moreover, as a direct result of their exposure to mobile data collection as part of this study, two research assistants went on to train project managers at the National AIDS Commission in tablet-administered data collection.

However, a key challenge in terms of providing added capacity training to peers beyond the basic research training was the limited budget for data collection. Since participatory research often goes unacknowledged and unsupported by institutional or academic grant-making bodies (Horowitz, Robinson, and Seifer 2009), peer capacity building does not usually benefit from dedicated allocation of funds in the research context. The participatory aspects of the research, including all community consultations, convening of the Community Advisory Group, and additional counselling and training support provided to the peer research team were kindly supported by grants from UNAIDS and from the Australian Network of Injecting and Illicit Drug Users League. These additional funding proposals were written by this candidate, with substantial involvement and direction from the Indonesian Drug User Network.

3.7.1.4 Need for additional support

Drug-user led networks are more well-suited to representing community interests in research compared with other types of organisations (Bell and Salmon 2010). However, such groups may require additional support, time, training, and material resources in order

to participate constructively in the research process. This includes acknowledging, accommodating, and being responsive to the lived reality of peers, which may include chaotic living conditions, extreme poverty, and active drug use.

This study was hosted by a community-led network, which involved daily engagement with people actively using and injecting drugs. Substance use and overdose management were discussed, and adequate training provided to all peer interviewers and members of the research team. During data collection, one field interviewer's substance use became increasingly problematic. When she began displaying visible signs of intoxication during coordination meetings, the project manager, field interviewer and peer support workers from the drug-led network discussed concerns with the interviewer privately. Previous participatory studies with drug-using populations have indicated that individuals who are deemed (or deem themselves) unable to participate at a particular time due to substance use issues should not be entirely excluded from study involvement, but offered additional supports (Souleymanov et al. 2016). Team managers offered the interviewer a range of supports, including enrolling in a voluntary community-based drug treatment, accessing drug dependence counselling, and considering a methadone program, while also terminating her contract temporarily until her substance use stabilised.

3.7.2 Punitive drug policies and policing practices

In December 2014, three months into data collection, Indonesian President Joko Widodo declared a state of emergency on drugs, and ordered the execution of 14 drug dealers (Irwanto et al. 2015). Indonesia's National Narcotics Agency broadened the national state of emergency to include a "war on drugs" which targeted not only drug producers, dealers and couriers, but also users. The anti-drug campaign declared that all people who use drugs

must turn themselves in and be voluntarily detained in government-run rehabilitation centres, or face forced detention, fines and/or imprisonment. Law enforcement targeted otherwise “safe” settings such as community health clinics that provided harm reduction services. These actions had several negative impacts on data collection, because they directly targeted existing or would-be study participants of the study. Detrimental impacts included:

- Substantial decrease in the number of participants willing to participate in the study, leading to slower recruitment;
- Increased fear among participants of unwanted disclosure and confidentiality breaches (i.e. being identified as a person using drugs), which could lead to potential arrest/detention;
- Decreased trust among the drug-using community of authorities and researchers;
- Increased mobility of the drug-using community in attempts to escape police raids.

In addition, the research team, in consultation with the Community Advisory Group and the host organisation, took additional precautions in response to this situation. Interviewers were instructed not to conduct any interviews in the vicinity of drug-using “hotspots” or other areas known to be targeted by the police. In addition, all interviewers were instructed to consider their safety first and postpone any interviews if they felt unsafe. Interviewers were advised to conduct interviews inside participants’ homes where possible, or within offices of collaborating CBOs. With the anti-drug campaign slowing down beginning in April 2015, and in light of slow recruitment between January and March 2015, the research team extended the data collection timeline to June 2015 to facilitate attainment of the desired sample size. Given the increasingly challenging fieldwork

circumstances during this period, the research team formulated a contingency plan in the unlikely case that recruitment waves were exhausted or become impossible to sustain before the required sample was achieved. In such a case, the team devised a protocol for converting the RDS sample to a convenience sample. Although it was not ultimately necessary, this could be achieved by removing RDS-specific restrictions to the number of peers a participant can recruit, and by recruiting additional seeds. This procedure has been successfully utilised in previous RDS studies that have experienced difficulties with recruitment (Simic et al. 2006). The effects of increased drug-related law enforcement activity on people who use drugs in the areas where data collection took place were documented using field notes, focus groups discussions, and in-depth interviews with the field team by this candidate and the field coordinator, and presented at the 2015 International Harm Reduction Conference in both abstract (Stoicescu and Ameilia 2015) and documentary film format.

3.7.3 Natural disasters

The Greater Jakarta area is affected by tidal flooding each year during high tide periods, usually between February and March. Coastal flooding occurs in many high-density neighbourhoods along the coast, including several of the study catchment areas. Although data collection was originally scheduled during the milder months (September – February), external circumstances that led to slow recruitment, such as Indonesia's political situation, necessitated the extension of data collection timelines into the monsoon season. In March 2015, severe flooding in some study areas and drug hotspots posed challenges to conducting interviews. Interviewers were instructed to only interview participants in areas known to be safe, and to cancel interviews altogether during days with particularly heavy

rain. To address the potential of monsoon rains and flooding interfering with work schedules and field travel, procedures for reporting and responding to issues as they arise in the field were updated and recorded in the field manual.

3.7.4 Theft and crime

The study was conducted in communities where women, their families, and the local research team experienced high rates of crime, especially theft. Based on fieldwork preparation requirements, this candidate conducted a risk assessment, led the drafting of a detailed safety protocol, and attended three fieldwork safety courses. The research team underwent several training sessions focusing on minimising the risk of becoming exposed to crime while the research was conducted. Fieldwork took place largely during daylight hours, fieldworkers travelled in pairs when interviewing during evening hours, and arranged for alternative locations to meet participants when possible.

3.8 Statistical analysis: respondent-driven sampling

RDS is both a recruitment strategy and a statistical analytic tool. This section describes RDS-related data analysis procedures conducted on the sub-samples from Greater Jakarta and Bandung. Additional descriptive and multivariate data analysis procedures for each the three papers included in this thesis are described separately in Chapters 5 – 7.

The use of RDS requires certain underlying assumptions to be met (Heckathorn 2002). These include assumptions that (i) sampled individuals have sufficient network ties, (ii) that these network ties are reciprocated, (iii) that participants consistently recruit their peers when requested, and (iv) that participants recruit uniformly at random from their network in the population. However, in practice assumptions underlying RDS recruitment may not

always be met, which may result in a biased sample. For example, anecdotal evidence suggests that individuals do not always recruit at random. Rather, some show preference for peers with similar characteristics as themselves or for those whom they think would benefit most from incentives, such as close friends or relatives (Abdul-Quader et al. 2006). Several of these assumptions were tested and potential sources of RDS-related bias were diagnosed for the present sample (see steps outlined below). Because bias in RDS data is specific to the variables analysed, there may be greater bias in one variable relative to another variable (Johnston and Luthra 2014). Thus, potential sources of RDS bias were assessed separately for each of 17 relevant variables, including outcome measures, explanatory variables, and key socio-demographic characteristics used in the three papers that comprise this thesis.

All analyses were conducted in Stata 14.2 (College Station, Texas) using Schonlau's RDS software package with the RDS-II estimator (Schonlau and Liebau 2012, 2013), and NetDraw version 2.160, a software that enables graphic visualisation of social network data (Borgatti 2002). There are several analytically distinct estimators proposed for calculating RDS-derived population proportions and making inferences about a given population. Among the most commonly used estimators are RDS-I, RDS-II, and RDS-SS (Heckathorn 2007; Volz and Heckathorn 2008; Gile and Handcock 2010; Heckathorn 1997, 2002). The RDS-I estimator accounts for differential recruitment (i.e. the probability that a participant with a particular characteristic will recruit someone with a similar characteristic) and participants' self-reported network sizes (Salganik and Heckathorn 2004). Since differential recruitment is measured for each variable separately, the weights applied by this estimator are variable-specific. The RDS-II estimator also relies on network size to create sampling

weights, but it allows for these weights to be applied to the entire sample, rather than to each variable separately (Volz and Heckathorn 2008). More recently, the Successive Sampling (SS) estimator has been proposed, which does not rely on meeting Markov chain theory assumptions and requires some knowledge about the size of the target population (Gile 2011). While testing the relative statistical merits of different RDS estimators for producing proportional population estimates was outside the scope of this thesis, existing RDS literature and current best practices were consulted to inform the selection of appropriate estimators for the analyses conducted here (Wirtz et al. 2016; WHO and UNAIDS 2014; Johnston and Luthra 2014; Tomas and Gile 2011). At present, there is no consensus in the literature regarding which of the alternative estimators is superior (Heckathorn and Cameron 2017). Previous simulations have demonstrated reductions in bias with each estimator, suggesting that each produces different results (Heckathorn 2002; Gile 2011). Two recent comparisons of the estimators using empirical RDS data from samples of men who have sex with men in Moscow, Russia (Wirtz et al. 2016) and Vancouver, Canada (Lachowsky et al. 2016) observed little difference between the three estimators, particularly RDS-II and SS. Additionally, previous computational simulations have shown that RDS-II has consistently outperformed RDS-I, and in similar situations, RDS-SS has outperformed RDS-II (Gile and Handcock 2010; Lansky et al. 2012; Wejnert et al. 2012). Given that the RDS-SS estimator requires knowledge of population size – which was unknown in this case – this study used the RDS-II estimator.

RDS-related analyses were conducted in two main areas: (1) network characteristics, which included personal network size (i.e. degree), network connectivity, and convergence; and (2) potential sources of RDS-related bias, including seed dependence, differential

recruitment, degree of homophily, and bottlenecks.

3.8.1 Network characteristics

3.8.1.1 Degree

In RDS, personal *degree* refers to the individual network size of participants. Because RDS relies on information about participants' social networks to derive quasi-probabilistic samples of less visible populations, a measure of degree is required for the weighting of RDS data. This measure is assumed to be proportional to the probability of selection into the study (Heckathorn 2002). This study measured participants' personal network sizes based on responses to the following two questions: "(1) How many female friends or acquaintances do you know (you know their name and they know yours), who have injected drugs in the past year, are 18 years or older, and reside in Greater Jakarta or Bandung, and who you would be able to contact right now?? and (2) How many of these women have you seen in the past month?" The latter part of the social network question asked participants about peers they could contact at the time of interview, rather than the standard question specifying a given timeframe in which participants had seen their peers (Tyldum and Johnston 2014). Since interview appointments were generally scheduled by phone or text message, assessing participants' ability to contact peers in their network, rather than the standard question specifying a given timeframe in which participants had seen their peers (Tyldum and Johnston 2014), more accurately reflected the number of people participants were likely to recruit for this survey.

3.8.1.2 Network connectivity

A basic assumption of the RDS method is that recruiters know their referrals, and vice versa (Heckathorn 1997). Network connectivity in this study was assessed by asking the question: “(1) How would you best describe your relationship to your recruiter, i.e., the person who referred you to this study?” The response options were: “a stranger, someone you met for the first time,” “someone you know, but not closely, i.e. an acquaintance,” “a close friend, someone you know well,” “a sexual partner,” “a family member or relative,” and “other”.

Furthermore, the coupon return rate (i.e. the proportion of referrals that resulted in enrolled participants) was monitored throughout fieldwork by recording each participant’s uniquely coded identifier in SyrEx2. Tracking the number of coupons distributed and subsequent referrals is important as it enables some assessment of non-response patterns. Recruitment into the study was additionally encouraged via the participatory nature of the research project, which ensured that the community of women who use drugs were familiar with the study, trusted the peer research team, and had greater ownership in the project. In addition, data collection was monitored throughout fieldwork to ensure that any potential recruitment challenges were addressed promptly and sensitively.

3.8.2 Biases associated with respondent-driven sampling

Several potential sources of RDS-related bias were diagnosed for the present sample. These included: seed dependence, differential recruitment, degree of homophily, and bottlenecks.

3.8.2.1 Seed dependence

RDS recruitment starts with purposively selected initial recruits, called *seeds*, which are chosen by the research team. Seeds may or may not accurately represent the underlying

network structure of the target population. Formative assessments and participatory approaches attempt to improve the heterogeneity of conveniently-selected seeds (and thus reduce variance in the resulting sample) by identifying these sub-populations at the outset, and ensuring that they are represented among the original seeds (Johnston et al. 2010; Tiffany 2006). However, isolated portions of the population could remain unknown to researchers, and it is possible that the RDS recruitment process does not reach all sub-populations in a network. Consequently, the resulting sample may be more representative of the characteristics of the seeds rather than the characteristics of the target population, resulting in a form of selection bias (Tyldum and Johnston 2014). One way to assess whether the eventual sample is dependent on the seeds is to measure whether equilibrium and convergence have been reached in the sample. The underlying theory behind RDS states that if referral chains are sufficiently lengthy, the characteristics of the final sample will be independent of the seeds and represent a random mix of characteristics upon which the population is structured. In other words, the recruitment distribution would reach an *equilibrium* (Heckathorn 2011). *Convergence* refers to the required referral chain length (i.e. recruitment depth) necessary to reach sampling equilibrium (Volz and Heckathorn 2008). Convergence was assessed for each variable of interest by calculating the cumulative sample proportions at each recruitment wave, as participants enrolled in the survey. If the required recruitment depth for a particular variable is smaller than the largest chain in the sample, then convergence has been reached. In other words, bias from seed dependence is said to be substantially eliminated when weighted proportions on variables of interest remain stable until the final wave and plateau within 2% of the sample proportion.

3.8.2.2 Differential recruitment

Differential recruitment activity measures the relative connectedness of one sub-population within the sample with another (Johnston and Sabin 2010). In particular, this feature of participant behaviour indicates the extent to which individuals tend to recruit others who have particular characteristics, rather than uniformly at random (Tomas and Gile 2011). If differential recruitment activity is present, it can result in the under or over-representation of some sub-groups in the sample. Differential recruitment can be assessed by collecting data on who recruits whom, and comparing the mean personal social network size of one group (e.g., women who engage in a particular behaviour) relative to that of another group (e.g., women who do not engage in that behaviour). In most cases, RDS estimators are designed to adjust for differential recruitment (Gile and Handcock 2010).

3.8.2.3 Homophily

Another common indication of differential recruitment activity is the level of *homophily*. Homophily measures the extent to which participants prefer to recruit from their own group rather than at random (Heckathorn 1997). An example in the context of substance use and HIV is serosorting in relation to injecting equipment sharing, i.e. when persons with a negative HIV diagnosis avoid sharing needles and syringes with those known to be living with HIV. In RDS data analysis, all RDS estimators adjust for some level of recruitment homophily (Wirtz et al. 2016). However, high recruitment homophily can result in unstable estimates and greater variance (Johnston and Luthra 2014). Homophily is calculated by comparing the estimated proportion of in-group ties within sample recruitment patterns, with affiliation patterns that would result from random mixing (Heckathorn 2002). This thesis used the homophily index proposed by Heckathorn, which contains values on a scale from -1.0 to 1.0. Scores are interpreted as follows: values close to 0 indicate random

recruitment, positive scores closer to $H=1$ indicate a higher preference for recruiting others with similar characteristics, and negative scores approaching $H=-1$ indicate disproportionately few in-group ties (Heckathorn 2002). Homophily scores higher than 0.3 (or -0.3) specify substantial in-group contact.

3.8.2.4 Bottlenecks

A *bottleneck* is a type of social network structuring that may influence the sampling process. The presence of a bottleneck indicates the absence of personal links between different sub-groups in a population. The opposite of a bottleneck is *clustering*, which refers to portions of a population which are more densely connected than others (Johnston and Luthra 2014). One example is gender, which could pose a bottleneck in some settings where strict gender norms may prevent men and women from recruiting across gendered social divisions. Most populations display some level of clustering and bottlenecks for particular variables (Tyldum and Johnston 2014). As with other potential RDS-related biases, the RDS estimators can adjust for bottlenecks and clustering to a certain extent. However, the presence of severe bottlenecks can add variance to a sample and produce unstable estimates (Gile, Johnston, and Salganik 2015). Bottlenecks for the present sample were assessed visually using network diagrams depicting recruitment structures in the sample (Johnston and Luthra 2014). Diagrams were created using the network visualisation package NetDraw (Borgatti 2002). Graphic plots are useful because they visually show the dynamics of the estimates from each individual seed, which may not be readily observable within a dataset.

CHAPTER 4. FINDINGS: NETWORK CHARACTERISTICS OF THE SAMPLE



Figure 4.1: Peer interviewers monitor data collection progress during a weekly team coordination meeting, February 2015

4.1 Introduction

The previous chapter discussed the methods used in this thesis. The current chapter discusses the network characteristics of the sample and assesses potential biases introduced by RDS sampling. The first section of the chapter provides a summary of participants' recruitment patterns and personal network sizes. In the second section, network connectivity and coupon return rates are discussed. Finally, several sources of potential bias in RDS data analyses are diagnosed. Sample characteristics and diagnostics are reported separately for each survey city (i.e. Greater Jakarta and Bandung). The chapter closes with a discussion of findings and their implications for the papers that follow in Chapters 5 – 7.

4.2 Recruitment and network size

This study recruited 731 women in total, using 18 seeds and 554 recruits in Greater Jakarta ($n = 572$) and 2 seeds and 157 recruits in Bandung ($n = 159$) (see Table 4.1).

Table 4.1: Sample sizes and number of seeds in Greater Jakarta and Bandung, Indonesia

Survey cities	Seeds	Recruits
Greater Jakarta	18	554
Bandung	2	157
Total	20	711

Of the 20 seeds approached, only one seed (Q), in Greater Jakarta, failed to recruit any participants. Overall, 15 of 20 seeds successfully propagated five or more waves of recruitment. Five seeds, two in Bandung (E, F) and three in Greater Jakarta (H, J, R), generated 54% ($N=391$) of the total sample combined across the two cities. The largest recruitment chain reached up to 11 waves and contained 105 participants in Greater

Jakarta, and 8 waves with 98 participants in Bandung. The largest recruitment chain accounted for 14% of referrals, such that no one chain dominated the sample. The mean degree (i.e. number of women in participants' individual social network) was 4.7 (SD = 4.2, range 1 – 35) in Greater Jakarta, and 3.9 (SD = 2.0, range 1 – 21) in Bandung.

Table 4.2: Respondent-driven sampling recruitment chains for women who inject drugs, by survey city and district

	Survey city (district)	Waves (n)	Recruits (n)
A.	Greater Jakarta (Bekasi)	7	34
B.	Greater Jakarta (East Jakarta)	8	26
C.	Greater Jakarta (East Jakarta)	5	18
D.	Greater Jakarta (Bekasi)	6	40
E.	Bandung	8	97
F.	Bandung	5	60
G.	Greater Jakarta (South Jakarta)	3	19
H.	Greater Jakarta (South Jakarta)	9	104
I.	Greater Jakarta (Central Jakarta)	7	29
J.	Greater Jakarta (East Jakarta)	10	63
K.	Greater Jakarta (Central Jakarta)	6	25
L.	Greater Jakarta (West Jakarta)	3	10
M.	Greater Jakarta (West Jakarta)	4	16
N.	Greater Jakarta (Tangerang)	5	18
O.	Greater Jakarta (South Jakarta)	7	25
P.	Greater Jakarta (South Jakarta)	6	27
Q.	Greater Jakarta (South Tangerang)	0	0
R.	Greater Jakarta (Bogor)	11	67
S.	Greater Jakarta (Bogor)	2	5
T.	Greater Jakarta (Bogor)	6	28

4.3 Network connectivity

Referrals and recruiters in this study had the following relationships: the majority of participants in both Jakarta (n = 550; 96.2%) and Bandung (n = 157; 98.7%) were referred to the study by a friend. Two participants in Jakarta (0.4%) were referred by an acquaintance, one by a female intimate partner (0.2%), and one by a relative (0.2%).

Furthermore, the coupon return rate in this study was satisfactory. Out of the 1444 referral coupons issued overall across the two cities, 802 were returned, giving a coupon return rate of 55.5%. Of participants who returned a coupon, 731/802 (91.1%) met eligibility criteria for study participation and were enrolled in the study. A total of 1120 coupons were distributed in Greater Jakarta, yielding 624 recruits and a coupon return rate of 53.9%. Of these recruits, 554 (91.7%) were eligible for the study (572 including seeds). In Bandung, the coupon return rate was 54.9%, representing 178 returned coupons of 324 distributed overall. Among participants who returned coupons, 157 (89.3%) were eligible (159 including seeds).

4.4 Assessing bias in respondent-driven sampling data

This section reports findings from analyses of seed dependence, differential recruitment, degree of homophily, and bottlenecks, which were conducted on key variables in this thesis.

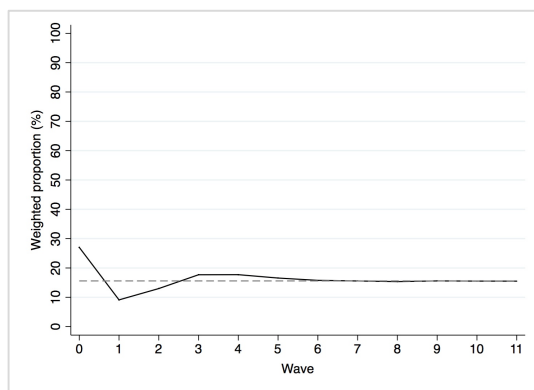
4.4.1 Seed dependence

To determine whether recruitment chains converged to a sampling equilibrium, convergence plots for all outcome measures and explanatory variables were examined

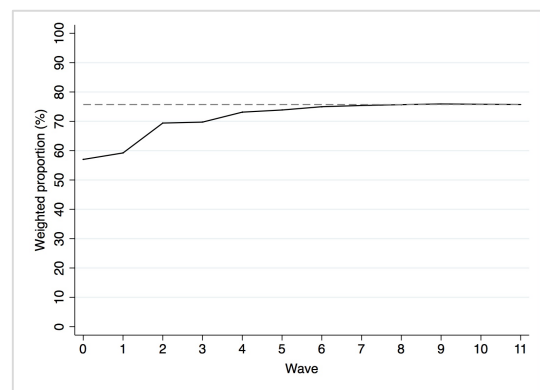
(Gile et al. 2015). The weighted outcome frequency of select variables was calculated across participants at each wave of recruitment using Schonlau and Liebau's RDS analysis package (2012, 2013). Computations for all variables of interest were made using two commands: *rds_network* and *rds*. The convergence plots presented in Figure 4.2 graph the weighted proportion (%) of select variables at each wave against the proportion based on the complete sample. As shown by the graphs, the proportions for this sample appear to stabilize between waves 2–6 for all variables assessed, and remain stable (i.e. within 2% of final sample proportions) until the full sample size is attained, at wave 11. This indicates that the sample is becoming random as additional participants enroll, and that bias associated with the non-random recruitment of seeds is substantially eliminated.

Figure 4.2: Convergence plots depicting the weighted cumulative prevalence of outcomes and select variables of interest across participants at each wave of recruitment. Prevalence (%) is shown on the Y-axis and recruitment waves on the X-axis. The horizontal dashed line indicates the estimated weighted proportion based on the complete sample (N=731).

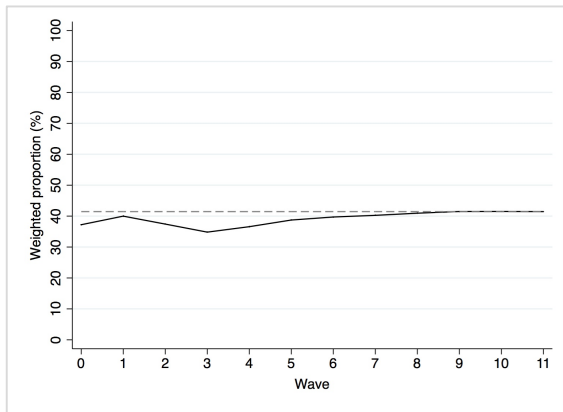
I. Past-month receptive syringe sharing.



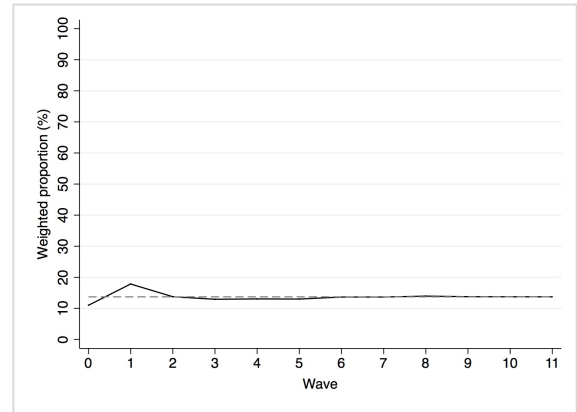
II. Engaged in any sexual risk behaviours.



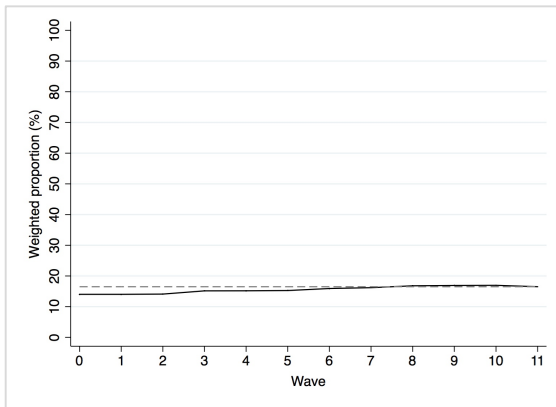
III. STI symptomatology.



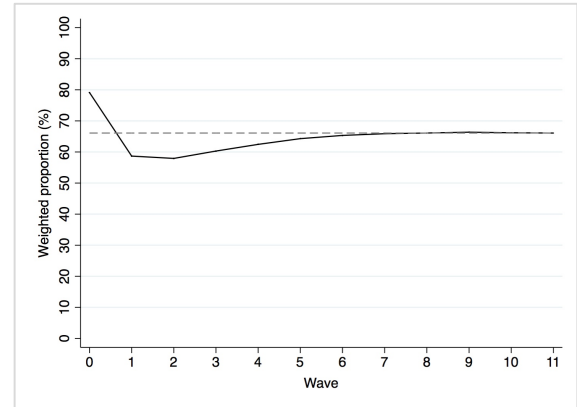
IV. Inconsistent condom use.



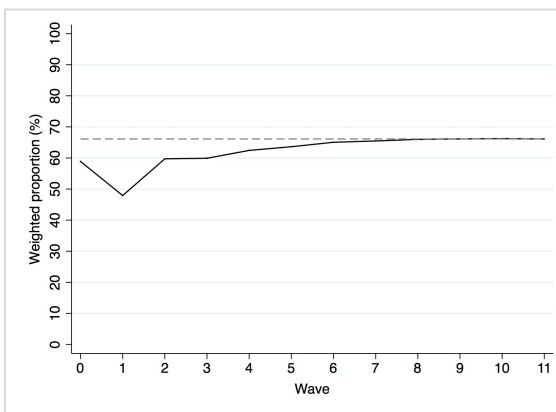
V. Survival sex work.



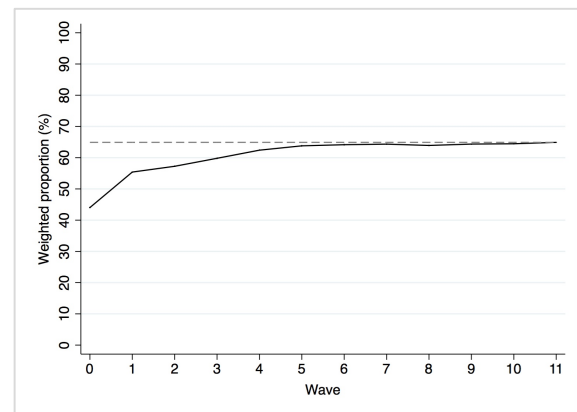
VI. Past-year IPV.



VII. Non-injection crystal meth use.



VIII. Depressive symptoms (CESD-R >16).



4.4.2 Differential recruitment

Table 4.3 lists the mean personal social network sizes (i.e. degrees) for key variables. For the majority of variables, differences in mean personal degrees were fairly minimal. For the

Bandung study site, no considerable differentials in mean degree were observed for any of the variables tested. For the Greater Jakarta study site, there were demonstrated differentials in personal degrees for three out of 17 variables tested, resulting in some women having a greater potential to recruit peers (likely those with similar characteristics to them). Specifically, the following variables showed substantial differentials in personal degrees:

- Women who engaged in past-month receptive syringe sharing had an average degree of 6.67 (over-representation), as compared to an average degree of 4.23 (under-representation) among those who did not share syringes during that period.
- Women who engaged in past-year survival sex work had a mean degree of 6.63 (over-representation), as compared to an average degree of 3.92 (under-representation) among those who did not engage in survival sex work.
- Women exposed to past-year sexual IPV reported an average degree of 3.57 (under-representation), relative to women not exposed to sexual IPV (5.14 = over-representation).

Table 4.3: Comparison of seed and recruit sample sizes (and proportions for recruits), estimated population proportions and their 95% confidence intervals, mean degrees, and homophily, by survey city

Variable (category)	Greater Jakarta (n = 572)					Bandung (n = 159)				
	Seeds (n=18)	Recruits (observed proportion)	Estimated population proportion (CI)	Mean degree	Homophily ^a	Seeds (n=2)	Recruits (observed proportion)	Estimated population proportion (CI)	Mean degree	Homophily ^a
Outcome measures										
Any HIV sexual risk behaviour										
Yes	11	435 (0.78)	0.76 (0.71, 0.81)	4.64	0.27	0	112 (0.70)	0.70 (0.62, 0.76)	3.63	0.07
No	7	118 (0.22)	0.24 (0.19, 0.29)	4.52	0.13	2	45 (0.30)	0.30 (0.24, 0.38)	3.93	0.16
Inconsistent condom use										
Yes	15	387 (0.70)	0.69 (0.65, 0.72)	4.71	0.12	0	91 (0.57)	0.58 (0.50, 0.66)	3.78	0.05
No	3	166 (0.30)	0.31 (0.28, 0.35)	4.40	0.09	2	66 (0.43)	0.42 (0.34, 0.50)	3.64	0.03
STI symptomatology										
Yes	7	279 (0.50)	0.47 (0.43, 0.51)	5.04	0.23	0	37 (0.23)	0.21 (0.16, 0.28)	3.49	- 0.06
No	11	274 (0.50)	0.53 (0.49, 0.57)	4.19	0.01	2	120 (0.77)	0.79 (0.72, 0.84)	3.79	0.07
Survival sex work										
Yes	4	142 (0.26)	0.17 (0.14, 0.20)	6.63	0.41	0	28 (0.18)	0.18 (0.13, 0.25)	3.75	- 0.09
No	14	411 (0.74)	0.83 (0.80, 0.86)	3.92	- 0.03	2	129 (0.82)	0.82 (0.75, 0.87)	3.71	- 0.08
Past-month receptive syringe sharing										
Yes	6	88 (0.17)	0.11 (0.09, 0.13)	6.67	0.24	0	59 (0.37)	0.29 (0.22, 0.36)	3.98	- 0.04
No	12	465 (0.83)	0.89 (0.87, 0.91)	4.23	- 0.13	2	98 (0.63)	0.71 (0.64, 0.78)	3.56	- 0.14
Explanatory variables										
Any past-year IPV										
Yes	14	386 (0.70)	0.69 (0.65, 0.73)	4.85	0.24	1	90 (0.57)	0.56 (0.48, 0.64)	3.64	- 0.01
No	4	167 (0.30)	0.31 (0.27, 0.35)	4.08	0.14	1	67 (0.43)	0.44 (0.36, 0.52)	3.82	0.04
Past-year psychological IPV										
Yes	13	334 (0.61)	0.59 (0.55, 0.63)	4.96	0.22	1	86 (0.55)	0.53 (0.45, 0.60)	3.65	0.05
No	5	219 (0.39)	0.41 (0.37, 0.45)	4.09	0.10	1	71 (0.45)	0.47 (0.40, 0.55)	3.80	0.10
Past-year physical and/or injurious IPV										
Yes	6	243 (0.44)	0.39 (0.35, 0.43)	5.30	0.19	0	75 (0.47)	0.42 (0.35, 0.50)	3.65	0.17
No	12	310 (0.56)	0.61 (0.57, 0.65)	4.08	- 0.08	2	82 (0.53)	0.58 (0.50, 0.65)	3.78	0.18

No										
Past-year sexual IPV										
Yes	6	185 (0.34)	0.40 (0.36, 0.44)	3.57	0.17	0	25 (0.16)	0.20 (0.14, 0.27)	3.48	0.09
No	12	368 (0.66)	0.60 (0.56, 0.64)	5.14	0.35	2	132 (0.84)	0.80 (0.73, 0.86)	3.76	0.15
Depressive symptoms										
Yes (CESD ≥ 16)	9	379 (0.68)	0.67 (0.63, 0.71)	4.87	0.34	0	90 (0.57)	0.56 (0.48, 0.63)	3.67	0.02
No (CESD < 16)	9	174 (0.32)	0.33 (0.29, 0.37)	4.07	0.22	2	67 (0.43)	0.44 (0.37, 0.52)	3.79	0.08
Past-year crystal meth use										
Yes	12	404 (0.73)	0.69 (0.65, 0.73)	4.77	0.24	0	74 (0.47)	0.51 (0.43, 0.59)	3.70	0.19
No	6	149 (0.27)	0.31 (0.27, 0.35)	4.21	0.08	2	83 (0.53)	0.49 (0.41, 0.57)	3.73	0.19
Selected socio-demographic variables										
Self-reported HIV status										
Positive	8	243 (0.44)	0.61 (0.57, 0.65)	5.40	0.26	2	88 (0.57)	0.51 (0.44, 0.59)	3.67	0.06
Negative/unknown	10	310 (0.56)	0.39 (0.35, 0.43)	4.00	0.03	0	69 (0.43)	0.49 (0.41, 0.56)	3.78	0.12
Education level (highest attained)										
Lower than high school	3	130 (0.23)	0.24 (0.20, 0.27)	4.30	0.09	0	15 (0.09)	0.10 (0.06, 0.15)	3.33	- 0.04
High school or above	15	423 (0.77)	0.76 (0.73, 0.80)	4.71	0.05	2	142 (0.91)	0.90 (0.85, 0.94)	3.76	0.02
Currently married										
Yes	8	258 (0.47)	0.50 (0.46, 0.54)	4.08	0.10	1	15 (0.10)	0.11 (0.07, 0.18)	3.60	0.04
No	10	295 (0.53)	0.50 (0.46, 0.54)	5.08	0.22	1	142 (0.90)	0.89 (0.82, 0.93)	3.73	0.00
Children and/or other dependents										
Yes	10	344 (0.62)	0.64 (0.60, 0.68)	4.18	0.11	2	56 (0.36)	0.39 (0.31, 0.47)	3.59	0.04
No	8	209 (0.38)	0.36 (0.32, 0.40)	5.33	0.19	0	101 (0.64)	0.61 (0.53, 0.69)	3.79	0.15
Individual monthly income (IDR/USD)										
≤ 3.8 million IDR (285 USD)	10	249 (0.45)	0.48 (0.43, 0.52)	4.16	0.06	2	136 (0.87)	0.88 (0.82, 0.92)	3.70	0.01
> 3.8 million IDR (285 USD)	8	304 (0.55)	0.52 (0.48, 0.57)	4.99	0.29	0	21 (0.13)	0.12 (0.08, 0.18)	3.86	0.04
Age										
≤ 24 years old	1	80 (0.14)	0.15 (0.12, 0.18)	4.19	0.12	0	11 (0.07)	0.07 (0.04, 0.13)	3.91	0.32
> 24 years old	17	473 (0.86)	0.85 (0.82, 0.88)	4.69	0.13	2	146 (0.93)	0.93 (0.87, 0.96)	3.71	0.26

^a Bolded values exceeding 0.3 or -0.3 indicate substantial homophily.

4.4.3 Homophily

Homophily metrics for all relevant study variables, by survey city, are displayed in Table 4.3. Nearly all outcome measures in this thesis showed low homophily for both Greater Jakarta and Bandung. The only exception was the “survival sex work” variable, for which homophily was substantial in the Jakarta study site ($H=0.41$). This indicated that women engaging in survival sex work recruited other women engaging in survival sex work 41% of the time, and at random only 59% of the time. Furthermore, low homophily was observed for the majority of explanatory variables in Papers 1, 2, and 3 (Chapters 5 – 7), with two exceptions. Firstly, women not reporting past-year sexual IPV in Jakarta tended to recruit women who also reported no sexual IPV 35% of the time ($H=0.35$). Secondly, women with depressive symptoms tended to recruit others with depressive symptoms in Jakarta 34% of the time ($H=0.34$). Finally, among the socio-demographic variables assessed, all but one variable (i.e. age) showed low homophily. Namely, women 24 years of age or younger in Bandung city tended to over-recruit other young women ($H=0.32$).

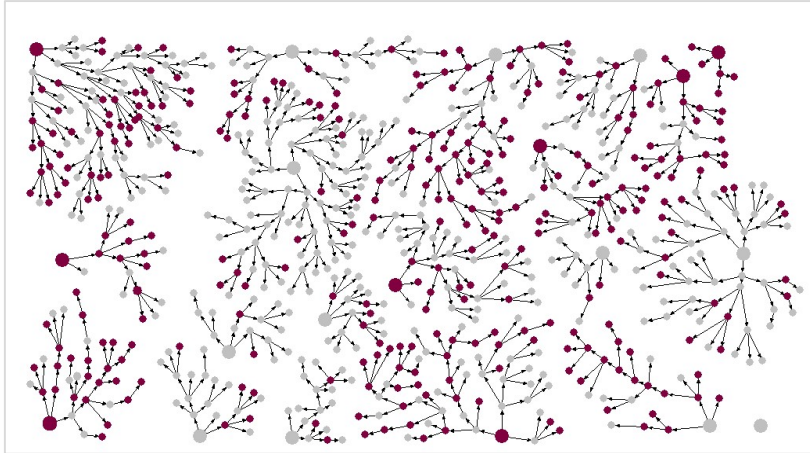
4.4.4 Bottlenecks

Figure 4.3 displays network diagrams conducted on the combined dataset from the two survey sites for study outcomes (i.e. any HIV sexual risk behaviour, receptive syringe sharing, STI symptomatology, inconsistent condom use, and survival sex work) and selected background variables (i.e. study city, age, self-reported HIV status, crystal meth use). The different colour nodes represent sub-groups of the population. Ideally, for each diagram, the different colour nodes should be interspersed to reflect recruitment across sub-groups (Johnston and Luthra 2014). The majority of the diagrams display sufficiently interspersed

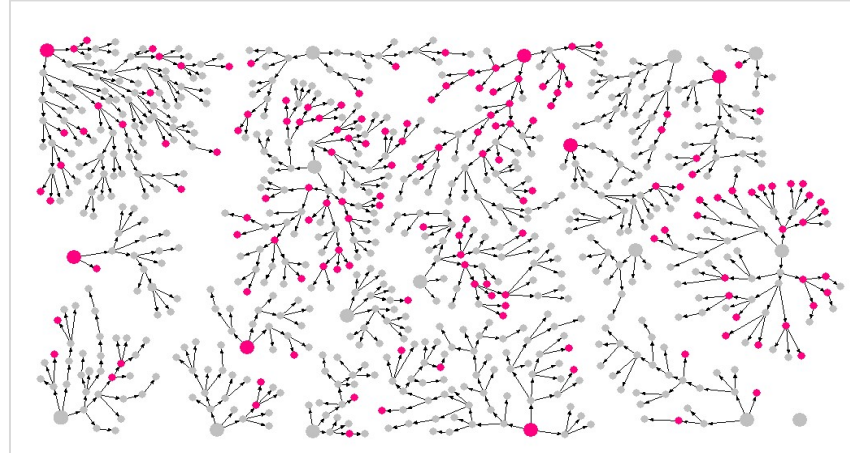
nodes, indicating that there were no major bottlenecks among sub-populations in this sample. The only observed bottleneck is shown in Figure 4.3 (V), which displays the distribution of the recruits from the two study cities, with grey nodes representing those residing in Greater Jakarta and purple nodes representing those residing in Bandung. In this case, all participants were clustered in either one of the two cities, forming two isolated geographical components (Johnston and Luthra 2014).

Figure 4.3: Network diagrams depicting recruitment structure for selected variables in the Perempuan Bersuara study. Larger shapes depict seed participants (n = 20); smaller shapes are recruits (n = 711); arrows demonstrate the direction of recruitment.

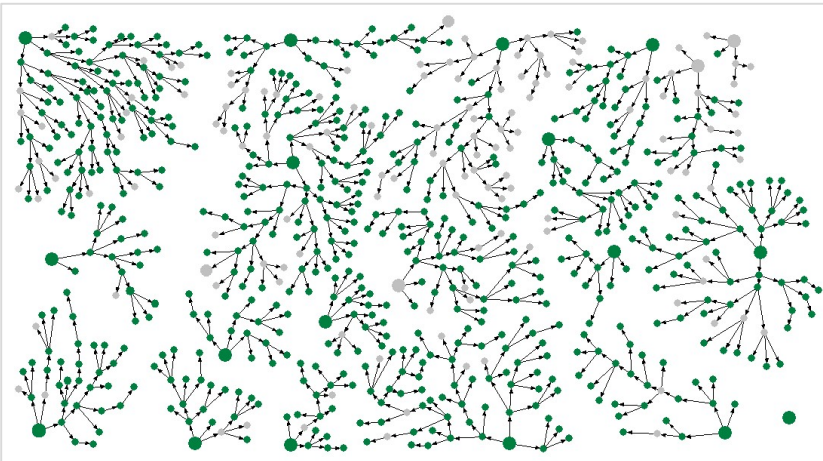
I. Recruitment structure for STI symptomatology: grey = no; brown = yes



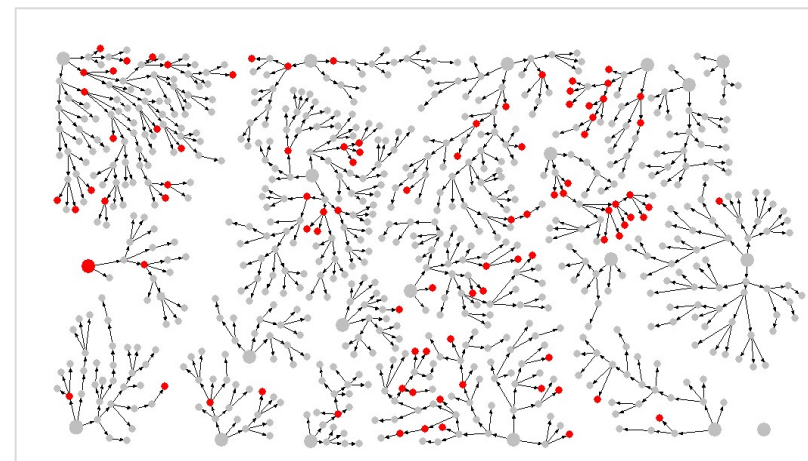
II. Recruitment structure for receptive syringe sharing: grey = no; pink = yes



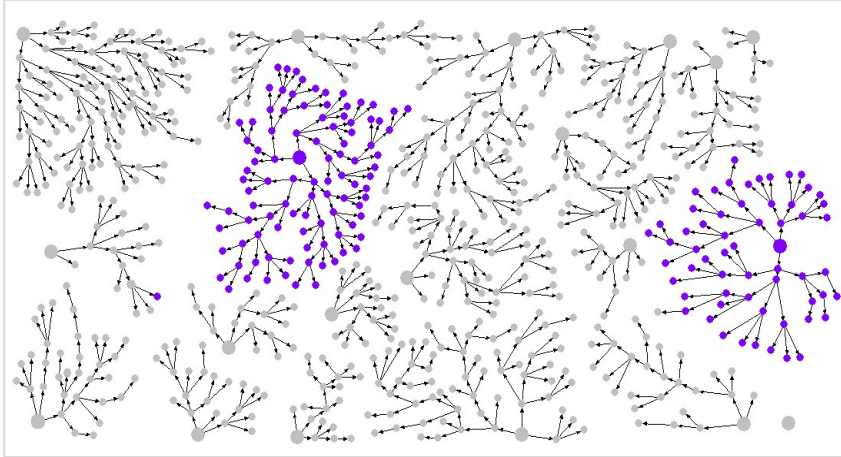
III. Recruitment structure for inconsistent condom use: grey = no; green = yes



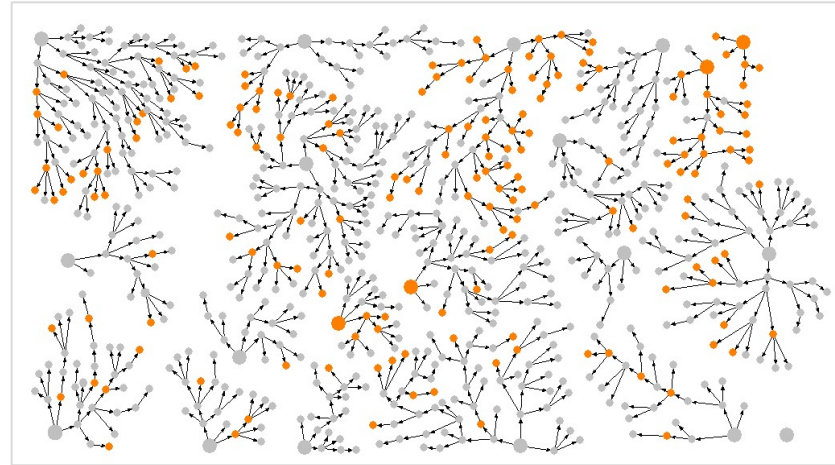
IV. Recruitment structure for survival sex work: grey = no; orange = yes



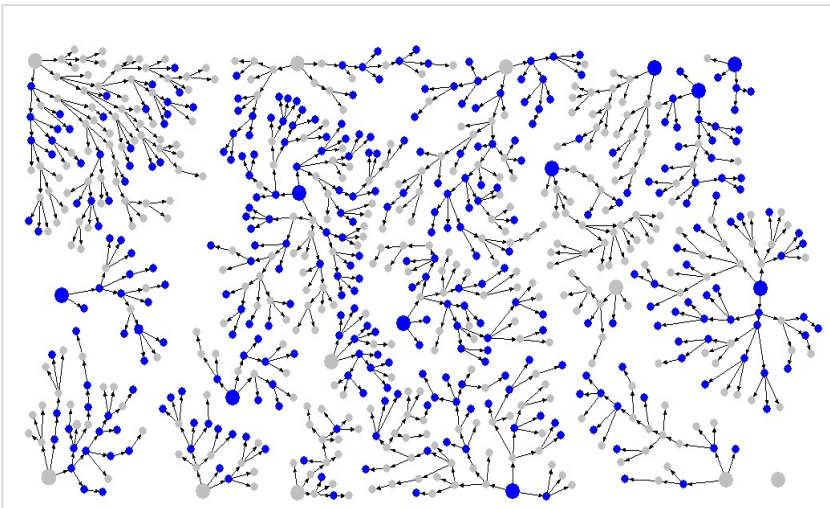
V. Recruitment structure for study city: grey = Greater Jakarta; purple = Bandung



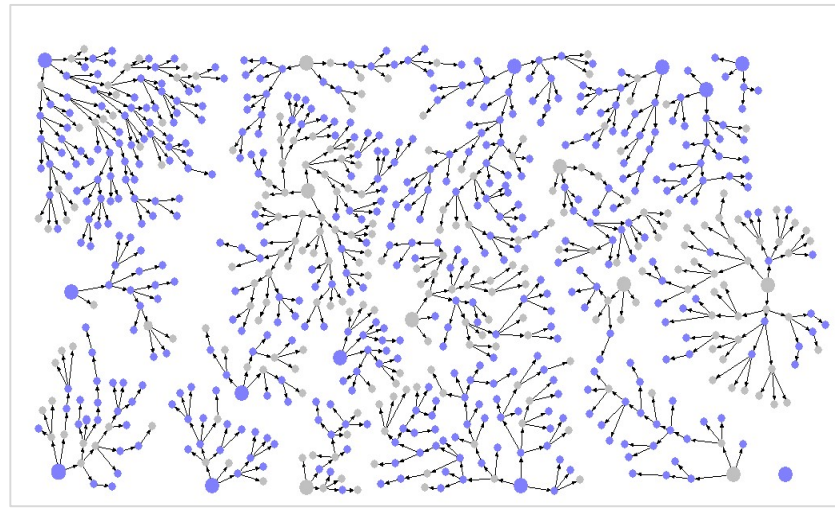
VI. Recruitment structure for age (years): grey = age >24; red = age ≤24



VII. Recruitment structure for HIV status: grey = HIV-/unknown; blue = HIV+



VIII. Recruitment structure for crystal meth use: grey = no; violet = yes



In the presence of a bottleneck, existing literature suggest that estimates should be reported for each sub-group individually, rather than combining them into an overall estimate (Goel and Salganik 2010). However, splitting the sample into smaller sub-samples can result in a lower power and confidence than that calculated in the initial sample size (Johnston and Luthra 2014). A recommended alternative is to conduct a sensitivity analysis by comparing several important variables for each of the two bottle-necked sub-samples (in this case, Greater Jakarta and Bandung). If the estimates based on the two sub-samples are similar, the data can be combined and analysed as one sample (Johnston and Luthra 2014).

To minimise potential biases arising from the combination of network samples, the two network sub-samples were assessed to determine whether combining them was warranted. Observed sample (unweighted) and estimated population (RDS-weighted) proportions for key variables, by survey city, are shown in Table 4.3. For the majority variables, no substantial differences in estimates were observed between the two city sub-samples. City differences of 10% or higher in estimated population proportions were observed for the following variables: inconsistent condom use, STI symptomatology, receptive syringe sharing, sexual IPV, depressive symptoms, crystal meth use, education level, marital status, having children or other dependents, and individual monthly income. In order to retain the power and precision of the calculated sample size, and because city differences can be controlled for in multivariate analyses, this candidate opted to use the full dataset available for the analyses presented in this thesis. For descriptive and multivariate regression analyses in the papers that follow (Chapters 5 – 7), data from the two cities were aggregated. In addition, multivariate regression analyses controlled for city

differences. Following current best practice, multivariate analyses were performed with RDS weights, and then repeated without the weights (Johnston and Luthra 2014). In the case that findings from the two analyses are similar, it is recommended that the unweighted estimates are reported, since weights can introduce additional variance that may impact confidence intervals (Johnston and Luthra 2014; Winship and Radbill 1994; Heckathorn 2007). Given that weighted and unweighted multivariate analyses conducted for this thesis produced statistically similar results, unweighted results were reported unless otherwise indicated.

4.5 Summary

In summary, this chapter reported on the network characteristics of the sample, and addressed the potential influences of key parameters, such as seed dependence, differential recruitment, homophily, and bottlenecks, on RDS estimates. Diagnostics revealed the following:

- Convergence was reached on all variables of interest, indicating minimal bias due to the non-random recruitment of seeds.
- All participants were referred to the study by a friend or acquaintance whom they know and who knew them, indicating adequate network connectivity in the sample.
- The proportion of referrals that resulted in enrolled participants (i.e. coupon return rate) was above 50% in both study sites.
- For the majority of variables, differences in mean personal degree were fairly minimal, indicating that most sub-groups were not under or over represented. Exceptions included women who reported past-month receptive syringe sharing

and those who engaged in past-year survival sex work, who were over-represented, and women exposed to past-year sexual IPV, who were under-represented in this sample.

- 14 of 17 variables tested showed low homophily scores, indicating that participant sub-groups recruited at random among their peers most of the time. The fact that category differences in homophily and personal degrees in this sample were minimal for the majority of variables indicate that the sample is fairly robust.
- No major bottlenecks were identified among most sub-populations in this sample. The only observed bottleneck was observed for study site, such that most participants were clustered in either one of the two survey cities with minimal across-group recruitment. However, in order to retain the power and confidence of the calculated sample size, the two network samples were merged and analysed as one dataset. Potential limitations associated with combining the network samples are further discussed in Chapter 8.

The next three chapters (5 – 7) are the three stand-alone papers that comprise this thesis. Each paper starts by presenting an overview of RDS-weighted population proportions and 95% CIs for key outcome and explanatory variables, by survey city. This is followed by descriptive and multivariate analyses, which were conducted on the aggregated dataset. The manuscripts included in this thesis have been edited from the original versions submitted to journals in order to ensure consistency and avoid overlap.

CHAPTER 5. PAPER 1: INTIMATE PARTNER VIOLENCE AND HIV-RELATED SEXUAL RISK BEHAVIOUR AMONG WOMEN WHO INJECT DRUGS IN INDONESIA: A RESPONDENT-DRIVEN SAMPLING STUDY

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This paper builds on the findings of the literature review in Chapter 2. It explores the potential association between exposure to IPV victimisation and Indonesian drug-using women's HIV sexual risk behaviours. The introduction presents a summary of the evidence base to date, followed by a detailed section on the methodology used, including an overview of the empirical study design, participant recruitment, measures, and analyses. The discussion interprets these findings, and draws implications for future research. Due to the cross-sectional design, caution is advised against inferring a causal association between the independent variables tested in this chapter and the HIV sexual risk outcome. This paper addresses the following set of research questions:

- Are different types of IPV associated with elevated odds of sexual risk behaviours?
- Does the co-occurrence of multiple forms of IPV (polyvictimisation) have additive effects on sexual risk behaviours?

Author statement: CS conducted the majority of work for this paper. She conceived the study, led the quantitative study design, data collection, analysis, and writing. LC, MC, AG, and I contributed to conceptualisation of the paper, and provided overall guidance on data analysis. TS contributed to the conceptualisation of the paper and advised on statistical analyses. All authors have reviewed and approved the final text and this author statement.

Abstract

Background: Women who inject drugs are disproportionately affected by HIV and IPV, yet the relationship between IPV and HIV risk among women who inject drugs is poorly understood in low- and middle-income countries. This study examined associations between different forms of past-year IPV victimisation and HIV-related sexual risk behaviours among 731 women who inject drugs in Indonesia.

Methods: Women (≥ 18 years, active injecting in the previous 12 months) were recruited using respondent-driven sampling (RDS). Consenting participants were interviewed by trained peer fieldworkers using validated measures. Multivariate logistic regressions assessed associations between different dimensions of past-year IPV (psychological, physical and/or injurious, sexual) and engaging in one or more sexual risk behaviours. Marginal effects analyses tested additive effects of each form of IPV and combination effects of polyvictimisation of different forms of IPV on sexual risk behaviour.

Results: Prevalence of IPV and sexual risk behaviours was 66.1% and 75.7%, respectively. In multivariate analyses, each dimension of IPV was significantly positively associated with engaging in one or more sexual risk behaviours, after controlling for other IPV forms and potential confounders. Self-reported HIV-positive status, crystal meth use, lower educational attainment, younger age, and not being currently married were independently associated with elevated sexual risk behaviour. Co-occurrence of multiple forms of IPV had additive effects: sexual risk behaviour was reported by 62.0% of women who did not experience any IPV; 71.6%–75.9% of those reporting one form of IPV; 80.9%–84.1% of those experiencing two forms of IPV; and 89.3% of those exposed to three forms of IPV.

Conclusion: Women who inject drugs in Indonesia experience high rates of IPV, which increases their risk for HIV infection and onwards transmission. HIV prevention interventions that incorporate IPV monitoring and prevention are urgently needed for this highly vulnerable group.



Figure 5.1: A fieldworker and a participant prepare to begin an interview in a private room at the participant's home, April 2015

5.1 Introduction

Asia is home to half of the estimated 3.8 million women who inject drugs globally (Larney et al. 2015). Meta-analytic evidence has established that women who inject drugs experience higher HIV rates than their male counterparts in high prevalence settings (Des Jarlais, Feelemyer, Modi, Arasteh, and Hagan 2012). Intimate partner violence (IPV) has been highlighted as a key contributor to HIV transmission among drug-using women (Gilbert et al. 2015). IPV is also more prevalent among women who inject drugs vis-à-vis women in the general population. For example, in the United States, rates of past-year IPV range from 20% to 57% among clinical and community-based samples of female drug users, which is 2 – 5 times higher than prevalence rates among general female populations (El-Bassel et al. 2011; Moore et al. 2008).

In North America, IPV victimisation against women who inject drugs has been associated with the presence of multiple risk factors for sexually-transmitted HIV, including condomless sex, multiple sexual partners, sexually transmitted infections (STIs), and trading sex for money, drugs, or shelter (Wu et al. 2003). IPV increases women's susceptibility to HIV risk through direct and indirect mechanisms. Sexual IPV or forced sex may directly increase women's HIV risk through biological mechanisms, via genital injuries and lacerations that facilitate disease transmission (Campbell et al. 2013). Indirectly, both sexual and physical IPV have been shown to impact HIV risk by creating a dynamic of fear and submission that hinders a woman's ability to negotiate safer sex (Gilbert et al. 2015). Psychological abuse may create a similar context of dominance and control, which increases women's likelihood of engaging in risky sexual behaviours (Maman et al. 2000). In fact, emerging research suggests that psychological aggression may exert similar, and at

times greater, effects on women's health outcomes than physical and sexual forms of IPV (Kouyoumdjian et al. 2013; Follingstad 2009).

Although there has been a proliferation of research on the syndemic relationships between IPV and HIV risk among drug-involved women in high-income countries (Meyer, Springer, and Altice 2011; Gilbert et al. 2015), there is a dearth of knowledge of these associations in low- and middle-income countries. Most research specifically addressing the links between IPV and HIV-related sexual risk among women who inject drugs is geographically clustered in North America (Gilbert et al. 2015; Li, Marshall, et al. 2014). Crucially, no published research has explored this relationship in Asian countries with injection-driven epidemics.

In contrast with a trend of stabilisation across most countries in the Asia region, Indonesia is facing an expanding HIV epidemic concentrated among key populations, such as people who inject drugs, female and transgender sex workers and their clients, and men who have sex with men (UNAIDS 2013). With an HIV prevalence rate of 36.4%, people who inject drugs remain disproportionately affected compared with other high-risk groups (Indonesian National AIDS Commission 2012). Despite their smaller numbers compared with their male counterparts, women who inject drugs face elevated vulnerability to HIV (Habsari et al. 2007; Sari and Nurmaya 2009; Spooner et al. 2010). In 2009, the only year for which sex-disaggregated estimates are available, national HIV prevalence among women who inject drugs in Indonesia was 57.1%, relative to 52.1% among male injectors (Indonesian National AIDS Commission 2009). Furthermore, qualitative studies from urban sites across the archipelago suggest that IPV and HIV vulnerability may co-occur among women who use drugs in Indonesia (Sari and Nurmaya 2009; Habsari et al. 2007; Saktiawati et al. 2013;

Stigma Foundation 2010; Lazuardi et al. 2012). For instance, in a multi-city qualitative study of 52 women who use drugs, Habsari et al. identified pervasive exposure to violence perpetrated by both intimate and non-intimate partners (Habsari et al. 2007). Women have also reported that in situations where they felt at risk of HIV infection whilst in an abusive relationship, their priority was not protection against HIV infection. Instead, women sought to avoid conflict out of fear of provoking aggression from their partners, and a desire to “maintain their relationship” (Lazuardi et al. 2012). However, no quantitative studies to date have explored the prevalence and associations of IPV and HIV-related sexual risk among women who inject drugs in Indonesia.

Understanding the relationship between different forms of IPV and HIV risk is essential for elucidating pathways to HIV and for informing effective interventions with women who inject drugs in low-and middle-income countries. There is a clear need for quantitative research with adequately sized samples and validated measures, to assess the effect of IPV on HIV risk outcomes among drug-injecting women in Asia. Accordingly, this study examines the largest representative sample of Indonesian women who inject drugs to investigate (1) associations between exposure to psychological, physical and/or injurious, and sexual dimensions of IPV and HIV-related sexual risk behaviour in this population; and (2) potential additive effects of IPV polyvictimisation on sexual risk behaviour.

5.2 Methods

5.2.1 Sampling

Data collection sites were selected with reference to national surveillance data identifying areas with large numbers of people who inject drugs and high HIV rates among injectors:

Jakarta and peri-urban surrounding cities Bogor, Tangerang, Depok and Bekasi (hereafter referred to as “Greater Jakarta”); and Bandung, the provincial capital of West Java (Ministry of Health 2012). The minimum sample size for this study (709 participants) was calculated by assuming a 36% HIV prevalence rate (Indonesian National AIDS Commission 2012), with a 95% CI, 5% precision, 80% power, and a design effect of 2 (Johnston 2008; Salganik 2006).

The community of women who inject drugs was actively engaged in the development, implementation, and dissemination of the research. Four focus group discussions with a total of 39 women, and three consultations with relevant key population networks and community-based organisations, were convened to ensure that all study procedures were sensitive to the needs of participants. A community advisory group comprised of six women with an injecting drug use background was established to advise researchers throughout study implementation. Once the data were analysed, a consultation was convened to discuss results with female peers and devise strategies for dissemination.

Between September 2014 and June 2015, 731 women were recruited using respondent-driven sampling (RDS). RDS, a modified variant of peer-based, snowball sampling, provides access to hidden populations, such as those involved in illicit or illegal activities (Magnani et al. 2005). It also provides the means to conduct more generalisable analyses by weighting the sample to reduce biases associated with non-random recruitment (Heckathorn 2002). Since its introduction in 1997, over 460 RDS studies in 69 countries have been conducted with hidden or hard-to-reach populations (White et al. 2015).

Eligibility criteria included: being female; ≥ 18 years of age; injecting illicit drugs in the previous 12 months; residing in one of the study catchment areas; possessing a valid

recruitment referral; and providing voluntary informed consent. To initiate recruitment, a diverse group of 20 initial recruits (“seeds”) was selected by the researchers. Seed selection was informed by extensive formative research, including mapping of hotspots where people inject drugs, key informant interviews with local harm reduction service providers, and community consultations. To increase the representativeness of the sample, selected seeds were heterogeneous in terms of age, preferred injectable drug type, levels of risk behaviour, relationship status, and known HIV status. Each initial recruit was asked to refer up to three peers to the study, who in turn enlisted others in a chain-referral fashion. Successive waves of recruitment continued until the desired sample size was reached.

This study used mobile-site interviewing. Potential recruits were asked to contact the research team by phone or text message to setup an interview at a location of their choice. As part of the RDS process, participants received a primary incentive of 75,000 Indonesian Rupiah (~USD \$5) for participating in the interview and a secondary incentive of 25,000 Indonesian Rupiah (~USD \$2) per eligible peer recruited. Monetary remuneration is considered an ethical and effective way to facilitate participation in public health research by people who use drugs (Fry et al. 2006; Festinger and Dugosh 2012). Appropriate remuneration was determined by consulting the community advisory group and previous bio-behavioural surveys with people who inject drugs in Indonesia. Each recruit was given a uniquely coded identifier and recorded in SyrEx2, a monitoring and evaluation tool used by drug service providers (Alliance for Public Health 2011).

5.2.2 Ethical considerations

The study was anonymous, and all participants were encouraged to use a pseudonym. Verbal and written voluntary informed consent was obtained from each participant.

Consent forms were worded in plain language and included clear explanations of the nature and purpose of the research, limits to confidentiality in the context of illegal activities, and explicit statements regarding participants' rights to opt-out at any point. Consent forms were read and discussed verbally by the interviewers to ensure that participants had the necessary information to be able to provide informed consent, regardless of literacy level.

Strict confidentiality was maintained, except where participants requested assistance or service referrals. In the case that information disclosed suggested that a participant was at risk of significant harm (e.g. severe violence) the interviewer discussed concerns with the participant and offered service referrals. Researchers maximised opportunities for referral by providing all participants with a local directory of HIV/STI testing and counselling, legal aid, and IPV support services. Interviewers explained to participants what existing services they could access for free and how to do so. Ethical protocols were approved by the Central University Research Ethics Committee at Oxford University (ref no: SSD/CUREC2/13-23) and the Ethics Board of Atma Jaya University (ref no: 1114/III/LPPM-PM.10.05/11/2013).

5.2.3 Measurement

Questionnaires were translated into Bahasa Indonesia by bilingual health workers and pre-tested with women representative of the target sample, according to WHO guidelines (World Health Organization 2017). Seven female fieldworkers with a history of drug use were trained by senior researchers in mobile-assisted interviewing, ethics, and health and safety. Face-to-face interviews lasted approximately one hour, and were conducted in the local language at locations deemed safe by participants, such as offices of non-

governmental organisations or participants' homes. Information was collected using tablets equipped with Open Data Kit, an open-source application for data collection and management on mobile devices (Hartung et al. 2010).

5.2.3.1 HIV-related sexual risk behaviours

HIV-related sexual risk behaviours in the preceding 12 months were measured using items for four pertinent risks associated with HIV infection among drug-using women: (1) unprotected sex at last vaginal and/or anal intercourse; (2) multiple sexual partners; (3) STI symptomatology, and (4) survival sex work. *Unprotected sex at last intercourse* and *multiple sexual partners* were derived from the 2014 UNAIDS Global AIDS Progress Reporting Indicator Registry (UNAIDS 2014b), and included both steady and casual partners, and paid and unpaid sex. *STI symptomatology* was measured using participant self-report of easily recognised symptoms, based on WHO guidelines (WHO 2003; Vuylsteke 2004). Sexually active participants reporting two or more of six symptoms (e.g. “sores, blisters and/or ulcers on or in the vagina,” “unusual vaginal discharge, such as pus or a thick and/or sticky liquid from the genital area”) were coded as 1= “STI symptoms.” *Survival sex work* referred to trading sex for drugs or other basic needs (e.g. shelter, food). Risk behaviours were combined into a composite scale and dichotomised as one or more risk behaviours versus none. Other studies have used similar variables and scales to measure sexual risk (Wu et al. 2010; Cavanaugh, Hansen, and Sullivan 2010), suggesting that these items serve as reasonable indices of risky sexual behaviour.

5.2.3.2 Intimate partner violence

Intimate partner violence was assessed using the psychological, physical, injurious, and

sexual subscales of the Revised Conflict Tactics Scale (CTS2) short form (Strauss, Boney-McCoy, and Sugarman 1996; Strauss and Douglas 2004). The CTS2 has been cross-culturally validated in more than 17 countries, including several low- and middle-income countries in Asia (Strauss 2004a). It is the most widely-used measure assessing IPV victimisation in community and clinical samples of drug-using women (El-Bassel et al. 2007; Gilbert et al. 2000; Wu et al. 2003). Questions in the CTS2 instrument ask respondents to indicate how often each event took place within the preceding 12 months (Strauss 2004b). Sample items from each of the subscales include: psychological aggression (“My partner insulted or swore or shouted or yelled at me”); physical assault (“My partner punched or kicked or beat-me-up”); physical assault with injury (“I went to see a doctor or needed to see a doctor because of a fight with my partner”); and sexual coercion (“My partner used force, like hitting, holding down, or using a weapon, to make me have sex”). Participants were asked about violence perpetrated by an intimate partner (i.e. any partner with whom the participant had a close emotional and/or sexual relationship) in the preceding 12 months. This comprised any formal partnerships, such as marriage, as well as informal partnerships including co-habiting, dating and other intimate relationships (World Health Organization 2013). Response to items on each of the subscales were dichotomised into any vs no IPV victimisation. For this sample, the CTS2 subscales had adequate to high internal consistency, ranging between $\alpha = .65$ and $\alpha = .82$, and totalling $\alpha = .87$ for the full scale (Strauss, Boney-McCoy, and Sugarman 1996).

5.2.3.3 Sociodemographic and background characteristics

Guided by a literature review and formative research, selected socio-economic and background information was collected as basis for a confounder analysis (Sari and Nurmaya

2009; Stoicescu, Sari, and Esteria-Tobing 2011; El-Bassel et al. 2007; Wu et al. 2003). Using items modelled on the Indonesia Population Census (Statistics Indonesia) and Integrated Biological and Behavioural Surveillance (Ministry of Health), women were asked their *age*, *relationship status*, *employment status*, *level of education*, *individual monthly income*, and *whether they had any dependent children* in the household or other dependents for whom they were responsible. *Individual monthly income* was classified as being either below or above the mean national income in Indonesia (Statistics Indonesia 2013). *Financial dependency* was assessed by asking participants about the main source (>50%) of their monthly income. Women were characterised as financially dependent if they indicated that their main source of income was from intimate partner(s). *Housing status* was assessed by asking participants about their current living arrangements and dichotomised into “stable housing” vs “unstable housing/homeless”. Women were coded as “unstably housed and/or homeless” if they lived on the street, including in public spaces (i.e. train station) or in temporary or transitional accommodation, such as a friend’s home, and “stably housed” if they lived in their family home, rental house/apartment, and rental long-term single-room accommodation (*kos-kosan*). Participants were asked about illegal and/or illicit drug use in the previous 12 months, in addition to injecting drugs. Because crystal meth (*shabu-shabu*) has been shown to increase IPV and HIV-risk (Lorvick et al. 2006; Klee 1993), a dichotomous variable was created to reflect any past-year use of non-injection crystal meth in addition to women’s injecting drug use. Participants were also asked whether they had knowledge of their HIV status.

5.2.4 Analysis

Data were analysed in Stata 14.2 (StataCorp, College Station, TX). Analyses were conducted

in five stages. First, to account for potential study design effects, weighted estimates of population proportions and 95% confidence intervals were calculated for outcome and explanatory variables, by survey city, using the user-written RDS for Stata package (Schonlau and Liebau 2012, 2013). Descriptive statistics for all variables were also conducted on the unweighted, aggregated sample. Second, bivariate associations between IPV and background variables and the sexual risk behaviour outcome were examined using logistic regressions. Variables associated with sexual risk behaviour at $p < 0.1$ were retained in multivariate analyses (Hosmer and Lemeshow 1989). Third, three sets of multivariate logistic regressions (models 1 – 3) investigated the relationship between each form of IPV and sexual risk behaviour, as shown in Figure 5.2. All models controlled for significant confounders from stage two. A final model (model 4) included covariance adjustments for all IPV types and significant confounders. Multicollinearity between IPV predictors included in the joint model was assessed using Pearson's correlation coefficient. The maximum correlation between any of the subscales was $r > 0.5$, indicating no multicollinearity. We also tested for plausible two-way interactions between each dimension of IPV and background variables on sexual risk using product terms. No statistically significant interactions were detected. Fifth, we tested whether sexual risk behaviour effects were greater if women experienced more than one form of past-year IPV. All IPV variables that were included in model 4 were entered into a marginal effects model. Predicted probabilities of engaging in sexual risk behaviour under each potential combination of IPV variables were computed, with significant covariates held at mean values. All multivariate analyses were conducted with RDS weights, and repeated without weights (Johnston and Luthra 2014). Since weighted odds ratio (OR) estimates were not statically different than unweighted estimates, unadjusted results were reported (Johnston and Luthra 2014).

Figure 5.2: Sequential multivariate logistic models between different forms of past-year intimate partner violence and HIV-related sexual risk behaviours

<i>Independent Variables</i>	Model 1	Model 2	Model 3	Model 4
Psychological abuse + covariates	X			
Physical and/or injurious assault + covariates		X		
Sexual coercion + covariates			X	
Psychological abuse + physical and/or injurious assault + sexual coercion + covariates				X

5.3 RESULTS

5.3.1 Overview by city

Data were gathered from 731 women who inject drugs from two largest metropolitan areas in Indonesia: Greater Jakarta and Bandung, West Java. Table 5.1 displays RDS-weighted population proportions and 95% confidence intervals (CIs) for sexual risk behaviour and IPV victimisation by survey city. Overall, similar proportions of participants in Greater Jakarta (76.2%; 95% CI=71.4, 80.5) and Bandung (74.1%; 95% CI=66.2, 80.6) reported one or more of three HIV-related sexual risk behaviours (i.e. condomless sex at last intercourse, STI symptomatology, multiple sexual partners, and survival sex work). The prevalence of condomless vaginal and/or anal sex at last intercourse with any type of partner (i.e. steady, casual, and transactional) was 18.2% higher in Greater Jakarta (65.1%; 95% CI=61.1, 68.8) than in Bandung (46.9%; 95% CI=39.2, 54.8). Similarly, the prevalence of STI symptomatology was higher in Greater Jakarta (52.8%; 95% CI=48.6, 56.8) relative to Bandung (21.2%; 95% CI=15.7, 28.1). However, a higher proportion of participants in

Bandung reported having multiple (2 – 5) sexual partners in the preceding year (37.8 %; 95% CI=30.5, 45.7), compared with Greater Jakarta (25.1%; 95% CI=21.6, 28.9).

There were notable differences in the prevalence of IPV victimisation across the two survey cities. Bandung had a lower prevalence of past-year IPV (55.9%; 95% CI=48.0, 63.5) relative to Greater Jakarta (68.9%; 95% CI=65.0, 72.6). Participants in Greater Jakarta reported higher levels of psychological aggression (58.8%; 95% CI=54.7, 62.8) as compared with those in Bandung (52.6%; 95% CI=44.7, 60.3). Notably, the prevalence of sexual IPV in Greater Jakarta (39.8%; 95% CI=35.7, 44.0) was nearly double that in Bandung (19.6%; 95% CI=13.7, 27.3). However, reported levels of physical and/or injurious assault were higher in Bandung (42.2%; 95% CI=34.8, 50.0) than in Greater Jakarta (38.8%; 95% CI=35.0, 42.8).

Table 5.1: RDS-weighted estimations and 95% confidence intervals for IPV victimisation and sexual risk behaviours among women who inject drugs, by survey city

	Greater Jakarta (n = 572)				Bandung (n = 159)			
	N	Unweighted %	RDS-weighted %	95% CI	N	Unweighted %	RDS-weighted %	95% CI
<i>Past-year intimate partner violence (IPV)</i>								
Any type of IPV (psychological, physical/injurious and/or sexual)								
Yes	401	70.1	68.9	65.0, 72.6	91	57.2	55.9	48.0, 63.5
No	171	29.9	31.1	27.3, 35.0	68	42.8	44.1	36.5, 52.0
Psychological aggression								
Yes	348	60.8	58.8	54.7, 62.8	87	54.7	52.6	44.7, 60.3
No	224	39.2	41.2	37.2, 45.3	72	45.3	47.4	39.7, 55.3
Physical and/or injurious assault								
Yes	250	43.7	38.8	35.0, 42.8	75	47.2	42.2	34.8, 50.0
No	322	56.3	61.2	57.2, 65.0	84	52.8	57.8	50.0, 65.2
Sexual coercion								
Yes	192	33.6	39.8	35.7, 44.0	25	15.7	19.6	13.7, 27.3
No	380	66.4	60.2	56.0, 64.3	134	84.3	80.4	72.7, 86.3
<i>HIV sexual risk behaviours</i>								
Condomless vaginal and/or anal sex at last intercourse								
Yes	353	61.7	65.1	61.1, 68.8	86	54.1	46.9	39.2, 54.8
No	219	38.3	34.9	31.2, 38.8	73	45.9	53.1	45.2, 60.8
Sexually transmitted infection (STI) symptomatology (≥2)								
Yes	287	50.2	52.8	48.6, 56.8	37	23.3	21.2	15.7, 28.1
No	285	49.8	47.2	43.2, 51.3	122	76.7	78.8	71.9, 84.3
Number of sex partners (past 12 months)								
≤ 1	334	58.4	63.8	59.8, 67.6	94	59.1	59.4	51.5, 66.8

2 – 5	138	24.1	25.1	21.6, 28.9	60	37.7	37.8	30.5, 45.7
≥ 6	100	17.5	11.1	9.2, 13.4	5	3.1	2.8	1.1, 6.6
Survival sex work (past 12 months)								
Yes	146	25.5	16.8	14.3, 19.6	28	17.6	18.1	12.8, 25.0
No	426	74.5	83.2	80.3, 85.6	131	82.4	81.9	75.0, 87.2
One or more of the sexual risk behaviours above								
Yes	447	78.2	76.2	71.4, 80.5	112	70.4	74.1	66.2, 80.6
No	125	21.8	23.8	19.5, 28.6	47	29.6	25.9	19.4, 33.8

5.3.2 Sociodemographic and background characteristics

Unweighted sociodemographic and background characteristics calculated on the aggregated sample are displayed in Table 5.2. Mean age in the sample was 31.3 years (SD=5.10 years). 20.2% of women completed less than a high school education, 38.7% were currently married, and 56.5% had children or other dependents. Mean individual monthly income was IDR 4.3 million/USD 385 (SD=3.38), with more than half (54.5%) of participants earning less than the average national income (IDR 3.8 million ~ USD 285). Nearly half of the women (44.3%) were unemployed, and at least one quarter (25.4%) were financially dependent on an intimate partner. 5.3% of the women were homeless or unstably housed. Use of non-injection crystal meth in the past year was reported by 67.2% of participants.

Table 5.2: Selected socio-demographic characteristics, IPV victimisation, and sexual risk behaviours among women who inject drugs in Indonesia, unweighted estimates.

<i>Total (N = 731)</i>	<i>N</i>	<i>%</i>
<i>Socio-demographic and background variables</i>		
Study site		
Greater Jakarta	572	78.2
West Java	159	21.8
Age (in years)		
≤ 24	92	12.6
25-34	473	64.7
≥ 35	166	22.7
Education level (highest completed)		
Junior high school or lower	148	20.2
High school or higher	583	79.8
Employment status		
Unemployed	324	44.3
Employed (including full-time, part-time, or contract work)	407	55.7
Housing status		
Unstable housing/homeless	39	5.3
Stable housing	692	94.7
Individual monthly income (in million Indonesian Rupiah, IDR)		
< 3.8 million IDR (approx. 285 USD)	398	54.5
≥ 3.8 million IDR (approx. 285 USD)	333	45.5
Primary source of monthly income (>50%)		
Intimate partner	186	25.4
Family/relatives	127	17.4

Full-time employment	142	19.4
Casual/contract work	120	16.4
Trading sex	79	10.8
Illicit/illegal activities (including selling drugs, stealing)	77	10.5
Relationship status		
Currently married	283	38.7
Not currently married	448	61.3
Dependent children or any other dependents for whom she is responsible	413	56.5
Yes	318	43.5
No		
Crystal methamphetamine use (past 12 months)		
Yes	491	67.2
No	240	32.8
Self-reported HIV status		
Positive	341	46.7
Negative	243	33.2
Unknown	147	20.1
<i>Past-year intimate partner violence (IPV)</i>	<i>N</i>	<i>%</i>
Any type of IPV (psychological, physical/injurious and/or sexual)		
Yes	492	67.3
No	239	32.7
Psychological aggression		
Yes	435	59.5
No	296	40.5
Physical and/or injurious assault		
Yes	325	44.5
No	406	55.5
Sexual coercion		
Yes	217	29.7
No	514	70.3
<i>HIV sexual risk behaviours</i>	<i>N</i>	<i>%</i>
Unprotected vaginal or anal sex at last intercourse		
Yes	439	60.1
No	292	39.9
Sexually transmitted infection (STI) symptomatology (≥ 2)		
Yes	324	44.3
No	407	55.7
Number of sex partners (past 12 months)		
≤ 1	428	58.6
2 – 5	198	27.1
≥ 6	105	14.4
Survival sex work (past 12 months)		
Yes	146	25.5
No	426	74.5
One or more sexual risk behaviours		
Yes	559	76.5
No	172	23.5

5.3.3 Bivariate associations between IPV and HIV-related sexual risk behaviour

Table 5.3 details results from bivariate regressions between variables from Table 5.2 and the sexual risk behaviour outcome. Engaging in sexual risk behaviour was positively associated with experiencing psychological aggression (OR=2.66, 95% CI=1.86, 3.80; $p<0.001$), physical and/or injurious assault (OR=2.73, 95% CI=1.87,3.98; $p<0.001$), and sexual coercion (OR=2.38, 95% CI=1.54,3.66; $p<0.001$). Women reporting sexual risk behaviour were also significantly more likely to report non-injection crystal meth use (OR=2.46, 95% CI=1.73,3.51; $p<0.001$), HIV-positive status (OR=1.37, 95% CI=0.97, 1.94; $p=0.075$), lower than high school educational attainment (OR=2.59, 95% CI=1.53, 4.39; $p<0.001$), and homelessness and/or unstable housing (OR=3.88, 95% CI=1.17,12.79; $p=0.026$), and less likely to be older (OR=0.94, 95% CI=0.91, 0.98; $p=0.002$) and currently married (OR=0.74, 95% CI=0.52, 1.05; $p=0.093$).

Table 5.3: Bivariate associations between IPV victimisation, background variables, and HIV-related sexual risk behaviour among women who inject drugs

<i>Independent variables</i>	<i>Dependent variable: engaged in one or more sexual risk behaviours (n = 559)</i>					
	β	SE	ORs	95% CIs	Wald χ^2	p-value
Past-year psychological aggression (ref. no)						
Yes	0.977	0.182	2.66	1.86, 3.80	5.35	≤ 0.001
Past year physical and/or injurious assault (ref. no)						
Yes	1.004	0.192	2.73	1.87, 3.98	5.23	≤ 0.001
Past-year sexual coercion (ref. no)						
Yes	0.867	0.220	2.38	1.54, 3.66	3.94	≤ 0.001
Past-year crystal methamphetamine use (ref. no)						
Yes	0.902	0.179	2.46	1.73, 3.51	5.03	≤ 0.001
Self-reported HIV status (ref. negative/unknown)						
Positive	0.316	0.177	1.37	0.97, 1.94	1.78	0.075
Survey city (ref. Bandung, West Java)						
Greater Jakarta	0.129	0.179	1.14	0.80, 1.62	0.72	0.471
Age (years)	- 0.056	0.018	0.94	0.91, 0.98	- 3.06	0.002
Education level (ref. high school and/or higher)						
Junior high school or lower	0.953	0.269	2.59	1.53, 4.39	3.55	≤ 0.001
Housing status (ref. stable housing)						
Unstable housing/homeless	1.355	0.608	3.88	1.17, 12.79	2.23	0.026
Employment status (ref. employed)						
Unemployed	- 0.116	0.175	0.89	0.63, 1.26	- 0.66	0.509
Individual monthly income (ref. ≥ 3.8 mill IDR)						

< 3.8 mill IDR (approx. 285 USD)	0.072	0.176	1.07	0.76, 1.52	0.41	0.681
Financial dependency (ref. no)						
Yes	0.031	0.201	1.03	0.69, 1.53	0.15	0.878
Relationship status (ref. not currently married)						
Currently married	– 0.297	0.177	0.74	0.52, 1.05	– 1.68	0.093
Dependent children or other dependents (ref. no)						
Yes	0.190	0.175	1.21	0.86, 1.70	1.08	0.278

Notes: 95% CI = 95% Confidence Intervals; ORs = Odds Ratios; SE = Standard Errors.

5.3.4 Multivariate associations between IPV and HIV-related sexual risk behaviour

After adjusting for significant covariates, all three forms of IPV increased the odds of engaging in one or more sexual risk behaviours (models 1 – 3, Table 5.4). Specifically, women who experienced psychological IPV had more than twice the odds (OR=2.54; 95% CI=1.73, 3.75; $p<0.001$) of engaging in sexual risk behaviour, relative to women who did not experience such abuse. Furthermore, women exposed to physical and/or injurious IPV were more likely to engage in sexual risk behaviour (OR=2.43; 95% CI=1.63, 3.62; $p<0.001$), compared with women who were not exposed to past-year physical and/or injurious IPV. Lastly, experiencing sexual IPV nearly tripled the odds of engaging in sexual risk behaviour (OR=2.64; 95% CI=1.67, 4.18; $p<0.001$). There were also statistically significant positive associations in all three multivariate models between engaging in sexual risk behaviour and the following covariates: crystal meth use, HIV-positive status, younger age, lower than high school educational attainment, and not being currently married (Table 5.4).

Table 5.4: Multivariate associations between IPV victimisation, background variables, and HIV-related sexual risk behaviour among women who inject drugs

<i>Dependent variable: engaged in one or more sexual risk behaviours (n = 559)</i>						
<i>Independent variables</i>	β	<i>SE</i>	<i>ORs</i>	<i>95% CIs</i>	<i>Wald χ^2</i>	<i>p-value</i>
Model 1^a						
Past-year psychological aggression (ref. no)						
Yes	0.934	0.197	2.54	1.73, 3.75	4.74	≤ 0.001
Past-year crystal methamphetamine use (ref. no)						
Yes	0.847	0.188	2.33	1.61, 3.37	4.50	≤ 0.001
Self-reported HIV status (ref. negative/unknown)						
Positive	0.581	0.195	1.79	1.22, 2.62	2.98	0.003
Age (years)	− 0.045	0.020	0.96	0.92, 0.99	− 2.23	0.026
Education level (ref. high school and/or higher)						
Junior high school or lower	0.982	0.274	2.67	1.56, 4.57	3.59	≤ 0.001
Housing status (ref. stable housing)						
Unstable housing/homeless	0.626	0.611	1.87	0.56, 6.20	1.02	0.306
Relationship status (ref. not currently married)						
Currently married	− 0.562	0.194	0.57	0.39, 0.83	− 0.290	0.004
Model 2^b						
Past-year physical and/or injurious assault (ref. no)						
Yes	0.889	0.203	2.43	1.63, 3.62	4.39	≤ 0.001
Past-year crystal methamphetamine use (ref. no)						
Yes	0.895	0.188	2.45	1.69, 3.54	4.76	≤ 0.001

Self-reported HIV status (ref. negative/unknown)						
Positive	0.481	0.197	1.62	1.10, 2.38	2.44	0.015
Age (years)	− 0.047	0.020	0.95	0.92, 0.99	− 2.34	0.019
Education level (ref. high school and/or higher)						
Junior high school or lower	0.924	0.276	2.52	1.46, 4.33	3.34	0.001
Housing status (ref. stable housing)						
Unstable housing/homeless	0.626	0.595	1.87	0.58, 6.02	1.05	0.294
Relationship status (ref. not currently married)						
Currently married	− 0.453	0.189	0.63	0.44, 0.92	− 2.39	0.017
Model 3 ^c	<i>β</i>	<i>SE</i>	<i>ORs</i>	<i>95% CIs</i>	<i>Wald χ</i>	<i>p-value</i>
Past-year sexual coercion (ref. no)						
Yes	0.971	0.234	2.64	1.67, 4.18	4.16	≤ 0.001
Past-year crystal methamphetamine use (ref. no)						
Yes	0.905	0.188	2.47	1.71, 3.57	4.82	≤ 0.001
Self-reported HIV status (ref. negative/unknown)						
Positive	0.581	0.195	1.79	1.22, 2.62	2.98	0.003
Age (years)	− 0.045	0.020	0.95	0.92, 0.99	− 2.23	0.026
Education level (ref. high school and/or higher)						
Junior high school or lower	0.986	0.275	2.68	1.56, 4.60	3.58	≤ 0.001
Housing status (ref. stable housing)						
Unstable housing/homeless	1.086	0.606	2.96	0.90, 9.73	1.79	0.073
Relationship status (ref. not currently married)						
Currently married	− 0.544	0.193	0.58	0.40, 0.85	− 2.82	0.005

Notes: 95% CI = 95% Confidence Intervals; ORs = Odds Ratios; SE = Standard Errors.

^a Model 1 includes past-year psychological aggression only, controlling for past-year crystal meth use, self-reported HIV status, age, education level, relationship status, and housing status.

^b Model 2 includes physical and/or injurious assault, controlling for past-year crystal meth use, self-reported HIV status, age, education level, relationship status, and housing status.

^c Model 3 includes sexual coercion, controlling for past-year crystal meth use, self-reported HIV status, age, education level, relationship status, and housing status.

Model 4 (Table 5.5) included all three dimensions of IPV and controlled for significant covariates from stage two. Psychological aggression (OR=1.62, 95% CI=1.05, 2.50; $p=0.029$), physical and/or injurious IPV (OR=1.75; 95% CI=1.12, 2.74; $p=0.014$) and sexual IPV (OR=2.06; 95% CI=1.27, 3.33; $p=0.003$) remained independently associated with engaging in one or more sexual risk behaviours. Furthermore, several background variables remained significantly positively associated with elevated sexual risk behaviour: crystal meth use (OR=2.33, 95% CI=1.60, 3.38; $p<0.001$), HIV-positive status (OR=1.71, 95% CI=1.16, 2.52; $p=0.007$), and lower than high school educational attainment (OR=2.65, 95% CI=1.54, 4.55; $p<0.001$). Two covariates were negatively associated with engaging in one or more sexual risk behaviours: age (OR=0.96, 95% CI=0.92, 0.99; $p=0.045$), and being currently married (OR=0.52, 95% CI=0.35, 0.77; $p<0.001$).

Table 5.5: Multivariate model including all forms of IPV victimisation and HIV-related sexual risk behaviour among women who inject drugs

<i>Dependent variable: engaged in one or more sexual risk behaviours (N = 559)</i>						
<i>Independent variables^a</i>	β	SE	ORs	95% CIs	Wald χ^2	p-value
Past-year psychological aggression (ref. no)						
Yes	0.482	0.220	1.62	1.05, 2.50	2.19	0.029
Past-year physical and/or injurious assault (ref. no)						
Yes	0.563	0.228	1.75	1.12, 2.74	2.47	0.014
Past-year sexual coercion (ref. no)						
Yes	0.721	0.246	2.06	1.27, 3.33	2.94	0.003
Past-year crystal methamphetamine use (ref. no)						
Yes	0.844	0.191	2.32	1.60, 3.38	4.43	≤ 0.001
Self-reported HIV status (ref. negative/unknown)						
Positive	0.538	0.198	1.71	1.16, 2.52	2.72	0.007
Age (years)	− 0.041	0.020	0.96	0.92, 0.99	− 2.01	0.045
Education level (ref. high school and/or higher)						
Junior high school or lower	0.975	0.275	2.65	1.54, 4.55	3.54	≤ 0.001
Housing status (ref. stable housing)						
Unstable housing/homeless	− 0.655	0.200	1.96	0.60, 6.36	− 3.27	0.260
Relationship status (ref. not currently married)						
Currently married	0.675	0.599	0.52	0.35, 0.77	1.13	0.001

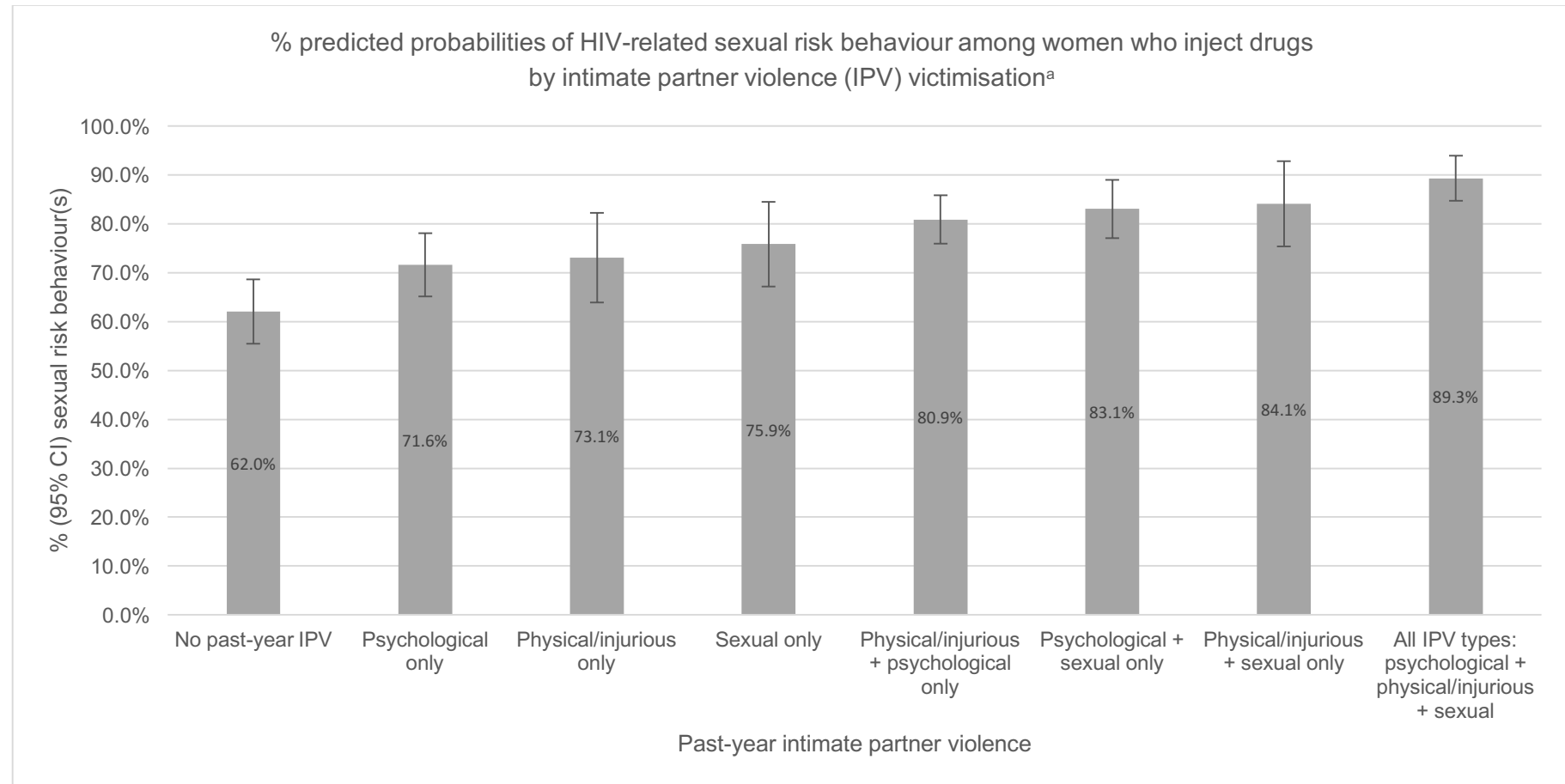
Notes: 95% CI = 95% Confidence Intervals; ORs = Odds Ratios; SE = Standard Errors.

^a Model 4 includes all IPV dimensions (psychological, physical and/or injurious, sexual) in the same multivariate logistic regression model, controlling for past-year crystal meth use, self-reported HIV status, age, education level, relationship status, and housing status.

5.3.5 Additive effects

The predicted probabilities of the outcome when exposed to co-occurring forms of IPV victimisation are displayed in Figure 5.2. Strong additive effects were shown on women's sexual risk behaviour. The prevalence of sexual risk behaviour was 62.0% among women who did not experience any form of past-year IPV. Among women exposed to any one of psychological abuse, physical and/or injurious assault, or sexual coercion, 71.6% – 75.9% reported engaging in sexual risk behaviour. Among women experiencing two co-occurring forms of IPV, rates of sexual risk behaviour increased to 80.9% – 84.1%. With polyvictimisation of all three forms of IPV, rates of sexual risk behaviour were 89.3%.

Figure 5.3: Marginal effects model testing for additive effects of different forms of IPV victimisation on sexual risk behaviour among women who inject drugs



^a Controls for self-reported HIV status, crystal meth use, age, relationship status, education level, and housing status.

5.4 Discussion

Findings from this study suggest that psychological, physical, and sexual forms of IPV have significant independent effects on sexual risk among women who inject drugs in Indonesia. This study found that at least 6 in 10 women who inject drugs were exposed to some form of past-year IPV, which is up to 22 times higher than rates in the general Indonesian female population (Statistics Indonesia 2017). For these urban, low-income women, IPV victimisation could result in increased engagement in risky sexual behaviour, and therefore in increased vulnerability to HIV.

More than three quarters of women in this sample engaged in one or more HIV-related sexual risk behaviours. It is especially concerning that nearly half of the women had STI symptoms, since the presence of STIs increases the infectiousness of HIV and facilitates HIV transmission (Rottingen, Cameron, and Garnett 2001; Chesson and Pinkerton 2000). Furthermore, more than one third of women had multiple sexual partners and nearly 1 in 4 engaged in survival sex work in exchange for drugs or basic needs, yet only 36.7% reported using a condom at last sex. These findings suggest a gendered vulnerability and risk: by comparison, among a national sample of mostly male injecting drug users in Indonesia, 51.6% reported using a condom at last sex (Indonesian National AIDS Commission 2012). Together, these findings highlight drug-using women's considerable risk for contracting HIV and onwards transmission to their sexual and injecting partners. Notably, this risk is magnified when different forms of psychological, physical and/or injurious, and sexual IPV co-occur.

Crucially, psychological, physical, and sexual forms of IPV were independently associated

with increased HIV-related sexual risk, corroborating findings from research in high-income countries (Gilbert et al. 2000; Wu et al. 2003; El-Bassel et al. 2005; Frye et al. 2011). This study contributes to an emerging body of research by showing that psychological aggression has independent and comparable effects to physical and/or injurious and sexual IPV among injection-drug using women. Our findings suggest that high rates of IPV may be facilitating the heterosexual transmission of HIV in Indonesia, as women's ability to negotiate condom use is significantly reduced in abusive relationships (Swan and O'Connell 2012). Previous research with women in methadone treatment in the U.S. found that women who insisted that a partner uses condoms were at elevated risk of IPV victimisation, since partners tended to perceive such requests as a breach of gender role expectations, lack of trust, sign of infidelity or a threat to male dominance in the relationship (El-Bassel et al. 2005). Similarly, in the Indonesian context, fear of escalating partner violence may lead women to acquiesce to unprotected sex and other risky behaviours, as has been substantiated by qualitative research with women who inject drugs in Central Java (Lazuardi et al. 2012). The link between IPV and HIV risk in Indonesia may be further shaped by social stigma, cultural norms and relationship power differentials where women have few negotiating rights (Saktiawati et al. 2013). Gendered cultural beliefs around placing care for an intimate partner above oneself, avoiding conflict, and preserving harmony in relationships may contribute to women's inability to negotiate safer sex, even in situations when they feel they are at risk (Saktiawati et al. 2013; Hayati et al. 2011).

Such gendered dynamics may also extend to trading sex. Women in intimate partnerships with drug-using partners may feel pressure to sell sex and engage in risky encounters in order to maintain both their and their partners' drug supply and to provide for their families

(Gilbert et al. 2000; Roberts, Mathers, and Degenhardt 2010). Other research suggests that the traumatic and economic consequences of being in an abusive relationship may steer women into various forms of transactional sex, including survival sex work (El-Bassel et al. 2007; Wu et al. 2003; Gilbert et al. 2000). In the Indonesian context, this often includes the practice of *turbo* (*tukar body*), or trading sex with drug dealers in exchange for drugs. This practice, which leaves little negotiating power for women, is common among low-income, drug-using women and may be enforced by women's partners as part of a gendered division of labour (Habsari et al. 2007). Thus, IPV may play a role both in enforcing and in reacting to the practice of *turbo* and other forms of sex work practiced by drug-using women.

Moreover, crystal meth use doubled the odds of engaging in sexual risk behaviour. This finding confirms previous research from North America (Lorvick et al. 2006; Shannon et al. 2011) and contributes to a nascent body of evidence on the link between non-injection crystal meth use and elevated HIV transmission risk in Indonesia (Neverndorff and Praptoraharjo 2015). This finding is particularly alarming considering that Indonesia has seen a surge in crystal meth use in recent years (UNODC 2016), which may be contributing to an increase in overall HIV prevalence rates. Existing HIV prevention interventions for women who inject drugs in Indonesia should therefore be adapted to better meet the needs of poly-drug and crystal meth users.

Furthermore, HIV-positive status was associated with greater sexual risk-taking. Previous research with injecting populations has been inconclusive on the relationship between HIV sero-positivity and sexual risk, with studies finding both positive (Abel-Ollo et al. 2009) and negative (Noor et al. 2014) associations. Our findings suggest that effective prevention of

HIV among women who inject drugs and their intimate partners in Indonesia may benefit from including enhanced prevention efforts focusing on women who live with HIV. In addition, younger women and women with a lower level of education were more likely to engage in sexual risk behaviour. These findings support research from the U.S. suggesting that women's educational and social disadvantage places them at higher risk of HIV transmission (Pellowski et al. 2013; Gilbert et al. 2015). Women's education level plays an important role in perpetuating high-risk situations and gender power imbalances (Pellowski et al. 2013), which may be intensified in abusive and drug-involved relationships. Our finding that married women were less likely than their non-married counterparts to engage in sexual risk behaviour is at odds with previous research. Specifically, studies have suggested that women in steady relationships, including those with high-risk partners, are more likely to engage in risky sex than those in casual or transactional partnerships (Wu et al. 2003).

This study is limited by several factors. First, the cross-sectional design prohibits assessing causality. Specifically, we were unable to compare previous levels of sexual risk behaviour among women who inject drugs with levels reported in this study. As such, it cannot be concluded that IPV has a temporal relationship with elevated sexual risk behaviour among Indonesian women who inject drugs, though it is noteworthy that a causal relationship between IPV and sexual risk behaviour has been observed among other samples of drug-involved women in the U.S. (El-Bassel et al. 2011). Follow-up research employing longitudinal designs is needed to confirm the associations identified in this paper. Second, the use of self-report may be subject to recall and reporting bias, particularly as related to sensitive information about sexual and drug-using behaviours. This limitation was

minimised through the use of a peer recruitment strategy (Broadhead et al. 1998) shown to enhance the validity and reliability of data by improving rapport and trust with participants (Goodson and Phillimore 2012). Third, although RDS is a widely-used sampling method, its multivariate properties remain an area of substantial research (Schonlau and Liebau 2012; Johnston et al. 2008; Wirtz et al. 2016). To mitigate this limitation, analyses were performed with and without RDS weights. Since the two sets of analyses were statistically similar, unweighted estimates were reported in order to avoid any added variance being introduced by the weights (Johnston and Luthra 2014; Winship and Radbill 1994; Heckathorn 2007). Furthermore, RDS depends on networks for referral. Some women who inject drugs might be underrepresented since they may have small or inexistent networks within the broader population (i.e. injecting only with one partner). However, the data presented here constitute the best currently available evidence on correlates of HIV sexual risk behaviour in a diverse sample of Indonesian women who inject drugs.

5.5 Conclusion

Notwithstanding these limitations, this study has several important implications. This study has provided new insights into the sexual risk associations of different forms of IPV among women who inject drugs in Asia. IPV prevention and screening targeting drug-involved women in the region should be integrated within existing HIV prevention and harm reduction programs. Possible settings for such interventions include methadone maintenance clinics and community-based drug treatment centers, as these provide the opportunity to interact with individuals on a regular basis for a prolonged period. Another context amenable to such interventions includes community-based drop-in centers

providing HIV prevention services. This study's findings demonstrate an urgent need for interventions that address for the co-occurrence of IPV and HIV risk among women who inject drugs.

CHAPTER 6. PAPER 2: INTIMATE PARTNER VIOLENCE AND RECEPTIVE SYRINGE SHARING AMONG WOMEN WHO INJECT DRUGS IN INDONESIA: A RESPONDENT-DRIVEN SAMPLING STUDY

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The second empirical paper addresses the associations between three main forms of IPV and injecting HIV risk behaviour (i.e. receptive syringe sharing). In the introduction, the paper summarises current evidence on this relationship, highlighting gaps in the extant literature. It then details the aims, methods, and measures used for data collection, as well as the analytical approach applied in this paper. Lastly, the discussion and conclusion sections summarise and contextualise the results within existing literature, and consider implications for policy and practice. Due to the cross-sectional nature of the study design, causal inferences cannot be made based on the analyses presented in this chapter. Therefore, findings can only be interpreted as suggestive and may not be generalizable to other women who inject drugs.

The specific research question addressed by this paper is:

- Are different forms of IPV associated with increased odds of receptive syringe sharing among women who inject drugs in Indonesia?

Author statement: CS conceived the study, led the quantitative study design, data collection, analysis, and writing. LC and TS contributed to conceptualisation of the paper and provided overall guidance on statistical analysis. RA and MM contributed to the overall

conceptualisation of the paper and provided guidance on interpretation, and MM provided support in the production of the network diagram. All authors have read and approved the final text and this author statement.

Abstract

Background: IPV and HIV are overlapping public health problems that disproportionately affect women who inject drugs. Little is known about the relationship between IPV and unsafe injecting practices among women in low- and middle-income settings. This study investigated whether IPV victimisation was associated with increased odds of receptive syringe sharing among women who inject drugs in Indonesia.

Methods: Respondent-driven sampling (RDS) was used to recruit 731 women aged ≥ 18 years, actively injecting drugs in the preceding 12 months, and residing in Greater Jakarta or Bandung, West Java. Population estimates were derived using the RDS-II estimator. Multivariate logistic regressions assessed relationships between different forms of past-year IPV (i.e. psychological abuse, physical and/or injurious assault, forced sex) and receptive syringe sharing, controlling for sociodemographic and drug-related co-factors.

Results: RDS-weighted prevalence of past-month receptive syringe sharing was 15.3% (unweighted 21.1%). Participants reported high levels of past-year psychological abuse (57.4%), physical and/or injurious assault (39.6%), and forced sex (rape) (5%). Controlling for all forms of IPV and potential confounders, higher odds of receptive syringe sharing were associated with experiencing psychological abuse (OR=1.82; 95% CI=1.05,3.15; $p=0.033$), physical and/or injurious assault (OR=1.73; 95% CI=1.03,2.93; $p=0.039$), and several covariates: injecting pharmaceuticals only (vs heroin only) (OR=3.67; 95%

CI=1.83,7.39; $p<0.001$), unstable housing and/or homelessness (OR=2.90; 95% CI=1.41,5.94; $p=0.004$), and residing in Bandung, West Java (vs Greater Jakarta) (OR=2.32; 95% CI=1.43,3.77; $p=0.001$).

Conclusion: IPV is a significant risk factor for HIV-related injection risk among women who inject drugs in Indonesia. Harm reduction interventions aimed at reducing unsafe injecting behaviours among people who inject drugs should integrate intimate partner violence prevention and support services.



Figure 6.1: Fieldworkers conduct a risk assessment in the context of punitive policing practices in study catchment areas, March 2015

6.1 Introduction

Unsafe injecting drug use is a major driver of the global HIV epidemic, accounting for one third of new HIV infections outside of sub-Saharan Africa (UNAIDS 2014a). Systematic review evidence suggests that women who inject drugs bear a disproportionate burden of HIV infections compared to male injectors (Des Jarlais, Feelemyer, Modi, Arasteh, and Hagan 2012). Yet, until recently, women who inject drugs have remained largely unrecognised in research and intervention development (El-Bassel and Strathdee 2015).

Asia is home to 3 – 5 million people who inject drugs, representing the highest concentration of any region globally (Stone 2015). An estimated one in three people who inject drugs in Asia are female (Larney et al. 2015). Regional HIV prevalence among people who inject drugs is 17%, and HIV incidence in this population is increasing (Stone 2016). Among national samples of women who inject drugs, HIV rates range from 6.4% in China to approximately 30% in Malaysia, Philippines and Thailand (Larney et al. 2015).

Indonesia is faced with an expanding HIV epidemic concentrated among key affected populations (Indonesian National AIDS Commission 2014). People who inject drugs bear a disproportionate burden of HIV, which affects more than 50% of injectors in the capital, Jakarta (UNAIDS 2014a). Although national-level HIV prevalence rates are not sex-disaggregated, qualitative research suggests that HIV-related risk behaviours among women who inject drugs are widespread (Indonesian National AIDS Commission 2014; Habsari et al. 2007; Sari and Nurmaya 2009; Spooner et al. 2010). According to national harm reduction program data, 22% of female and 7% of male HIV-positive injecting drug users reported sharing needles and syringes in the preceding week, despite accessing harm reduction services during that period (Blogg 2012). To develop a commensurate HIV

response and optimise existing harm reduction services, it is vital to identify the factors driving HIV-related injection risk in this under-researched population.

Studies conducted with women who inject drugs in high-income countries suggest that one such factor may be intimate partner violence (IPV) (Gilbert et al. 2015). Indeed, extensive research to date has offered insight into how IPV contributes to elevated sexual HIV risks among drug-using women in North America (Strathdee et al. 1997; Braitstein et al. 2003; Wagner et al. 2009). Such risks include engaging in unprotected vaginal and anal sex, contracting sexually transmitted infections, having multiple partners, and trading sex for money, drugs, and shelter (El-Bassel et al. 2005; El-Bassel et al. 2007). However, fewer studies have explored the relationship between IPV and risks associated with unsafe injecting drug use, and those that have are largely conducted in North America (Lorvick et al. 2006; Wagner et al. 2009; Strathdee et al. 1997). Evidence from multiple settings indicates that women are more likely to share injecting equipment than men (Roberts, Mathers, and Degenhardt 2010; Strathdee et al. 1997; Sherman, Latkin, and Gielen 2009). Moreover, women are more likely to engage in unsafe injecting practices within sexual relationships with other persons who inject drugs than in other social relationships (Cleland et al. 2007; Hunter et al. 1995; Davies et al. 1996; Bruneau et al. 2001). Several studies, all conducted in the U.S., have established a significant association between IPV and needle/syringe sharing and borrowing (Strathdee et al. 1997; Braitstein et al. 2003; Wagner et al. 2009). Specifically, IPV can elevate women's HIV risk by establishing a dynamic of control, fear and submission that inhibits the ability to negotiate safe behaviours (Maman et al. 2000). However, existing research remains limited. Among studies that have addressed this topic, the majority assessed lifetime history of sexual violence, including

childhood abuse. Thus far, such research has not accounted for recent IPV or for the independent effects of different dimensions of IPV (e.g., psychological, physical, and sexual) on unsafe injecting practices. Moreover, existing research largely focuses on women in drug treatment or other health care settings; thus, findings may not be generalisable to community samples of women who inject drugs. Lastly, existing studies are geographically clustered in high-income regions, particularly North America (Gilbert et al. 2015). Given that Asia is home to nearly half of all female injecting drug users worldwide (Larney et al. 2015), there is an urgent need to explore the effects of different dimensions of IPV on unsafe injecting behaviours in this highly vulnerable population.

Understanding the interplay between IPV and HIV-related injection risk behaviours is crucial for informing interventions that address HIV vulnerability among women who use drugs in the region. This study aims to address this essential research gap by investigating whether different forms of IPV – psychological abuse, physical and/or injurious assault, and forced sex (rape) – are associated with higher rates of unsafe injecting practices (i.e. receptive syringe sharing) in a sample of women who inject drugs in Indonesia.

6.2 Methods

6.2.1 Study design and population

This study combined in-depth formative research with results from a quantitative survey based on a respondent-driven sample. Formative research conducted prior to the quantitative study comprised of four focus group discussions with members of the target population (n = 39) and key informant interviews with policy-makers, service providers, and community-based organisations in the substance use and HIV sectors. In addition to

gathering information on the social networks of injection-drug using women, formative research also helped identify sub-populations of interest to guide the selection of initial recruits, inform the study instrument, and determine appropriate incentives.

The community of women who inject drugs was actively engaged throughout the development, implementation, and dissemination of this project. To ensure that all study procedures were sensitive to the needs of the community, three consultations with key population networks and community-based organisations were convened. A community advisory group comprised of women with an injecting drug use background was established to advise the research team throughout study implementation. Furthermore, a community consultation convened post-data collection guided the interpretation of findings and the formulation of a dissemination plan.

Between September 2014 and June 2015, 731 women were recruited from two sites in Indonesia: 1) Greater Jakarta, an administrative region with over 30 million inhabitants that includes Indonesia's capital Jakarta and adjacent metropolitan areas Bogor, Depok, Tangerang and Bekasi; and 2) Bandung, the provincial capital of West Java, and home to 8 million people. Study sites were selected with reference to their sizeable populations of people who inject drugs, and the substantial HIV burden shouldered by this group (Ministry of Health 2012).

Women were eligible for the study if they were 18 years of age or older, injected any illegal or illicit drugs within the past 12 months, reported living in one of the study catchment areas, had a valid referral from an existing study participant, and were willing and able to provide informed consent.

Respondent-driven sampling (RDS) was used to recruit participants. RDS is an established, modified chain-referral method that employs statistical weighting to produce less biased estimates (Heckathorn 1997). Conducting research with “hidden” or hard-to-reach groups such as drug injectors is often problematic because there may not be an adequate sampling frame (McCreesh et al. 2012). Research with women who inject drugs is particularly challenging given the increased stigma associated with being a woman and engaging in an illegal/illicit activity (Simic et al. 2006). RDS addresses this challenge by facilitating access to hard-to-reach, well-networked groups via peer-to-peer referral (Kendall et al. 2008; Johnston et al. 2006). RDS analytic methods produce more representative samples than commonly used snowballing techniques by reducing biases that result from network-based sampling via adjustment for differentials in network size and rates of recruitment across groups (Heckathorn 2002; Salganik and Heckathorn 2004).

To commence recruitment, a diverse group of 20 seeds – heterogeneous by geography, age, socio-economic status, known HIV status, and levels of risk behaviour – was selected with guidance from the formative assessment and the community advisory group. A greater number of seeds was selected in Jakarta given its substantially larger geographical catchment area and number of inhabitants compared to Bandung. Initial recruits were asked to refer up to three eligible peers to the study, who, in turn, enlisted the next wave of participants. Recruitment continued in sequential waves until the desired sample size was attained.

6.2.2 Procedures

Questionnaires on self-reported behaviour were administered by trained female peer

fieldworkers. Interviews were arranged by phone or text message at locations deemed safe by participants, including participants' homes, community health centres, and offices of non-governmental organisations. Information was collected conducted in the local language (i.e. Bahasa Indonesia) using tablets equipped with Open Data Kit, an open-source data collection and management application operating on mobile devices (Hartung et al. 2010). As part of the RDS process, participants received a primary incentive of 75,000 Indonesian Rupiah (~USD \$5) for participating in the interview and a secondary incentive of 25,000 Indonesian Rupiah (~USD \$2) per eligible peer recruited. Each recruit was provided with a unique identifier and recorded in SyrEx2, a monitoring and evaluation tool developed by drug service providers (Alliance for Public Health 2011).

6.2.3 Ethical considerations

Drug use in Indonesia is illegal and harshly prosecuted (Lai, Asmin, and Birgin 2013). This made the present study particularly sensitive and required additional care to protect participants. Participation was voluntary and data collected were anonymous. All participants were provided with a plain-language information sheet describing the nature of the study, limits to confidentiality, and explicit statements on participants' right to withdraw at any time. Informed consent forms were subsequently read aloud by the interviewer to ensure participants could make a fully informed decision, regardless of literacy level. Strict confidentiality was maintained, except where women requested assistance or referrals to health and support services. In the case that information disclosed suggested that a participant was at risk of significant harm (e.g. severe violence) the interviewer discussed concerns with the participant and offered service referrals. Following interviews, participants were provided with harm reduction materials and a directory of

voluntary HIV counselling and testing services, sexual and reproductive health services, paralegal support and services for survivors of violence in the area. Ethical protocols were approved by the Central University Research Ethics Committee at Oxford University (ref no: SSD/CUREC2/13-23) and the Ethics Board of Atma Jaya University (ref no: 1114/III/LPPM-PM.10.05/11/2013).

6.2.4 Measurement

Receptive syringe sharing was measured using four items from the Blood-Borne Virus Transmission Risk Assessment Questionnaire (BBV-TRAQ), a validated instrument that captures the frequency of injecting, sexual and other skin penetration risk practices in the previous 30 days (Fry and Lintzeris 2002). The BBV-TRAQ has been used extensively by governmental and community-based harm reduction and drug treatment programs (Wijoyo, Sarasvita, and Rachman 2014) and research studies in Indonesia (Iskandar et al. 2010; Wijoyo, Sarasvita, and Rachman 2014). Items assessed included: “In the last month, how many times have you injected with another person’s used needle/syringe?”; “In the last month, how many times have you injected with a needle/syringe after another person has already injected some of its contents?”; “In the last month, how many times have you received a needle-stick/prick from another person’s used needle/syringe?” and “In the last month, how many times have you re-used a needle/syringe taken out of a shared disposal/sharps container?” To achieve a higher sensitivity of the measure, affirmative responses (i.e., never, once, twice, 3 – 5 times, 6 – 10 times, > 10 times) were dichotomised to “any” or “no past-month receptive syringe sharing”.

Intimate partner violence was assessed using items from the Revised Conflict Tactics Scale short form (CTS2S) (Strauss and Douglas 2004). The reliability of the CTS2S for this sample

was Cronbach's $\alpha = 0.85$. The following items were used for past-year IPV: psychological abuse ("My partner insulted or swore or shouted or yelled at me," "My partner destroyed something belonging to me or threatened to hit me"); physical assault ("My partner pushed, shoved, or slapped me," "My partner punched or kicked or beat-me-up"); injurious physical assault ("I had a sprain, bruise, or small cut, or felt pain the next day because of a fight with my partner," "I went see a doctor or needed to see a doctor because of a fight with my partner"); and forced sex or rape ("My partner used force, like hitting, holding down, or using a weapon, to make me have sex"). For each IPV dimension, responses were summed and dichotomised into any and no past-year violence victimisation. Scores for physical and injurious violence were combined since the specific items on the CTS2 physical and injurious subscales describe similar types of intimidation and control. This combination of scores is commonly employed in existing literature on IPV, HIV risk, and drug use (El-Bassel et al. 2003; Wu et al. 2003; Gilbert et al. 2013).

Informed by literature review and formative assessment, several potentially confounding socio-demographic and drug-related variables were assessed. Socio-demographic variables included: *recruitment site, age, education level, employment status, relationship status, individual monthly income, housing status, and having dependent children in the household or other dependents for whom the participant is responsible*. Individual monthly income was classified as being either below or above the average national monthly income in Indonesia (i.e. IDR 3.8 million/285 USD) (Statistics Indonesia 2013). Housing status was assessed by asking participants about their current living arrangements. Unstable housing/homelessness referred to living on the street, including in public spaces (i.e. rail station, parks) or in temporary or transitional accommodation, such as a friend's home.

Stable housing included residing in the family home, rental house or apartment, or long-term single-room accommodation (*kos-kosan*).

Participants also provided data on drug-related factors. These included *age of injecting initiation*, *duration of injecting* (Cleland et al. 2007), *type of substance injected in the previous year* (Stoicescu, Sari, and Esteria-Tobing 2011), *intimate partner's injecting drug use status* (Shaw et al. 2007), and *whether women usually injected drugs together with an intimate partner* (Tortu et al. 2003). Participants were also asked whether they had knowledge of their *HIV status*. All measures were based on self-report.

6.2.5 Statistical analysis

All analyses were conducted using Stata 14.2 (StataCorp, College Station, TX). Data analysis consisted of four steps. First, population proportions and 95% CIs were estimated for outcome and key analysis variables using the RDS add-on package in Stata (Schonlau and Liebau 2012), which produces weighted population estimates using the RDS-II estimator (Volz and Heckathorn 2008). Moreover, descriptive statistics were calculated for all socio-demographic, background, and analysis variables using the combined, unweighted dataset. Second, bivariate logistic regressions tested associations between IPV, and drug-related and socio-demographic factors, and receptive syringe sharing as the dependent variable, and guided the subsequent model selection. Variables associated with receptive syringe sharing at $p < 0.1$ were retained in the multivariate models. Third, three sets of multivariate logistic regressions were estimated sequentially with psychological abuse, physical and/or injurious assault, and forced sex. All multivariate analyses controlled for significant covariates from the bivariate regressions. These included: injection drug type, survey city, housing status, relationship status, and having dependent children or other dependents. A

final multivariate logistic regression model included all IPV dimensions (physical, psychological, and forced sex) and significant covariates. We assessed multicollinearity between the IPV variables in the models using Pearson's correlation coefficient. No collinearity was detected (all scores $r > 0.5$). Because RDS-adjusted estimates were not statistically different from unadjusted estimates, only unadjusted findings are reported for bivariate and multivariate analyses (Johnston and Luthra 2014).

6.3 Results

6.3.1 Overview of injecting practices and exposure to IPV victimisation, by city

Table 6.1 shows RDS-weighted estimations and 95% confidence intervals (CI) for injecting risk outcomes and IPV victimisation variables, by survey city. Overall, Bandung had a higher prevalence of HIV-related injecting risk practices relative to Greater Jakarta. The proportion of women engaging in any past-month receptive syringe sharing behaviours in Bandung was three times higher (35.5%; 95% CI = 28.4, 43.2) than in Greater Jakarta (10.8%; 95% CI = 8.8, 13.1). In the preceding month, 26.6% (95% CI = 20.4, 33.9) of participants in Bandung and 4.4% (95% CI = 3.0, 6.3) in Greater Jakarta reported injecting drugs with someone else's used syringe. Furthermore, 17.3% (95% CI = 12.6, 23) of women in Bandung and 7.3% (95% CI = 5.7, 9.4) of women in Greater Jakarta received a needle-stick/prick from someone else's used needle/syringe in the same time period. The prevalence of re-using a needle/syringe from a shared disposal or sharps container was 18.6% (95% CI = 13.5, 25.1) in Bandung and 1.2% (95% CI = 0.06, 2.3) in Greater Jakarta.

More than half of the women in both cities experienced past-year psychological IPV, with slightly higher prevalence reported in Greater Jakarta (58.8%; 95% CI = 54.7, 62.8) than Bandung (52.6%; 95% CI = 44.7, 60.3). Past-year physical and/or injurious assault was

reported by 38.8% (95% CI = 35.0, 42.8) of women in Greater Jakarta and 42.2% (95% CI = 34.8, 50.0) of women in Bandung. Notably, the prevalence of forced sex (rape) was more than four times higher among women from Bandung (13.7%; 95% CI = 9.0, 20.3) than women from Greater Jakarta (3.1%; 95% CI = 2.0, 4.8).

Table 6.1: RDS-weighted estimations and 95% confidence intervals for injecting risk behaviours and IPV victimisation among women who inject drugs, by survey city

	Greater Jakarta (n = 572)				Bandung (n = 159)			
	N	Unweighted %	RDS-weighted %	95% CI	N	Unweighted %	RDS-weighted %	95% CI
<i>Past-year intimate partner violence</i>								
Psychological aggression								
Yes	348	60.8	58.8	54.7, 62.8	87	54.7	52.6	44.7, 60.3
No	224	39.2	41.2	37.2, 45.3	72	45.3	47.4	39.7, 55.3
Physical and/or injurious assault								
Yes	250	43.7	38.8	35.0, 42.8	75	47.2	42.2	34.8, 50.0
No	322	56.3	61.2	57.2, 65.0	84	52.8	57.8	50.0, 65.2
Forced sex (rape)								
Yes	19	3.3	3.1	2.0, 4.8	20	12.6	13.7	9.0, 20.3
No	553	96.7	96.9	95.2, 98.0	139	87.4	86.3	79.7, 91.0
<i>Injecting practices (past 30 days)</i>								
Injected with someone else's used syringe								
Yes	28	4.9	4.4	3.0, 6.3	46	28.9	26.6	20.4, 33.9
No	544	95.1	95.6	93.7, 96.9	113	71.1	73.4	66.1, 79.6
Injected with a needle/syringe after someone already injected its contents								
Yes	40	7.0	5.4	4.0, 7.4	49	30.8	25.4	19.5, 32.4
No	532	93.0	94.6	92.6, 96.0	110	69.2	74.6	67.6, 80.5
Received a needle-stick/prick from someone else's used needle/syringe								
Yes	61	10.7	7.3	5.7, 9.4	38	23.9	17.3	12.6, 23.2
No	511	89.3	92.6	90.6, 94.3	121	76.1	82.7	76.8, 87.4
Re-used a needle/syringe from a shared disposal/sharps container								
Yes	8	1.4	1.2	0.06, 2.3	34	21.4	18.6	13.5, 25.1
No	564	98.6	98.8	97.7, 99.4	125	78.6	81.4	74.9, 86.5

One or more of the receptive syringe sharing practices above								
Yes	95	16.6	10.8	8.8, 13.1	59	37.1	35.5	28.4, 43.2
No	477	83.4	89.2	86.9, 91.2	100	62.9	64.5	56.8, 71.6

6.3.2 Sociodemographic and drug-related characteristics

Socio-demographic characteristics calculated on the unweighted, aggregated sample are displayed in Table 6.2. The majority of participants were under 35 years of age (64.7%), with a mean age of 31.3 years (SD=5.10 years; range: 18.0 – 44.6). 62.6% of women in the sample were married or in a steady relationship, and 56.5% had children or other dependents. Nearly half of the women (44.3%) were unemployed, and one in five (20.2%) completed less than a high school education. Mean individual monthly income was IDR 4.3 million/USD 385 (SD=3.38). 5.3% of women lived on the street or in unstable housing. Self-reported HIV prevalence in the full sample was 46.7%. Considering that 56.3% of the women were last tested for HIV more than 12 months prior to the survey and 16.1% never accessed HIV testing, actual undiagnosed HIV prevalence in the sample is likely to be higher.

Self-reported injection drug type in the sample is shown in Table 6.2. Women injected several types of drugs in the previous year, ranging from heroin only (77.8%), to illicit pharmaceuticals only (5.3%), and crystal meth (0.6%). A substantial proportion of the sample (16.3%) injected both heroin and pharmaceuticals. Among women exclusively injecting pharmaceuticals, the most commonly injected pharmaceutical was buprenorphine (93.8%), an oral opioid antagonist used to treat opioid dependence, followed by illicit benzodiazepines (e.g. diazepam), commonly used to treat anxiety and depression, and opioid pain medications (e.g. codeine, tramadol) (6.2%). Participants injected drugs for an average of 10.3 years (SD=5.09, range: 0.3–24.1). 6.4% of the women in the sample were new injectors (i.e. injecting for ≤ 2 years). Mean age of injecting initiation was 21.2 years (SD=4.28, range: 12–37), with nearly one third (28.4%) of participants initiating injecting drug use at 18 years or younger. The youngest reported age of initiation

to injecting drug use was 12 years old. 52.1% of women had an intimate partner who also injected drugs. Nearly half of women in the sample (43.5%) reported that they usually injected drugs together with an intimate partner.

Table 6.2: Selected sociodemographic characteristics, IPV victimisation, and syringe sharing practices among women who inject drugs in Indonesia, unadjusted estimates

<i>Total (N = 731)</i>	N	%
<i>Socio-demographic characteristics</i>		
Survey city		
Greater Jakarta	572	78.2
West Java	159	21.8
Age groups		
≤24 years	92	12.6
25-34 years	473	64.7
≥35 years	166	22.7
Education level (highest attained)		
Lower than high school	148	20.2
High school or higher	583	79.8
Employment status		
Employed	407	55.7
Unemployed	324	44.3
Individual monthly income (million IDR)		
< 3.8 (approx. 285 USD)	398	54.5
≥ 3.8 (approx. 285 USD)	333	45.5
Housing status		
Unstable housing/homeless	39	5.3
Stable housing	692	94.7
Relationship status		
Single, never married	102	14.0
Married/steady relationship	458	62.6
Divorced	99	13.5
Widowed	72	9.9
Dependent children or other dependents		
Yes	413	56.5
No	318	43.5
Self-reported HIV status		
Positive	341	46.7
Negative/Unknown	390	53.3
<i>Drug-related factors</i>		
Duration of injecting		
≤2 years	47	6.4
2–5 years	86	11.8
5–10 years	223	30.5
10+ years	375	51.3

Age of injecting initiation		
≤18 years	208	28.4
19–24 years	353	48.3
≥ 25 years	170	23.3
Injection drug type (past 12 months)		
Heroin only	569	77.8
Pharmaceuticals only	39	5.3
Crystal methamphetamine only ^a	4	0.6
Heroin + pharmaceuticals	119	16.3
Intimate partner injects drugs		
Yes	381	52.1
No	350	47.9
Injects most often with intimate partner		
Yes	318	43.5
No	413	56.5
<i>Past-year intimate partner violence</i>	<i>N</i>	<i>%</i>
Psychological abuse		
Yes	435	59.5
No	296	40.5
Physical and/or injurious assault		
Yes	325	44.5
No	406	55.5
Forced sex (rape)		
Yes	39	5.3
No	692	94.7
<i>Injecting practices</i>	<i>N</i>	<i>%</i>
Injected with someone else's used syringe		
Yes	74	10.1
No	657	89.9
Injected with a needle/syringe after someone already injected its contents		
Yes	89	12.2
No	642	87.8
Received a needle-stick/prick from someone else's used needle/syringe		
Yes	99	13.5
No	632	86.5
Re-used a needle/syringe from a shared disposal/sharps container		
Yes	42	5.8
No	689	94.2
One or more of the needle/syringe sharing practices above		
Yes	154	21.1
No	577	78.9

6.3.3 Associations between past-year IPV and receptive syringe sharing

Results from bivariate analyses between variables from Table 6.2 and the receptive syringe sharing outcome are shown in Table 6.3. Elevated odds of receptive syringe sharing were associated with exposure to past-year psychological abuse (OR=2.37; 95% CI=1.59, 3.53; $p<0.001$), physical and/or injurious IPV (OR=2.43; 95% CI=1.68, 3.50; $p<0.001$), and forced sex (OR=3.13; 95% CI= 1.61, 6.06; $p=0.001$). Women were also more likely to engage in receptive syringe sharing if they resided in Bandung (vs Greater Jakarta) (OR=2.96; 95% CI=2.00, 4.38; $p<0.001$), were homeless or unstably-housed (vs stably-housed) (OR=3.13; 95% CI=1.61, 6.06; $p=0.001$), and injected pharmaceuticals only (OR=5.06; 95% CI=2.60, 9.85; $p<0.001$) or combination heroin and pharmaceuticals (vs. heroin only) (OR=1.92; 95% CI=1.22, 3.03; $p=0.005$). Women who were married or in a steady relationship (OR=0.53; 95% CI=0.32, 0.87; $p=0.011$) and women with children or other dependents (OR=0.63; 95% CI=0.44, 0.90; $p=0.011$) were less likely to engage in receptive syringe sharing, compared with their single counterparts and women without dependents, respectively.

Table 6.3: Bivariate associations between socio-demographic characteristics, IPV, and receptive syringe sharing among women who inject drugs

<i>Independent variables</i>	<i>Dependent variable: receptive syringe sharing (n = 154)</i>					
	β	SE	ORs	95% CIs	Wald χ^2	p-value
<i>Socio-demographic characteristics</i>						
Survey city (ref. Jakarta)						
West Java	1.086	0.199	2.96	2.00, 4.38	5.46	< 0.001
Age groups (ref. ≤24 years)						
25-34 years	-0.074	0.277	0.93	0.54, 1.60	-0.27	0.790
≥35 years	0.032	0.314	1.03	0.56, 1.91	0.10	0.919
Education level (ref. high school and/or higher)						
Lower than high school	0.283	0.216	1.33	0.87, 2.03	1.31	0.191
Employment status (ref. employed)						
Unemployed	-0.008	0.183	0.99	0.69, 1.42	-0.05	0.963
Individual monthly income (ref < 3.8 mill Rp./ 285 USD)						
≥ 3.8 mill Rp. (approx. 285 USD)	-0.239	0.184	0.79	0.55, 1.13	-1.30	0.194
Housing status (ref. stable housing)						
Unstable housing/homeless	1.14	0.337	3.13	1.61, 6.06	3.39	0.001
Relationship status (ref. single, never married)						
Married/in steady relationship	-0.633	0.249	0.53	0.32, 0.87	-2.54	0.011
Divorced	-0.498	0.332	0.61	0.32, 1.16	-1.50	0.134
Widowed	-0.012	0.338	0.99	0.51, 1.92	-0.03	0.972
Dependent children or other dependents (ref. no)						
Yes	-0.465	0.182	0.63	0.44, 0.90	-2.55	0.011
Self-reported HIV status (ref. negative/unknown)						
Positive	0.236	0.182	1.27	0.89, 1.81	1.30	0.194
<i>Drug-related factors</i>	β	SE	ORs	95% CIs	Wald χ^2	p-value

Duration of injecting (ref. ≤2 years)						
2–5 years	0.111	0.456	1.12	0.46, 2.74	0.24	0.807
5–10 years	0.147	0.405	1.16	0.52, 2.56	0.36	0.717
10+ years	0.119	0.392	1.13	0.52, 2.43	0.30	0.761
Age of injecting initiation (ref. ≤18 years)						
19–24 years	0.060	0.218	1.06	0.69, 1.63	0.28	0.783
≥ 25 years	0.226	0.251	1.25	0.76, 2.05	0.90	0.369
Injection drug type (past 12 months) (ref. heroin only)						
Pharmaceuticals only	1.621	0.339	5.06	2.60, 9.85	4.78	< 0.001
Heroin + pharmaceuticals	0.653	0.231	1.92	1.22, 3.03	2.82	0.005
Intimate partner injects drugs (ref. no)						
Yes	0.024	0.182	1.02	0.72, 1.46	0.13	0.894
Injects most often with intimate partner (ref. no)						
Yes	0.067	0.183	1.07	0.75, 1.53	0.37	0.714
<i>Past-year intimate partner violence</i>	β	SE	ORs	95% CIs	Wald χ^2	<i>p</i> -value
Psychological abuse (ref. no)						
Yes	0.862	0.203	2.37	1.59, 3.53	4.24	< 0.001
Physical and/or injurious assault (ref. no)						
Yes	0.887	0.186	2.43	1.68, 3.50	4.76	< 0.001
Forced sex (rape) (ref. no)						
Yes	1.14	0.337	3.13	1.61, 6.06	3.39	0.001

Notes: 95% CI = 95% Confidence Intervals; ORs = Odds Ratios; SE = Standard Errors.

Results of multivariate models for each dimension of IPV (models 1 – 3) are displayed in Table 6.4. After adjusting for covariates significant at $p < 0.1$ in bivariate analyses (i.e. recruitment site, injection drug type, relationship status, having children and or other dependents, and housing status), each form of IPV remained significantly associated with increased odds of receptive syringe sharing. Specifically, women who experienced psychological abuse were 2.7 more likely (OR=2.66; 95% CI=1.73, 4.09; $p<0.001$) to engage in receptive syringe sharing. Exposure to physical and/or injurious assault more than doubled the odds of receptive syringe sharing (OR=2.51; 95% CI=1.67, 3.75; $p<0.001$). Experiencing past-year forced sex tripled the odds of engaging in receptive syringe sharing (OR=3.08; 95% CI=1.26, 7.54; $p=0.014$). The following covariates remained significantly associated with receptive sharing in all three models: injecting pharmaceuticals (vs heroin only), homelessness/unstable housing, and residing in Bandung (vs Greater Jakarta) (models 1 – 3, Table 6.4).

The final multivariate model (model 4, Table 6.4) included all three forms of IPV. After adjusting for significant covariates, psychological abuse (OR=1.82; 95% CI=1.05, 3.15; $p=0.033$) and physical and/or injurious assault (OR=1.73; 95% CI=1.03, 2.93; $p=0.039$) retained a statistically significant positive association with receptive syringe sharing. Forced sex did not remain significant in the final model (OR=1.11; 95% CI=0.54, 2.28; $p=0.768$). Additionally, women who injected illicit pharmaceuticals only (vs heroin only) (OR=3.67; 95% CI=1.83, 7.39; $p<0.001$), and homeless/unstably-housed women (OR=2.90; 95% CI=1.41, 5.94; $p=0.004$) had higher odds of engaging in receptive syringe sharing. Compared with their counterparts from Greater Jakarta, women from Bandung, West Java were more likely to engage in receptive syringe sharing (OR=2.32; 95% CI=1.43, 3.77; $p=0.001$).

Table 6.4: Multivariate associations between IPV, socio-demographic and drug-related characteristics, and receptive syringe sharing among women who inject drugs

Independent variables	Dependent variable: receptive syringe sharing (n = 154)					
	β	SE	ORs	95% CIs	Wald χ^2	p-value
Model 1^a						
Past-year psychological abuse (ref. no)						
Yes	0.978	0.220	2.66	1.73, 4.09	4.45	< 0.001
Injection drug type (past 12 months) (ref. heroin only)						
Pharmaceuticals only	1.267	0.355	3.55	1.77, 7.13	3.57	< 0.001
Heroin + pharmaceuticals	0.231	0.267	1.26	0.74, 2.13	0.87	0.387
Housing status (ref. stable housing)						
Unstable housing/homeless	1.144	0.363	3.14	1.54, 6.41	3.15	0.002
Relationship status (ref. single, never married)						
Married/in steady relationship	−0.377	0.290	0.68	0.39, 1.21	−1.30	0.193
Divorced	−0.372	0.376	0.69	0.33, 1.44	−0.99	0.323
Widowed	0.204	0.378	1.22	0.58, 2.57	0.54	0.590
Dependent children or other dependents (ref. no)						
Yes	−0.190	0.211	0.83	0.55, 1.25	−0.90	0.369
Survey city (ref. West Java)						
Greater Jakarta	0.885	0.246	2.42	1.49, 3.93	3.59	< 0.001
Model 2^b						
Past-year physical and/or injurious assault (ref. no)						
Yes	0.920	0.205	2.51	1.67, 3.75	4.48	< 0.001
Injection drug type (past 12 months) (ref. heroin only)						
Pharmaceuticals only	1.348	0.339	3.85	1.98, 7.49	3.98	< 0.001
Heroin + pharmaceuticals	0.169	0.269	1.18	0.70, 2.01	0.63	0.529

Housing status (ref. stable housing)						
Unstable housing/homeless	1.108	0.360	3.03	1.49, 6.14	3.07	0.002
Relationship status (ref. single, never married)						
Married/in steady relationship	−0.312	0.285	0.73	0.42, 1.28	−1.10	0.274
Divorced	−0.434	0.377	0.65	0.31, 1.36	−1.15	0.250
Widowed	0.191	0.375	1.21	0.58, 2.53	0.51	0.610
Dependent children or other dependents (ref. no)						
Yes	−0.194	0.212	0.82	0.54, 1.25	−0.92	0.360
Survey city (ref. West Java)						
Greater Jakarta	0.838	0.247	2.31	1.42, 3.75	3.40	0.001
Model 3 ^c	β	SE	ORs	95% CIs	Wald χ	p-value
Past-year forced sex (ref. no)						
Yes	1.124	0.456	3.08	1.26, 7.54	2.46	0.014
Injection drug type (past 12 months) (ref. heroin only)						
Pharmaceuticals only	0.902	0.397	2.46	1.13, 5.37	2.27	0.023
Heroin + pharmaceuticals	0.441	0.321	1.55	0.83, 2.92	1.38	0.169
Housing status (ref. stable housing)						
Unstable housing/homeless	1.679	0.572	5.36	1.74, 16.48	2.93	0.003
Relationship status (ref. single, never married)						
Married/in steady relationship	−0.297	0.359	0.74	0.37, 1.50	−0.83	0.409
Divorced	−0.942	0.446	0.39	0.16, 0.93	−2.12	0.035
Widowed	−0.521	0.466	0.59	0.24, 1.48	−1.12	0.265
Dependent children or other dependents (ref. no)						
Yes	−0.110	0.270	0.89	0.53, 1.52	−0.41	0.683
Survey city (ref. West Java)						
Greater Jakarta	1.173	0.299	3.23	1.80, 5.82	3.92	< 0.001
Model 4 ^d	β	SE	ORs	95% CIs	Wald χ	p-value

Past-year psychological abuse (ref. no)						
Yes	0.597	0.279	1.82	1.05, 3.15	2.14	0.033
Past-year physical and/or injurious assault (ref. no)						
Yes	0.551	0.266	1.73	1.03, 2.93	2.07	0.039
Past-year forced sex (ref. no)						
Yes	0.108	0.364	1.11	0.54, 2.28	0.30	0.768
Injection drug type (past 12 months) (ref. heroin only)						
Pharmaceuticals only	1.301	0.356	3.67	1.83, 7.39	3.66	< 0.001
Heroin + pharmaceuticals	0.196	0.271	1.22	0.71, 2.07	0.73	0.468
Housing status (ref. stable housing)						
Unstable housing/homeless	1.063	0.366	2.90	1.41, 5.94	2.90	0.004
Relationship status (ref. single, never married)						
Married/in steady relationship	−0.403	0.291	0.67	0.38, 1.18	−1.38	0.166
Divorced	−0.465	0.384	0.63	0.29, 1.33	−1.21	0.227
Widowed	0.165	0.379	1.18	0.56, 2.48	0.44	0.663
Dependent children or other dependents (ref. no)						
Yes	−0.184	0.212	0.83	0.55, 1.26	−0.87	0.387
Survey city (ref. West Java)						
Greater Jakarta	0.841	0.248	2.32	1.43, 3.77	3.40	0.001

Notes: 95% CI = 95% Confidence Intervals; ORs = Odds Ratios; SE = Standard Errors.

^a Model 1 includes past-year psychological abuse only, controlling for survey city, injection drug type, relationship status, having children and/or other dependents, and housing status.

^b Model 2 includes physical and/or injurious assault, controlling for survey city, injection drug type, relationship status, having children and/or other dependents, and housing status.

^c Model 3 includes forced sex, controlling for survey city, injection drug type, relationship status, having children and/or other dependents, and housing status.

^d Model 4 includes all IPV dimensions (psychological abuse, physical and/or injurious assault, forced sex) in the same multivariate logistic regression model, controlling for survey city, injection drug type, relationship status, having children and/or other dependents, and housing status.

6.4 Discussion

To our knowledge, this is the first quantitative study to investigate associations between different dimensions of IPV and unsafe injecting practices amongst women who inject drugs in Asia. This study found that a sizeable minority of women who inject drugs in Indonesia continue to engage in receptive syringe sharing, despite more than a decade of harm reduction interventions (Indonesian National AIDS Commission 2014). In 2015, 5.8% of people who inject drugs surveyed as part of national bio-behavioural HIV surveillance reported sharing needle-syringes in the previous week (Ministry of Health 2015), compared with a rate nearly three times as high among women in this sample. These findings suggest that there remains a high potential for HIV infection among women who inject drugs and onward transmission to their injecting and sexual partners.

Furthermore, past-year rates of psychological abuse and physical and/or injurious violence in this sample were 8 – 22 times higher than rates among Indonesian women in the general population (Statistics Indonesia 2017). The prevalence of physical and/or injurious assault in this study was comparable and/or higher than rates found in community samples of women who inject drugs in other low- or middle-income countries in the region, such as India (17%) and China (39.5%) (India HIV/AIDS Alliance 2011; Gu et al. 2014). While previous research has shown a link between IPV and elevated risk for HIV-related sexual risk behaviours among women who inject drugs, this is the first study in the region to suggest a similar link between IPV and unsafe injecting practices.

This study adds new evidence from a lower-middle income setting showing that psychological abuse and physical and/or injurious assault were independently associated

with greater HIV-related injecting risk, after controlling for other forms of IPV and socio-demographic factors. Previous research suggests that sharing injecting equipment within a sexual relationship can be associated with feelings of support, trust, love, intimacy and protection (MacRae and Aalto 2000; Sherman, Latkin, and Gielen 2009; Simmons and Singer 2006; Roberts, Mathers, and Degenhardt 2010), but also with male power and control (Klee 1993; Barnard 1993; Wagner et al. 2009; Spooner et al. 2010; Lazuardi et al. 2012). In the Indonesian context, qualitative research suggests that control – both physical and psychological – is central to the role of intimate partnerships in the lives of many women who inject drugs. Submitting to men's wishes, including on occasions where there is a known HIV risk, is often viewed as a way of avoiding conflict, confrontation and, potentially, further violence (Spooner et al. 2010). Similar to findings showing that women in violent relationships are less able to negotiate condom use (El-Bassel et al. 2005; Panchanadeswaran et al. 2010), this study extends previous research from the U.S. by suggesting that they may also be less able to negotiate safer drug injection (Wagner et al. 2009). Such power imbalances and their consequences seem to persist despite availability of sterile needles and syringes. These findings underline the urgent need to integrate case-finding and support interventions aimed at identifying and addressing IPV among women who use drugs within existing HIV prevention programs.

Notably, women who exclusively injected pharmaceuticals, primarily buprenorphine, were significantly more likely to share and re-use needles and syringes than women who injected heroin only. This finding is at odds with results from an international review suggesting that buprenorphine injectors report lower rates of injecting equipment sharing and other HIV-related risk behaviours, compared with heroin injectors (Yokell et al. 2011). Medically-

supervised oral buprenorphine was introduced in Indonesia in 2002 as substitution therapy for the detoxification and maintenance of opioid-dependent persons. However, the management of buprenorphine administration by private doctors, combined with the absence of national guidelines until recently, may have increased buprenorphine's potential for diversion and illicit use. Significantly higher rates of injecting equipment sharing among women who inject pharmaceuticals in this study may be explained by increases in the diversion and illicit use of buprenorphine and other prescription drugs, coupled with the absence of comprehensive harm reduction programs targeting this subgroup of the drug-using population. Indeed, until recently, Indonesia's HIV prevention program has targeted heroin users, despite documented increases in the injection of illicit buprenorphine and other pharmaceuticals (Indonesian National AIDS Commission 2014). Thus, this study's findings suggest that HIV prevention interventions in Indonesia would benefit from broadening their focus to include people who use multiple substances and drugs other than heroin.

Furthermore, unstable housing and homelessness were associated with greater HIV-related injection risk. Specifically, the odds of receptive syringe sharing were between 3 – 5 times as high among women who were homeless or unstably housed, compared with women with stable housing. This finding extends research from high-income settings highlighting that precarious housing increases HIV-related risks among people who use drugs (Aidala et al. 2005). Women's housing disadvantage may increase their HIV vulnerability by perpetuating gender power imbalances. For instance, many drug-using women living on the street resort to survival sex work to maintain their and/or their partner's drug supply and provide for dependents (Shannon et al. 2008). This increases

women's risk of experiencing violence, and places them in high-risk sexual and injecting contexts where they may have limited negotiating power. Any effective HIV prevention strategy must include structural solutions such as enhanced housing and economic opportunities. Our data suggest that support toward housing and economic empowerment could be important tools for reducing HIV-related risk behaviours. Previous research in the U.S. shows that stable housing is associated with decreases in risky sexual and injecting behaviours (Aidala et al. 2005; Wenzel et al. 2009). Similarly, some economic enhancement initiatives for women who use drugs have been associated with a reduction in HIV risk behaviours (Pinkham, Stoicescu, and Myers 2012; Sherman et al. 2006). Since the behaviours studied here are also risk factors for other blood borne viruses such as hepatitis B and C, structural interventions including housing support and economic empowerment could contribute to multiple prevention goals. Given that no such interventions have been tested among women who inject drugs in Indonesia to date, further research is needed to understand the multitude of risk environments shaping women's HIV vulnerability and develop appropriate and culturally-relevant responses.

Limitations include the cross-sectional nature of the study, which constrains the ability to make causal inferences. We were unable to compare previous levels of receptive syringe sharing with recent levels of syringe sharing among our cohort of participants, and we were therefore unable to determine whether injecting risk practices increased among Indonesian women who inject drugs upon experiencing IPV victimization. This limitation highlights the need for longitudinal research to test the temporality of associations observed in our analyses. Second, self-reported data on injecting behaviours may be subject to social desirability bias. Women may be reluctant to report sharing of injecting

equipment in a context where sterile needles and syringes are available. We attempted to improve reporting of HIV risk-taking by assuring confidentiality and anonymity, and by using female peer interviewers with an injecting drug use background. The latter strategy has been shown to provide greater opportunity to foster trust between participants and interviewers, thus improving the reliability of self-reported behaviours (Broadhead et al. 1998).

Despite these limitations, the current study has important implications. Reducing unsafe injection practices among people who inject drugs has been the target of numerous HIV prevention interventions implemented in Indonesia since the early 2000s (Morineau et al. 2012). Despite these interventions, an unacceptably high proportion of women continue to share and re-use injecting equipment. Existing harm reduction programmes aimed at reducing blood borne virus transmission among people who inject drugs in Indonesia should tailor their services to be more accessible to women (Malinowska-Sempruch 2015). This could include creating women-only hours and child-friendly spaces within existing services, employing female peers, expanding mobile and other outreach-led health services, and integrating harm reduction, sexual and reproductive health and rights education, and violence prevention services into a “one-stop shop” model of service provision (Blankenship et al. 2015; Pinkham, Myers, and Stoicescu 2012). Furthermore, case-finding and IPV prevention and support programs should target women who use drugs. Potential settings amenable to violence prevention interventions among drug-using women are outpatient substance use treatment and community-based drug treatment services (Tirado-Munoz et al. 2015). Case-finding interventions would be optimised by robust referral systems that enable effective referral to a diverse array of services, including

legal advocacy and/or parenting and childcare support. Clearly, more effective public health responses to reduce violence and address unsafe injecting drug use amongst this highly-vulnerable population are urgently needed.

CHAPTER 7. PAPER 3: THE SYNERGISTIC EFFECTS OF INTIMATE PARTNER VIOLENCE, SUBSTANCE USE, AND MENTAL HEALTH ON HIV SEXUAL RISK BEHAVIOUR AMONG WOMEN WHO INJECT DRUGS: FINDINGS FROM THE PEREMPUAN BERSUARA STUDY IN INDONESIA

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The final empirical paper addressed the syndemic and synergistic relationships between co-occurring IPV, crystal meth use, and depressive symptoms and three HIV sexual risk behaviour outcomes (i.e. sexually transmitted infection (STI) symptomatology, inconsistent condom use, and survival sex work) among women who inject drugs. It starts by providing an overview of the literature on syndemics among women who inject drugs, highlighting key geographical and analytical gaps in knowledge. The introduction is followed by a description of the study methods, including data collection, measures, and ethical considerations, as well as analyses undertaken. Lastly, results from additional computations of multiplicative and additive interaction metrics are reported. The final section of the paper contextualises results in light of existing literature, and discusses implications for public health research and interventions. Because data were collected only once at one point in time (i.e. cross-sectionally), temporal associations between risk factors and outcomes cannot be extrapolated from the analyses presented in this chapter. Therefore, only associations suggestive of risk factors that merit further investigation, and not causal relationships, can be inferred from the analyses presented below. The research questions addressed by this paper are as follows:

- Does IPV co-occur with depression and crystal meth use among women who inject drugs in Indonesia?
- Are depression, IPV, and crystal meth independently associated with elevated HIV sexual risk behaviour?
- Does aggregate exposure to multiple conditions have additive effects on women's odds of engaging in HIV sexual risk behaviour?
- Do depression, IPV, and crystal meth interact on the multiplicative and/or additive scales to exacerbate drug-using women's odds of engaging in HIV sexual risk behaviour?

Author statement: CS conducted the majority of the work for this paper. She conceived the study, conceptualised the paper, and led the quantitative study design, data collection, analysis, and writing. LC, I and RM contributed to the overall conceptualisation of the paper and provided guidance on interpretation of findings. All authors have read and approved the final text and this author statement.



Figure 7.1: A fieldworker records her reflections on a feedback form

Abstract

Background: Women who inject drugs are disproportionately affected by co-occurring intimate partner violence (IPV), poor mental health, and substance use. However, little is known about the potentially synergistic effects of these factors on women's HIV risk behaviour, and no known studies in Asia examine these relationships. This study assessed the additive and interactive effects of exposure to syndemic health conditions on HIV sexual risk behaviours amongst the largest cross-sectional sample of women who inject drugs in Indonesia.

Methods: 731 women aged ≥ 18 years, injecting drugs in the preceding 12 months, and residing in Greater Jakarta or Bandung, West Java were recruited using respondent-driven sampling (RDS). Population estimates were derived using the RDS-II estimator. Weighted multivariate logistic regressions and marginal effects models tested associations and predicted probabilities of exposure to depression, IPV, and crystal meth use on three major HIV sexual risk behaviour outcomes (i.e. sexually transmitted infection (STI) symptomatology, inconsistent condom use, and survival sex work). Multiplicative interaction was evaluated through cross-product terms. Additive interaction was assessed by calculating the relative excess risk due to interaction (RERI), attributable proportion due to interaction (AP), and synergy index (S).

Results: 26% of women experienced concurrent IPV, crystal meth use, and depressive symptoms. All syndemic factors were significantly positively associated with sexual risk outcomes in multiple logistic regressions that controlled for potential confounders. In adjusted marginal effects models, concurrent exposure to these conditions was associated with increases in the prevalence of HIV risk behaviours: STI symptomatology (from 12% to

60%), inconsistent condom use (from 3% to 22%), and survival sex work (from 6% to 25%). Statistically-significant interaction was detected on both multiplicative and additive scales. Specifically, an interaction was detected on the multiplicative scale between depression and crystal meth on STI symptomatology (OR=2.61; 95% CI=1.24, 5.48; p=0.011). There was also evidence of additive interaction, with most observed joint effects being greater than additive. Specifically, significant positive interaction was detected between IPV and crystal meth on inconsistent condom use (AP=0.38, p<0.05); depression and crystal meth on STI symptomatology (RERI=2.04, p<0.001; AP=0.61, p<0.001) and survival sex (RERI=1.20, p<0.01; AP=0.53, p<0.01); and IPV and depression on STI symptomatology (RERI=3.01, p<0.01; AP=0.52, p<0.001; S=2.70, p<0.01) and survival sex (RERI=1.21, p<0.05; AP=0.40, p<0.05).

Conclusions: This study provided new empirical evidence showing that the syndemic factors IPV, depression, and crystal meth consumption interact synergistically to increase HIV risk among women who inject drugs. Findings suggest that drug-involved women in Indonesia face multiple, overlapping risks that substantially increase their HIV vulnerability. Interventions that consider the full scope of syndemic vulnerabilities, rather than addressing individual conditions separately, may be essential.

7.1 Introduction

Women account for half of the 37 million people estimated to be living with HIV globally (UNAIDS 2016). In regions where HIV is concentrated among key at-risk populations, the proportion of newly-diagnosed women is increasing (Larney et al. 2015). People who inject drugs are one such at-risk population, with women constituting one third of all drug injectors (Degenhardt et al. 2013). Violence, HIV and AIDS, and substance use are among the most commonly occurring health problems, and have been associated with elevated risk of HIV transmission in samples of female drug-using women in the U.S. (El-Bassel et al. 2011). Compared to their male counterparts and vis-à-vis women in the U.S. general population, women who inject drugs are disproportionately affected by all three conditions, often concurrently (Gilbert et al. 2015; Illangasekare et al. 2013).

The concept of syndemic conditions that interact to amplify disease burden was first used in relation to low-income, urban women in the U.S. (Singer 1996). A syndemic refers to two or more overlapping health or psychosocial afflictions that interact synergistically to contribute to excess burden of health adversity in a population (Singer 2006). The frequent co-occurrence of substance use, violence, and HIV/AIDS among drug-using women in the U.S. has been described as the “SAVA” (Substance Abuse, Violence, and AIDS) syndemic (Meyer, Springer, and Altice 2011). This concentration and interaction of negative health and psychosocial outcomes is hypothesised to occur and be sustained in geographical or temporal contexts of inequality, stigmatisation, and structural violence (Tsai et al. 2017; Singer et al. 2017).

The cumulative effects of concurrent health problems in marginalised female populations,

and the mechanisms that link them, are the subject of a growing number of studies (Illangasekare et al. 2013; Sullivan, Messer, and Quinlivan 2015; Loeliger et al. 2016). For instance, meta-analytic evidence, largely based on studies conducted in the U.S., suggests that the influence of intimate partner violence (IPV) and substance use among women is complex and bi-directional (Moore et al. 2008). The onset of risky drug-using behaviours may be triggered by the traumatic experience of IPV or the mental health consequences of victimisation, including depression and post-traumatic stress disorder (Kidorf et al. 2004; Wagner et al. 2009; Illangasekare et al. 2013; Beydoun et al. 2012). Substance use, in turn, is associated with elevated mental health problems, particularly depression (Hyde, Mezulis, and Abramson 2008; Tsuyuki et al. 2017). Drug-involved women are at higher risk of experiencing IPV and acquiring HIV (El-Bassel et al. 2003; El-Bassel et al. 2005). Specifically, sexual violence has been associated with HIV and other sexually-transmitted infections among drug-using women via biological mechanisms such as vaginal and anal lacerations resulting from aggressive sex (Roberts, Mathers, and Degenhardt 2010; Phillips et al. 2014). Indirectly, IPV increases the risk of unprotected and high-risk sex by establishing an unequal dynamic of control and fear that thwarts women's capacity to negotiate condom use (Wu et al. 2003; Lorvick et al. 2006).

Despite the proliferation of studies testing the *concentration* of these risk factors, the evidence base testing whether such factors *interact* synergistically to amplify health adversity among women who inject drugs remains limited. For instance, among 71 quantitative studies investigating the empirical merit of the syndemic framework identified by a recent systematic review, 57 studies (80%) tested the disease concentration concept using some variation of a sum score corresponding to the total count of psychosocial

problems (Tsai et al. 2017; Tsai and Burns 2015). None of the studies went beyond the count variable approach to explore synergism between co-morbidities using measures of interaction. Crucially, of the 10 (14%) studies that focused on female populations, including drug-involved women, none tested for the interaction of concurrent health problems on women's HIV outcomes. All studies that tested interactions within a syndemic framework have evaluated interaction using product terms in multivariate regressions. Existing research was further limited in terms of geographic scope, with all studies being geographically clustered in the U. S. Only 7 (23%) studies were longitudinal and none were experimental or quasi-experimental, placing all at some risk of bias. In the absence of experimental and longitudinal studies that randomise and 'treat' participants with co-occurring conditions and follow them to assess the extent to which the treatment synergistically improved outcomes of interest, Tsai and others argue that analyses of cross-sectional data employing robust econometric methods can provide compelling evidence for probable synergistic risk factors that merit further investigation (Tsai et al. 2015). To this end, Tsai and other epidemiologists argue for an expansion of the assessment of interactions based purely on product terms in multiplicative models of cross-sectional data to also include additive interaction (Greenland 2009; Tsai and Burns 2015; Rajaleid, Imre, and Johan 2011). Briefly, statistical interaction is said to be present on the multiplicative scale when the joint effect of risk factors differs from the product of the effects of the individual factors (Kalilani and Atashili 2006). Statistical interaction can also be present on the additive scale, and is present when the joint effect of risk factors differs from the sum of the effects of the individual factors. Additive interaction, also known as synergism, is considered to be a property of causality, and refers to the interdependent action of two or more risk factors to produce an effect (Rothman 1976). It has been argued that the latter

concept is an appropriate way to statistically approximate the underlying causal mechanisms on a given outcome in studies of health behaviour, and thus has more direct public health relevance (Kalilani and Atashili 2006; Rothman 1978).

There is an urgent need for empirical studies that test the concept of syndemics among drug-using women using risk factor interaction on the multiplicative and additive scales. Moreover, to achieve optimal public health impact, it is necessary to broaden the geographical scope of studies assessing syndemics among drug-involved women to include resource-limited geographical settings, particularly regions with injection-driven HIV epidemics, such as Asia and Eastern Europe. Such approaches could provide a more nuanced understanding of HIV risk amongst drug-using populations, and inform appropriate interventions in under-researched geographical contexts.

Asia has a critical gap in research on drug-using women. The region is home to the largest absolute numbers of women who inject drugs (1.5 million) and amphetamine-dependent women (2.4 million) globally (Larney et al. 2015). Despite a trend of stabilisation across most countries in Asia, Indonesia is facing an expanding HIV epidemic concentrated among key affected populations, including people who inject drugs, sex workers and their clients, transgender individuals, and men who have sex with men (UNAIDS 2016). In recent years, heterosexual transmission has played an increasing role in the expansion of Indonesia's HIV epidemic, with women comprising a growing proportion of incident HIV cases (Rahmalia et al. 2015). In an earlier analysis, we found 41.6% HIV prevalence among a sample of women who inject drugs in Indonesia in 2015 (Stoicescu 2016), which is approximately 13% higher than HIV prevalence (28.8%) among a mostly-male national sample of people who inject drugs from the same year (Ministry of Health 2015). Recent bio-behavioural surveillance in

Indonesia identified people who inject drugs as the only key population among whom HIV sexual risk behaviours had increased since 2013 (Ministry of Health 2015). At the same time, a recent qualitative study of HIV risk behaviours among crystal meth users posited that crystal meth may be contributing to increasing HIV prevalence rates in Indonesia (Neverndorff and Praptoraharjo 2015). A better understanding of the potential interactive effects of key risk factors driving HIV sexual transmission risk among women who inject drugs is essential for elucidating pathways to HIV and developing effective interventions for this group.

This study aims to address this research gap. We conducted Indonesia's largest study of women who inject drugs to assess (1) whether depression, IPV, and crystal meth use are independently associated with elevated HIV sexual risk behaviour; (2) the potential additive effects of aggregate exposure to one or more of these conditions on women's HIV sexual risk behaviours; and (3) the extent to which these conditions may interact on the multiplicative and/or additive scales to increase women's odds of participation in HIV sexual risk-taking behaviours beyond each condition's individual effects.

7.2 Methods

7.2.1 Study design and sampling

Between September 2014 and June 2015, 731 drug-using women were recruited using respondent-driven sampling (RDS) from Greater Jakarta, which comprises Indonesia's capital, Jakarta and its metropolitan areas Bogor, Tangerang, Depok and Bekasi; and Bandung, the provincial capital of West Java. RDS, a modified form of snowball sampling, facilitates more generalisable estimates by using a systematic peer referral procedure and weighting the sample to reduce biases associated with non-random recruitment

(Heckathorn 2002).

Eligibility criteria included: being female; ≥ 18 years of age; injecting illicit drugs in the preceding 12 months; residing in one of the study areas; having a valid recruitment referral; and providing voluntary informed consent. A diverse group of 20 initial recruits (“seeds”), diverse in relation to age, socioeconomic status, levels of risk behaviour, and known HIV status, were selected and asked to enlist up to three eligible peers in the study. Chain-like waves of recruitment continued until the desired sample size was reached. Participants received a primary incentive of 75,000 Indonesian Rupiah (~USD \$5) for participating in the interview and a secondary incentive of 25,000 Indonesian Rupiah (~USD \$2) per eligible peer recruited.

Women completed an interviewer-administered survey eliciting information on sociodemographic and behavioural characteristics. Seven female peer fieldworkers were trained in questionnaire administration using mobile-assisted technology, ethics, and health and safety. Interviews lasting approximately one hour were conducted at locations deemed safe by participants, such as offices of non-governmental organisations or participants’ homes. Information was collected using tablets equipped with Open Data Kit, an open-source application for data collection and management on mobile devices (Hartung et al. 2010).

7.2.2 Ethical considerations

The study was anonymous; all participants were encouraged to use a pseudonym. Participants provided verbal and written voluntary informed consent. Consent forms used plain language and included clear explanations of the nature and purpose of the research,

limits to confidentiality, and explicit statements regarding participants' rights to opt-out at any time. Interviewers read and discussed consent forms verbally to ensure that participants understood the information needed to provide informed consent, regardless of literacy level. Strict confidentiality was maintained, except where women requested assistance or service referrals. In the case that information disclosed suggested that a participant was at risk of significant harm interviewers discussed concerns with the participant and offered service referrals. The Institutional Review Boards of Oxford University (ref no: SSD/CUREC2/13-23) and Atma Jaya University (ref no: 1114/III/LPPM-PM.10.05/11/2013) approved the study.

7.2.3 Measurement

7.2.3.1 HIV risk behaviour outcomes

The primary outcome of interest was HIV sexual risk behaviour. Sexual risk behaviour was defined using three behaviours associated with HIV infection among women who inject drugs and analysed separately for each construct: (1) inconsistent condom use; (2) sexually transmitted infection (STI) symptomatology; and (3) survival sex work.

Inconsistent condom use was based on reporting less than 100% condom use for vaginal and/or anal sex in the previous 12 months with steady, casual, and transactional partners. Consistent condom users were defined as those who reported using condoms "every time," and inconsistent users as those reporting using condoms "most of the time," "sometimes," or "never."

STI symptomatology was measured using participant self-report of easily recognised symptoms, based on WHO guidelines (WHO 2003). Sexually-active participants reporting $\geq$

2 of 6 current symptoms (e.g. “sores, blisters and/or ulcers on or in the vagina,” “unusual vaginal discharge, such as pus or a thick and/or sticky liquid from the genital area”) were coded as 1= “having STI symptoms.”

Survival sex work referred to the exchange of sex for drugs, shelter, or other commodities as a means of basic subsistence in the previous 12 months.

7.2.3.2 Syndemic factors

Crystal meth use was measured by asking participants which illicit and/or illegal substances they used at least once in the previous 12 months. For crystal meth, participants were coded either as “1” = used crystal meth or “0” = did not use crystal meth.

Intimate partner violence was assessed using the Revised Conflict Tactics Scale (CTS2) short form (Strauss, Boney-McCoy, and Sugarman 1996; Strauss and Douglas 2004). Reliability of the CTS2 for this sample was $\alpha = 0.85$. CTS2 items ask respondents to indicate how often each event took place within a referent period (Strauss 2004b). Participants were asked about violence perpetrated by a current or former intimate partner, including partners within formal and informal partnerships, in the preceding 12 months. Responses to victimisation items on the instrument’s psychological, physical, injurious, and sexual subscales were summed, combined, and dichotomised into any vs no IPV victimisation.

Depressive symptoms were measured using the Revised Center for Epidemiologic Studies Depression (CESD-R) scale (Radloff 1977). The CESD-R is validated and used widely across settings, including in Indonesia (Li, Hershow, et al. 2014; Van Dam and Earleywine 2011). It measures symptoms of depression in the previous two weeks, as defined by the American Psychiatric Association Diagnostic and Statistical Manual, fifth edition. Possible scores for

the 20-item scale range from 0 to 60, with a cut-off score of 16 or above indicating the presence of clinically-significant depressive symptoms. Responses to each of the 20 questions were summed, combined, and dichotomised as either below or above 16. For this sample, the reliability of the CESD-R was $\alpha = 0.90$.

7.2.3.3 Sociodemographic characteristics

The following socioeconomic and background information was collected: *age, relationship status, employment status, education level, housing status, individual monthly income, and whether they had any dependent children* in the household or other dependents for whom they were responsible, and *known HIV status*. Individual monthly income was classified as being either below or above the mean national income in Indonesia (Statistics Indonesia 2013). Housing status was assessed by asking women about their current living arrangements. Women were coded as “homeless/unstably housed” if they lived on the street, in public spaces (i.e. train station) or in temporary or transitional accommodation, and “stably housed” if they lived in a family home, rental house/apartment, or long-term single-room rental accommodation (*kos-kosan*).

7.2.4 Statistical analysis

Data were analysed in four stages in Stata 14.2 (StataCorp, College Station, TX):

1. Estimates of population proportions and 95% confidence intervals were calculated for study outcomes and key explanatory variables using RDS-II generated weights computed in the RDS software package for Stata (Schonlau and Liebau 2012, 2013). Frequencies for all variables were calculated on the full, unweighted sample combining data from the two survey cities.
2. Bivariate and multivariate logistic regressions were conducted on the aggregated dataset to allow sufficient power to explore associations between syndemic variables, covariates, and each HIV risk behaviour outcome. Variables associated with behavioural outcomes at $p < 0.1$ in bivariate analyses were retained in subsequent multivariate analyses (Hosmer and Lemenshow 1989). Following current best practice, multivariate analyses were

conducted both with and without RDS weights (Johnston and Luthra 2014). Only unweighted estimates were reported, given that no statistical differences were observed between the two sets of estimates.

3. Three sets of marginal effects models (one for each outcome) were conducted to test the additive effects of cumulative syndemic exposures on sexual risk behaviours, with significant covariates from stage two held at mean values.

4. To test the assertion that concurrent health problems interact to increase HIV risk behaviour, measures for both multiplicative and additive interaction were computed. Multiplicative interaction reflects the degree to which odds of an exposure are *multiplied* in individuals with a given risk factor compared to those without it. To assess interaction on the multiplicative scale, we tested two- and three-way product terms of syndemic risk factor exposures on each of the three behavioural outcomes.

Additive interaction refers to the interdependent action of two or more factors to produce or prevent an effect, and assesses whether the combined effect of two exposures is more or less than the sum of their separate effects (Kalilani and Atashili 2006; De Mutsert et al. 2009). In epidemiological studies, it is measured using the difference of risk differences, also known as the interaction contrast (IC) (Rothman, Greenland, and Lash 2008). Three indices developed by Rothman (Rothman 1974) were computed to test interaction contrast using the *ic* statistical package for Stata (Bruun, Fenger-Gron, and Prior 2015). This statistical package implements the procedure described in Hosmer & Lemeshow (1992) and Andersson et al. (2005) for calculating metrics of additive interaction, 95% confidence intervals, and statistical significance (Hosmer and Lemeshow 1992; Andersson et al. 2005). To enable the measurement of synergism metrics, three dummy variables were

created to calculate the joint effects of each pair of syndemic conditions (Kalilani and Atashili 2006; Andersson et al. 2005). These were: 1) IPV and depression, 2) IPV and crystal meth use, and 3) crystal meth use and depression. Dummy variables were coded as follows: “0” = presence of neither condition (reference category), “1” = presence of condition A, but not condition B, “2” = presence of condition B, but not condition A, and “3” = presence of both conditions. A series of logistic regressions were run with the sexual risk outcomes regressed separately on each of the 3 dummy coded variables, adjusting for significant confounders (9 regression models in total).

To quantify the amount of interaction on the additive scale, three indices were calculated based on the OR estimates (Kalilani and Atashili 2006; Richardson and Kaufman 2009):

- (i) RERI, the relative excess risk due to interaction in relation to the level of risk at no exposure, is calculated as the difference between the expected risk and the observed risk:

$$RERI = OR_{++} - OR_{+-} - OR_{-+} + 1.$$

- (ii) AP, which computes the attributable proportion of risk due to interaction among those with both exposures:

$$AP = RERI/OR_{++}.$$

- (iii) S, the synergy index, which measures the interaction between two risk factors expressed as the ratio of the relative excess risk for the combined effect of the risk factors and the sum of the relative excess risks for each separate effect of the two risk factors:

$$S = [OR_{++} - 1]/[(OR_{+-} - 1) + (OR_{-+} - 1)].$$

As recommended by The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement, the separate effect of each exposure was reported in addition to the joint effect compared with the unexposed group as a joint reference category (Vandenbroucke et al. 2007). We were unable to test for additive interaction beyond two exposures, as there is no consensus in the literature on a rigorous way to compute this (VanderWeele and Knol 2014). Some epidemiologists consider any departure from 0 (in the case of RERI and AP) or 1 (in the case of S) as evidence for the presence of interaction. However, there are now several methods to derive CIs and p -values around these measures (Hosmer and Lemeshow 1992; Andersson et al. 2005; Assmann, Hosmer, and Lemeshow 1996) and software that easily calculates these additional computations. Therefore, for this study, statistically significant $RERI > 0$, $AP > 0$, or $S > 1$ indicated the presence of interaction on the additive scale.

7.3 Results

7.3.1 Overview by city

Table 7.1 presents RDS-weighted estimations and 95% confidence intervals (CI) for sexual risk outcomes and syndemic variables, i.e. IPV, depressive symptoms, and crystal meth use, by survey city. There were notable city differences in relation to two of the three sexual risk outcomes assessed. First, the prevalence of inconsistent condom use was more than 10% higher in Greater Jakarta (68.8%; 95% CI = 64.8, 72.5) relative to Bandung (58.2%; 95% CI = 50.3, 65.6). Second, STI symptomatology was reported by more than half of the women recruited from Greater Jakarta (52.8%; 95% CI = 48.6, 56.8), and 1 in 5 of the women recruited from Bandung (21.2%; 95% CI = 15.7, 28.1). The prevalence of survival sex work was 18.1% (95% CI = 12.8, 25.0) in Bandung and 16.8% (95% CI = 14.3, 19.6) in Jakarta.

City differences were also observed for the three syndemic factors assessed in this paper – IPV, depressive symptoms, and crystal meth use. The prevalence of clinically-significant depressive symptoms was higher in Greater Jakarta (67.0%; 95% CI = 63.0, 70.7) than Bandung (55.6%; 95% CI = 47.7, 63.3). Furthermore, prevalence figures of past-year IPV victimisation among women in Greater Jakarta (68.9%; 95% CI = 65.0, 72.6) were over 10% higher than those reported by women in Bandung (55.9%; 95% CI = 48.0, 63.5). Non-injection crystal meth was used by 69.1% (95% CI = 65.0, 72.9) of women in Greater Jakarta and 50.9% (95% CI = 41.3, 56.9) of women in Bandung.

Table 7.1: RDS-weighted estimations and 95% confidence intervals for sexual risk outcomes, depressive symptoms, IPV, and substance use among women who inject drugs, by survey city

	Greater Jakarta (n = 572)				Bandung (n = 159)			
	N	Unweighted %	RDS-weighted %	95% CI	N	Unweighted %	RDS-weighted %	95% CI
Intimate partner violence								
Any IPV in the past year	401	70.1	68.9	65.0, 72.6	91	57.2	55.9	48.0, 63.5
No IPV in the past year	171	29.9	31.1	27.3, 35.0	68	42.8	44.1	36.5, 52.0
Crystal methamphetamine use								
Yes	417	72.9	69.1	65.0, 72.9	74	46.5	50.9	41.3, 56.9
No	155	27.1	30.9	27.1, 35.0	85	53.5	49.1	43.0, 58.6
Depressive symptoms (CESD-R ≥ 16)								
Yes	388	67.8	67.0	63.0, 70.7	90	56.6	55.6	47.7, 63.3
No	184	32.2	33.0	29.2, 37.0	69	43.4	44.4	36.7, 52.2
STI symptomatology (≥ 2)								
Yes	287	50.2	52.8	48.6, 56.8	37	23.3	21.2	15.7, 28.1
No	285	49.8	47.2	43.2, 51.3	122	76.7	78.8	71.9, 84.3
Condom use consistency (past 12 months)								
Consistent	169	29.5	31.2	27.5, 35.2	68	42.8	41.8	34.4, 49.7
Inconsistent	403	70.5	68.8	64.8, 72.5	91	57.2	58.2	50.3, 65.6
Survival sex work (past 12 months)								
Yes	146	25.5	16.8	14.3, 19.6	28	17.6	18.1	12.8, 25.0
No	426	74.5	83.2	80.3, 85.6	131	82.4	81.9	75.0, 87.2

7.3.2 Socio-demographic characteristics

Sociodemographic characteristics for the combined sample are displayed in Table 7.2. Most women were under 35 years of age (64.7%), and 12.6% were under 24 years or younger. 62.7% were married or in a steady relationship, 13.9% were single (never married), 13.5% were divorced, and 9.9% were widowed. The majority of women (56.5%) had children or other dependents for whom they were responsible. 79.8% of women completed at least a high school education, and 44.3% were unemployed. Self-reported HIV prevalence among women in this sample was 46.7%.

Table 7.2: Sample characteristics, syndemic variables, and sexual risk practices among women who inject drugs in Indonesia, unadjusted estimates

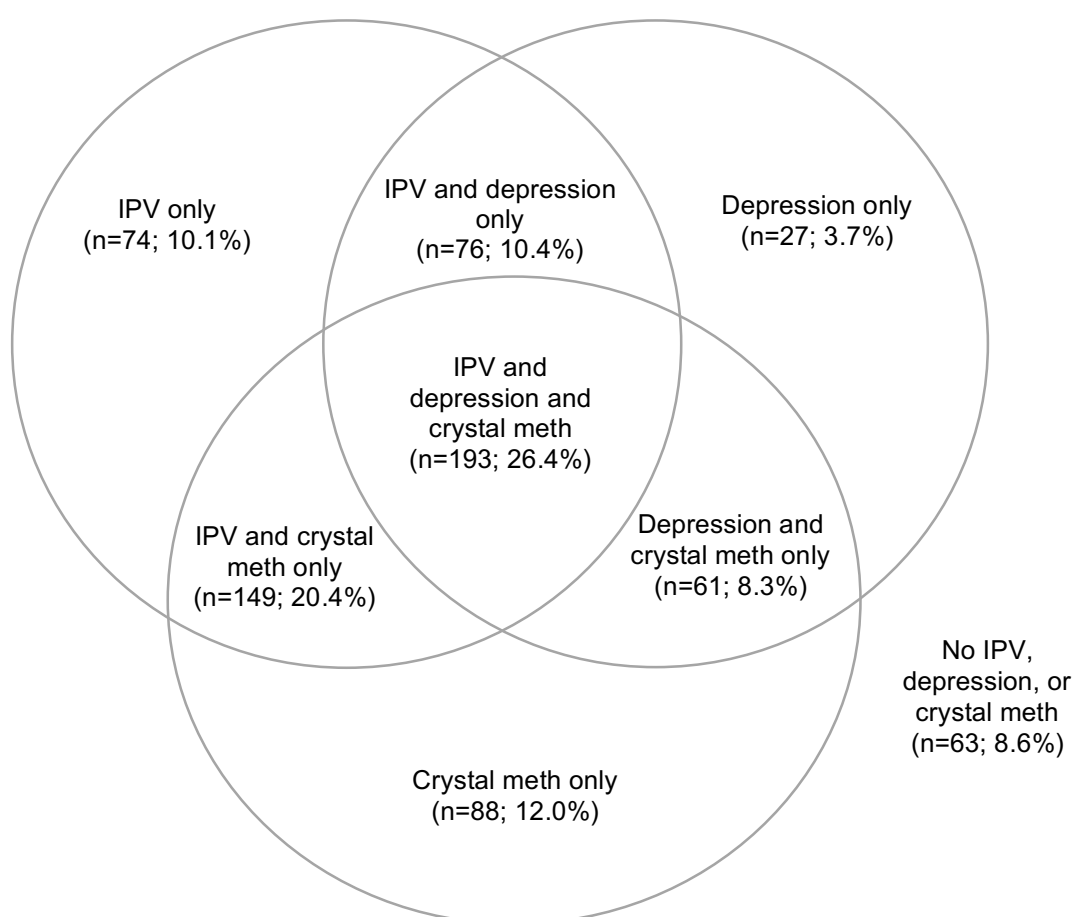
Total N = 731		
<i>Independent variables</i>	N	%
Age groups		
≤24 years	92	12.6
25-34 years	473	64.7
≥35 years	166	22.7
Education level (highest attained)		
Less than high school	148	20.2
High school or higher	583	79.8
Employment status		
Currently working	407	55.7
Not currently working	324	44.3
Individual monthly income (million IDR) ^{&}		
≤ 3.8 (approx. 285 USD)	398	54.5
> 3.8 (approx. 285 USD)	333	45.5
Relationship status		
Married/steady relationship	458	62.7
Single, never married	102	13.9
Divorced	99	13.5
Widowed	72	9.9
Dependent children or other dependents		
Yes	413	56.5
No	318	43.5
Housing status		
Homeless/unstable housing	39	5.3

Stable housing	692	94.7
Self-reported HIV status		
Positive	341	46.7
Negative/Unknown	390	53.3
Intimate partner violence		
Any IPV in the past year	492	67.3
No IPV in the past year	239	32.7
Crystal methamphetamine use		
Yes	491	67.2
No	240	32.8
Depressive symptoms (CESD-R ≥ 16)		
Yes	478	65.4
No	253	34.6
STI symptomatology		
Yes	324	44.3
No	407	55.7
Condom use consistency		
Consistent	135	18.5
Inconsistent	596	81.5
Survival sex work		
Yes	174	23.8
No	557	76.2

Abbreviations: CI = Confidence Intervals; IDR = Indonesian Rupiah; USD = United States dollars; STI= Sexually-transmitted Infection; CESD = Center for Epidemiologic Studies Depression scale.

The overlap in exposures to syndemic problems in the sample is illustrated in Figure 7.1. Between 3.7% and 12.0% of women reported one of either depression, IPV, or crystal meth use. 8.3% – 20.4% of women experienced two simultaneously co-existing conditions. Notably, more than one quarter of women in the sample (26.4%) were exposed to all three conditions concurrently.

Figure 7.2: Overlap in exposures to syndemic conditions (past-year intimate partner violence, depressive symptoms, crystal meth use) among women who inject drugs, RDS-weighted estimates



7.3.3 Associations between syndemic exposures and HIV risk behaviours

Results from bivariate analyses between variables listed in Table 7.2 and HIV sexual risk outcomes are displayed in Table 7.3. The following covariates were significantly associated with all three HIV risk behaviour outcomes at $p < 0.1$ and were thus retained in multivariate models: self-reported HIV-positive status, homelessness/unstable housing, lower than high school educational attainment, relationship status, higher individual monthly income, and having children and/or other dependents.

Table 7.4 displays results from multivariate analyses. In confounder-adjusted logistic regressions, all three syndemic exposures had statistically significant independent effects on the sexual risk outcomes. In particular, IPV (OR=2.62; 95% CI=1.80, 3.80; $p<0.001$), depression (OR=2.38; 95% CI=1.67, 3.39; $p<0.001$), and crystal meth use (OR=1.66; 95% CI=1.16; 2.38; $p=0.006$) each doubled the odds of reporting STI symptoms. Furthermore, higher odds of inconsistent condom use were significantly positively related to IPV (OR=3.61; 95% CI=2.03, 6.42; $p<0.001$), depression (OR=1.66; 95% CI=1.00, 2.73; $p=0.048$), and crystal meth consumption (OR=1.84; 95% CI=1.12, 3.02; $p=0.016$). Lastly, each syndemic exposure remained significantly positively associated with elevated odds of participating in survival sex work, after controlling for sociodemographic co-factors: IPV (OR=1.85; 95% CI=1.20, 2.85; $p=0.006$), depression (OR=1.83; 95% CI=1.18, 2.84; $p=0.007$), and crystal meth use (OR=1.76; 95% CI= 1.14, 2.70; $p=0.011$).

Table 7.3: Bivariate associations between syndemic factors, sociodemographic characteristics, and HIV sexual risk behaviours among women who inject drugs

<i>Independent variables (categories)</i>	STI symptomatology			Inconsistent condom use			Survival sex work		
	ORs	95% CIs	<i>p</i> value	ORs	95% CIs	<i>p</i> value	ORs	95% CIs	<i>p</i> value
Past-year intimate partner violence									
Yes	3.16	2.25, 4.43	<0.001	3.83	2.27, 6.47	<0.001	1.86	1.25, 2.76	0.002
No	1			1			1		
Depressive symptoms									
Yes (CESD-R ≥ 16)	3.05	2.19, 2.24	<0.001	2.44	1.55, 3.85	<0.001	2.34	1.57, 3.51	<0.001
No (CESD-R <16)	1			1			1		
Past-year crystal methamphetamine use									
Yes	1.97	1.43, 2.73	<0.001	1.81	1.17, 2.80	0.008	1.80	1.22, 2.67	0.003
No	1			1			1		
Self-reported HIV status									
Positive	1.56	1.16, 2.09	0.003	1.73	1.19, 2.53	0.005	2.01	1.42, 2.84	<0.001
Negative/Unknown	1			1			1		
Age									
≤ 24 years	1			1			1		
25-34 years	0.77	0.49, 1.21	0.256	0.74	0.43, 1.29	0.293	1.16	0.68, 2.02	0.587
≥ 35 years	.76	0.46, 1.28	0.307	0.93	0.50, 1.73	0.812	1.43	0.77, 2.63	0.252
Education level (highest attained)									
Less than high school	1.53	1.06, 2.19	0.022	1.90	1.24, 2.91	0.003	1.41	0.94, 2.12	0.095
High school or higher	1			1			1		
Employment status									
Not currently working	1.03	0.77, 1.38	0.835	1.04	0.72, 1.52	0.823	0.97	0.68, 1.36	0.845
Currently working	1			1			1		
Individual monthly income (IDR/USD)									
≤ 3.8 million IDR (approx. 285 USD)	1			1			1		
> 3.8 million IDR (approx. 285 USD)	1.23	0.92, 1.65	0.161	1.83	1.25, 2.67	0.002	2.19	1.55, 3.11	<0.001
Housing status									

Homeless/unstable housing	3.40	1.66, 6.96	0.001	7.44	3.80, 14.56	<0.001	5.78	2.95, 11.31	<0.001
Stable housing	1			1			1		
Relationship status									
Married/steady relationship	1			1			1		
Single, never married	0.38	0.24, 0.62	<0.001	1.00	0.56, 1.79	0.986	0.98	0.57, 1.69	0.952
Divorced/separated	1.05	0.68, 1.63	0.811	2.18	1.33, 3.59	0.002	2.51	1.57, 4.01	<0.001
Widowed	1.00	0.61, 1.65	0.992	1.00	0.51, 1.96	0.988	2.14	1.25, 3.67	0.005
Dependent children or other dependents									
Yes	1.22	0.91, 1.64	0.180	0.53	0.36, 0.77	0.001	0.63	0.44, 0.88	0.008
No	1			1			1		
Survey city									
Greater Jakarta	1			1			1		
Bandung	0.30	0.20, 0.45	<0.001	0.74	0.46, 1.19	0.217	0.88	0.60, 1.28	0.506

Abbreviations: OR= Odds Ratio; CI = Confidence Intervals; IDR = Indonesian Rupiah; USD = United States dollars; CESD-R = Revised Center for Epidemiologic Studies Depression scale.

Table 7.4: Multivariate associations between syndemic factors, sociodemographic characteristics, and HIV sexual risk behaviours among women who inject drugs^a

<i>Independent variables</i>	STI symptomatology			Inconsistent condom use			Survival sex work		
	ORs	95% CIs	<i>p</i> value	ORs	95% CIs	<i>p</i> value	ORs	95% CIs	<i>p</i> value
Past-year intimate partner violence									
Yes	2.62	1.80, 3.80	<0.001	3.61	2.03, 6.42	<0.001	1.85	1.20, 2.85	0.006
No	1			1			1		
Depressive symptoms									
Yes (CESD-R ≥16)	2.38	1.67, 3.39	<0.001	1.66	1.00, 2.73	0.048	1.83	1.18, 2.84	0.007
No (CESD-R <16)	1			1			1		
Past-year crystal methamphetamine use									
Yes	1.66	1.16, 2.38	0.006	1.84	1.12, 3.02	0.016	1.76	1.14, 2.70	0.011
No	1			1			1		
Self-reported HIV status									
Positive	1.79	1.28, 2.51	0.001	2.04	1.30, 3.19	0.002	1.98	1.35, 2.91	<0.001
Negative/Unknown	1			1			1		
Education level (highest attained)									
Less than high school	1.38	0.92, 2.07	0.041	2.74	1.68, 4.45	<0.001	–	–	–
High school or higher	1			1					
Individual monthly income (IDR/USD)									
≤ 3.8 million IDR (approx. 285 USD)	–	–	–	1			1		
> 3.8 million IDR (approx. 285 USD)				2.41	1.56, 3.73	<0.001	2.59	1.76, 3.80	<0.001
Housing status									
Homeless/unstable housing	1.90	0.88, 4.11	0.031	4.99	2.44, 10.20	<0.001	3.47	1.60, 7.54	0.002
Stable housing	1			1			1		
Relationship status									
Married/steady relationship	1			1			1		
Single, never married	0.67	0.39, 1.16	0.156	1.22	0.60, 2.47	0.585	1.07	0.57, 2.00	0.842
Divorced/separated	1.32	0.81, 2.15	0.257	3.00	1.66, 5.43	<0.001	3.21	1.94, 5.31	<0.001
Widowed	1.36	0.76, 2.44	0.299	0.93	0.42, 2.08	0.864	2.35	1.24, 4.48	0.009

Dependent children or other dependents									
Yes	–	–	–	0.43	0.27, 0.67	<0.001	0.49	0.33, 0.72	<0.001
No				1			1		
Survey city									
Greater Jakarta	1			–	–	–	–	–	–
Bandung	0.36	0.23, 0.57	<0.001						

Abbreviations: OR= Odds Ratio; CI = Confidence Intervals; IDR = Indonesian Rupiah; USD = United States dollars; CESD-R = Revised Center for Epidemiologic Studies Depression scale.

– Not included in multivariate model.

^a Multivariate models for each outcome include the three syndemic variables: past-year IPV, depressive symptoms, and past-year crystal meth use, adjusting for covariates significant at $p < 0.1$ in bivariate analyses with each of the outcomes.

7.3.4 Additive effects of syndemic exposures on HIV risk behaviour

Strong additive effects were shown on women's HIV sexual risk behaviours, after controlling for co-factors (Table 7.5). The prevalence of STI symptomatology was 11.9% among women who did not experience IPV, depression, or crystal meth use, but increased to 59.7% among women exposed to all three factors. Similarly, with the presence of all three conditions the prevalence of inconsistent condom use increased 7-fold to 21.6%, from 3.0% among women without these conditions. Moreover, with the concurrent presence of all three exposures, women's reported prevalence of survival sex work was 4-fold to 24.6%, compared with 6.1% among women without any exposures.

Table 7.5: Predicted probabilities of syndemic exposures on HIV sexual risk behaviours among women who inject drugs

<i>Syndemic exposures</i>			STI symptomatology		Inconsistent condom use		Survival sex work	
			Predicted Probability (%) ^a	95% CIs	Predicted Probability (%) ^b	95% CIs	Predicted Probability (%) ^c	95% CIs
IPV	Crystal meth	Depression						
–	–	–	11.9	6.9, 16.9	3.0	1.0, 5.1	6.1	2.9, 9.2
+	–	–	25.2	17.5, 32.9	9.3	4.8, 13.8	10.3	5.6, 14.9
–	+	–	20.0	13.6, 26.4	5.2	2.3, 8.1	9.9	5.8, 13.9
–	–	+	24.7	17.4, 32.0	4.8	1.9, 7.6	10.2	6.1, 14.3
+	+	–	38.2	30.7, 45.8	15.0	9.6, 20.5	16.0	11.0, 21.0
–	+	+	37.6	29.8, 45.3	8.1	4.4, 11.8	15.9	11.0, 20.8
+	–	+	44.7	37.2, 52.3	13.9	9.0, 18.7	16.5	11.5, 21.5
+	+	+	59.7	54.1, 65.3	21.6	17.4, 25.9	24.6	20.3, 28.9

Abbreviations: CI = Confidence Intervals; STI = Sexually Transmitted Infection.

^a Adjusted for self-reported HIV status, relationship status, housing status, education level, and survey city.

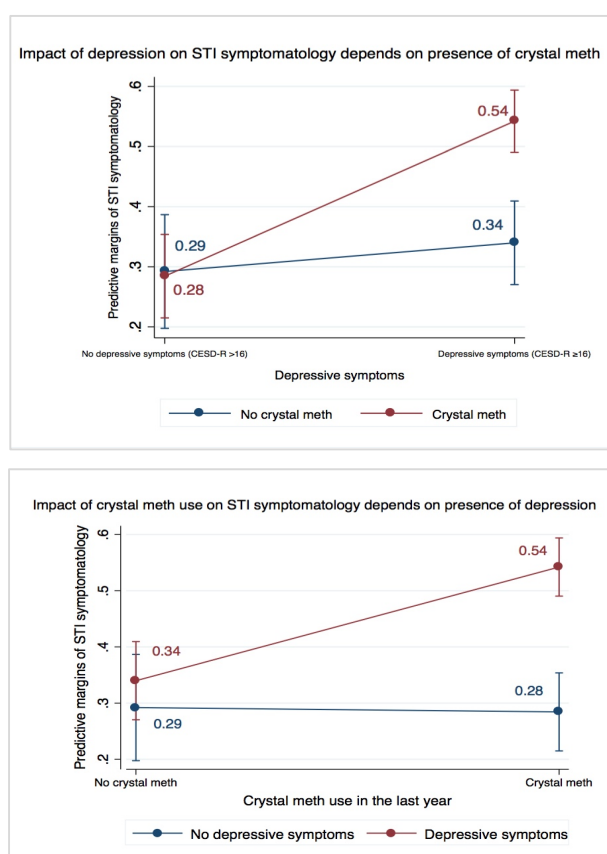
^b Adjusted for self-reported HIV status, relationship status, housing status, education level, individual monthly income, and having children and/or other dependents.

^c Adjusted for self-reported HIV status, relationship status, housing status, individual monthly income, and having children and/or other dependents.

7.3.5 Interactions

Interaction analysis using two- and three-way product terms revealed a significant positive interaction on the multiplicative scale between depressive symptoms and crystal meth on STI symptomatology (OR=2.61; 95% CI=1.24, 5.48; $p=0.011$). In other words, the prevalence of STI symptomatology was 54.2% among women who reported crystal meth use and depressive symptoms, relative to 28.4% among women reporting crystal meth only, and 34.0% among women reporting depressive symptoms only. The potential impact of this interaction with and without the presence of depression and crystal meth is visually represented in Figure 7.2. No other combinations of syndemic exposures were significantly associated with HIV risk behaviours on the multiplicative scale.

Figure 7.3: Interacting effects of depression and crystal meth on STI symptomatology among women who inject drugs, controlling for HIV status, education, housing, marital status, and survey city



There was also evidence for additive interaction (i.e. synergism). In a series of multivariate logistic regressions, the joint effects of all two-way combinations of syndemic conditions were significantly associated with elevated odds of engaging in HIV risk behaviours compared to the absence of these conditions (Table 7.6).

Measures of synergism were calculated to better understand the nature of these joint effects. Five out of nine tested joint effects showed evidence of statistically significant greater than additive interaction on at least one of the indices assessed. In particular, a positive interaction was detected between IPV and crystal meth on inconsistent condom use ($AP=0.38$, $p<0.05$). In other words, an estimated 38% of inconsistent condom use among those reporting past-year IPV and crystal meth use was attributable to the interaction between these exposures.

Furthermore, a positive interaction was found between depression and crystal meth on STI symptomatology ($RERI=2.04$, $p<0.001$; $AP=0.61$, $p<0.001$) and survival sex ($RERI=1.20$, $p<0.01$; $AP=0.53$, $p<0.01$). This means that an estimated 61% in STI symptomatology and 53% of survival sex participation among women reporting depression and past-year crystal meth use was attributable to the interaction between these exposures. Particularly, the prevalence of STI symptoms and survival sex work among women who reported both depression and crystal meth use were twice and 1.2 times as high, respectively, than prevalence among women who did not use crystal meth or have depression.

A positive interaction was also observed between IPV and depression on STI symptomatology ($RERI=3.01$, $p<0.01$; $AP=0.52$, $p<0.001$; $S=2.70$, $p<0.01$). Namely, the joint effect of IPV and depression was associated with a nearly 3-fold increase in STI symptoms compared to each exposure's main effect, with 52% of the presence of STI symptomatology

attributed to the interaction of these two exposures.

Lastly, the joint effect of IPV and depression showed a positive interaction on survival sex (RERI=1.21, $p<0.05$; AP=0.40, $p<0.05$), such that 40% of survival sex work reported by women was attributable to the interaction between IPV and depression.

Table 7.6: Main and joint effects of two-way syndemic exposures and additive interactions on HIV sexual risk behaviours among women who inject drugs

		STI symptomatology				Inconsistent condom use				Survival sex work			
		OR (95% CI) ^a	RERI	AP	S	OR (95% CI) ^b	RERI	AP	S	OR (95% CI) ^c	RERI	AP	S
IPV	Crystal meth												
-	-	1				1				1			
+	-	3.47 (1.73, 6.96)***				2.92 (1.03, 8.28)*				2.44 (1.05, 5.65)*			
-	+	2.45 (1.22, 4.92)**				1.37 (0.45, 4.15)				2.17 (0.94, 4.97)			
+	+	6.11 (3.18, 11.72)***	1.19 (-0.82, 3.20)	0.19 (-0.12, 0.51)	1.30 (0.79, 2.14)	5.30 (1.98, 14.16)***	2.01 (-0.33, 4.35)	0.38 (-0.00, 0.76)*	1.88 (0.72, 4.90)	3.81 (1.75, 8.30)***	0.20 (-1.57, 1.98)	0.05 (-0.42, 0.52)	1.08 (0.54, 2.16)
Crystal meth	Depression												
-	-	1				1				1			
+	-	1.01 (0.55, 1.85)				1.79 (0.66, 4.82)				0.99 (0.46, 2.15)			
-	+	1.32 (0.72, 2.42)				1.73 (0.65, 4.64)				1.08 (0.51, 2.32)			
+	+	3.37 (1.95, 5.80)***	2.04 (0.94, 3.13)***	0.61 (0.36, 0.85)***	7.17 (0.26, 198.94)	2.97 (1.19, 7.41)*	0.45 (-1.07, 1.97)	0.15 (-0.39, 0.70)	1.29 (0.42, 3.97)	2.28 (1.16, 4.47)*	1.20 (0.32, 2.08)**	0.53 (0.11, 0.94)**	15.96 (0.00, 4.18)
IPV	Depression												
-	-	1				1				1			
+	-	1.98 (1.08, 3.62)*				3.97 (1.42, 11.15)**				1.45 (0.68, 3.07)			
-	+	1.79 (0.96, 3.32)				1.89 (0.63, 5.63)				1.39 (0.66, 2.92)			
+	+	5.78 (3.39, 9.86)***	3.01 (1.11, 4.92)**	0.52 (0.30, 0.74)***	2.70 (1.26, 5.80)**	6.47 (2.51, 16.70)***	1.61 (-1.25, 4.47)	0.25 (-0.17, 0.67)	1.42 (0.69, 2.92)	3.04 (1.61, 5.77)***	1.21 (-0.01, 2.42)*	0.40 (0.01, 0.79)*	2.44 (0.49, 12.24)

*p<0.05, **p<0.01, ***p<0.001. Abbreviations: OR = Odds Ratio; CI = Confidence Intervals; RERI = Relative Excess Risk due to Interaction; AP= Attributable Proportion due to Interaction; S = Synergy index.

^a Adjusted for self-reported HIV status, relationship status, housing status, survey city, and education level.

^b Adjusted for self-reported HIV status, relationship status, housing status, education level, individual monthly income, and having children and/or other dependents.

^c Adjusted for self-reported HIV status, relationship status, housing status, individual monthly income, and having children and/or other dependents.

7.4 Discussion

This is the first known study to quantify the syndemic and synergistic effects of IPV, depression, and substance use on HIV risk behaviour in a community-drawn sample of drug-involved women. Our findings show that more than 1 in 4 women experienced concurrent exposure to IPV, depression, and crystal meth use, lending support to the syndemic theory concept of *disease concentration* (Singer et al. 2017). Furthermore, the joint effects of most two- and three-way combinations of risk factors were associated with increased odds of engaging in HIV risk behaviour. Strikingly, the presence of all three conditions concurrently was associated with a 4- to 7-fold elevation in women's reported prevalence of sexual risk behaviours.

Our findings suggest that the interaction of syndemic conditions IPV, crystal meth use, and depression may have a significant impact on HIV risk-taking behaviour in this sample of Indonesian women who inject drugs. Specifically, experiencing depressive symptoms in conjunction with using crystal meth nearly tripled women's odds of reporting STI symptoms. Moreover, most two-way effects of syndemic factors showed a greater than additive interaction. For instance, 38% of inconsistent condom use among women who experienced past-year IPV and used crystal meth was attributable to the intersection of these risk factors. Furthermore, the presence of STI symptomology among women exposed to both IPV and depression was more than 3 times higher than the prevalence of STI symptoms among women without either exposure. Likewise, the interaction between crystal meth use and depression accounted for 61% of reported STI symptomatology and 53% of survival sex work among women with both conditions. While previous studies have documented the concentration of health and psychosocial problems among drug-involved

women (Gilbert et al. 2015), this study extends the field by demonstrating that a substantial proportion of variation in drug-using women's HIV risk behaviours may be explained by interactions among syndemic IPV, substance use and mental health problems.

Strengths of this study include its probability-based sampling method, large sample size, and community-based nature of the sample. However, due to the cross-sectional design, causality cannot be inferred. It is important to acknowledge that measures of additive interaction calculated using ORs, as has been done in this paper, only approximate relative risk ratios (RRs) in cohort studies. In their analysis of the validity of RERI, AP, and S as measures of interaction when ORs are used as approximations for relational risks, Kalilani and Atashili (2006) observed that ORs may produce unreliable estimates depending on the measure of interaction used, the type of interaction present, and the baseline risk of the outcome. Specifically, for all three metrics, the interaction assessed was consistently of higher absolute magnitude when measures used ORs, compared to measures derived from RRs, especially when the study outcome was not rare. The RERI metric, although most widely reported in analyses of additive interaction in epidemiologic studies, appears to be the most unstable. When comparing greater than additive interaction measures derived from ORs with those calculated from RRs, the increase in magnitude of interaction with each increase in the baseline risk was most pronounced for the RERI and S, and least pronounced for the AP metric. Furthermore, it has been shown that in analyses of additive interaction that adjust for confounding in regression models, as is the case in this paper, S is the most robust among the three indices as it does not vary across strata of the additional covariates (Skrondal 2003). Given that the outcomes in the present paper are not rare and all analyses adjust for confounding, caution is thus advised about affirming the presence of

greater than additive interaction based on exclusively on the RERI metric. To minimize this limitation, we followed Kalilani and Atashili's recommendation to assess and report all three indices in order to provide a range in the estimation of additive interaction and allow for a careful consideration of any inconsistencies among them. No discrepancies were observed between the three indices in terms of the type or direction of interaction for any of the nine analyses of additive interaction assessed in this paper. Nevertheless, in the absence of longitudinal data confirming the risk factor relationships observed here, the findings may be inconclusive and should therefore be interpreted with caution. An additional constraint is the inability to test for additive interactions beyond two exposures due to limitations inherent in tests of synergism. An examination of the three-way marginal effects of syndemic conditions on HIV risk behaviour outcomes suggests that the combination of three conditions may also be greater than additive. However, there is no consensus within existing literature on a rigorous way to quantify this effect (Knol and VanderWeele 2012). Other limitations include the reliance on self-reported measures, which may be subject to recall and reporting bias, particularly as related to illicit, illegal, and intimate behaviours.

Notwithstanding these caveats, the data presented here constitute the best available empirical evidence of risk factor interaction among women who inject drugs. Our findings show that, in a sample of drug-using women in Indonesia, IPV, depression, and crystal meth use co-occur and interact synergistically to amplify the burden of HIV risk. These findings have important public health implications. Considered in tandem with previous research showing that the syndemic factors of IPV, depression, and substance use are also mutually-causal (Gilbert et al. 2015), this study contributes to the empirical foundation for multilevel

interventions (Tsai et al. 2017). Specifically, appropriate multicomponent interventions aimed at improving women's health and psychosocial wellbeing must target the full scope of syndemic vulnerabilities, rather than addressing these in isolation. For example, existing harm reduction programs could benefit from integration with case-finding interventions to effectively detect IPV and provide appropriate support. Similarly, improving the well-being of vulnerable women requires resilient, low-threshold health systems with adequate referral links to mental health services. The provision of such combination interventions would require ongoing, rigorous evaluation to ensure optimal effects, and conduct appropriate adjustments as needed. In the absence of more complex approaches in resource-limited settings, a sensible first step could be adjusting existing harm reduction and other HIV prevention programmes to enable greater uptake by drug-using women. This could be achieved by hiring more female staff, especially female peers, providing on-site childcare support, and expanding fixed-site health care to include mobile services, among other low-cost modifications (Pinkham, Stoicescu, and Myers 2012).

In the Indonesian context, the implementation of complex interventions for women who use and inject drugs may be hindered by structural and legal barriers (Stone 2015). The increase in crystal meth consumption in recent years and its role in exacerbating syndemic HIV vulnerability (Neverndorff and Praptoraharjo 2015) is concerning given the lack of focus on people who use crystal meth in the country's harm reduction and AIDS strategies. Furthermore, the continued criminalisation of people who use drugs tends to drive the most marginalised members of the population further away from health and support services due to fear of arrest (Stoicescu and Ameilia 2015). High rates of gendered discrimination and abuse faced by women who use drugs in both health and criminal justice

settings may further sustain their adverse health outcomes (Sari and Nurmaya 2009). Thus, in order for harm reduction, mental health, and IPV prevention interventions to be accessible and beneficial to this highly-stigmatised community, they must be supported by conducive policies. Such policies should be aligned with improving the health and psychosocial wellbeing for vulnerable drug-using populations. To this end, more research is needed to model the ways in which social conditions and policy contexts could reduce the clustering of syndemics among marginalised women in low- and middle-income contexts.

These data suggest that syndemic risk factors may also act synergistically among Indonesian drug-involved women, a finding which merits further exploration in HIV behavioural research in other low- and middle-income settings with injection-driven epidemics. By establishing an empirical basis for the syndemic interactions between mental health, IPV, and substance use among women who inject drugs, this study highlights the urgent need to optimise existing health systems to better address the needs of key populations. Implementing effective interventions to address this challenge requires not only programmatic improvements, but attention to the broader social and policy contexts that can reduce adverse health outcomes.

CHAPTER 8. DISCUSSION AND CONCLUSION



Figure 8.1: The Perempuan Bersuara field team, August 2014

8.1 Summary of findings

8.1.1 Overview

The aim of this thesis was to contribute to the problem theory of HIV transmission risk among women who inject drugs in Indonesia. Specifically, it aimed to elucidate associations and mechanisms linking IPV victimisation, depression, and substance use with HIV-related sexual and injecting risk outcomes. This objective was further subdivided into seven aims, corresponding to three stand-alone papers:

Paper 1: *Intimate Partner Violence and HIV-Related Sexual Risk Behaviour Among Women Who Inject Drugs in Indonesia: A Respondent-Driven Sampling Study (Chapter 5)*

1. To investigate associations between different forms of IPV and HIV-related sexual risk behaviours;
2. To test whether the co-occurrence of multiple forms of IPV types has additive effects on sexual risk behaviours.

Paper 2: *Intimate Partner Violence and Receptive Syringe Sharing Among Women Who Inject Drugs in Indonesia: A Respondent-Driven Sampling Study (Chapter 6)*

1. To explore associations between different types of IPV and receptive syringe sharing.

Paper 3: *The Synergistic Effects of Intimate Partner Violence, Crystal Methamphetamine Use, and Depression on HIV Sexual Risk Behaviour Among Women Who Inject Drugs: Findings from The Perempuan Bersuara Study in Indonesia (Chapter 7)*

1. To determine whether IPV co-occurs with depression and crystal meth use among women who inject drugs in Indonesia;
2. To evaluate associations between depression, IPV, and crystal meth, and three key HIV-associated sexual risk behaviours;
3. To assess the potential additive effects of aggregate exposure to multiple conditions on women's HIV sexual risk behaviours;
4. To test whether depression, IPV, and crystal meth use interact to exacerbate HIV sexual risk behaviours.

This thesis used a syndemic approach to health disparities to inform the selection of constructs and the analyses conducted (Singer 2006). Following syndemics theory, and guided by a social-ecological approach that recognises the relevance of network and social

influences on women's HIV risk (Baral et al. 2013), a comprehensive literature review was conducted to identify relevant factors and mechanisms through which the interplay of IPV, poor mental health, and substance use increase the likelihood of women's HIV acquisition and transmission. The review identified 17 reviews, including 3 meta-analyses, of which 13 had a global focus and 4 focused on US-only studies. Internationally, there were 13 studies (11 in the US, 1 in South Africa, 1 in Nepal) that explored the cumulative effects of multiple concurrent health and psychosocial conditions on women's well-being. Among these, only one tested multiplicative interaction using a product term in regression analyses, and none tested synergism. There were no quantitative studies conducted with drug-involved women in Indonesia. However, qualitative and anecdotal research indicated that drug-using women experience multiple disparities, particularly in partner and non-partner perpetrated violence, mental health problems, and risky behaviours. These afflictions are thought to be reinforced and perpetuated by external stressors such as gendered relationship power differentials and punitive drug policies.

The three papers included in this thesis offered insights into critical gaps in research on women who inject drugs in Asia more generally, and in Indonesia specifically. The first paper (Chapter 5) focused on how different forms of IPV victimisation (i.e. psychological aggression, physical and/or injurious assault, sexual violence) were associated with engaging in one or more sexual HIV sexual risk practices (i.e. unprotected sex at last vaginal and/or anal intercourse, multiple partners, STI symptomatology, and survival sex work). Logistic regressions assessed associations between different dimensions of past-year IPV and engaging in one or more sexual risk behaviours, controlling for potential confounders. A final multivariate logistic regression model included covariance adjustments for the three

IPV types and significant co-factors. Marginal effects models tested predicted probabilities of each form of IPV on sexual risk and combination effects of IPV polyvictimisation.

The second paper (Chapter 6) responded to a major regional gap in research identified by the literature review in Chapter 2; namely, the interplay between IPV victimisation and receptive syringe sharing. A series of three logistic regressions assessed relationships psychological, physical and/or injurious, and sexual forms of IPV victimisation and receptive syringe sharing, controlling for relevant sociodemographic and drug-related covariates. A fourth multivariate logistic regression included covariance adjustments for all forms of IPV and significant confounders from bivariate analyses.

The third paper (Chapter 7) tested a key tenet of syndemics theory that has, until now, lacked empirical support. Specifically, it assessed whether co-occurring health conditions have greater than additive and multiplicative (i.e. synergistic) effects on drug-using women's HIV risk behaviours. Multivariate logistic regressions and marginal effects models tested associations and predicted probabilities of concurrent exposure to depression, IPV, and crystal meth use on three sexual risk behavioural outcomes, controlling for socio-demographic confounders: (1) STI symptomatology, (2) inconsistent condom use, and (3) survival sex work. Multiplicative effects were evaluated through the inclusion of interaction terms in multivariate logistic regression models. Additive interaction was assessed by calculating three indices for all possible two-way syndemic exposures: relative excess risk due to interaction (RERI), attributable proportion due to interaction (AP), and synergy index (S).

The following sections provide a summary of the overall thesis findings, categorised based

on the three stand-alone papers. Next, thesis limitations and strengths are discussed. The penultimate section reflects on implications for future research, policy, and practice. The chapter ends with a summary of dissemination strategies employed as part of this thesis.

8.1.2 Paper 1: Intimate Partner Violence and HIV-Related Sexual Risk Behaviour Among Women Who Inject Drugs in Indonesia: A Respondent-Driven Sampling Study

More than three quarters (75.7%) of women in the sample engaged in one or more of four high-risk sexual behaviours in the preceding year. Furthermore, approximately 6 in 10 (66.1%) female drug injectors experienced some form of IPV in the preceding 12 months. This finding substantiates similar findings from the US on the disproportionate burden of IPV shouldered by drug-using women relative to their counterparts in the general population (Gilbert et al. 2015). In multivariate analyses, the three different types of IPV (i.e. psychological, physical and/or injurious, and sexual) tested remained significantly associated with increased engagement in risky sexual behaviour, after controlling for other forms of IPV and potential confounders. Furthermore, several covariates were significantly associated with elevated sexual risk behaviour in the final multivariate model and merit further exploration in future analyses: non-injection crystal meth use, self-reported HIV-positive status, lower educational attainment, younger age, and not being married. Concurrent victimisation of different forms of IPV had additive effects, after adjusting for co-factors: sexual risk behaviour was reported by 62.0% of women who did not experience any IPV, but rose to 89.3% among those exposed to three forms of IPV. These findings contribute to an important regional evidence gap on the independent effects of psychological, physical and/or injurious, and sexual forms of IPV.

8.1.3 Paper 2: Intimate Partner Violence and Receptive Syringe Sharing Among Women Who Inject Drugs in Indonesia: A Respondent-Driven Sampling Study

Approximately 1 in 5 (RDS-weighted 15.3%; unweighted 21.1%) women in this sample reported engaging in receptive syringe sharing. This rate is three times higher than the prevalence of past-week needle-syringe sharing among people who inject drugs surveyed as part of national sentinel surveillance in Indonesia in the same year (Ministry of Health 2015). It is concerning that a sizeable minority of women continue to engage in receptive syringe sharing, despite more than a decade of harm reduction interventions aimed at reducing unsafe injecting drug use (Indonesian National AIDS Commission 2014). This enhances the potential for HIV infection by facilitating onward transmission to their injecting and sexual partners, as well as to infants via vertical transmission.

In a multivariate regression including psychological IPV, physical and/or injurious violence, and forced sex, controlling for potential confounders, higher odds of receptive syringe sharing were associated with experiencing psychological abuse and physical and/or injurious IPV. While previous research in the US has shown strong associations between IPV and elevated risk for sexually-transmitted HIV among women who inject drugs (Srirak et al. 2005; Stockman, Lucea, and Campbell 2013), this is the first empirical study in a low- to middle-income setting to establish a similar link with HIV-related injecting practices. Qualitative and anecdotal research in Indonesia suggests that male control is central to intimate partnerships, and plays a strong role in shaping the extent to which women can negotiate safer behaviours (Saktiawati et al. 2013). It is thus essential that programs aimed at reducing unsafe injecting behaviours among people who inject drugs also integrate IPV prevention, case-finding, and support services.

Two covariates, injecting illicit pharmaceutical opioids, and homelessness/housing instability, remained positively associated with receptive syringe sharing in the final multivariate model. As compared with injecting heroin only, injecting illicit pharmaceutical opioids more than tripled the odds of receptive syringe sharing. The higher rates of injecting equipment sharing among pharmaceutical injectors in this sample may be explained by a recent increase in the diversion and use of buprenorphine and other prescription medications, coupled with the absence of comprehensive harm reduction programs targeting this subgroup of the injecting population in Indonesia. Further research is required to better understand the epidemiology and correlates of pharmaceutical injection.

Furthermore, the odds of receptive syringe sharing were between 3 – 5 times as high among women who were homeless or precariously-housed, compared with women with stable housing. This finding is corroborated by research from high-income settings showing an association between precarious housing and HIV-related risks among people who use drugs (Aidala et al. 2005). HIV prevention strategies for drug-involved women should consider structural solutions such as enhanced housing and economic opportunities, which have been associated with maintaining sobriety (Wenzel et al. 2009) and with a decrease in risky sexual and injecting behaviours (Aidala et al. 2005) in U.S. studies.

8.1.4 Paper 3: The Synergistic Effects of Intimate Partner Violence, Crystal Methamphetamine Use, and Depression on HIV Sexual Risk Behaviour Among Women Who Inject Drugs: Findings from The Perempuan Bersuara Study in Indonesia

The final paper empirically tested the syndemic and synergistic effects of key health and psychosocial disparities affecting women who inject drugs. These disparities included IPV, depressive symptoms, and crystal meth use. 64.5% of women in the sample had clinically-

significant depressive symptoms, and 66.1% reported recent crystal meth use and IPV, respectively. Overall, at least 1 in 4 women experienced all three conditions concurrently. In weighted multivariate models including IPV, depressive symptoms, and crystal meth use and adjusting for significant confounders, all three factors remained associated with sexual risk outcomes. Furthermore, cumulative exposure to IPV, crystal meth use, and depression had additive effects: compared with the absence of these conditions, exposure to all three resulted in a 4- to 7-fold increase in rates of different HIV risk behaviours. Specifically, rates of STI symptomatology increased from 11.9% among women who did not report experiences of IPV, depression, or crystal meth consumption, to 59.7% among women exposed to all three factors. Similarly, the aggregation of these conditions elevated rates of inconsistent condom use 7-fold to 21.6%, from 3.0% among women without any conditions. Rates of survival sex work increased 4-fold to 24.6% with three concurrent afflictions, from 6.1% among women without any syndemic factors. These findings substantiate the *disease concentration* concept in syndemic theory, which holds that two or more epidemics tend to co-occur to aggravate negative health outcomes in a given population. In this sample, interpersonal factors such as IPV victimisation interacted with mental health challenges and substance use to elevate HIV sexual risk behaviours.

Furthermore, this study provided new empirical evidence that the disease burden attributable to health risks in combination exceeds the sum of the disease burden of the health risks when considered separately, thus quantifying the second fundamental tenet of syndemics theory, namely, that of *disease interaction*. In particular, statistically significant interaction between syndemic factors was detected on both multiplicative and additive scales. Multiplicative interaction analysis using two- and three-way product terms

revealed a significant interaction between depression and crystal meth use on STI symptomatology, whereby consuming crystal meth in conjunction with having depression resulted in 26.1% increase in the observed proportion of STI symptomatology, compared with using crystal meth only. Moreover, statistically-significant positive additive interaction was detected for five out of nine two-way combinations of syndemic factors, as follows:

- An estimated 38% of inconsistent condom use among women reporting past-year IPV and crystal meth use was attributable to the interaction between these exposures;
- Rates of STI symptoms and survival sex among women who reported both depression and crystal meth use were twice higher than rates among women who did not use crystal meth or have depression only;
- Rates of survival sex work among women who reported both depression and crystal meth use were 1.2 times as high as rates among women who did not use crystal meth or have depression;
- The joint effect of IPV and depression was associated with a nearly 3-fold increase in STI symptoms compared to each exposure's main effect, with 52% of the presence of STI symptomatology attributed to the interaction of these two exposures;
- 40% of survival sex work reported by women was attributable to the interaction between IPV and depression.

Based on the literature review conducted for this thesis, previous studies addressing syndemic synergism among drug-involved women have documented the concentration of health and psychosocial problems, but stopped short of assessing their probable

interactions. This study adds empirical merit to the assertion that syndemic conditions interact synergistically to amplify the burden of HIV risk among women who inject drugs.

8.2 Study limitations

Several limitations must be noted when drawing inferences from this doctoral study's findings. This section addresses these limitations and discusses the ways in which they were mitigated.

8.2.1 Cross-sectional study design

There were limitations in terms of research design: the study measured IPV, syndemic factors, and HIV risk outcomes, retrospectively and at one data point (cross-sectional). These study design characteristics limited the capacity to determine temporality, i.e. whether women's HIV risk preceded experiencing IPV, mental health challenges, and substance use, or resulted due to their individual or combined effects. Although cross-sectional studies provide opportunities to generate hypotheses, the temporal relationship between determinants and outcomes is best established through longitudinal research (Pearl 2009). However, this doctoral study aimed to provide indications of areas where future longitudinal and intervention research could helpfully be focused. In order to determine causal relationships, and to evaluate the effect of interventions in reducing the adverse impacts of syndemics amongst drug-using women, rigorous intervention trials are required.

Future research with longitudinal designs is urgently needed in Asia to build on the present study and further elucidate temporal relationships and bi-directional pathways among

syndemic factors, socio-structural forces, and HIV risk (Gilbert et al. 2015). However, longitudinal study design with women who inject drugs faces particular challenges in terms of retaining participants due to high levels of mobility, criminalisation of drug use, and precarious housing in this population, which can lead to biased results (Lankenau et al. 2010). Nonetheless, some of this study's methodological strengths would allow for the future development of longitudinal data with this group. Two longitudinal cohorts to date (both US-based) have measured relationships among syndemic factors for substance-involved women (Koblin et al. 2015; El-Bassel et al. 2005). In a future project, contingent on funding, this candidate plans to extend this research by following up the women in the present sample.

Finally, this study could not determine the effects of interventions (Shadish, Cook, and Campbell 2002). However, an aetiological study such as this D.Phil is critical to indicate areas where future longitudinal and intervention research could helpfully be focused. In order to determine causal relationships, and the effect of interventions in reducing that impacts of syndemics amongst drug-using women, rigorous and pragmatic intervention trials are required.

8.2.2 Limitations of respondent-driven sampling

RDS is both a recruitment and an analytic method. Although RDS has demonstrated advantages over other convenience and snowball sampling methods in terms of statistical validity and breadth of coverage in the field (Platt et al. 2006; Abdul-Quader et al. 2006; Abramovitz et al. 2009; Heckathorn 2011; Kendall et al. 2008), it remains subject to several analytical limitations. This section addresses several shortcomings related to the use of

RDS: (1) available estimators for the calculation of population-based estimates derived from RDS survey data; (2) the multivariate properties of RDS; and (3) potential violations of RDS statistical assumptions by combining two network samples. Since additional sources of bias in RDS data analysis were diagnosed and discussed in Chapter 4, they will not be addressed at length here.

First, there are potential biases associated with the RDS estimators used to make inferences from RDS survey data. In a comparative assessment of the empirical performance of different RDS estimators (i.e. RDS-I, RDS-II, and RDS-SS), Wirtz and her colleagues demonstrated that there were no substantial differences across the population prevalence estimates produced by the estimators after an appropriate recruitment depth was reached (see Chapter 4) (Wirtz et al. 2016). Since there is no consensus on which estimator is correct, estimator selection was made by consulting existing literature and current best practices in the field (Wirtz et al. 2016; WHO and UNAIDS 2014; Johnston and Luthra 2014; Tomas and Gile 2011). The RDS-II estimator has been shown to produce less biased estimates than RDS-I based on mathematical simulations (Heckathorn 2002; Gile 2011) and empirical data (Wirtz et al. 2016; Lachowsky et al. 2016). Nonetheless, it is important to acknowledge that none of the estimators can control for all potential biases in all circumstances. For example, recent simulation and empirical studies have demonstrated bias resulting from errors in participants' self-reported network size, which is a necessary measure used by the different estimators (McCreesh et al. 2012; Mills et al. 2014). However, this study did not measure potential errors in participants' self-reported network size in the current sample. As such, some sources of bias may have remained untested in this thesis. Wirtz cautions against over-reliance on the use of RDS estimators,

and encourages the reporting of both weighted and unweighted estimates (Wirtz et al. 2016). Due to space limitations, only unweighted estimates were reported for multivariate analyses in this thesis. For transparency, RDS-weighted estimates from multivariate analyses are reported in supplementary reference files available online.¹⁴

Second, the multivariate properties of RDS remain an area of development (Schonlau and Liebau 2012; Johnston et al. 2008; Wirtz et al. 2016; Johnston and Luthra 2014). Discussions are underway in the academic community on how to advance the use of RDS data in multivariate analyses (Gile, Johnston, and Salganik 2015; Wirtz et al. 2016; Platt, Luthra, and Frere-Smith 2015; Heckathorn and Cameron 2017). However, there is currently no consensus among statisticians as to whether RDS data can be appropriately weighted for complex (i.e. multivariate) analyses, and thus there is no standardised software for producing or testing the significance of adjusted odds ratios (Johnston and Luthra 2014). This thesis relied on current best practice (Johnston and Luthra 2014; WHO and UNAIDS 2014), which proposes that weights calculated using a carefully-selected estimator are applied to multivariate models to adjust for some biases. Furthermore, it is suggested that multivariate analyses be conducted with weights, and then repeated without weights to compare estimates, as was done in this thesis (Johnston and Luthra 2014). Notwithstanding the efforts taken to minimise potential biases related to complex analyses of RDS data, some biases may remain. Thus, findings from multivariate models in this thesis may not be applicable to all women who inject drugs in Indonesia, and should be interpreted with caution.

¹⁴ RDS-weighted estimates from multivariate analyses conducted in this thesis are available at the following link: <https://drive.google.com/open?id=1yvX0g3l4JeeClyjsq4vGHNVMpCishjHc>.

Thirdly, biases may have been introduced by the combination of sub-samples from the Bandung and the Jakarta survey sites. Combining two network samples derived from an RDS survey can lead to unstable estimates if the two samples have different characteristics (Johnston and Luthra 2014). However, splitting the sample into two smaller sub-samples can result in a lower power and confidence than that calculated in the initial sample size. An option suggested in previous literature is to analyse several important variables for each of the two sub-samples (i.e. Jakarta and Bandung) (Johnston and Luthra 2014). If the estimates based on the two samples are similar, the data can be combined and analysed as one sample. To minimise potential biases arising from the combination of network samples, this candidate analysed the two sub-samples on all key outcomes, and investigated the influence of key parameters, such as recruitment depth, homophily, and bottlenecks on population estimates, by survey city (see Chapter 4). No significant differences in estimates were observed on most of the outcome measures in this thesis between the two sub-samples from Jakarta and Bandung. However, differences of more than 10% were detected for several explanatory and background variables. Thus, a two-pronged approach was applied. First, the computation of RDS-weighted proportions and diagnostics such as homophily, convergence, and bottlenecks was performed on the different network samples for key explanatory and outcome variables, as is standard practice in RDS literature (Gile, Johnston, and Salganik 2015). Secondly, to retain the power and precision of the calculated sample size, the two network samples were merged and multivariate analyses were performed on the full dataset.

8.2.3 Reliance on self-report

This study relied on self-report for all measures included. Self-reported measures contain

risk of recall and social desirability bias, particularly illicit or illegal behaviours (i.e. drug use) and taboo topics (i.e. sexual practices, IPV, and HIV status) (Needle et al. 1995). Socially-motivated misreporting can occur as survey participants are more likely to under-report socially undesirable activities and over-report socially desirable ones, thus skewing survey data (Lee and Renzetti 1993). Recall bias can occur in studies with retrospective design where participants are required to provide responses that depend on their ability to recall past events (Althubaiti 2016).

A common robustness check is triangulation of certain self-reported measures with medical records or with laboratory-confirmed test results (for example, in the case of STIs or HIV serostatus). In the present study, this was complicated by the inability to collect biological samples due to ethical, practical, and financial concerns. Nonetheless, several alternative strategies were employed by this candidate to reduce potential biases associated with self-report and improve the validity of measures in this study. Following recommendations from previous research with drug-using and other stigmatised populations (Broadhead et al. 1998; Salmon, Brown, and Pederson 2010; Souleymanov et al. 2016), this study utilised trained female peer interviewers recruited from the local community of women who use drugs (see Chapter 3). This strategy has shown success in terms of improving rapport and trust between interviewers and participants, which in turn increases the chances that participants provide honest responses. Furthermore, since the presence of by-standers can increase participants' discomfort and compromise confidentiality (Krumpal 2013), the field team made every feasible effort to ensure that interview locations were, in every case, comfortable, private, safe, and chosen by the participants themselves. Interview locations frequently included private spaces within

participants' homes and offices of collaborating non-governmental organisations. Finally, this study used a community-based participatory approach at all stages of the research process, as described in detail in the Methodology chapter of this thesis (Chapter 3). This approach further ensured that interview questions were worded in a neutral, non-judgemental, and easily-understood manner, and that interview processes prioritised participants' confidentiality and data protection. Together, these strategies sought to reduce social desirability bias and increase participants' comfort in relation to sensitive questions, thus generating more valid data.

Furthermore, to reduce the risk of recall bias, this candidate considered cases where recall errors were most likely to occur (Althubaiti 2016), and carefully applied these considerations to the selection of measures and scales used in the questionnaire. For example, length of recall period was a key consideration when selecting scales assessing sexual and drug-related behaviours, as well as those measuring violence victimisation (Latkin and Vlahov 1998). Longer recall periods (e.g. lifetime) carry a higher risk of erroneous reporting than measures requiring shorter recall periods (Althubaiti 2016). The recall period can also be stratified according to participant demographics and the frequency of events they experience (Althubaiti 2016). One example of this is the assessment of injection risk practices among people who may inject several times a day, week, month, year, or lifetime. In this case, shorter recall periods (e.g. past year, past month) were used to capture the behaviour being assessed. Another example is the IPV measure used in this study. The literature review conducted for this thesis (Chapter 2) identified several methodological discrepancies and limitations in previous studies in regard to measures for IPV. These included: use of non-standardised, investigator-designed

questionnaires; focus on lifetime, rather than recent, history of violence; broad definitions of gender-based violence that comprised abuse that occurred in childhood and adulthood; and definitions that aggregate all forms of IPV into one construct, thereby limiting the ability to isolate the effects of psychological, physical, and sexual IPV. This thesis aimed to minimise these limitations by using the short form of the Revised Conflict Tactics Scale (CTS2) (Strauss, Boney-McCoy, and Sugarman 1996; Strauss and Douglas 2004), a standardised and cross-culturally validated instrument. The CTS2 assessed recent IPV using psychological, physical, injurious, and sexual subscales. Assessing shorter violence victimisation time-frames (i.e. past 12 months), and clearly defining partner-perpetrated violence, ensured more precise analyses and enabled the isolation of the effects of different forms of victimisation. To further reduce potential biases associated with self-reporting and ensure that informed consent requirements were met, participants who were visibly intoxicated or under the influence of drugs were offered to reschedule the interview.

8.2.4 Mobile-assisted data collection

This study used mobile devices (low-cost tablets) that automatised data entry, monitoring, and storage. The platform used, Open Data Kit, is optionally encrypted and password-protected to ensure optimal confidentiality and data protection (Hartung et al. 2010). Mobile-assisted data collection enabled the development of complex sets of questions and skip patterns, which simplified the questionnaire for relevant subsets of respondents. While the use of mobile devices (tablets) for data collection resulted in improved data quality and minimal missing data (< 1%), it remains unclear whether their use improved reporting of highly-stigmatised, illicit/illegal or otherwise sensitive behaviours. Previous

experimental field studies suggest that computerised and self-administered survey modes do increase levels of reporting of socially stigmatised or undesirable behaviours, including sexual behaviours and substance use (Krumpal 2013). This study provided participants with the option of either receiving interviewer assistance with using the mobile device, or having the interviewer complete the questionnaire on the tablet based on the participant's response. Participants opted for different modes of responding to the questionnaire depending on age and literacy levels. Thus, while the flexibility of the data collection methodology employed in this study ensured participants were comfortable with the instrument and able to complete the full questionnaire, the survey did not collect process data on how these different modes of survey administration may have affected response rates for sensitive questions. Further research is needed to explore how mobile-assisted data collection shapes the quality of self-reported behaviours among drug-involved women.

8.2.5 Lack of validated scales

Where possible, this study used scales previously used among drug-involved persons in Indonesia (i.e. Blood Borne Virus Transmission Risk Assessment Questionnaire to measure injecting risk practices; Center for Epidemiologic Studies Depression Scale to assess clinically-significant depressive symptoms). However, this was not possible for all measures in the study, as detailed in the Methodology chapter (Chapter 3). In cases where no validated scales in Indonesia were available, measures and constructs used previously in samples of drug-using women in neighbouring countries and for which good reliability had been established were selected. An example of this is the use of The Revised Conflict Tactics Scale for measuring IPV. These were further adapted in a series of pilot studies prior to

their inclusion in the questionnaire instrument. Extensive piloting with women who inject drugs was conducted to ensure that these measures were appropriately worded for female participants and captured researchers' intended meaning. Piloting was crucial, since even the most rigorously validated scales may not perform well in populations that are different from the validation sample. For instance, measures for several drug-related factors, particularly as related to initiation into drug injecting and drug use contexts and socio-demographic characteristics, were adapted from national bio-behavioural surveillance studies in Indonesia to allow for comparison and contextualisation of study findings.

8.2.6 Translation

Despite ensuring careful translation and back-translation from the local language following WHO recommended best practices (World Health Organization 2017), translation errors cannot be discounted. This study sought to minimise any translation errors by holding all interviews in the local language, Bahasa Indonesia. Additionally, it ensured that community input into the questionnaire and extensive interviewer training was provided. A lengthy process of deliberation regarding the wording and intended meaning of questions took place among the peer research team to ensure that all members were in agreement on all aspects of the questionnaire. Where participants did not understand questions, interviewers were asked to clarify. Interviewers were provided with standardised clarification answers, which were regularly revisited and discussed throughout survey administration. Interviewer bias associated with clarifications of translated version of the questionnaire were additionally minimised by holding regular coordination meetings with the field team and revising data quality and participant engagement.

8.2.7 Limitations related to full-sample analyses

There may be biases introduced by conducting full-sample analyses using the receptive syringe sharing and sexual risk outcome measures. Specifically, the analyses presented in the three stand-alone papers may be underestimating rates of sexual risk behaviours (papers 1 and 3) and past-month receptive syringe sharing (paper 2) by including women who were not sexually active in the previous year and women who did not inject drugs in the past month in the comparison groups. In papers 1 and 3, the outcomes of interest, namely *engaging in sexual risk behaviours* (i.e. condomless sex at last intercourse, inconsistent condom use, STI symptomatology, multiple sexual partners, and survival sex work) was compared to the rest of the sample of women *not engaging in sexual risk behaviours* (i.e. women who were not sexually active in the previous year, used a condom use at least intercourse, used condoms consistently, did not have STI symptoms, had one or no sexual partners, and did not engage in survival sex work). Furthermore, in paper 2, the outcome of interest, namely *past-month receptive syringe sharing*, was compared to the rest of the sample (i.e. women not injecting in the past month or those injecting, but not engaging in receptive syringe sharing). In this sense, the analyses in this thesis focused on identifying associations between syndemic factors and sexual or injecting risk behaviours, and considered the absence of sexual activity in the previous year or of injecting in the previous month as protective behaviours. A further limitation relates to the IPV scale, which assessed IPV victimisation and perpetration in relation to women's steady partners. This definition potentially resulted in the underreporting of IPV victimisation perpetrated by casual or transactional intimate partners, which was not assessed in this study. Moreover, the reference category for the IPV victimisation constructs used in analyses in this thesis included both women who did not experience IPV and had steady

partners, and women who did not have steady partners. However, using the full sample for analyses increased the power of the study and enabled the computation of complex analyses for the empirical papers. Where the full sample was used in analyses, the reference categories for each measure were reported in full in the papers submitted for publication in order to ensure full transparency regarding the inferences that can be drawn from the data.

8.3 Directions for future research

This study's findings have several implications for future research. Firstly, this study represents the first step in developing a rigorous problem theory for syndemic impact on HIV risk among women who inject drugs in Indonesia. Longitudinal data are needed to test the temporal relationships of associations observed in this thesis (Kleinbaum, Kupper, and Morgenstern 1982), and assess potential causal mechanisms to be subsequently addressed through intervention research. Such research is urgently needed in the Indonesian and South East Asian contexts, as well as in other regions with expanding HIV epidemics among populations of people who inject drugs, such as Eastern Europe (UNAIDS 2016). Longitudinal analyses would enable testing of potentially modifiable pathways and theories of change for HIV-related risk behaviour among drug-using women. Such analyses would be the next step to informing evidence-based interventions and service provision.

Subsequent to longitudinal research, rigorous and controlled intervention studies are required in order to determine the effectiveness of existing policies and services in addressing syndemic risks among substance-involved women. Ideally, such studies would apply randomised community-based controlled trial designs, with sufficient follow-up time

to determine sustainability of intervention effect (Weir et al. 2009; Tirado-Munoz et al. 2015). These trials would also be supplemented with qualitative evidence, in order to address concerns around the acceptability and community relevance of targeted interventions. There are presently no studies of this kind in the region, and this would be an important area of research. All future studies should meaningfully engage communities of women who use drugs at all stages of design, implementation, and dissemination.

In the absence of longitudinal and RCT studies, cross-sectional datasets can be more effectively analysed using robust methods that manage unobserved confounding to test hypothesised synergistic pathways (Tsai and Burns 2015). The majority of studies testing syndemic mechanisms on women's HIV outcomes identified in the literature review (Chapter 2) were cross-sectional. Among these, only one study formally tested synergism among hypothesised syndemic pathways using a product term in a multiplicative regression model (Oldenburg, Perez-Brumer, and Reisner 2014). All other existing studies addressing syndemics in drug-involved populations used some version of the "syndemic count variable" approach (i.e., sum score corresponding to the total number of health problems). The latter approach can indicate added risk, but cannot assess the extent to which syndemic problems interact to magnify negative health outcomes. For this reason, it has been criticised as being too simplistic (Rajaleid, Imre, and Johan 2011). Future analyses could maximise rigorous cross-sectional datasets by extending "count variable" approaches to calculate measures of multiplicative interaction (i.e. using product terms) and assess departure from additivity through metrics of additive interaction (i.e. RERI, AP, and S) (Rothman, Greenland, and Lash 2008).

The literature review presented in Chapter 2 identified a substantial body of research in support of mutually-causal relationships between syndemic factors such as IPV, substance use, and depression, and HIV-related outcomes (Kouyoumdjian et al. 2012; Gilbert et al. 2015), suggesting that the observed associations in this thesis could also be bi-directional. As a case in point, analyses presented in Chapter 3 revealed that IPV victimisation was associated with engagement in HIV risk behaviours such as survival sex work and having multiple sexual partners. However, the opposite is also highly plausible: Indonesian drug-using women's participation in survival sex work can trigger the onset of IPV due to the unequal, and often violent contexts in which sex work takes place. This plausibility has important implications for public health practice, particularly in contexts of limited resource availability. If two factors are synergistic (i.e. interdependent on one another to produce a greater effect on the outcome than each exposure alone), but not bi-directional, it is possible, as Tsai et al. (2017) have argued, that ameliorating either one of the factors through a single-component intervention would suffice to ameliorate HIV outcomes. However, if the factors are also bi-directional, (i.e. they exacerbate one another and have reciprocal relationships with HIV), effective HIV prevention would necessitate multicomponent interventions that target both risk factors in concert. Although testing for the reciprocal associations between syndemic risk factors and HIV-related outcomes among Indonesian women who inject drugs was outside the scope of this doctoral study, it is a noteworthy area of focus for future analyses.

Further to this, future research should also investigate of the role played by large-scale social forces operating at the community and structural levels – drug legislation, poverty, mass incarceration, and beliefs about gender roles – in producing, perpetuating, and

potentially ameliorating syndemic risk factors in the context of HIV and AIDS. Social and structural influences are likely to have a substantial impact on shaping individual-level behaviours, especially in contexts with punitive drug policies. The analytical approach used in this thesis sought to contribute to the problem theory for drug-using women's HIV risk behaviour in Indonesia, by testing whether the clustering of substance use, IPV, and poor mental health has syndemic and synergistic effects on HIV outcomes. The focus on these particular syndemic factors, to the exclusion of broader social forces, was informed by previous research pointing to the so-called SAVA syndemic as the key locus of intersecting risk for this population in other settings (see Chapter 2), the lack of quantitative research on this topic in Indonesia, and the range of variables available in the current dataset. Furthermore, the potential utility of the analyses undertaken for Indonesian practitioners and policy-makers was also considered. The acceptance of violence against women, mental health challenges, and substance use as proximate risk factors for women's negative health outcomes (versus, for example, beliefs about gender roles) renders these risk factors more amenable to intervention. Nevertheless, the omission of key structural aspects is a notable limitation of the analytical approach. Modelling the impact of structural factors on the syndemic associations observed in this doctoral study would be the logical next step in establishing a more nuanced problem theory for HIV among women who inject drugs in Indonesia. For example, men's beliefs about gender roles and power imbalances within relationships are established risk factors for IPV in several settings (El-Bassel et al. 2011; Montgomery 2013; Shannon et al. 2012). These adverse factors may also be most likely to impact violence against women in contexts like Indonesia, where women are structurally disadvantaged and such violence is often socially tolerated. One could argue that if these harmful structural conditions were diminished through cultural, economic, and legislative

changes, individual and relational risk factors may also be mitigated at the population level. The theory of syndemics, and, specifically, its concept of disease interaction, involves multiple levels of analysis (Tsai et al. 2017; Singer et al. 2017). Understanding the adverse impacts of structural conditions that could be mitigated through longer-term cultural, economic, or legislative interventions at the level of populations using multi-level modelling could have greater impact than modifying syndemic factors at the behavioural level alone. Such an approach could achieve more efficient population-level prevention of the disease burden wrought by syndemics (Tsai and Burns 2015).

Thirdly, multiple factors in the interpersonal, social, and environmental domains of women's lives were addressed in the questionnaire (Appendix 2), but were not reported in this thesis. These are relevant areas for future analyses and research. One factor in particular that will be analysed using this dataset in future papers is that of perceived social support from peers, partners, and family. Previous studies with substance-involved women in the US have been inconclusive on the role played by social support in modifying the effects of substance use, mental health, and HIV syndemics (Illangasekare et al. 2013; Wagner et al. 2009). Initial analyses suggest significant associations between social support and HIV risk outcomes, and indicate that social support may partly mediate the relationship between mental health problems and HIV risk in this sample. Furthermore, given that this study stems from the need to develop appropriate programmes for women who inject drugs, the omission of variables depicting access to and uptake of current health services (e.g. sexual and reproductive health and harm reduction) limit current analyses. Previous research with women who use drugs in the U.S. has observed that inequitable access to health care can negatively impact drug-involved women and increase risk for adverse

health outcomes (Gonzalez-Guarda et al. 2011). Initial analyses using the present dataset indicate that limited access to harm reduction services may moderate the relationship between syndemic exposure to IPV, crystal meth, and depression on Indonesian drug-using women's HIV risk outcomes, and warrants additional attention. The inclusion of service-related factors in future analyses may provide important insights into HIV risk dynamics amongst this population. Other environmental/structural factors were indicated by this dataset to have relevance for drug-using women's HIV risk, and require additional attention in future analyses. They include: policing practices, arrest and incarceration, injecting in public shooting galleries, and childhood trauma. These areas of research were beyond the scope of this thesis but could help further inform the problem theory of HIV risk among women who inject drugs. This candidate has developed strong partnerships with governmental, academic, and community stakeholders and plans to build on this research as part of her postdoctoral studies.

Fourthly, there are several sub-populations of women who use drugs that may experience additional vulnerabilities, and thus warrant further research and analyses. Compared with their HIV-negative counterparts, injection drug-using women living with HIV and aware of their status reported higher rates of receptive syringe sharing (Chapter 5) and were twice as likely to engage in sexual risk-taking behaviours (Chapter 4). This sub-group of women living with HIV, who may or may not be accessing antiretroviral medication or be virally suppressed, yet engage in high-risk behaviours, should be the focus of future research. Second, the overlap of sex work and drug use should be explored in further analyses, since research in the region has identified high rates of mental health challenges (Gu et al. 2010), high-risk behaviours (Gu et al. 2011), and added environmental risk associated with sex

work risk environments (Gu et al. 2014) among women who inject drugs that trade sex. Third, it is unclear which factors shape HIV-related risk behaviours for incarcerated drug-using women or women in other closed settings such as mandatory drug treatment centres. Anecdotal data suggest that women in these high-risk, often violent environments may experience additional vulnerabilities to drug-using women in the community (Open Society Foundations 2012; Rahmah et al. 2014) and thus merit further investigation. Moreover, this study linked women's younger age with increased odds of sexual risk-taking (Chapter 4); future research could focus more specifically on younger women. Fourth, women who use drugs and are pregnant or have young children merit special focus in future research studies, given the effects of certain substances such as methadone and heroin on reproductive health, and the increased rates of sexual risk behaviour among pregnant, substance-involved women identified in U.S. studies (Martinez et al. 2017). Fifth, three women in this study reported having both male and female sexual partners, but due to the small sample size we could not investigate whether or how this affected their HIV risk behaviour relative to other women. Women who have sex with women may have different HIV risks, but data on their sexual and drug use practices remain extremely limited and warrant further attention (Tat, Marrazzo, and Graham 2015). Finally, this study did not include transgender women because formative research indicated early on that this population has separate social network structures. However, given that transgender women are a high burden population for HIV (Baral et al. 2012) research addressing the role of syndemics in the Indonesian transgender population may be warranted.

Lastly, future research on this topic would benefit from a number of improvements and innovations. First, future studies should test HIV serostatus by including anonymous HIV

counselling and testing as well as testing of common co-morbidities such as viral hepatitis and tuberculosis, in addition to self-reported behavioural outcomes. Laboratory testing was not included in the present study due to cost implications, practical and logistical challenges, and ethical complexities. However, anonymous testing of multiple co-morbidities, including HIV, has been successfully included in national surveillance studies with people who inject drugs in Indonesia (Ministry of Health 2015). In addition to testing, future research could also monitor a number of HIV-related treatment outcomes such as viral load, enrolment, and adherence to antiretroviral treatment among women injecting drugs who live with HIV. Moreover, large-scale, rigorous quantitative research is needed to determine the effects of syndemics on a wider range of health outcomes than HIV risk. For example, emerging research in Malaysia has identified associations between suboptimal HIV testing and/or monitoring and co-occurring interpersonal violence, psychiatric illness, and child sexual abuse (Loeliger et al. 2016). These findings suggest that syndemics may play a role in perpetuating numerous health-related disparities among women in the region, and warrant further exploration in relation to a broader range of outcomes. Such studies may be especially effective if carried out in parallel with existing national bio-behavioural surveillance efforts.

8.4 Implications for policy and programming

This study has several implications for policy and practice. First, papers 1 and 2 highlight the high burden of IPV victimisation among injection drug-using women. They further demonstrate that such victimisation elevates HIV risk behaviours. It is clear that this population has been under-served thus far, despite implementation of harm reduction programmes aimed at reducing sexual and injecting HIV risk in Indonesia for over a decade

(Indonesian National AIDS Commission 2014). This reflects potential deficiencies and sub-optimal integration among existing health and HIV services, limited resources, weak health systems, and unresponsive referral mechanisms.

It is important to acknowledge that women who inject drugs are a highly vulnerable group experiencing multiple, overlapping health disparities, and should receive targeted services for the screening, prevention and response to IPV and HIV. Emerging research, mostly conducted in the U.S. and sub-Saharan Africa, suggests that integrated behavioural IPV and HIV interventions may be effective in reducing sexual HIV risks among women (Gilbert et al. 2015). However, few interventions to date have focused exclusively on women who use or inject drugs. Among interventions that target substance-involved women, brief behavioural interventions and couple-based interventions have been found to reduce syndemic risks for IPV and HIV. One such example is Women's CoOP, an integrated HIV and sexual safety intervention, which reduced risky sex, drug use, and victimisation among women who sell sex and use drugs in South Africa (Wechsberg, Luseno, and Lam 2006). Another recent RCT found that WORTH, a 4-session group-based integrated HIV and IPV prevention intervention for drug-using women under community supervision in the U.S., significantly reduced both condomless sex acts and IPV, compared with an attentional control condition (El-Bassel, Gilbert, and Goddard-Eckrich 2014). Careful testing and evaluation of interventions in drug-using female populations in Indonesia and other low- and middle-income settings is needed in order to ensure cultural appropriateness, effectiveness, and sustainability.

Second, Paper 3 has identified syndemic mechanisms by which IPV interacts with poor mental health and crystal meth consumption to exacerbate women's HIV risk outcomes.

These findings speak to the importance of considering multiple simultaneous and synergistic health risks in vulnerable populations, as shown in this study. Strengthening referral mechanisms in existing health systems would be a first step in improving quality and coverage of existing prevention and support services for drug-using women in Indonesia. This would be in line with the provisions of article 12 of the 1979 Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), which state that women must have access to health care services equivalent to the access enjoyed by men. However, in order for existing programmes to be more accessible to women, modifications to existing models of service delivery and the mobilisation of peer networks of women to ensure their sustainability and relevance are also required (Blankenship et al. 2015). Often these modifications are minor, require little extra cost, and include onsite childcare, employing female and non-judgmental staff, offering mobile services, and locating in relatively safe and discrete areas (Pinkham, Myers, and Stoicescu 2012). A promising example is Ladies' Night, a drop-in program for precariously-housed, drug-using women in San Francisco that combines integrated HIV prevention services, a safe women-only space, community building, and drug law advocacy (Magee and Hurliaux 2008).

Given the high rates of depression identified by this study, and the known bi-directional links between mental health and drug use, IPV, and HIV risk (Beydoun et al. 2012; Gu et al. 2010), it is particularly important for links between existing harm reduction and mental health services in Indonesia to be improved. Intervention research has demonstrated that reductions in trauma and mental health symptoms have shown some success in improving substance-using women's outcomes (Hien, Jiang, and Campbell 2010), including by reducing re-victimisation (Johnson, Zlotnick, and Perez 2011) and risky sexual behaviour

(Amaro, Larson, and Zhang 2007; Sikkema, Wilson, and Hansen 2008). Several U.S.-based trauma-informed interventions have been assessed over the past decade in relation to syndemic health problems (Gilbert et al. 2015). The most widely tested of these is Seeking Safety, a trauma-focused integrated treatment programme that significantly reduced substance use and trauma-related symptoms across different female populations (Torchalla, Nosen, and Rostam 2012). However, few of these interventions are culturally congruent, and none have been tested and culturally-adapted with drug-using women in Asia. In addition, few studies have assessed efficacy of combined pharmacotherapy and behavioural interventions for syndemic factors in this population. These limitations provide strong opportunities for future research and interventions.

Third, pending longitudinal data, this thesis's results provide new empirical evidence in support of multicomponent interventions that combine behavioural and biomedical HIV prevention while addressing contextual factors in the risk environment (Blankenship et al. 2015; Wechsberg et al. 2015). It is evident that in order to achieve a large-scale population effect in reversing key syndemic mechanisms, there is a critical need for structural, combination interventions. These interventions should be aimed at primary prevention of IPV victimisation and HIV prevention in communities disproportionately affected by substance use (Gilbert et al. 2015). The service delivery system is an important locus for multicomponent interventions. Settings amenable to such interventions within the health care system include opioid substitution therapy clinics, needle syringe programmes, and spaces for safe drug use and drug treatment. In the Indonesian context, punitive drug policies that prioritise the criminalisation of people who use drugs have been shown to drive drug-using populations further away from health and support services due to fear of

arrest (Stoicescu and Ameilia 2015). High rates of gendered discrimination and abuse faced by women who use drugs in both health and criminal justice settings may further exacerbate their adverse health outcomes (Sari and Nurmaya 2009). Thus, in order for integrated interventions to be accessible and beneficial to this highly-stigmatised community, they must be supported by conducive national and international policies. Such policies should be aligned with improving the health and psychosocial wellbeing for vulnerable drug-using populations.

Lastly, by contributing to the problem theory for informing multicomponent and combination interventions, the results of this thesis support international UN development policy. Specifically, the 2016 – 2021 UNAIDS Strategy calls for “90% of people who inject drugs to have access to tailored combination prevention services” by 2020 (UNAIDS 2015). Furthermore, in support of the 2030 Agenda for Sustainable Development, the 2016 United Nations Political Declaration on HIV and AIDS makes a commitment to “reduce new HIV infections to fewer than 500,000 globally” by 2020 (United Nations General Assembly 2016). The Declaration also recognises the importance of expanding access to those who need it most, including by “reaching all women, adolescent girls and key populations with comprehensive HIV prevention services, including harm reduction by 2020.” These goals cannot be realised, particularly among key affected populations such as people who inject drugs, without addressing the disproportionate burden of health disparities faced by women who inject drugs.

8.5 Dissemination and impact

Strategic dissemination, knowledge exchange, and impact were among the main goals of this thesis. The evidence stemming from this thesis has been reported to researchers, community-based partners, service providers, and policy-makers in Indonesia and internationally. Dissemination efforts to date have included: submitting publications to peer-reviewed journals, presentations at conferences and high-level meetings, talks at universities, advocacy platforms and local/ national organisations, and targeted dissemination to the community of women who use and inject drugs, service providers, and Indonesian government stakeholders.

Two peer-reviewed papers based on this thesis have been published (papers 1 and 2), and the third is currently under review in a scientific journal (paper 3). Analysis and write-up of 3 additional first author manuscripts based on the Perempuan Bersuara dataset is currently underway. A full list of publications and presentations arising from this thesis is included at the beginning of this thesis. Findings from accepted papers will be turned into infographics in English and Bahasa Indonesia that make findings more accessible to non-academic audiences (see Figure 8.2). These infographics will be published on the websites of collaborating community following the publication of the papers. Parts of this thesis research and participatory methodologies have been featured in commentary in a peer-reviewed journal as an example of best practice in community-based participatory research with key populations (Pierce et al. 2015), and presented at a workshop at the 2016 International AIDS Conference in Durban, South Africa.

Figure 8.2: Sample dissemination materials: infographics (left) and policy report (right)



The analyses and methodologies used for this thesis were presented by this candidate at 6 national and international conferences, in the form of first author oral and poster abstracts. These included: 22nd International AIDS Conference in July 2018 (poster discussion), 25th International Harm Reduction Conference in May 2017 (oral presentation), 21st International AIDS Conference in July 2016 (two poster presentations and one workshop), 24th International Harm Reduction Conference in October 2015 (two poster presentations), 5th National AIDS Summit in October 2015 (oral presentation), and Southeast Asia Studies Symposium in April 2016 (oral presentation). Academic presentations included a seminar at the Department of Social Policy and Intervention in Oxford (March 2016) and a public lecture at Atma Jaya University in Jakarta, Indonesia (April 2014).

Findings and participatory methods from this study were also presented at strategic high-level meetings and consultations. First, reflections on community-based participatory methods as applied in this research were invited for presentation at a Central European University best practice workshop (September 2017); the workshop was a first step toward producing an edited edition on the gendered aspects of drug use and policy. Second, this

candidate has engaged in targeted policy outreach with the aim to providing direct input into donor programming and national policies. The early involvement of affected communities, policy-makers, and practitioners in this research project was central to ensuring the uptake and relevance of this research. Preliminary findings have been submitted in writing and presented to the Indonesian Ministry of Law and Human Rights and the National Commission on Violence Against Women as part of a consultation to inform Universal Periodic Review (UPR) and the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) reporting (September 2016). Third, preliminary data from this thesis were presented to UN Women and the Indonesian National Positive Women Network as part of an expert group meeting to inform the drafting of national guidelines for the integration of violence screening into HIV prevention programming (December 2014). Fourth, preliminary research findings facilitated the inclusion of injection-drug using women as a target group for intervention and funding allocation by The Global Fund to Fight AIDS, Tuberculosis and Malaria (December 2016). Lastly, findings from this thesis were presented to Indonesia's National Intergovernmental Working Group on Gender and Human Rights, which comprises representatives from all government ministries (March 2015).

A key component of dissemination for this project involves reporting findings to community-based collaborating organisations and organisations of people who use drugs. This portion of the dissemination strategy was carefully planned with community partners from the start of the project. It included (1) the production and dissemination of a policy report¹⁵ presenting descriptive findings and visuals for a general audience (see Figure 8.2).

¹⁵ The English version of the publication "Women Speak Out: Understanding Women Who Inject Drugs in Indonesia" can be accessed at: http://korbannapza.org/files/pdf/WomenSpeakOut_English_Web.pdf.

This report was launched in Jakarta in December 2016 to an audience of over 25 key policy-makers from the Ministry of Law and Human Rights, Ministry of Health, Ministry of Social Affairs, National Narcotics Agency, British Embassy, and National AIDS Commission, as well as community leaders; (2) a workshop based on this project's findings alongside a photography exhibition by and for the drug-using female community, which was held in May 2017; and (3) two short documentary films related to the topics covered in this thesis, and co-produced by this candidate. One of the films has already been launched and disseminated in international settings. The second film, which follows the lives of three drug-involved women, remains in the planning stages. Furthermore, this candidate has secured funding toward further public engagement and dissemination from the Pierre Elliott Trudeau Foundation. This will allow for the opportunity to engage in local dissemination tailored to relevant government departments, service providers, and local communities of drug-using women.

8.6 Conclusion

This study provided a better understanding of the relationships between IPV, poor mental health, substance use, and HIV risk outcomes among women who inject drugs in Asia. Findings highlight the urgent need for countries in the region, particularly Indonesia, to identify female injecting drug user populations, support follow-up longitudinal research, and deliver appropriate and relevant interventions. They also highlight the immediate need to strengthen referral mechanisms among existing services, and expand programmatic responses to HIV and related syndemics from single-component services to integrated, multicomponent programmes that address concurrent health afflictions. Such efforts must be coupled with rigorous process and outcome evaluations. Longitudinal research to

inform targeted interventions is also urgently needed. In particular, future studies can contribute to this field by grounding hypotheses in ecological and intersectional frameworks, utilising theories of change, and accounting for literature- and theory-informed confounders. While cross-sectional design limits inferences about causality, as the first representative, large-scale quantitative study on HIV risk among women who inject drugs in the Indonesia, this thesis has important implications for future longitudinal studies, practice, and policy. It is hoped that findings from this thesis will contribute to shaping directions in future research and inform the development of appropriate, integrated services for drug-using women in Indonesia and globally.

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CHAPTER 9. APPENDICES

Appendix 1: Summary of consultations with experts, practitioners, and community organizations

Expert name	Affiliation	Date & mode of consultation	Consultation topic and contribution
1. Professor Irwanto	HIV/AIDS Research Centre, Atma Jaya University	Several in-person meetings & email exchanges Dec 2012 – Dec 2013	- Study feasibility, funding and partnerships; - Selection of sampling methods and geographical focus areas; provision of service data on women.
2. Professor Ignatius Praptoraharjo	HIV/AIDS Research Centre, Atma Jaya University	Several in-person meetings Dec 2012 – Dec 2013	- Selection of field coordinators and seeds; suggestions for suitable interview locations; - Advice on benefits and drawbacks of respondent driven sampling as previously applied in Indonesia; - Study logistics and geographical mapping.
3. Gabriella Anindita	HIV/AIDS Research Centre, Atma Jaya University	Several in-person meetings, phone calls, and email exchanges Dec 2012 – Dec 2013 & throughout study implementation in 2014-2015	- Identification of locally validated mental health scales and constructs; - Support with grant preparation for the study and provision of research assistance; - Volunteer assistance with group counselling for the peer research team.
4. Irawati Atmosukarto	Coordinator for Research and international Partnerships, National AIDS Commission	Several in-person meetings and email exchanges Dec 2012 – Dec 2013	- Support with in-country research, funding, and government contacts; - Support with securing commitment of National AIDS Commission and input on research proposal.
5. Nafsiah Mboi	Former Minister of Health, Secretary of the National AIDS Commission	In-person meeting on 20 September 2011, and follow-up email exchange in Dec 2012	- Support with in-country contacts; - Provision of official letter endorsing the study for governmental research permit.
6. Arif Iryawan	Monitoring and Evaluation Coordinator, National AIDS Commission	Several in-person meetings and email exchanges Dec 2012 – Dec 2013 & throughout study implementation in 2014-2015	- Support with design of study instrument, and selection of appropriate measures and constructs;

			- Training support for the peer researcher team; - Identification of local partners, seeds, and key stakeholders at the local level.
7. Professor Budi Utomo	Public Health Faculty, University of Indonesia & Research Adviser, Indonesian government	In-person meeting, December 12, 2012 and several follow-up email exchanges	- Measures and constructs for drug use, sexual behaviours, and socio-demographics; - Access to national surveillance data and questionnaires to inform study instrument.
8. James Blogg	Head of HIV Cooperation Program for Indonesia, Australian government	In-person meeting, December 12, 2012	- Input on study concept and design, particularly on outcomes and predictor variables most relevant to program and policy priorities in Indonesia.
9. Suzanne Blogg	Monitoring & Evaluation Officer, HIV Cooperation Program for Indonesia, Australian government	In-person meeting, December 12, 2012 and several follow-up email exchanges	- Access to unpublished national harm reduction program data for women; - Feedback on study concept and design; - Discussion on range of appropriate sampling methods.
10. Arie Rahadi	Independent Consultant and Researcher, Indonesia	Several in-person meetings and email exchanges Dec 2012 – Dec 2013	- Connections with research and governmental contacts; - Advised on study logistics, proposal development, budgets, and local organizational contacts.
11. Laura Milette	Independent Consultant and Researcher, Indonesia	Several in-person meetings and email exchanges Dec 2012 – Dec 2013	- Support connecting with local research, governmental, and organizational contacts; - Help with identifying unpublished qualitative studies and other relevant literature; - Sampling strategy and study logistics.
12. Halik Sidik	Provincial Program Coordinator for Jakarta & West Java, National AIDS Commission	Email exchange January 3, 2013 – April 17, 2013	- Contacts for provincial and municipal offices of the National AIDS Commission; - Support with governmental research permit application.

13. Cho Kah Sin	Country Director, UNAIDS Indonesia	In-person meeting on April 5, 2013	- Funding and dissemination support toward participatory community involvement.
14. David Bridger	Senior Adviser Human Rights and Gender, UNAIDS Indonesia	Several in-person meetings from April 2013 to April 2014	- Funding toward supporting participatory approaches and community consultation meetings; - Feedback on dissemination plan and engagement with other international stakeholders.
15. Syafirah Hardani	Coordinator of the Gender Taskforce, National AIDS Commission	In-person meeting, October 18, 2013, and follow-up email exchanges	- Input on effectively implementing community-based participatory approaches; - Access to attend and present research proposals, preliminary data, and final results at the inter-governmental Gender Taskforce.
16. Dr Riza Sarazvita	Director, Sub-Directorate of Substance Abuse Management & Prevention, Ministry of Health	Email exchange on January 11, 2012, and in-person meeting December 26, 2012.	- Proposal review and support with developing budget; - Contacts from relevant governmental agencies; - Feedback on study instrument, dissemination plan, and drafts of policy briefs.
17. Dr Siti Nadia Wiweko	Director, Sub-Directorate of AIDS & Sexually Transmitted Infections, Ministry of Health	In-person meeting on January 26, 2013	- Project administrative and logistical support; - Letters of reference for national research permit; - Feedback on study instrument.
18. Baby Rivona	National Coordinator, Indonesian Positive Women's Network	In-person meeting on December 6, 2012 and several follow-up email exchanges	- Selection of relevant constructs for analysis; - Support with study socialisation and grant development; - Input on community-based participatory strategies and suggestions for seed participants.

19. Naomi Tobing	Jakarta focal point, Indonesian Positive Women's Network	Several in-person meetings and email exchanges between January 2013 and May 2014	- Research assistance on logistics and coordination, and support with translation and coding of questionnaire; - Connections with key gatekeepers in the community.
20. Ade Aulia	National Program Officer, UNODC Indonesia	Email exchanges on December 5, 2013 and 7 September, 2015	- Funding and dissemination support for study findings in the form of trainings and publications.
21. Aditya Wardhana	National Coordinator, Indonesia AIDS Coalition	Email exchange November 19, 2012	- Contacts for potential drug user and community-based organisations, policy-makers
22. Suherto Sugiharto	Programme Manager, Indonesian Drug User Network	Several in-person meetings and email exchanges Dec 2012 – Dec 2013, and again through study implementation	- Provided key support to project, including project office and administration; - Connections to community contacts; - Support with questionnaire instrument translation and piloting, and study logistics.
23. Wulan Sekar Sari	Stigma Foundation	Several in-person meetings and email exchanges Dec 2011 – February 2013	- Input into participatory approach strategy, and initial planning of formative research; - Identification of key community contacts and unpublished literature in Indonesia.
24. Yusriani Taslim	Female Plus Bandung	In-person meeting on February 11, 2013	- Reach of existing services for women who inject drugs; - Acceptability of research among Bandung female drug users, and local contacts for engaging in formative research.
25. Dr. Sally Iskandar	Faculty of Medicine, Padjadjaran University	In-person meeting on February 10, 2013	- Shared previous experiences and challenges of conducting respondent-driven sampling study with people who inject drugs in West Java, Indonesia; - Provided advice on avoiding repeat enrolment and other RDS implementation logistics in the Indonesian context.

26. Anton Djadjaprawira	Director, Rumah Cemara	In-person meeting with his team on February 11, 2013	- Recommendations for formative research, seed selection, services, and study logistics in the Bandung study site - Sharing experience piloting mobile-assisted data collection.
27. Daniel Ramadhan	Director, Grapiks Foundation Bekasi	Email exchange March 19, 2013	- Recommendations for formative research, seed selection, services, and logistics in the Bekasi area of the study
28. Tono Hartono	Director, Grapiks Foundation Bandung	In-person meeting on February 14, 2013	- Mapping of female drug users reached by services in Bandung study site; - Recommendations for research assistance and study logistics in Bandung.
29. Wahyu Kresna	Director, Karisma Foundation	In-person meeting on March 20, 2013	- Piloting mobile-assisted data collection; - Recommendations for seeds and formative research.
30. Husen Muhamad	Director, Kios Atma Jaya	In-person meeting on February 21, 2013	- Community and gate-keeper contacts in North and West Jakarta study areas; logistical support for interviews; - Input on sampling method, strategies for avoiding double enrolment and other fieldwork challenges.
31. Dr. Sabarinah Prasetyo	Professor, Faculty of Public Health, University of Indonesia	In-person meeting on February 20, 2013	- Data on service coverage for women in South Jakarta and Depok, and suggestions regarding drug use hotspots.
32. Iriantoni Almuna	UN Women Indonesia	E-mail exchange on October 11, 2014	- Input into future factors for analysis and discussion of potential dissemination support.
33. Putri Tanjung	Counsellor, Rumah Sebaya Bekasi	In-person meeting on July 20, 2013	- Suggestions for seeds and potential peer interviewers in Bekasi and Jakarta; - Commitment of logistical support and private counselling rooms for interviewing during study implementation.

34. Sam Nugraha	Founder, Rumah Singga PEKA	In-person meeting on March 3, 2013	-Study logistics and planning in Bogor area; -Suggestions for seed identification, formative research, and contacts of local gatekeepers.
35. Lucky Pramitasari	Addiction Counsellor, Rumah Singga PEKA	In-person meeting on March 3, 2013	- Input on translated, locally-validated injecting and sexual risk measures and scales.
36. Pavlo Smyrnov	Alliance for Public Health	Several email exchanges between April 2013 and December 2013	- Methods for implementing peer-driven interventions, avoiding duplication and other anticipated fieldwork challenges; - Instructions and resources for adapting SyREX+ database for use with current study. - Support with learning how to prepare raw data for visual presentation in NetDraw.

Appendix 2: Survey questionnaire

The Bahasa Indonesia version of the questionnaire for this study was coded using the XLSForm tool (<https://opendatakit.org/use/xlsform/>) for conversion to the Open Data Kit Collect application (Figure 9.2.1). The instrument was subsequently piloted and administered on mobile tablets (Figure 9.2.2). Thus, the English language version of the questionnaire below is not formatted for field administration, and is for reference only.

Figure 9.2.1: Screenshots of the XLSForm tool used to code the questionnaire instrument for use with the Open Data Kit (ODK) Collect application on mobile devices

The figure consists of two screenshots of the XLSForm tool interface, showing the coding of a survey questionnaire. The top screenshot displays the 'PB_instrument_coded_full' spreadsheet, which is organized into columns for different types of questions and their corresponding labels and constraints. The bottom screenshot shows a detailed list of choices for various questions, including 'list_name', 'consent', 'provinci', 'seed', 'nama_pewawancara', 'pendidikan_tertinggi', 'status_hubungan', and 'jumlah_anak_kandung'.

type	name	label	hint	constraint	constraint_message	required	appearance
select_one	consent	Kepada pewawancara: harap anda sudah baca terlebih dahulu lembar informasi dan lembar persetujuan bersama dengan responden, dan responden sudah tanda tangani lembar persetujuan. Apakah si responden sudah tanda tangani lembar persetujuan?		not(selected({consent}, '2'))	Silahkan tutup kuesioner ini, dan mengisi formulir ketidaklayakan	true ()	
begin_group	start_info	Informasi dasar					field-list
note	start_03	Kepada pewawancara: tolah informasi dibawah ini sebelum memulai wawancara:					
select_one	provinci	Provinci				true ()	
text	kota_kabupaten	Kota/Kabupaten:				true ()	
text	lokasi_wawancara	Lokasi wawancara:				true ()	
select_one	seed_not_seed	Tipe responden:				true ()	
text	id_responden	ID Responden:	Sesuaikan dengan ID				
begin_group	start_info	Informasi dasar					field-list
note	start_pewawancara	Nama anda dan tanggal hari ini:					field-list
select_one	nama_pewawancara	Nama dan ID pewawancara:				true ()	
text	tanggal_wawancara	Silahkan pilih tanggal wawancara:				true ()	
begin_group	start_info	Informasi dasar					field-list
text	start_0-3	Mari kita mulai! Apa pun yang anda ceritakan tentang diri anda akan dijaga kerahasiannya. Hal ini berarti kita tidak akan melaporkan nama asli anda. Anda dapat memilih untuk memberi tahu kami nama asli atau nama samaran kepada kami selama wawancara.				true ()	
text	start_0-4	Mohon tuliskan nama yang akan anda gunakan selama wawancara berlangsung:					
text	start_0-4	Sekarang silahkan pikirkan nama samaran yang bisa kita gunakan ketika kita menulis tentang penelitian ini:				true ()	field-list
note	Informasi diri	Ceritakan sedikit tentang diri anda!					

list_name	name	label
consent		1. Ya 2. Tidak
provinci	provinci DKI Jakarta	DKI Jakarta
provinci	provinci Banten	Banten
provinci	provinci Jawa Barat	Jawa Barat
seed	seed	Seed
nama_pewawancara	nama_pewawancara_01	01. Dinda
nama_pewawancara	nama_pewawancara_02	02. Dwi
nama_pewawancara	nama_pewawancara_03	03. Ernie
nama_pewawancara	nama_pewawancara_04	04. Merry
nama_pewawancara	nama_pewawancara_05	05. Mira
nama_pewawancara	nama_pewawancara_06	06. Puni
nama_pewawancara	nama_pewawancara_07	07. Tatiek
pendidikan_tertinggi	pendidikan_tertinggi	tidak pernah SD SLTP SLTA akademi sarjana lajang / Single
status_hubungan	status_hubungan	Pacaran Menikah Cerai hidup Cerai mati
jumlah_anak_kandung	jumlah_anak_kandung	1. Ada (sebutkan berapa di layar berikutnya) 2. Meninggal (sebutkan berapa di layar berikutnya) 3. Tidak ada
tinggal_bersama	tinggal_bersama	1. Sendiri 2. Pasangan

Figure 9.2.2: Screenshots from the tablet version of the Perempuan Bersuara questionnaire

The figure displays seven screenshots of the ODK Collect application interface for the Perempuan Bersuara questionnaire, arranged in two rows. The top row shows the initial setup and consent steps, while the bottom row shows the data entry and finalization steps.

Screenshot 1: ODK Collect > Main Menu
 ODK Collect 1.4.3 (1041)
 Data collection made easier...
 Buttons: Fill Blank Form, Edit Saved Form, Send Finalized Form, Get Blank Form, Delete Saved Form.

Screenshot 2: ODK Collect > PerempuanBersuara_full_pelatihan
 You are at the start of PerempuanBersuara_full_pelatihan.
 Swipe the screen as shown below to go backward and forward.
 Arrows indicate: backward to previous prompt, forward to next prompt.

Screenshot 3: ODK Collect > PerempuanBersuara_full_pelatihan
 Kepada pewawancara: harap Anda sudah baca terlebih dahulu lembar informasi dan lembar persetujuan bersama dengan responden, dan responden sudah tanda tangani lembar persetujuan. Apakah si responden sudah tanda tangani lembar persetujuan?
 Radio buttons: ☐ Ya, ☒ Tidak
 Note: Silakan tutup kuesioner ini, pilih "ignore changes", dan mengisi formulir kelayakan langsung di tablet.

Screenshot 4: ODK Collect > Formulir_Penolakan
 Formulir Penolakan Berpartisipasi Di Dalam Penelitian
 Alasan penolakan
 Isilah dengan alasan mengapa seseorang menolak untuk berpartisipasi di dalam penelitian.
 List of reasons:
☐ Tidak bersedia menandatangani informed consent
☐ Tidak mau menjawab pertanyaan
☐ Khawatir akan diketahui sebagai pengguna Napza suntik
☐ Tidak punya waktu
☐ Lain-lain, jelaskan:

Screenshot 5: ODK Collect > Formulir Kelayakan
 Formulir Kelayakan
 ID dan Nama Pewawancara
 List of names:
☐ 01. Dinda
☐ 02. Dwi
☐ 03. Erni
☐ 04. Merry
☐ 05. Mira
☐ 06. Puni
☐ 07. Tatiek

Screenshot 6: ODK Collect > PerempuanBersuara_full_pelatihan
 Informasi dasar
 Kepada pewawancara: Isilah informasi dibawah ini sebelum memulai wawancara:
 Provinsi:
☐ DKI Jakarta
☐ Banten
☐ Jawa Barat
 Kota/kabupaten:
 Lokasi wawancara:
 Tipe responden:
☐ Seed
☐ Not seed
 ID responden:

Screenshot 7: ODK Collect > PerempuanBersuara_full_pelatihan
 You are at the end of PerempuanBersuara_full_pelatihan.
 Name this form
 Input field: responden id
☐ Mark form as finalized
 Button: Save Form and Exit

PEREMPUAN BERSUARA

INTRODUCTION

[Only proceed with the informed consent forms and questionnaire once and the participant has shown a valid referral from an eligible peer already interviewed for the study, and the participant's eligibility criteria is met based on the Perempuan Bersuara field manual]

Hi, I'm _____. I'm an interviewer for the Perempuan Bersuara research study here in [name of district]. We are currently collecting data from women just like you on topics like health, relationships and drug use. We are interested in knowing how you are doing in terms of health, what your experiences have been like with health care programs, such as drug treatment and HIV services, the police, and people close to you like partners, friends and family. We will also be asking you some personal questions about sex, relationships and drugs.

[Give participant information sheet and informed consent. Read aloud and answer any clarification questions]

This information will help us to create better services for women like you that consider women's needs and experiences. Your answers are very important to us! The interview will last about one hour. If you are ready, we can get started right away!

[Wait for participant's answer before proceeding]

THE BASICS

Province : _____

City/Municipality : _____/_____

Interview Location : _____

Respondent Type : seed _____¹ not seed _____²

Respondent ID : _____

Name of Interviewer : _____

Interview Date (dd/mm/yyyy) : _____/_____/_____

LET'S GET STARTED!

Anything you tell us about yourself will be kept strictly confidential, and will not be shared with anyone else. This means we will not report your real name. You can choose to share your real name with us during the interview, but we would like to ask you to also provide a false name that we can use when we report the results of this study.

Please write the name you would like us to use during the interview:

• _____

Now please think of a different, false name or nickname that we can use when we are writing about this research:

• _____

1. TELL US A LITTLE BIT ABOUT YOURSELF!

1.1 When is your birthday (mm/yyyy)? Month

 Year

1.2 What is the highest level of education you have completed or are currently in the process of attaining?

- ☐ I have never been to school
- ☐ Completed elementary school
- ☐ Completed junior high school
- ☐ Completed high school
- ☐ Postsecondary education (diploma, vocational training)
- ☐ Graduated university

1.3 What is your current relationship status?

- ☐ Single
- ☐ Dating
- ☐ Married
- ☐ Separated/Divorced
- ☐ Widowed

1.4 How many children do you have?

- ☐ Biological children (specify # deceased, # alive)
- ☐ Non-biological children (adopted, stepchildren)
- ☐ I do not have children

1.5 If yes, what is the age of your youngest child?

1.6 How many dependents (people for whom you are financially responsible) do you have, including any children?

1.7 Who do you live with currently?

- ☐ I live alone
- ☐ I live with my partner
- ☐ I live with my siblings/family
- ☐ I live with a friend(s)
- ☐ Other (specify)

1.8 Which of the following best describes where you live currently?

- ☐ I live in a rental room ('kos-kosan')
- ☐ I live in a rental apartment
- ☐ I live in an apartment that I own (paid for myself)
- ☐ I live in an apartment that my family owns
- ☐ I live in a rental house
- ☐ I live in a house that I own (paid for myself)
- ☐ I live in a house that my family owns
- ☐ I live at someone else's place (specify)
- ☐ I live on the street
- ☐ Other (specify)

1.9a How long have you lived in this city?

- ☐ less than 6 months
- ☐ 6 months to one year
- ☐ all my life

1.9b How many times have you moved in the past year?

1.10 What was your main (>50%) source of income in the last month?

- ☐ Fixed-term regular monthly salary
- ☐ Salary from temporary contract/casual work
- ☐ Salary from work in the informal/black market
- ☐ My parents/family
- ☐ An intimate partner
- ☐ Selling/couriering drugs
- ☐ Selling/exchanging sex
- ☐ Stealing
- ☐ Other (specify)

1.11 What was your income last month? *(Please provide estimate in thousand Indonesian rupiah/IDR)*

_____ Rupiah

1.12 What is your current employment status?

- ☐ Fixed-term regular work
- ☐ Casual work
- ☐ Short-term contracts
- ☐ Informal economy/ black market
- ☐ I do not currently work (*continue to section 2*)

1.13 What type of work do you currently do?

- ☐ Professional (specify)
- ☐ Administration/secretarial (specify)
- ☐ Sales (including businesses, shops, markets) (specify)
- ☐ Agriculture and animal husbandry (specify)
- ☐ Operator/assembler (specify)

- ☐ Technician (specify)
- ☐ NGO staff/social work (incl. counsellor, fieldworker, case manager)
- ☐ Sex worker
- ☐ Other (specify)

2. GETTING PERSONAL: SEX AND RELATIONSHIPS!

Now I'm going to ask you some personal questions about relationships, intimacy, and sex. Are you ready to continue?

[wait for respondent to reply before continuing]

Let's start by talking about your first sexual experience.

2A. LET'S TALK ABOUT RELATIONSHIPS!

2.1 Have you ever had vaginal or anal sex?

- ☐ Yes
- ☐ No

2.2 How old were you when you first had sex (anal or vaginal)?

___ Years

- ☐ I don't know/I can't remember

2.2 Have you ever had sex with...? (Check all that apply)

- ☐ Men
- ☐ Women (*Continue to section 2E*)
- ☐ Transgender (specify: male to female; female to male)
- ☐ Both men and women

2.4 In the past year, have you had vaginal or anal sex?

- ☐ Yes
- ☐ No

2.3 In the past year, have you ever had sex with...? (Check all that apply)

- ☐ Men
- ☐ Women
- ☐ Transgender (male to female; female to male)
- ☐ Both men and women

2.5 In the past year, have you taken drugs before or during vaginal or anal sex?

- ☐ Yes
- ☐ No

2.6 If yes, what drugs do you usually use before or during sex? (Check all that apply)

- ☐ Heroin
- ☐ Amphetamine-type stimulants
- ☐ Benzodiazepine
- ☐ Subutex (buprenorphine)
- ☐ Subuxone (buprenorphine + naloxone)
- ☐ Methadone

- ☐ Ecstasy
- ☐ Ketamine
- ☐ Codeine
- ☐ Cannabis
- ☐ Alcohol
- ☐ Other (specify)

2B. STEADY SEXUAL PARTNERS

Next we'll talk about sex with a steady partner. A steady partner can be a husband, boyfriend, or any other intimate partner that you have had a close emotional and/or sexual relationship with for 3 (three) months or longer in the past year. For the questions in this section, think about the last steady partner you had in the last year.

2.7 Have you had a steady partner in the past year?

- ☐ Yes
- ☐ No

2.8 In the past year, have you had anal or vaginal sex with your steady partner?

- ☐ Yes
- ☐ No (*Continue to section 2C*)

2.9 In the past year, how often did you use a condom when you had anal or vaginal sex with your steady partner?

- ☐ Every time/always
- ☐ Often
- ☐ Rarely
- ☐ Never

2.9 Last time you had sex with your steady partner, did you use a condom?

- ☐ Yes
- ☐ No

2.10 Does your steady partner know that you inject drugs?

- ☐ Yes
- ☐ No

2.11 Does your steady sexual partner also inject drugs?

- ☐ Yes
- ☐ No (*continue to section 2C*)
- ☐ I don't know

2.12 If yes, how often do you and your partner inject drugs together?

- ☐ Every time/always
- ☐ Often
- ☐ Rarely
- ☐ Never (*continue to section 2C*)

2.13 How often do you share injecting equipment (needles, syringes) when you inject together with your partner?

- ☐ Every time/always
- ☐ Often

- ☐ Rarely
- ☐ Never

2.14 When you share injecting equipment with your partner, who usually injects first?

- ☐ Me
- ☐ My partner

2C. CASUAL RELATIONSHIPS

Now let's talk about other sexual relationships outside of the relationship with your steady partner. These relationships can include anyone else you have had sex with.

2.15 In the past year, have you vaginal or anal sex with other people besides your steady partner (casual partners)?

- ☐ Yes
- ☐ No (Continue to section 2D)

2.16 In the past year, how often did you use a condom with casual sexual partners?

- ☐ Always/Every time
- ☐ Often
- ☐ Sometimes
- ☐ Never

2.17 Last time you had vaginal or anal sex with a casual sexual partner, did you use a condom?

- ☐ Yes
- ☐ No

2.18 How many (casual) sexual partners other than your steady sexual partner have you had in the past year?

2.19 How many (casual) sexual partners other than your steady sexual partner have you had in the past month?

2D. TRANSACTIONAL RELATIONSHIPS

Women have sex for many different reasons. Sometimes we may choose have sex in exchange for material things, drugs or money. Other times, social circumstances place us in situations in which we cannot refuse sex. Now I'm going to ask you a few questions about some of these experiences.

2.20 In the past year, have you ever had sex in exchange for something?

- ☐ Yes
- ☐ No (Continue to section 3)

2.21 If yes, have you ever had sex in exchange for any of the following?
(Check all that apply)

- ☐ Drugs
- ☐ Money
- ☐ Basic needs (food, clothes, shelter)

- ☐ Valuable items (smartphone, jewelry)
- ☐ Other (specify)

2.22 If yes, did you use a condom last time you had sex in exchange for something?

- ☐ Yes
- ☐ No

2.23 In the past year, how often did you use a condom with a partner who offered you money, drugs or anything else in exchange for sex?

- ☐ Always/Every time
- ☐ Often
- ☐ Sometimes
- ☐ Never

2.24 Now think about the last time you had sex with anyone (i.e. any type of partner, including steady, casual or a partner from whom you got something in exchange). Did you use a condom the last time you had sex?

- ☐ Yes
- ☐ No

2E. SEXUAL EXPERIENCES WITH OTHER WOMEN

In the next section, we will talk about your sexual experiences with other women. These experiences refer to any sexual experience you have had with another woman in the past year. Are you ready to continue?

2.25 In the past year, have you performed oral sex on another woman?

- ☐ Yes
- ☐ No (*continue to question 2.27*)

2.26 If yes, how often have you used a barrier when performing oral sex on another woman?

- ☐ Always/Every time
- ☐ Often
- ☐ Sometimes
- ☐ Never

2.27 In the past year, have you received oral sex from another woman?

- ☐ Yes
- ☐ No (*continue to question 2.31*)

2.28 If yes, how often has the person used a barrier when she performed oral sex on you?

- ☐ Always/Every time
- ☐ Often
- ☐ Sometimes
- ☐ Never

2.29 In the past year, how often have you performed oral sex on a woman while she was menstruating?

- ☐ Always/Every time
- ☐ Often
- ☐ Sometimes

☐ Never

2.30 In the past year, how often has another woman performed oral sex on you while you were menstruating?

- ☐ Always/Every time
- ☐ Often
- ☐ Sometimes
- ☐ Never

2.31 In the past year, have you used a sex toy for vaginal and/or anal sex with another woman?

- ☐ Yes
- ☐ No (*Continue to section 3*)

2.32 If yes, how often do you put condoms or another barriers on the sex toy before using it for vaginal or anal intercourse?

- ☐ Always/Every time
- ☐ Often
- ☐ Sometimes
- ☐ Never

2.33 If yes, did you put a condom on the sex toy before vaginal or anal intercourse the last time you engaged in this activity with another woman?

- ☐ Yes
- ☐ No

2.34 How often have you used the same sex toy for vaginal or anal intercourse without a barrier, after it was used for vaginal or anal intercourse on her?

- ☐ Always/Every time
- ☐ Often
- ☐ Sometimes
- ☐ Never

2.35 How often has your sex partner used the same sex toy for vaginal or anal intercourse without a barrier, after it was used for vaginal or anal intercourse on you?

- ☐ Always/every time
- ☐ Often
- ☐ Sometimes
- ☐ Never

3. CONDOM USE SELF-EFFICACY

I'm now going to ask you some questions about using condoms use. These questions refer to condoms use with any type of partner (steady, casual, transactional). Please answer each question using one of the following response options:

Strongly agree Agree Undecided Disagree Strongly
disagree

3.1 I feel confident in my ability to put a condom on my partner.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.2 I feel confident I could purchase condoms without feeling embarrassed.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.3 I feel confident I could remember to carry a condom with me should I need one.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.4 I feel confident in my ability to discuss condom usage with any partner I might have.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.5 I feel confident in my ability to suggest using condoms with a new partner.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.6 I feel confident I could suggest using a condom without my partner feeling "diseased."

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.7 I feel confident in my partner's ability to maintain an erection while using a condom.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.8 I would feel embarrassed to put a condom on my partner.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.9 If I were to suggest using a condom to a partner, I would feel afraid that he or she would reject me.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.10 If I were unsure of my partner's feelings about using condoms, I would not suggest using one.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.11 I feel confident in my ability to use a condom correctly.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.12 I would feel comfortable discussing condom use with a potential sexual partner before we ever had any sexual contact (e.g. hugging, kissing, caressing, etc.)

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.13 I feel confident in my ability to persuade a partner to accept using a condom when we have intercourse.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.14 I feel confident I could gracefully remove and dispose of a condom when we have intercourse.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.15 If my partner and I were to try to use a condom and did not succeed, I would feel embarrassed to try to use one again (e.g. not being able to unroll condom, putting it on backwards, or awkwardness).

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.16 I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I've "slept around".

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.17 I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I have a sexually transmitted disease.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.18 I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I thought they had a sexually transmitted disease.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.19 I would feel comfortable discussing condom use with a potential partner before we ever engaged in intercourse.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.20 I feel confident in my ability to incorporate putting a condom on my partner into foreplay.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.21 I feel confident that I could use a condom with a partner without "breaking the mood."

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.22 I feel confident in my ability to put a condom on my partner quickly.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.23 I feel confident I could use a condom during intercourse without reducing any sexual sensations.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.24 I feel confident that I would remember to use a condom even after I have been drinking.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.25 I feel confident that I would remember to use a condom even if I were high.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.26 If my partner didn't want to use a condom during intercourse, I could easily convince him or her that it was necessary to do so.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.27 I feel confident that I could use a condom successfully.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

3.28 I feel confident I could stop to put a condom on my partner even in the heat of the moment.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
----------------	-------	-----------	----------	-------------------

4. YOUR EXPERIENCE WITH DRUGS

Let's continue with some more personal questions, this time about drugs. Are you ok to continue? Now I will ask you a series of questions about how you use and inject drugs, and what your experience has been like.

4A. LET'S START WITH THE FIRST TIME YOU EVER USED DRUGS

4.1 How old were you when you first tried drugs?

____ Years

4.2 What was the first drug you ever tried?

- ☐ Heroin
- ☐ Amphetamine
- ☐ Subutex (buprenorphine)
- ☐ Subuxone (buprenorphine + naloxone)
- ☐ Methadone
- ☐ Ecstasy
- ☐ Ketamine
- ☐ Codeine
- ☐ Benzodiazepine
- ☐ Cannabis
- ☐ Alcohol
- ☐ Other (specify)

4B. NOW THINK ABOUT THE FIRST TIME YOU EVER INJECTED

4.3 How old were you when you first injected drugs?

____ Years

4.4 Who got the drugs for you that time?

- ☐ Myself directly from drug dealer
- ☐ From a female friend
- ☐ From a male friend
- ☐ My partner (boyfriend/girlfriend/husband)
- ☐ From a sibling
-
- ☐ From another member of the family (specify)
- ☐ Other (specify)

4.5 Where did you first inject (setting)?

- ☐ At home
- ☐ At a friend's home
- ☐ At my then partner's home

- ☐ On the street
- ☐ In a public toilet (restaurant, mall)
- ☐ Train station/bus terminal
- ☐ In a car
- ☐ In a parking lot
- ☐ In a park
- ☐ At school
- ☐ Other (specify)

4.6 Who was present when you first injected?

- ☐ Partner only
- ☐ Group of friends
- ☐ Drug dealer
- ☐ Strangers
- ☐ I was alone
- ☐ Other (specify)

4.7 When you first injected, did someone help you inject?

- ☐ I injected by myself
- ☐ Someone else helped me inject

4.8 If the answer to the question above is 'someone else', who injected you the first time?

- ☐ Partner
- ☐ Female friend
- ☐ Male friend
- ☐ Drug dealer
- ☐ Sibling (specify)
- ☐ Stranger
- ☐ Other (specify)

4.9 In the past year, which of the following drugs have you used at least once? (check all that apply)

- ☐ Heroin
- ☐ Amphetamine
- ☐ Subutex (buprenorphine)
- ☐ Subuxone (buprenorphine + naloxone)
- ☐ Methadone
- ☐ Ecstasy
- ☐ Ketamine
- ☐ Codeine
- ☐ Benzodiazepine
- ☐ Cannabis
- ☐ Alcohol
- ☐ Other (specify)

4.10 Of these, which drug have you used most often (your preferred drug) in the past year?

4.11 Of these, which drug have you injected most often (your preferred drug) in the past year?

4.12 In the past year, how did you usually procure your drugs?

- ☐ I get them myself directly from the dealer
- ☐ My partner gets drugs for me
- ☐ My friend(s) get drugs for me
- ☐ Other (specify)

4.13 Where do you usually inject (setting)?

- ☐ At home
- ☐ At a friend's home
- ☐ At my then partner's home
- ☐ On the street
- ☐ In a public toilet (restaurant, mall)
- ☐ Train station/bus terminal
- ☐ In a car
- ☐ In a parking lot
- ☐ In a park
- ☐ At school
- ☐ Other (specify)

4.14 Usually when you use drugs, how do you inject?

- ☐ I inject by myself (*Continue to question 4.18*)
- ☐ Someone else helps me inject

4.15 If the answer to the question above is 'someone else', who usually helps you inject?

- ☐ Partner
- ☐ Female friend
- ☐ Male friend
- ☐ Drug dealer
- ☐ Sibling
- ☐ Stranger
- ☐ Other (specify)

4.16 Have you injected any drugs in the past month?

- ☐ Yes
- ☐ No

4.2 Which drugs did you inject in the past month?

- ☐ Heroin
- ☐ Amphetamine
- ☐ Subutex (buprenorphine)
- ☐ Subuxone (buprenorphine + naloxone)
- ☐ Methadone
- ☐ Ecstasy
- ☐ Ketamine
- ☐ Codeine
- ☐ Benzodiazepine
- ☐ Cannabis
- ☐ Alcohol
- ☐ Other (specify)

4.17 In the past month, how much money have you spent on drugs?
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5. MORE ON DRUG INJECTION IN THE PAST MONTH

Please consider the following questions carefully and answer each one as accurately and truthfully as you can. All questions refer to your drug injecting practices in the past 30 days / 4-week period (i.e. **the month before this interview**). Try and remember that the only correct answer is an accurate and honest answer. The information you provide will remain completely confidential.

5.1 In the last month, how many times have you handled another person's used needle/syringe (eg. to dispose, to break-off needle) at a time when you had cuts, sores or lesions on your fingers and hands?

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.2 In the last month, how many times have you sucked or licked left-over drugs from a spoon or other mixing container which had been used by another person?

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.3 In the last month, how many times have you sucked or licked a filter which had been used by another person?

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.4 In the last month, how many times have you sucked or licked a plunger after using it in a mix which has been used by another person?

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.5 In the last month, how many times have you injected a drug that was filtered through another person's filter?

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.6 In the last month, how many times have you injected a drug that was prepared in another person's used spoon or mixing container?
(If never, go to question 5.7)

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.6b On those occasions how often did you clean the spoon or mixing container before using it?

Never

Rarely

Sometimes

Often

Every time

5.7 In the last month, how many times have you injected a drug prepared with water which had been used by another person?

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.8 In the last month, how many times have you injected a drug which had come into contact with another person's used needle/syringe?

Never	Once	Twice	3-5 Times	6-10 Times	More than 10 Times
-------	------	-------	-----------	------------	--------------------

5.9a In the last month, how many times have you injected a drug that you prepared immediately after 'assisting' another person with their injection (eg. injecting them, holding their arm, handling their used needle/syringe; touching their injection site to feel for a vein, to wipe away blood, or to stop bleeding)?

(If never, go to question 5.10a)

Never	Rarely	Sometimes	Often	Every time
-------	--------	-----------	-------	------------

5.9b On those occasions, how often did you wash your hands before preparing your mix?

Never	Once	Twice	3-5 Times	6-10 Times	More than 10 Times
-------	------	-------	-----------	------------	--------------------

5.10a In the last month, how many times have you injected a drug that was prepared by another person who had already injected or assisted in someone else's injection?

(If never, go to question 5.11a)

Never	Once	Twice	3-5 Times	6-10 Times	More than 10 Times
-------	------	-------	-----------	------------	--------------------

5.10b On those occasions, how often did the person preparing the mix wash their hands before preparing the mix?

Never	Rarely	Sometimes	Often	Every time
-------	--------	-----------	-------	------------

5.11 In the last month, how many times have you been injected by another person who had already injected or assisted in someone else's injection?

(If never, go to question 5.12a)

Never	Once	Twice	3-5 Times	6-10 Times	More than 10 Times
-------	------	-------	-----------	------------	--------------------

5.11b On those occasions, how often did the person injecting you wash their hands before injecting you?

Never	Rarely	Sometimes	Often	Every time
-------	--------	-----------	-------	------------

5.12a In the last month, how many times have you injected with a needle/syringe which had been handled or touched by another person who had already injected?

(If never, go to question 5.13a)

Never	Once	Twice	3-5 Times	6-10 Times	More than 10 Times
-------	------	-------	-----------	------------	--------------------

5.12b On those occasions, how often did they wash their hands prior to handling the needle/syringe that you used?

Never

Rarely

Sometimes

Often

Every time

5.13a In the last month, how many times have you injected with another person's used needle/syringe?

(If never, go to question 5.14)

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.13b On those occasions, how often did you rinse it with a combination of full- strength bleach and water (ie. the '2x2x2' method) before you used it?

Never

Rarely

Sometimes

Often

Every time

5.14 In the last month, how many times have you injected with a needle/syringe after another person has already injected some of its contents?

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.15a In the last month, how many times have you touched your own injection site (eg. to feel for a vein, to wipe away blood, or to stop bleeding) soon after 'assisting' another person with their injection (eg. injecting them, holding their arm, handling their used needle/syringe; touching their injection site to feel for a vein, to wipe away blood, or to stop bleeding)?

(If never, go to question 5.16a)

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.15a On those occasions, how often did you wash your hands before touching your own injection site?

Never

Rarely

Sometimes

Often

Every time

5.16a In the last month, how many times has another person touched your injection site (e.g. to feel for a vein, to wipe away blood, or to stop bleeding)?

(If never, go to question 5.17)

Never

Once

Twice

3-5 Times

6-10 Times

More than 10 Times

5.16b On those occasions, how often did the person wash their hands before they touched your injection site?

Never

Rarely

Sometimes

Often

Every time

5.17 In the last month, how many times have you wiped your own injection site with an object (e.g. swab, tissue, hanky, towel, etc.) which had been used by another person?

Never	Once	Twice	3-5 Times	6-10 Times	More than 10 Times
-------	------	-------	-----------	------------	--------------------

5.18 In the last month, how many times have you used a tourniquet (e.g. medical tourniquet, belt, rope, tie, cord, etc.) which had been used by another person?

Never	Once	Twice	3-5 Times	6-10 Times	More than 10 Times
-------	------	-------	-----------	------------	--------------------

5.19 In the last month, how many times have you received an accidental needle- stick/prick from another person's used needle/syringe?

Never	Once	Twice	3-5 Times	6-10 Times	More than 10 Times
-------	------	-------	-----------	------------	--------------------

5.20a In the last month, how many times have you re-used a needle/syringe taken out of a shared disposal/sharps container?

Never	Once	Twice	3-5 Times	6-10 Times	More than 10 Times
-------	------	-------	-----------	------------	--------------------

5.20b On those occasions, how often did you rinse it with full-strength bleach before you re-used it?

Never	Rarely	Sometimes	Often	Every time
-------	--------	-----------	-------	------------

6. CONTACT WITH LAW ENFORCEMENT

*Sometimes people get in trouble with the law. This can be quite upsetting.
Can you tell me more about your experience?*

6.1 Since you started using drugs, how many times have you been arrested?

☐ Never (continue to question 6.5) _____ Times

6.2 If you have previously been arrested, what was the reason(s) why you got arrested? (Check all that apply)

- ☐ Drug possession for personal use
- ☐ Drug dealing/trafficking/couriering
- ☐ Other drug-related criminal offence (e.g. stealing to be able to purchase drugs)
- ☐ Engaging in paid sex work
- ☐ Other (specify)

6.3 If you have been previously arrested, did you experience any of the following during any of your arrests and periods of detention? (Check all that apply)

- ☐ I/my family was asked to pay a bribe to secure my release
- ☐ I/my family was asked to pay a bribe to secure a reduced charge/sentence
- ☐ I was called names, yelled at and/or insulted by police/law enforcement officers
- ☐ I was physically hit, punched or slapped by police/law enforcement officers
- ☐ I was touched sexually/in private places by police/law enforcement officers against my will
- ☐ I was asked to perform oral sex by police/law enforcement officers against my will
- ☐ I was asked to have vaginal/anal sex with police/law enforcement officers against my will

6.4 Since you started using drugs, how many times have you been placed in a compulsory rehabilitation centre against your will?

- ☐ Never _____ Times

6.5 Since you started using drugs, how many times have been to prison?

- ☐ Never (*Continue to section 7*) _____ Times

6.6 If yes, have you ever injected drugs while in prison?

- ☐ Yes
☐ No

6.7 Did your very first injection take place while you were in prison?

- ☐ Yes
☐ No

7. RELATIONSHIP PROBLEMS

No matter how well two partners get along, there are times when they disagree, get annoyed with the other person, want different things from each other, or just have spats or fights because they are in a bad mood, are tired, or for some other reason. Couples also have many different ways of trying to settle their differences. This is a list of things that might happen when you have differences. Please circle how many times you did each of these things in the past year with your steady partner, and how many times your partner did them in the past year. If you or your partner did not do one of these things in the past year, but it happened before that, circle "7. How often did this happen?

- (1) Once in the past year*
- (2) Twice in the past year*
- (3) 3-5 times in the past year*
- (4) 6-10 times in the past year*
- (5) 11-20 times in the past year*
- (6) More than 20 times in the past year*
- (7) Not in the past year, but it did happen before*
- (8) It never happened*

7.1 I explained my side or suggested a compromise for a disagreement with my partner

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.2 My partner explained his or her side or suggested a compromise for a disagreement with me

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.3 I insulted or swore or shouted or yelled at my partner

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.4 My partner insulted or swore or shouted or yelled at me

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.5 I had a sprain, bruise, or small cut, or felt pain the next day because of a fight with my partner

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.6 My partner had a sprain, bruise, or small cut or felt pain the next day because of a fight with me

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.7 I showed respect for, or showed that I cared about my partner's feelings about an issue we disagreed on

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.8 My partner showed respect for, or showed that he or she cared about my feeling about an issue we disagreed on

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.9 I pushed, shoved, or slapped my partner

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.10 My partner pushed, shoved, or slapped me

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.11 I punched or kicked or beat-up my partner

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.12 My partner punched or kicked or beat-me-up

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.13 I destroyed something belonging to my partner or threatened to hit my partner

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.14 My partner destroyed something belonging to me or threatened to hit me

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.15 I went see a doctor (M.D.) or needed to see a doctor because of a fight with my partner

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.16 My partner went to see a doctor (M.D.) or needed to see a doctor because of a fight with me

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.17 I used force (like hitting, holding down, or using a weapon) to make my partner have sex

☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8

7.18 My partner used force (like hitting, holding down, or using a weapon) to make me have sex

1 2 3 4 5 6 7 8

7.19 I insisted on sex when my partner did not want to or insisted on sex without a condom (but did not use physical force)

1 2 3 4 5 6 7 8

7.20 My partner insisted on sex when I did not want to or insisted on sex without a condom (but did not use physical force)

1 2 3 4 5 6 7 8

8. HEALTH AND SOCIAL SERVICE ACCESS

Health is important for all women. Now I want to ask you some questions about how you think of your own health, and what kinds of services you access for different kinds of health needs. Are you ready to continue?

8.1 In the past year, have you accessed any the following services voluntarily (check all that apply):

- ☐ HIV test
- ☐ Hepatitis C test
- ☐ Drug rehabilitation/detox program (specify)
- ☐ Needle syringe program (fixed site)
- ☐ Needle syringes program (outreach worker)
- ☐ Sexually transmitted infection (STI) testing
- ☐ Support group
- ☐ Methadone maintenance therapy
- ☐ Buprenorphine maintenance therapy
- ☐ Paralegal support services
- ☐ Sexually transmitted infection testing
- ☐ Sexually transmitted infection treatment

8.2 Have you ever had an abortion?

- ☐ Yes
- ☐ No (*continue to question 8.5*)

8.3 If yes, how many times have you had an abortion?

_____ Times

8.4 What was the reason(s) why you had an abortion? (Check all that apply)

- ☐ I was asked to by my partner
- ☐ I was asked to by my family/relatives
- ☐ I wanted to

- ☐ I have too many children already
- ☐ I would be embarrassed to have children outside of marriage
- ☐ I would be embarrassed to be viewed as someone who is promiscuous
- ☐ Health reasons
- ☐ Other (specify)

8A. LET'S TALK ABOUT HIV, HEPATITIS C TESTING & SEXUALLY TRANSMITTED INFECTIONS

Sexually transmitted infections (STIs) are very common among both men and women – more than half of all of us will get one at some time in our lives. I am now going to ask you some personal questions about your experience with such infections.

8.5 Have you ever heard of sexually transmitted infections (STIs)?

- ☐ Yes
- ☐ No

8.6 Have you ever been diagnosed with an STI?

- ☐ Yes
- ☐ No

8.7 In the last year, have you experienced the following symptoms? (Check all that apply):

- ☐ Burning sensation and/or discomfort when urinating
- ☐ Itching and/or discomfort in the genital area
- ☐ Discomfort and/or pain when having sex
- ☐ Sores and/or ulcers on or in the vagina
- ☐ Unusual vaginal discharges
- ☐ Lower abdominal pain
- ☐ None of the above

8.8 If yes, did you have vaginal or anal sex without using a condom during that time?

- ☐ Yes
- ☐ No

8.8 Have you ever gotten a test to know if you have HIV?

- ☐ Yes
- ☐ No

8.9 If yes, when did you last get tested?

- ☐ In the past three months
- ☐ In the past 6 months
- ☐ In the past year
- ☐ More than one year ago

8.10 If yes, did you go voluntarily the last time you got tested?

- ☐ Yes
- ☐ No

8.11 How much did you pay for your last HIV test?

_____Rupiah

- ☐ It was free

8.12 Last time you got tested, what was the main reason why you got an HIV test?

- ☐ It was required for an official letter
- ☐ It was required to secure permission to get married
- ☐ I felt I might be at risk
- ☐ I felt sick
- ☐ I was asked to get tested by a health worker
- ☐ I was asked to get tested by an outreach worker
- ☐ Other (specify)

8.13 Did you receive counselling before you got your last HIV test?

- ☐ Yes
- ☐ No

8.14 Do you know the results of your last HIV test?

- ☐ Yes
- ☐ No

8.15 Did you disclose your HIV test results to anyone?

- ☐ Yes (continue to question 8.17)
- ☐ No

8.16 If not, what is the main reason why you did not disclose?

- ☐ I was scared I would be discriminated against
- ☐ I was scared I would lose my job
- ☐ I was scared I would lose my friends
- ☐ I was scared my partner would reject me
- ☐ I was scared my family would reject me
- ☐ Other reason (specify)

8.17 What was the result of your last HIV test?

- ☐ Reactive
- ☐ Non-reactive
- ☐ I don't know

8.18 Have you ever knowingly had unprotected sex (no condom, or removed condom mid- sexual intercourse) with someone living with HIV?

- ☐ Yes
- ☐ No

8.19 If yes, what is the main reason why you had unprotected sex with someone living with HIV?

- ☐ I do not like how condoms feel
- ☐ I do not feel that I am at risk of contracting HIV
- ☐ I do not care if I contract HIV
- ☐ My sexual partner forced me to have unprotected sex
- ☐ My sexual partner believes using condoms is a sign of infidelity
- ☐ I believe using condoms is a sign of infidelity
- ☐ HIV is manageable and is not such a big deal
- ☐ Other (specify)

8.20 Have you ever taken antiretroviral treatment (ARVs) for HIV?

- ☐ Yes
- ☐ No (*continue to question 8.23*)

8.21 Are you currently taking ARVs?

- ☐ Yes
- ☐ No

8.22 (for respondents who interrupted treatment) If yes, when have you taken ARVs?

Between _____ month/year and _____ month/year.

8.23 If not, why do you not take ARVs?

- ☐ My doctor says I do not yet require treatment.
- ☐ I feel fine without medication.
- ☐ ARVs are hard to access.
- ☐ I am scared of side effects.
- ☐ I believe ARVs are a corporate scheme that will only make me more ill.
- ☐ Other (specify)

8.24 Have you ever had a hepatitis C test?

- ☐ Yes
- ☐ No (*continue to section 9*)

8.25 What is your hepatitis C status?

- ☐ Reactive
- ☐ Non-reactive
- ☐ I don't know

8.26 Have you ever taken antiviral treatment (pegylated interferon + ribavirin) for hepatitis C?

- ☐ Yes
- ☐ No

8.27 If not, what is the main reason why you have not started antiviral treatment?

- ☐ My doctor says I do not yet require treatment.
- ☐ I feel fine without medication.
- ☐ Diagnostic tests that would determine whether I need treatment are too expensive.
- ☐ Hepatitis C treatment is too expensive.
- ☐ I am scared of the side effects of antiviral medication.
- ☐ Other (specify)

9. OPIOID SUBSTITUTION THERAPY & DRUG TREATMENT

9.1 Are you currently enrolled in a methadone maintenance therapy (MMT) program?

- ☐ Yes
- ☐ No (*continue to question 9.4*)

9.2 If yes, approximately how much money do you spend each time you get a dose of methadone (including cost of methadone, transport and other related costs)?

_____ Rupiah

9.3 How long have you been enrolled in a methadone maintenance program?

_____ months _____ years

9.4 Are you currently enrolled in a buprenorphine maintenance therapy program?

☐ Yes

☐ No (*continue to question 9.7*)

9.5 If yes, approximately how much money do you spend each time you get a dose of buprenorphine?

_____ Rupiah

9.6 How long have you been enrolled in a buprenorphine maintenance program?

_____ months _____ years

9.7 Have you ever attended rehabilitation/detox program?

☐ Yes

☐ No (*continue to question 9.11*)

9.8 What type of rehabilitation programs have you attended? (Check all that apply)

☐ Therapeutic community

☐ Religious/spiritual

☐ Community-based

☐ Medical detox

☐ Traditional/herbal

☐ Other (specify)

9.9 Last time you were a rehabilitation program, what was the main reason why you attended?

☐ I wanted to/voluntary

☐ I was asked to by my family

☐ I was referred by law enforcement (National Narcotics Board, police or a judge)

☐ I was referred by an institution (school, workplace)

☐ Other (specify)

9.10 If yes, for how long were you there the last time you attended?

_____ months

9.11 Which rehabilitation method do you prefer/best fits your needs?

☐ Therapeutic community

☐ Religious/spiritual

☐ Community-based treatment (voluntary)

- ☐ Medical detox
- ☐ Traditional/herbal
- ☐ Other (specify)

10. NOW LET'S TALK ABOUT FEELINGS AND EMOTIONS

*I am going to read you a list of some of the ways that people sometimes feel or behave. Please indicate how often you've felt this way during **the past week**.*

No.	Place a check mark (✓) in the appropriate column. During the past week...	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	All of the time (5-7 days)
1.	I was bothered by things that usually don't bother me.				
2.	I did not feel like eating; my appetite was poor.				
3.	I felt that I could not shake off the blues even with help from my family.				
4.	I felt that I was just as good as other people.				
5.	I had trouble keeping my mind on what I was doing.				
6.	I felt depressed.				
7.	I felt that everything I did was an effort.				
8.	I felt hopeful about the future.				
9.	I thought my life had been a failure.				
10.	I felt fearful.				
11.	My sleep was restless.				
12.	I was happy.				
13.	I talked less than usual.				
14.	I felt lonely.				
15.	People were unfriendly.				
16.	I enjoyed life.				
17.	I had crying spells.				
18.	I felt sad.				
19.	I felt that people disliked me.				
20.	I could not "get going."				

*I am now going to read you a list of problems and complaints that people sometimes have in response to stressful life experiences. Please indicate how much you have been bothered by that problem **in the last month**.*

No.	Response	Not at all (1)	A little bit (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
1.	Repeated, disturbing <i>memories</i> , <i>thoughts</i> , or <i>images</i> of a stressful experience from the past					
2.	Repeated, disturbing <i>dreams</i> of a stressful experience from the past?					

3.	Suddenly <i>acting</i> or <i>feeling</i> as if a stressful experience <i>were happening</i> again (as if you were reliving it)?					
4.	Feeling <i>very upset</i> when <i>something reminded</i> you of a stressful experience from the past?					
5.	Having <i>physical reactions</i> (e.g., heart pounding, trouble breathing, or sweating) when <i>something reminded</i> you of a stressful experience from the past?					
6.	Avoid <i>thinking</i> about or <i>talking</i> about a stressful experience from the past or avoid <i>having feelings</i> related to it?					
7.	Avoid <i>activities</i> or <i>situations</i> because they <i>remind you</i> of a stressful experience from the past?					
8.	Trouble <i>remembering important</i> parts of a stressful experience from the past?					
9.	Loss of <i>interest in things that you used to enjoy</i> ?					
10.	Feeling <i>distant</i> or <i>cut off</i> from other people?					
11.	Feeling <i>emotionally numb</i> or being unable to have loving feelings for those close to you?					
12.	Feeling as if your <i>future</i> will somehow be <i>cut short</i> ?					
13.	Trouble <i>falling</i> or <i>staying asleep</i> ?					
14.	Feeling <i>irritable</i> or having <i>angry outbursts</i> ?					
15.	Having <i>difficulty concentrating</i> ?					
16.	Being “ <i>super alert</i> ” or watchful/on guard?					
17.	Feeling <i>jumpy</i> or easily startled?					

I am now going to ask you a few questions that may be difficult. We will talk about any trauma you may have experienced after 18 years old. Are you ready to continue?

PART 1. AFTER THE AGE OF 18

1.	Were you ever exposed to a life-threatening natural disaster?	Yes	No
2.	Were you involved in a serious accident?	Yes	No
3.	Did you ever suffer a serious personal injury or illness?	Yes	No
4.	Did you ever experience the death or serious illness of a parent or a primary caretaker?	Yes	No
5.	Did you experience the divorce or separation of your parents?	Yes	No
6.	Did you experience the health or serious injury of a sibling?	Yes	No
7.	Did you ever experience the death or serious injury of a friend?	Yes	No
8.	Did you ever witness violence towards others, including family members?	Yes	No

9.	Did anyone in your family ever suffer from mental or psychiatric illness or have a “breakdown”?	Yes	No
10.	Did your parents or primary caretaker have a problem with alcoholism or drug or drug abuse?	Yes	No
11.	Did you ever see someone murdered?	Yes	No

*Now I will ask you some questions about experiences that took place **before** you turned 18 years old.*

PART 2. BEFORE THE AGE OF 18

1.	Were you ever slapped in the face with an open hand?	Yes	No
2.	Were you ever burned with hot water, a cigarette or something else?	Yes	No
3.	Were you ever punched or kicked?	Yes	No
4.	Were you ever hit with an object that was thrown at you?	Yes	No
5.	Were you ever pushed or shoved?	Yes	No

PART 3. BEFORE THE AGE OF 18

1.	Were you often put down or ridiculed?	Yes	No
2.	Were you often ignored or made to feel that you didn't count?	Yes	No
3.	Were you often told you were no good?	Yes	No
4.	Most of the time you were treated in a cold, uncaring way or made to feel like you were not loved?	Yes	No
5.	Did your parents or caretakers often fail to understand you or your needs?	Yes	No

PART 4. BEFORE THE AGE OF 18

1.	Were you ever touched in an intimate or private part of your body (e.g. breast, thighs, genitals) in a way that surprised you or made you feel uncomfortable?	Yes	No
2.	Did you ever experience someone rubbing their genitals against you?	Yes	No
3.	Were you ever forced or coerced to touch another person in an intimate or private part of their body?	Yes	No
4.	Did anyone ever have genital sex with you against your will?	Yes	No
5.	Were you ever forced or coerced to perform oral sex on someone against your will?	Yes	No
6.	Were you ever forced or coerced to kiss someone in a sexual rather than an affectionate way?	Yes	No

*If you responses “Yes” for any of the above events, answer the following for the one that has had the greatest impact on your life. In answering consider how you felt **at the time of the event.***



1.	Did you experience emotions of intense fear, horror or helplessness?	Yes	No
2.	Did you feel out-of-your-body or as if you were in a dream?	Yes	No

11. PERCEIVED SOCIAL SUPPORT

Please let me know how you feel about each of the statements, based on the following options:

- (1) *Very Strongly Disagree*
- (2) *Strongly Disagree*
- (3) *Mildly Disagree*
- (4) *Neutral*
- (5) *Mildly Agree*
- (6) *Strongly Agree*
- (7) *Very Strongly Agree*

11.1 There is a special person who is around when I am in need.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

11.2 There is a special person with whom I can share my joys and sorrows.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

11.3 My family really tries to help me.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

11.4 I get the emotional help and support I need from my family.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

11.5 I have a special person who is a real comfort to me.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

11.5a Who is this person? Specify _____

11.6 My friends really try to help me.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

11.7 I can count on my friends when things go wrong.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

11.8 I can talk about my problems with my family.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

11.9 I have friends with whom I can share my joys and sorrows.

1	2	3	4	5	6	7
---	---	---	---	---	---	---

11.10 There is a special person in my life who cares about my feelings.

1 2 3 4 5 6 7

11.11 My family is willing to help me make decisions.

1 2 3 4 5 6 7

11.12 I can talk about my problems with my friends.

1 2 3 4 5 6 7

12. REFERRAL INFORMATION

12.1 Who provided you with a referral to take part in this study?

- ☐ Friend
- ☐ Acquaintance
- ☐ Sexual partner
- ☐ Sibling/family
- ☐ Stranger
- ☐ Other (specify)

12.2 Approximately how many female friends or acquaintances do you know (you know their name and they know yours), who are 18 years or older, who have injected drugs in the past year, who reside in Greater Jakarta or Bandung, and who you would be able to contact right now?

_____ women

12.3 How many of these women have you seen in the past month?

_____ women

13. ENDING ON A POSITIVE NOTE

13.1 Looking back at the past year, what are you most proud of?

13.2 Looking forward at the next year, what are your future plans?

13.3 Do you have any advice for the Indonesian Drug Users Network on what kind of programming you would like to see for women?

13.4 Is there anything else that you would like to add about any topic that came up during the interview?

This is the end of the interview. Thank you for taking the time to speak with us!

Appendix 3: Protocol for tablet use, storage, and data retrieval

Protocol for Tablet Use in the *Perempuan Bersuara* Research Study

Our team has developed this protocol for the research process so that the use of tablets in data collection does not post additional obstacles or risks for our team members, participants, and data.

REPORT ANY PROBLEMS WITH TABLETS IN THE FIELD TO THE FIELD COORDINATOR AND THE PROJECT MANAGER IMMEDIATELY!

Tablet Use:

- Tablets are to be used for work purposes only, specifically, to collect questionnaire data.
- Interviewers are fully responsible for the safety of the tablet.
- Only data collection applications (i.e. Open Data Kit) can be installed on the tablet. No other applications or games of any kind may be installed.

Your Safety

- Only use only tablets when you are fully prepared to start the interview process with participants.
- Only remove the tablets from their casing and use them if you feel safe.
- When traveling on foot, by public transport, or motorcycle, always keep the tablet safely stored away in your backpack.
- Always make sure the tablet battery is in sufficient condition for the interview process. Charging the battery is your responsibility.
- No applications may be downloaded on tablets other than those required for the research.

Participant Safety

- Ensure that the interview location is always agreed upon by the participant.
- Ensure that the location for the interview process is safe and convenient.
- Ensure that participants feel safe and comfortable in a mutually agreed place.
- Never allow participants to use tablets to fill out questionnaires without supervision, or lend a tablet to others (family, friends etc.).
- Make sure that no participant answers are shown to anyone who is not part of the team.

Tablet Safety

- Tablets can be brought home by the interviewer throughout the duration of data collection.
- The interviewer is solely responsible for the security of the tablet at home and in the field.
- The tablets **MUST** be brought to the project office for every weekly coordination meeting.

- Each tablet will have an application that allows the field coordinator or project manager to track it in case it is lost; this feature cannot be deleted.
- No social media applications or any other applications outside of research can be downloaded on the tablet, and no phone sim cards may be used with the tablet.
- Report any problems concerning the tablet to the field coordinator or the project manager immediately, including issues such as broken or wet tablets, technical issues with ODK applications and any other problems as they come up.

Damaged, Lost or Stolen Tablets

- Each tablet costs Rp 1,300,000, - (one million three hundred rupiah). Please pay attention and take good care for the tablet until the project is completed.
- If your existing tablet is software or hardware problems, immediately notify the field coordinator and the project manager for immediate follow up and repair.
- If the tablet is lost or stolen, immediately notify the field coordinator and the project manager. A report to the nearest police office along will be made with the field coordinator and / or project manager.
- Remember that you and the participants are more valuable than the tablet.

Data Protection

- During each coordination meeting (at least 1x per week), the project manager and the field coordinator will check whether the data stored in the ODK Collect application on the tablet is fully complete before uploading the data to the server.
- Each interviewer must be present at the project office at least 1X per week for coordination meetings (mandatory).
- The interviewer should report to the office for monitoring data in accordance with the agreed timetable. If an interviewer has interviewed seven respondents prior to the weekly coordination meeting, the interviewer should coordinate with the field coordinator at the project office to check data completion before sending the data to the server.
- Make sure that the respondent ID in the questionnaire on the tablet matches the respondent's ID on the consent form.
- Do not change or delete any respondent data from tablet before it is monitored by the project manager and field coordinator. The respondent's data will be deleted automatically from the tablet after the data has been uploaded to the server at the coordination meeting, or in between meetings.

Participant's personal data will be collected only in the following format:

1. Name/pseudonym, signature and respondent ID on consent form (paper) and incentive receipt;
2. Pseudonym and respondent ID on the questionnaire (tablet).

Any data in the form of paper will be stored separately in a locked filing cabinet. The key will be held by the project manager. Similarly, existing data on tablets will be protected with anonymous codes only known by the team and will be immediately sent to the server, where data will be encrypted and stored securely.

The data will be validated once a week, and downloaded from the server to monitor any errors as the research progresses. Data monitoring will be ongoing. Data cleaning will be conducted at the end of data collection. Data will be stored for the following 5 years after collection in an anonymous format.

I have read and understood all the above conditions. I am willing and committed to following the guidelines for using this tablet for the data collection process only.

Date : _____

Interviewer :

Signature :

Project manager :

Signature :

Appendix 4: Sample feedback forms for piloting

Interviewer checklist and feedback form

Please use the following checklist to write down any feedback during and after the test run of the interview. Keep in mind the following when conducting the interview:

- ✓ Consider both the full questionnaire instrument (information sheet, consent forms, and questionnaire) as well as particular questions.
- ✓ **Think out loud:** say out loud any reaction that you have to the questions that you are reading. For example, if you have to read a question twice because it is confusing or the choices are unclear, express this verbally AND note it on your feedback form.
- ✓ Make a quick note of particularly difficult, challenging or confusing questions on the questionnaire sheet as you go along. Add more detailed feedback to the sheet after the interview. Do not stop in the middle of the interview to write down lengthy comments or reactions.
- ✓ Write down any body language, facial expressions, and other verbal or physical signs of hesitation, confusion, discomfort, and/or embarrassment that you notice on the respondent.

Questions	Observations	Notes <i>*write down specific questions that are problematic, body language, "out loud" thoughts, and any other verbal or physical signs, etc.</i>
1. Does the respondent understand the objective of the survey?		
2. Does the respondent look/feel comfortable answering the questions?		
3. Is the wording of the questions clear? Note any specific questions where you felt that the respondent hesitated or reacted in any way.		
4. Does the order of the questions make sense conversationally (e.g. general to specific; less personal to more personal)?		
5. Is the time reference noted in the questions clear to the respondent?		

6. Do any of the questions require the respondent to think too long or hard before responding? If so, which ones?		
7. Do any questions need to be repeated or explained? If so, which ones?		
8. Which questions produce irritation, embarrassment, or confusion?		
9. Do any of the questions or descriptive sections lead the respondent? If so, which ones?		
10. How long does the full process take to complete?		
11. How long does only the informed consent take to complete? What about the actual questionnaire?		
12. Have any other important issues been overlooked?		

Respondent checklist and feedback form

Please use the following checklist to write down any feedback during and after the test run of the interview. Keep in mind the following when participating in the interview:

- ✓ Consider both the full questionnaire instrument as well as particular questions.
- ✓ **Think out loud:** say out loud any reaction that you have to the questions that you are hearing from the interviewer. For example, if you have to ask for a question to be repeated because it is confusing or the choices are unclear, express this verbally AND note it on your feedback form.
- ✓ Make a quick note of particularly difficult, challenging or confusing questions on your feedback form as you go along. Add more detailed feedback to the sheet after the interview. Do not stop in the middle of the interview to write down lengthy comments or reactions.
- ✓ Write down anything you feel throughout the interview, including boredom, tiredness, discomfort, hesitation, confusion, and/or embarrassment.

Questions	Observations	Notes <i>*write down specific questions that are problematic, body language, "out loud" thoughts, and any other verbal or physical signs, etc.</i>
1. Do you understand the objective of the survey as read out from the informed consent form?		
2. How comfortable do you feel answering the questions?		
3. Is the wording of the questions clear? Write down any specific questions where you felt that you are hesitating, need clarification, or felt uncomfortable answering.		
4. Does the order of the questions make sense conversationally (e.g. general to specific; less personal to more personal)?		
5. Is the time reference noted in the questions clear to you?		
6. Do any of the questions require you to think too long or hard before		

responding? If so, which ones?		
7. Do any questions need to be repeated or explained by the interviewer? If so, which ones?		
8. Which questions make you feel irritated, embarrassed, or confused?		
9. Do you feel that any of the questions or descriptive sections lead you to a particular answer or way of answering the question? If so, which ones?		
10. How long does the full process take to complete? Is it too long, too short?		
11. Have any other important issues been overlooked?		

Appendix 5: Oxford Central University Research Ethics Committee approval letter

SOCIAL SCIENCES & HUMANITIES
INTER-DIVISIONAL RESEARCH ETHICS COMMITTEE

Research Services, University of Oxford, Wellington Square, Oxford OX1 2JD
Tel: +44(0)1865 616576 Fax: +44(0)1865 280467
ethics@socsci.ox.ac.uk

Co-ordinator of the SSH IDREC
Research Services



29 January 2014

Claudia Stoicescu
Social Policy and Intervention

Dear Claudia,

Research Ethics Approval

Ref No: SSD/CUREC2/13-23

Title: Identifying risk and protective factors for sexual and injecting risk behaviours among women who inject drugs in three provinces in Indonesia

The above application has been considered on behalf of the Social Sciences and Humanities Inter-divisional Research Ethics Committee (IDREC) in accordance with the procedures laid down by the University for ethical approval of all research involving human participants.

I am pleased to inform you that, on the basis of the information provided to the IDREC, the proposed research has been judged as meeting appropriate ethical standards, and accordingly approval has been granted.

Should there be any subsequent changes to the project, which raise ethical issues not covered in the original application, you should submit details to the IDREC for consideration.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'L. Osman'.

Dr Liesl Osman
Secretary and Co-ordinator SSH IDREC

cc: Dr Lucie Cluver
Bryony Groves

LO/CK

Appendix 6: Atma Jaya University Ethics Committee approval letter

	UNIVERSITAS KATOLIK INDONESIA ATMA JAYA	LEMBAGA PENELITIAN DAN PENGABDIAN KEPADA MASYARAKAT <i>Institute of Research and Community Service</i> Jalan Jenderal Sudirman 51, Jakarta 12930, Indonesia Telepon : +62 21 570 3306, 572 7615 ext. 139 Faks : +62 21 572 7481 Website : www.atmajaya.ac.id E-mail : lpkm@atmajaya.ac.id
---	--	---

21 November 2013

No. : 1114/III/LPPM-PM.10.05/11/2013
Hal : *Ethical Clearance*
Lamp : 1 berkas

Yang terhormat,
Claudia Stoicescu
Kesehatan Masyarakat
University of Oxford

Dengan hormat,

Setelah melakukan *peer review* terhadap proposal penelitian berjudul

**FAKTOR-FAKTOR RISIKO DAN PROTEKTIF PERILAKU SEKSUAL DAN MENYUNTIK BERISIKO
PADA WANITA PENGGUNA NARKOBA SUNTIK DI TIGA PROVINSI DI INDONESIA**

dengan ini kami sampaikan bahwa Komisi Etika Penelitian Unika Atma Jaya menyatakan bahwa proposal penelitian tersebut dapat dilaksanakan.

Diharapkan setelah pelaksanaan, Saudara dapat memberikan laporan beserta uraian pelaksanaan penjaminan aspek etika penelitian tersebut.

Demikian dapat kami sampaikan. Atas perhatiannya kami haturkan terima kasih.

Komisi Etika Penelitian Unika Atma Jaya,

		
Dr. Lidia L. Hidayat, MPH, Psikologi Sekretaris		Dr. Alexander Seran Ketua

Appendix 7: Official permits from the Indonesian Ministry of Research and Technology and the National Police

Ministry of Technology official research permit:

No. 365

RISTEK

**KEMENTERIAN RISET DAN TEKNOLOGI
REPUBLIK INDONESIA**

Jl. M.H. Thamrin No. 8, Jakarta 10340, Gedung II BPPT Lantai 8
Tel. 021-3169293 Fax. 021-39836180. e-mail: frp@ristek.go.id

KARTU IZIN PENELITI ASING

Nama : Ms. Claudia Stoicescu

No. Pasport : JX832553

Warganegara: Kanada

Berlaku s/d : 18 September 2014

No. Surat Izin: 365/SIP/FRP/SM/VIII/2013

FRM APP 28/IX 12/REV.00



National Police research registration certificate:

**MARKAS BESAR
KEPOLISIAN NEGARA REPUBLIK INDONESIA
BADAN INTELIJEN KEAMANAN**

Surat Keterangan Lapor Diri
(Certificate of Police Registration)

No. SKLD : 07-415936/P0/X/2013

Nama : STOICESCU CLAUDIA

Warga Negara : KANADA

Pekerjaan : Peneliti
KEMENRISTEK

Alamat : Jl. Kemang Timur 36
Jakarta Selatan

Berlaku s/d :
17-09-2014

Jakarta, 01 Oktober 2013
a.n KABAINTELKAM
WAKA

Drs. DIDIEK S. TRIWIDODO, MM, M.Hum
INSPEKTUR JENDERAL POLISI




Appendix 8: Informed consent forms



Perempuan Bersuara **Important Information for Participants**

Please take time to read and this sheet carefully and decide whether you do or do not want to take part in this research. The interviewer will also read this sheet out loud and discuss any concerns or questions you may have. Please feel free to approach the interviewer or anyone on the research team if you have any questions. Thank you!

1. What is the purpose of this research? Why women?

Sometimes, women have different experiences and health needs compared to men. This also applies to those of us who use or inject drugs, no matter how often or how rarely we use. This study aims understand the experiences and needs of women like us in Greater Jakarta, West Java and Banten. This information will be used to improve health services and government policies that affect women who inject drugs, their children, families and communities. Your input is very important!

2. How is this research going to be conducted?

This study uses a type of chain referral sampling which involves women who are already participating in the study referring their friends and acquaintances that fit the eligibility criteria to take part in the research. You can receive up to four small rewards to cover transport and time spent talking to us. First, you will receive a reward (Rp 75,000) for completing the interview. You may then pick up an additional reward (Rp. 25,000) each time a friend or acquaintance you have referred that fits the eligibility criteria also completes the interview. Your interview will last about an hour. You can then refer up to 3 of your friends to take part in the study.

We will never ask you to use your real name, nor use your full name outside of the interview should you choose to share it. We ask you that you similarly do not refer to yourself and your peers by full name during the interview. Any information that you give us will thereafter only be referred to using a random numerical sequence.

3. What kind of information will I have to provide?

We will start by asking you a range of questions about yourself, your partner, and your family. We will then ask you more detailed questions about your drug use, reproductive and sexual health, and whether/how you access health services. Each question will have several choices, and you will be asked to pick one, or more.

Some of the questions we will ask will be related to drug use, sex, police and violence, and might be very personal. These are important to help us understand women's experiences and needs as accurately as possible, and to effectively improve the way that health services in Indonesia address these issues. If you feel uncomfortable answering any questions that we ask you, or if any questions upset you, you are free to stop the interview at any point

or ask to take a break, without needing to give the interviewer a reason.

4. What if I decide I don't want to participate, or change my mind in the middle of the interview?

Your decision to take part in this research study is entirely voluntary. You may decide that you do not want to participate at any point during the research process or interview. Your decision not to participate won't affect any services that you are already accessing. If you decide to take part, you are still free to stop at any time without giving a reason. However, if you do decide to stop, we will be unable to offer you the monetary reward.

5. Will the information I provide you be kept confidential?

Anything you tell us about yourself will be kept strictly confidential, and will not be shared with anyone else. Your real name and contact details will be removed from any information you provide so that you cannot be recognised. However, during this study it may become clear that you are dealing with serious challenges. If this is the case, your interviewer will explain to you, in private, possibilities for further help. If there is a safety issue, we might suggest that we contact an organisation that can offer further assistance, but we will never do this without asking for your permission and discussing the issue with you first.

6. Can you give me more information and/or referrals to health services?

Yes, we can provide you with updated information on where you can access HIV testing, harm reduction, sexual and reproductive health services, violence reporting and prevention, counselling and paralegal services in your area. Attached to this information sheet, you will find a directory of services for HIV testing and treatment and other services should you wish to contact them or go there directly. Your interviewer will be happy to explain which of these you can access for free and how to do so. If you wish to speak with a counselor about anything that came up during this interview, just ask your interviewer and she will provide you with a referral.

7. What if I have a complaint or want more information after the interview?

If you are unhappy with anything or want more information about the research, you can contact Claudia confidentially at PerempuanBersuara@gmail.com.

8. What will happen with the results of the study?

The results of this study will be used to help community networks, local organisations, and the government to advocate for better research and improved health services that take into consideration the specific needs of drug-involved women. We will also use these results to advocate for better and fairer policies on drugs and health care access.

9. Who is organizing and supporting this research?

This research is organized jointly by the Indonesian Drug Users Network in collaboration with researchers from Oxford and Atma Jaya Universities. The following organisations are also actively involved in the research process: Rumah Cemara, Karisma, Yayasan Stigma, Grapiks, KIOS Atma Jaya, and Rumah Singga Peka. The study is financially supported by AusAID, Australian Illicit and Injecting Drug Users League, Asian Network of People Living with HIV, Canadian Institutes for Health Research, and UNAIDS.

Informed Consent

1. I have read and understand the information sheet for this research study, and have had a chance to ask questions.
2. I understand that participation in this study is entirely voluntary, and that I am free to stop at any time, without having to provide any reason. This will not affect any services I am already accessing.
3. I understand and agree that any information I provide during the interview will be used, without disclosing my real name, in the presentation of the research results.
4. I agree to participate in the research study.

Participant's name:

Participant's signature:

Interviewer's name:

Interviewer's signature:

Date: _____

Date: _____

Thank you for participating in this study. Your opinion matters!