DRUG ABUSE PATTERNS, SELECTED PSYCHOSOCIAL CONDITIONS AND ASSOCIATED RISKY SEXUAL BEHAVIOR AMONG WOMEN WHO INJECT DRUGS LIVING IN INFORMAL URBAN SETTLEMENTS IN NAIROBI COUNTY KENYA

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Drug Abuse Patterns, Selected Psychosocial Conditions and Associated Risky Sexual Behavior a mong Women Who Inject Drugs Living in Informal Urban Settlements in Nairobi County Kenya

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

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DEDICATION

I wish to dedicate this work to the women who have directly suffered from the debilitating and degrading effects of drug abuse. Your determination to make a difference in your lives despite a multitude of challenges gave me inspiration to do this work. I greatly appreciate my husband Mwangi Njuguna for his incredible support and encouragement, my sons; Mwangi, Njuguna and Kariuki for their patience during periods of my absence from their daily activities. Your love, positive attitude towards life enabled me to maintain the level of determination and enthusiasm required to complete this academic journey. I appreciate the love and encouragement from my late parents Mr David Mwangi and Mrs Janet N. Mwangi who always emphasized the benefits of a good education.

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ABBREVIATIONS AND ACRONYMS

AIDS	Acquired immunodeficiency syndrome
ART	Antiretroviral therapy
CTS	Conflict Tactics Scale
DIC	Drop in Centre
DSM	Diagnostic and Statistical Manual of Mental Disorders
FGD	Focus Group Discussion
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HIV	Human immunodeficiency virus
IBBS	Integrated Bio -Behavioral Survey
IDU	Injecting drug use
KAIS	Kenya Aids Indicator Survey
KDHS	Kenya Demographic Health Survey
KEMRI	Kenya Medical Research Institute
KNBS	Kenya National Bureau of Statistics
KP	Key population
KPCU	Kenya Planters Cooperative Union
MOH	Ministry of Health
NACADA	National Authority Campaign against Alcohol and Drug Abuse
NACC	National Aids Control Council
NASCOP	National AIDS & STI Control Programme

PWID	People who inject drugs
SAPTA	Support for Addiction Prevention and Treatment in Africa
STI	Sexually Transmitted Infections
TMDS	Targeted mobiliser driven sampling
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNODC	United Nations Office on Drugs and Crime
WHO	World Health Organization.
WWID	Women who inject drugs

OPERATIONAL DEFINITION OF TERMS

Harm Reduction	Refers to policies, programs and practices that aim to reduce the harm associated with the use of psychoactive drugs in people unable or unwilling to stop. The defining features are the focus on the prevention of harm, rather than primarily on the prevention of drug use itself, and the focus on people who continue to use drugs.
Heroin	An opioid drug that appears as a white or brown powder or as a black sticky substance that is synthesized from morphine, a naturally occurring substance extracted from the seed pod of the Asian opium poppy plant.
Illicit drugs use	The non-medical use of a variety of drugs that are prohibited by international law. These drugs include: amphetamine- type stimulants, cannabis, cocaine, heroin, and other opioids, and MDMA (ecstasy).
Injecting Drug Use	A method of illicit drug use where drugs are injected directly into the body (into a vein, into a muscle, or under the skin) with a needle and syringe.
Intimate Partner Violence	Defined as physical violence (slaps, punches, kicks, assaults with a weapon), sexual violence (rape, coercion and abuse, use of physical force, verbal threats and harassment to have sex, unwanted touching or physical advances), psychological violence (belittling, intimidation, withholding of resources), and any violence (a combination of physical, sexual, and psychological violence by a current or former intimate partner.
Licit drugs use	Use of drugs that are allowed by law.
Medically Assisted Therapy	The use of opioid agonist prescription medications for the management of persons dependent on opioids and who have used opioids for an extended period.
Methadone	Methadone is one of the critical components of harm reduction.

	It is an opioid agonist medication used for the treatment of opioid addiction and pain.
Needle and Syringe Program	It is one of the critical components of harm reduction program and involves distribution of sterile and disposable syringes and needles in adequate quantity to the injecting drug users.
Opioids	A class of drugs that include the illegal drug heroin, synthetic opioids such as fentanyl, and pain relievers available legally by prescription, such as oxycodone (OxyContin®), hydrocodone (Vicodin®), codeine, morphine, and many others.
Opioid Substitution Therapy.	The administration, under medical supervision, of a prescribed psychoactive substance, pharmacologically related to the one producing dependence, to people with substance dependence, for achieving defined treatment objectives.
Overdose	Occurs when a person takes opioid drugs or opioids in combination with other drugs, in quantities that the body cannot handle. As a result, the brain is not able to carry out normal body functions. The person may pass out and stop breathing, and in extreme cases, develop heart failure, or experience convulsions.
People Who Inject Drugs	Persons who use narcotic drugs through injecting mode.
Route of administration	The way a drug is taken into the body. Drugs are most commonly taken by eating, drinking, inhaling/sniffing, injecting, snorting, or smoking.
Substance abuse	The harmful or hazardous use of psychoactive substances, including alcohol and illicit drugs which can lead to substance use dependence or addiction.
Substance use	Consumption of alcohol or drugs that does not always lead to addiction but it always comes with the risk that it might lead to substance use dependence.

Substance use dependence	Adaptive state that develops from repeated drug administration which results in withdrawal symptoms upon cessation of drug use.
Substance use disorder.	A medical illness caused by disordered use of a substance or substances. According to the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), substance use disorders are characterized by clinically significant impairments in health, social function, and impaired control over substance use and are diagnosed through assessing cognitive, behavioral, and psychological symptoms.
Tolerance	A pharmacological concept describing subjects' reduced reaction to a drug following its repeated use.
Withdrawal	Symptoms that can occur after long-term use of a drug is reduced or stopped. These symptoms occur if tolerance to a substance has occurred, and vary according to substance. Withdrawal symptoms can include negative emotions such as stress, anxiety, or depression, as well as physical effects such as nausea, vomiting, muscle aches, and cramping, among others. Withdrawal symptoms often lead a person to use the substance again.

ABSTRACT

An estimated 16 million people who inject drugs worldwide are female. In Kenya it is estimated that 18,327 people inject drugs and 10% are women with a HIV prevalence of 36%. Women who inject drugs (WWIDs) experience great disparities in health outcomes relative to their counterparts in the general population, most notably in HIV. HIV clusters together with intimate partner violence (IPV), substance abuse (SA), and depression among WWIDs. This thesis applied ecological approach guided by syndemics theory to determine drug use patterns, selected psychosocial conditions and associated risky sexual behavior among women who inject drugs living in informal urban settlements in Nairobi Kenya. The objectives of the study were to determine the prevalence of substance abuse, intimate partner violence, depression and risky sexual behavior, establish patterns of drug use, determine the co-occurrence of substance abuse, intimate partner violence, depression, risky sexual behavior and investigate the socio-demographic and socio-economic variables associated with substance abuse, intimate partner violence, depression and risky sexual behavior among women who inject drugs.This study used a cross sectional study design with a mixed method approach. 306 women, ≥18 years of age, and injecting heroin in the preceding year were recruited using targeted mobliser driven sampling. Statistical analysis software STATA version 15 was used for statistical analyses. Multiple methodologies including descriptive analyses, standard logistic regression, classification trees algorithm for predictive modelling were employed. Thematic analysis was used for qualitative data. The prevalence of SA, IPV, depression and risky sexual behaviour were 88%, 84%, 77.1% and 69.3% respectively. Persons who introduced drugs used at age of initiation of substance use was associated with current poly substance use (Fisher exact P=0.0001). There was a significant association between SA and depression and with risky sexual behavior. Each additional psychosocial condition was associated with 6-fold odds of having risky sexual behaviour. (*P*=0.0001). Standard logistic regression analyses returned three significant variables: SA*depression interaction effect, age of delivery of the first child and income. Classification tree modelling predicted SA, depression, time lived in informal settlement, type of family women grew in and number of children to have the highest influence on risky sexual behaviour. This thesis provides new evidence on prevalence of the psychosocial conditions and drug abuse patterns among WWIDs. Further, it presents evidence on individual and cumulative effects of IPV, depression, SA on risky sexual behaviour outcome and socio-demographic and socio-economic variables associated with the IPV, depression, SA and risky sexual behaviour among WWIDs. The findings of this study have great public health significance and important implications for further research, interventions, and policy.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Even with over three decades of HIV prevention interventions, the global share of HIV infections shouldered by women is increasing (Larney *et al.,* 2015). Globally in 2016, women accounted for 52% of 37million people estimated to be living with HIV compared with 46% in 1999 (UNAIDS, 2016; 2000). Women who inject drugs are a sub-population of women at greater risk of HIV transmission worldwide (UNAIDS, 2016). 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 showed that women who inject drugs experienced significantly higher HIV rates than male injectors (Des Jarlais *et al.,* 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). In Africa, it is estimated that 630,000 people inject drugs with a HIV prevalence of 13.6% but sex-disaggregated data was missing (UNODC, 2018).

Illicit substance abuse such as injection drug use poses significant global public health challenges linked to multiple negative health outcomes (Crime, 2016). This is particularly so in the transmission of Human immunodeficiency virus (HIV) and other blood-borne viruses (Debeck *et al.,* 2017). Equally important is the elevated risk of morbidity and mortality related to substance abuse overdose (Gomes *et al.,* 2018). According to the United Nations Office on Drugs and Crime, illict substance abuse includes the non-medical use of a variety of drugs that are prohibited by international law (UNODC, 2017).

These drugs include heroin which can be used through injection or non-injection modes, other drugs such as cannabis, cocaine, amphetamine. Research on injection drug use

patterns in women who inject drugs serves to better understand determinants and pathways to substance dependency such as age of onset of use (Nkansah-Amankra & Minelli, 2016;Poudel & Gautam, 2017) motivation for primary substance use (Bracken *et al.,* 2013; Ghandour *et al.,*2014) characteristics of social networks that introduce and maintain licit and illicit substance use (Bohnert & Catherine, 2014) prospective poly substance use trends (Betts *et al.,*2016; Roth *et al.,*2015) and polyroute of substance administration (Meacham *et al.,* 2018).

Injection drug use among women also feature additional complex interactions with poverty highlighting the role of social contexts (Khajedaluee *et al.,* 2015). This underscores the need to strengthen linkages between substance use prevention policies, HIV prevention programmes and addressing social determinants of poverty in specific settings. Characterization of interplay between age of onset of substance use, motivation and primary introduction of substance use among women who inject drugs is a crucial first step in identifying pathways into substance dependency later in life. Research has shown that the first introducers of licit and illicit drugs to young girls at adolescence are intimate sexual partners who may be already dependent on drugs (Meacham *et al.,* 2018; Wickersham *et al.,* 2016; Betts *et al.,* 2016; Zolala *et al.,* 2016).

With concurrent sexual debut in girls during adolescence, critical sound judgements about both sexual relationships and psychosocial transitions to adulthood are limited (Pringle *et al.,* 2017; Skinner *et al.,* 2015; Baams *et al.,* 2015). For this reason, blind securities among the adolescent girls in the hands of intimate sexual partners and relational power dynamics that are skewed towards the man resulting in diverse forms of violence meted towards the girls (WHO, 2011; Pulerwitz *et al.,* 2018). Consequently, the girls experience stress and other mental and social suffering on which they may medicate with licit and or illicit drugs (Atherton *et al.,* 2016). Often, these intimate relationships with male sexual partners do not last, and the girl transitions into adulthood with substance dependence. For instance, available studies suggest that use of alcohol, marijuana, and cigarette during adolescence predicts subsequent substance abuse problems in adulthood (Nkansah-Amankra & Minelli, 2016; Trenz *et al*., 2017). These

observations provide an important background for specific studies on early substance use onset and pathways to substance dependency in adulthood (Jordan & Andersen, 2017).

Instances of substance dependence after onset of use among young women are followed by combining of multiple categories of drugs either simultaneously or sequentially over time, a process normally termed as poly substance use (Betts *et al.*, 2016; Nkansah-Amankra & Minelli, 2016). These drug categories may include depressants, stimulants or hallucinogens. Poly substance use can be further characterized by diverse modes of administration including injection where illicit drugs are injected directly into the body (into a vein, muscle, or under the skin) and non-injection modes such as smoking, snorting, sniffing and oral consumption (Nkansah-Amankra & Minelli, 2016; Novak & Kral,2011; Harrell *et al.,* 2012). Factors related to the choice of mode of administration of heroin among women who inject drugs is dependent upon the type and quality of heroin, physiological status such as pregnancy and sicknesses, speed of desired effect and unavailability of heroin for diverse reasons (Harrell *et al.,* 2012; Woodcock *et al.,* 2015).

Given that injection drug use is a key driver of HIV epidemic through risky sexual behaviour and use of contaminated injection tools (UNAIDS, 2016), majority of an estimated 3.8 million women and girls who inject drugs globally are at risk of contracting HIV (Larney *et al.,* 2015). Among these women who inject drugs, certain psychosocial conditions including intimate partner violence and depression co-occur within them leading to increased rates of risky sexual behaviour and subsequent HIV transmission (Stoicescu *et al.,* 2018; Azim *et al.,* 2015). For instance, HIV prevalence among people who inject drugs in sub-Saharan Africa is estimated to range from 5.5% to a high of 42.9% (Mathers *et al.,* 2008). In Kenya, HIV prevalence among people who inject drugs is estimated at 18.7% (Male prevalence at 17%; Female prevalence at 36%) (NASCOP, 2018) which is considerably higher than in the general population (6.6%) (NASCOP, 2018). The co-occurrence of substance abuse, depression, intimate partner

violence and risky sexual behaviour has been reported across low socio-economic urban settings among women who inject drugs (Azim *et al.,* 2015; Loeliger *et al.,* 2016).

Hypothesized relationships between these psychosocial conditions and risky sexual behaviour comprise a syndemic (Mizuno *et al.,* 2015). Syndemic approach is novel attempt in global health research that challenges conventional frameworks that emphasize on individual risk factor analyses in medicine and public health (Singer *et al.,* 2017). These conventional frameworks have been criticized as they often ignore social, economic, cultural, political, and ecological context (Loeliger *et al.,* 2016). Thus, the syndemic approach postulates that a common cause, such as low socio-economic disadvantage/poverty, underlies a syndemic (Gilbert *et al.,* 2015).

The syndemic approach was originally developed by medical anthropologists to explain the population-level occurrence of HIV/AIDS in certain populations disproportionately affected by socio-economic disadvantage/poverty, social marginalization, gender-based violence and other forms of social and environmental stress (Singer, 1996). Previous research in diverse global regions has proven existence of syndemics (Singer *et al.,* 2017). Senn (2010) outlined a syndemic pattern constituting of intimate partner violence, substance abuse, depression, and sexually transmitted diseases among patients attending an urban sexually transmitted diseases clinic in the United States of America (Senn *et al*.., 2010). Distefano (2016) reported the presence of at least three syndemics in circumstances linking HIV with poor mental health, substance abuse and violence in synergistic manner in Japan (Distefano, 2016). Jiwatram-Negron (2018) described a syndemic impact of injection drug use, IPV, and HIV on mental health among women using drugs in Kazakhstan (Jiwatram- negrón et al.,).

The value of a syndemics approach in social epidemiology research is immense – the approach reveals clustering of exposures and outcomes of interest within populations, explains better the social, psychological, and biological factors on why and how exposures and outcomes of interest cluster within populations, the ways these factors interact with each other, the importance of these interactions to the health burden within

the populations, and the pathways to the generation of these interactions (Singer *et al.,* 2017).

A review of scientific literature indicates that there are no studies that have identified and characterized syndemics revolving around HIV burdens in sub-Sahara Africa including Kenya except in South Africa (Pitpitan *et al.,* 2012; Okafor *et al.,* 2018). Studies that have been conducted among PWIDs in Kenya have mainly been limited to assessment of individual risk factors and behaviours associated with HIV incidence and prevalence missing out on the syndemic approach that advances a systems-thinking approach (Syvertsen *et al.,* 2015; NASCOP, 2014; Tun *et al.,* 2015). Further, these studies have employed small samples that lacked gender representativeness and gendered insights. For example, in one national Integrated Bio-Behavioural Survey (IBBS) conducted among PWIDs (n=269), only 8.5% of the study respondents represented women (Tun *et al*., 2015). Similarly, in a rapid assessment survey of HIV and related risk factors among PWIDs (n=344), women who inject drugs represented only 6.4% of the study respondents (NASCOP, 2014).

1.2 Statement of the problem

In Kenya HIV prevalence among women who inject drugs is 4 times higher than in male counter parts and more than 10 times higher than women in the general population (NASCOP, 2015; 2018). Research indicates that the heightened risk of HIV among women who inject drugs starts at adolescence when girls drop out of schools in context of limited resources. They engage in sexual relationships with older men already using drugs and take up marriage /parental responsibilities or engage in spontaneous short-lived relationships with casual or regular partners who are often violent (WHO, 2011; Pringle *et al.,* 2017; Skinner *et al.,* 2015; Baams *et al.,* 2015; Ewing *et al.,* 2015; Girma & Paton, 2015). Relationship break ups, violence, substance abuse and the need to provide for their young children leads the girls further to economic and mental health challenges later in adulthood. Exposure to substance abuse, Intimate partner violence and mental health challenges (depression) can have direct or indirect impact on women's

ability to negotiate safer sexual behaviours and engage HIV prevention interventions (El-Bassel & Strathdee, 2015; Larney *et al.,* 2015). Substance abuse, intimate partner violence and depression may co-occur, interact, and reinforce each other in geographical or temporal contexts of inequality, stigmatization, and structural violence (Tsai *et al.,* 2017; Singer *et al.,* 2017). Research that characterizes the associations of these risk factors among women who inject drugs is scanty in Kenya. In addition, the theoretical framework that guides the design of research and interventions targeting women who inject drugs in Kenya is weak because it focuses on conventional approaches that emphasize individual risk factors in public health but ignore social, economic, cultural, political, and ecological contexts of disease occurrence. This promotes a perspective of behavioral risk-taking as a product of calculative, rational, and context-free risk assessment (Tsai *et al.,* 2017; Wechsberg *et al.,* 2015).

1.3 Significance of the study

Persistent HIV infection disparities among women who inject drugs pose a considerable public health challenge, since HIV is associated with several adverse health outcomes. Elucidating the dynamics of elevated HIV vulnerability among women who inject drugs in this study and how it is sustained and propagated creates an evidence base for effective HIV prevention interventions. Establishing the patterns of drug use from adolescence and their link to the risk of HIV infection later in adulthood contributes to the national strategy of halting escalating HIV infections among adolescent girls and young women in Kenya.

1.4 Justification of the study

Preventing early substance use initiation will protect the girls from depression, IPV, early sexual debut and HIV. Establishing injection drug use pattern will inform development of interventions to create awareness for preventing early substance abuse. Characterizing associations of substance abuse, intimate partner violence, depression, risky sexual behaviour will inform national strategy of halting escalating HIV infections

in adolescents' girls. Identification of socio-demographic and socio-economic factors will inform development of sustainable livelihoods interventions aimed at reducing poverty.

1.5 Research questions

1. What is the prevalence of substance abuse, intimate partner violence, depression and risky sexual behaviour among women who inject drugs living in informal urban settlements in Nairobi County?
2. What are the drug use patterns among women who inject drugs living in informal urban settlements in Nairobi County?
3. What is the co-occurrence of substance abuse, intimate partner violence, depression, risky sexual behavior among women who inject drugs living in informal urban settlements in Nairobi County?
4. What are the socio-demographic and socio-economic variables associated with substance abuse, intimate partner violence, depression and risky sexual behaviour among women who inject drugs living in informal urban settlements in Nairobi?

1.6 Objectives

1.6.1 Broad objective

To determine drug use patterns, selected psychosocial conditions and associated risky sexual behavior among women who inject drugs living in informal urban settlements in Nairobi County.

1.6.2 Specific objectives

1. To determine the prevalence of substance abuse, intimate partner violence, depression and risky sexual behaviour among women who inject drugs living in informal urban settlements in Nairobi County.

2. To establish patterns of drug use among women who inject drugs living in informal urban settlements in Nairobi County.
3. To determine the co-occurrence of substance abuse, intimate partner violence, depression and risky sexual behavior among women who inject drugs living in informal urban settlements in Nairobi County.
4. To investigate the socio-demographic and socio-economic variables associated with substance abuse, intimate partner violence, depression and risky sexual behavior among women who inject drugs living in informal urban settlements in Nairobi County.

1.7 Conceptual framework

This study combines a social-ecological approach to HIV vulnerability more broadly, with the theory of syndemics, which has been applied to women who use drugs from marginalized backgrounds (Singer, 1996; González-Guarda *et al.,* 2011; Stoicescu *et al.,* 2018). These frameworks propose that for substance abuse, intimate partner violence, depression, drug use patterns, socio-demographic and socio-economic factors to influence risky sexual behaviour they must co-occur and interact with each other to produce excess health adversity. In this study the psychosocial conditions (substance abuse, intimate partner violence and depression) are hypothesised to interact syndemically and/or synergistically on women's sexual risk. Other actors that could influence sexual risk include substance abuse-related factors such as drug use patterns (age of initiation of substance use, person who introduced licit/illicit drugs at initiation of substance use, poly substance use, and mode of drug administration), socio-demographic factors including (age, marital status, religion, parity, age at first child, age started living with partner, years lived in the informal settlments, reason for living in the informal settlement), socio-economic factors (occupation, income). Further other factors (that are beyond the scope of this research) including social network and/or community factors that may shape women's sexual risk mainly sexual networks, illicit drug networks, structural and policy factors including societal gender norms that support male

violence, stigma and discrimination, laws that criminalise drug use & sex work and gender based social economic inequalities.

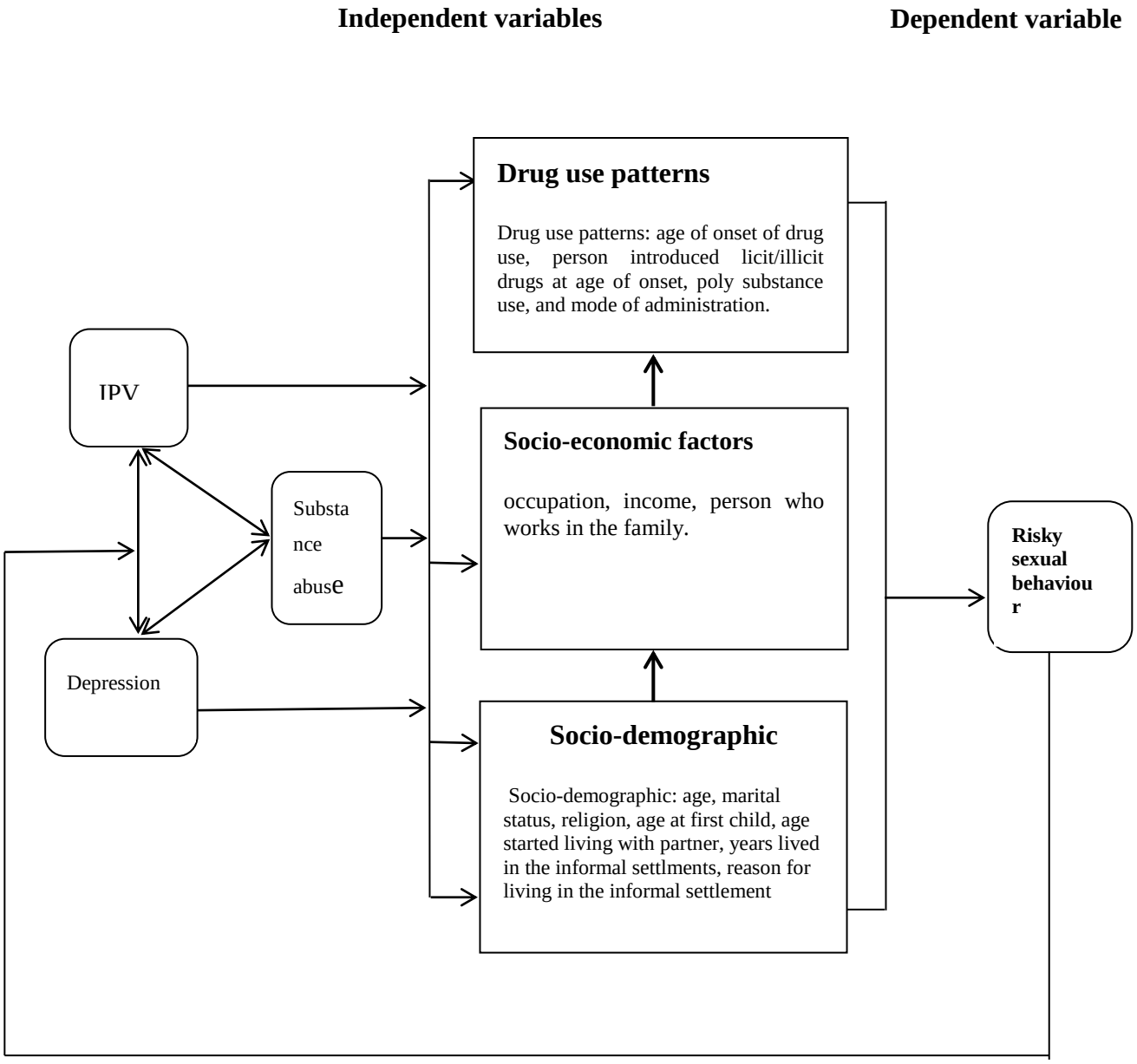

Figure 1.1: Conceptual frameworks on the interrelationship between substance abuse, Intimate partner violence, depression and risky sexual behaviour among women who inject drugs. (Singer, 1996)

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The previous chapter (chapter one) presented an overview of study background, problem statement, research questions, objectives, and conceptual framework. This chapter details the findings of review of literature to understand global, regional and country specific statistics on women and injection drug use. It presents findings of a review of risk factors for HIV amongst women who inject drugs and existing literature on syndemic processes and the mechanisms by which they elevate HIV acquisition and transmission among women who inject drugs.

2.2 Global trend in injection drug use among women

Women account for half of the 37 million people estimated to be living with HIV globally (UNAIDS, 2016). In regions with concentrated HIV epidemic among key at-risk populations, the number 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 the 16 million drug injectors worldwide (Degenhardt *et al.*, 2013). As compared 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).

Studies from 14 countries with concentrated HIV epidemics among people who inject drugs show that women who inject drugs experience significantly higher HIV rates than male injectors (Des Jarlais *et al.*, 2012). Further, 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). Similarly, a review of studies in nine European Union countries found that the average HIV prevalence in injecting populations was more than 50 times higher among women who inject drugs than among

their male counterparts (EMCFDAD, 2012). In 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).

In low and middle income countries, HIV prevalence is estimated to range from 5.5% to a high of 42.9 % (UNAIDS, 2016). However, data on women who inject drugs is scarce resulting to limited interventions to reduce HIV among them in the region (Larney *et al.,* 2015). Among the few surveys conducted in sub-Saharan Africa, HIV prevalence among women who inject drugs is 3 to 5 times higher than that of male counterparts (Degenhardt *et al.,* 2013; Des Jarlais *et al.,* 2012). For example, in a survey conducted in four states in Nigeria HIV prevalence among women who inject drugs ranged from 7.4% to 37.7% compared to male prevalence that ranged from 3.3% to 9.3% (Eluwa *et al.,* 2013). In a similar study in Senegal, HIV prevalence among women who inject drugs was 13.3% compared to prevalence among men of 3% (Lepretre *et al.,* 2015). In Tanzania the national HIV prevalence for all people who inject drugs was 15.5% and 71 % among women who inject drugs (Nyandindi *et al.,* 2014). Likewise, in Kenya HIV prevalence among women who inject drugs is 60.7% compared to prevalence among men who inject drugs of 15.4% (NASCOP, 2015).

Women who inject drugs experience heightened risk of HIV infection due to unsafe drug use practices and sexual risk taking (Roberts *et al.,* 2014). Commonly, drug-related risks of HIV infection include the sharing of contaminated needles and syringes (Nyandindi *et al*., 2013; NASCOP, 2014, Gilbert *et al.,* 2015). Risky sexual behaviors associated with HIV transmission among women who inject drugs include engaging in unprotected vaginal sex (Des Jarlais *et al.,* 2012; Degenhardt *et al.,* 2013) with regular or casual partners and sex work (Zamudio-Haas *et al.,* 2016), overlapping sexual risks, and exchanging sex for money, drugs, shelter and/or basic needs (Shannon *et al.,* 2015).These persistent HIV infection disparities among women who inject drugs pose a great public health challenge and lead to serious health outcomes that may include increased AIDs related mortality, limited access to treatment and care due to low adherence as compared to men who inject drugs (Roberts *et al.,* 2014; Mathers, &

Degenhardt, 2010; Zamudio-Haas *et al.,* 2016) and to other women in the general population (Mathers *et al.,* 2013).

Several studies globally have found that as compared to women in the general population women who inject drugs also experience disparities in rates of psycho-social health outcomes, mainly IPV and mental health. For instance, prevalence of past year IPV experience was 70% among clinical and community-based samples of women who inject drugs in five European regions in Austria, Catalonia, Italy, Poland, and Scotland which was three times higher than prevalence rates among women in the general population (Tirado-Muñoz *et al.,* 2018; Lepretre *et al.,* 2015; Shannon *et al.,* 2015; Gilbert *et al.,* 2015). Similarly, rates of past year IPV in the United States ranged between 20% to 57% among female drug users which was two to five times higher than prevalence among women in the general population (El-Bassel *et al.,* 2011).

Further, among a sample of drug involved women from a community sample in five countries in Africa prevalence of depression was 32.3% and was five times higher than women in the general population (Bajunirwe *et al.,* 2018; Adeponle *et al.,* 2017; Ngcobo *et al.,* 2008). Similarly, among samples of people who use heroin in developed countries prevalence of depression ranged between 16% and 44% (Yang *et al.,*2015; Ulibarri *et al.,*2013; Cheek *et al.,*2016) and was twice as high among women than men (Sordo *et al.,* 2012; Torrens *et al.,* 2011).

Clustering of substance abuse, HIV, IPV and depression can cumulatively worsen women's health. Research globally has documented increases in women who use drugs poor health outcomes with the number of exposures to these psychosocial health outcomes (Illangasekare *et al.,* 2013; Loeliger *et al.,* 2016). Further, research has indicated that these adverse health outcomes, particularly their co-existence and interaction, may equally be increasing women who inject drugs vulnerability to HIV epidemic in low- and middle-income countries, but little research exists to support this contention outside of the developed countries (Azim *et al.,*2015; Gilbert *et al.,* 2015).

2.2.1 HIV and injection drug use in Kenya

Kenya has the third-largest population of people living with HIV in sub-Saharan Africa and the highest national HIV prevalence of any country outside of Southern Africa (NACC, 2014). In 2017 approximately 1.5million people were living with HIV with a national adult HIV prevalence estimate of 4.9% (NACC, 2018). In these estimates HIV prevalence rate was higher among women (5.2%) than among men (4.5%). Although the spectrum results show a continued decline in HIV prevalence among the adult population aged 15-49 years over a period of time, HIV prevalence is higher among key populations. 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 (NASCOP, 2014).

People who inject drugs are among the three key populations in Kenya identified as being at greater risk of HIV infection (NASCOP, 2014). HIV epidemic among key populations is driven by high-risk sexual behaviour, such as unprotected anal or vaginal sex, drug related HIV-risk behaviour, such as unsafe injection practices and structural factors such as violence, poverty that heighten the vulnerability of key populations (NASCOP, 2014). Injection drug use is a major public health challenge in Kenya due to its contribution to HIV transmission (NACC, 2009; NASCOP, 2014). Heroin is the established primary drug used by people who inject drugs in Kenya, as it is in Mozambique (Baltazar, *et al.,* 2019). The estimated size of people who inject drugs in Kenya is 18,327 with more than 90% of them using heroin either through various mode of use or a combination of them such as injection, smoking, sniffing or inhaling (NASCOP, 2018; Mburu *et al.,* 2019).

According to the Kenya HIV prevention responses and modes of transmission analysis approximately 33% of all new infections in the country are attributed to key populations and in the aggregated data 3.8% of the new HIV infections were attributed to people who inject drugs (Gelmon *et al.,* 2009). Further analysis showed that in Nairobi people

who inject drugs contributed 26% of the new HIV infections almost one-third of new infections.

Since the introduction of the needle and syringe program in 2012, Kenya has focused on transmission of HIV through unsafe injecting practices which has seen reduction in risky injection practices from 67.3% in 2011 to 12 % in 2017 (NASCOP, 2015; 2018). Nevertheless, little attention has been given to sexual transmission of HIV resulting to limited impact in the reduction of HIV prevalence among women who inject drugs. Studies in Kenya have indicated that people who inject drugs engage in risky sexual practices such as multiple sexual partnerships, unprotected sex with regular and casual partner, and trading of sex for money or goods, sex with male partners who inject drugs (NASCOP,2014; Syvertsen *et al.,* 2015; Mburu *et al.,* 2019) indicating their elevated vulnerability to HIV.

2.2.2 Injection drug use among women in Kenya

In Kenya women who inject drugs are disproportionately affected by HIV compared with their male counterparts (NASCOP, 2018). For example, while women who inject drugs comprise between 8%-10% of the total population of people who inject drugs, they have more than double HIV prevalence as compared to their male counter parts (NASCOP, 2018; Tun *et al.,* 2015; Syvertsen *et al.,* 2015). In the first Integrated Bio-Behavioral Survey (IBBS) conducted among people who inject drugs in Kenya, HIV prevalence among women was estimated to be 60.7% compared to male prevalence of 15.4 % (NASCOP, 2014; Tun *et al.,* 2015).

Similarly, in a rapid situational assessment conducted among people who inject drugs in Kisumu, HIV prevalence among women who inject drugs was estimated to be 43.5% compared to male prevalence of 14.7% (Syvertsen *et al.,* 2015). Most recently, a national behavioral assessment survey among key populations in Kenya indicated self-reported HIV prevalence among women who inject drugs to be 36% compared to male prevalence of 17 % (NASCOP, 2018). Globally women who inject drugs are

underrepresented in national surveys in low- and middle-income countries (UNODC, 2017). For example, the Kenya Demographic Health Surveys (KDHS) and Kenya Aids Indicators Surveys (KAIS) conducted between 2003 to 2014 did not capture any data on sub-population of women who use drugs (KDHS, 2003; 2009; 2014; KAIS, 2007; 2012). In addition, the few surveys that have been conducted among people who inject drugs have utilized very small samples of women who inject drugs. For example, women who inject drugs represented only 8.5% of respondents (n=269) in the IBBS conducted in 2012 (NASCOP, 2014), 6.4% (n=344) in a study conducted among People who inject drugs in Nairobi (NASCOP, 2014), 16% (n=151) in a study conducted among People who inject drugs in Kisumu (Syvertsen *et al.,* 2015). This has led to paucity of information about needs and factors that pre-dispose women who inject drugs to HIV and knowledge gap in pathways to injection drug use that would inform early prevention of substance use among girls.

Recruiting sufficient numbers of women who inject drugs into surveys is difficult because women are more stigmatised and discriminated against by health services, the general community, peers, and family (UNODC, 2017). 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 Kenya, despite indications that they may be more predisposed to HIV as compared with their male counterparts and women in the general population (NASCOP, 2014; Mburu *et al.,* 2019). 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 risky sexual behaviour.

2.2.3 Policy context of injection drug use in Kenya

HIV prevention programs for people who inject drugs in Kenya exist within highly punitive legal environment due to the enactment of the Narcotic Drugs and Psychotropic Substances Control Act of 1994 (NASCOP, 2014; Bhattacharjee *et al.,* 2018). This Act aims at reducing the supply of, and demand for, narcotic drugs but also criminalises

possession of narcotic drugs or psychotropic substance for personal use (with the exception of a person with a licence issued under the Act, a clinician in possession for medical use, or a person in possession for prescribed medical purposes).

Precisely, the act criminalises any person who smokes, inhales, sniffs or otherwise uses any narcotic drug, as well as being in a place where drug use is happening; allowing drug use, preparation or sale on person's premises; and possessing pipes or other equipment for use in connection with drugs, including needles and syringes. There is evidence that law enforcement officials use these clauses to harass and arrest any person in possession of controlled drugs as well as sterile or used needles and syringes (Bhattacharjee *et al.,* 2018; Mburu *et al.,* 2019). Further evidence from civil society organisations working with people who inject drugs suggest that law enforcement practices and the experience of stigma have fuelled fear among women who inject drugs, deterring them from accessing services (NASCOP, 2014).

At the international level, Kenya has ratified the three UN conventions on drug control: the 1961 Single Convention on Narcotic Drugs (UNODC, 1961), the 1971 Convention on Psychotropic Substances (UNODC, 1971) and the 1988 Convention against Illicit Trafficking in Narcotic Drugs and Psychotropic Substances (UNODC, 1988). Together, these form the cornerstone of the international response to drug use and markets, a response that is dominated by law enforcement and supply reduction measures.

At the national level, the National Authority for the Campaign against Alcohol and Drug Abuse (NACADA) is the lead agency for drug control. It focuses on demand and supply reduction, public awareness, drug dependence treatment and rehabilitation, and its mission is to provide leadership on policy development, education, regulation, management, programme implementation and research coordination on matters pertaining to drug and substance abuse in Kenya (GOK, 2011).

The National Drug Control Bill of 2011 that mandates NACADA put excessive focus on prevention, incarceration and limited focus on harm reduction which is the public health

approach used by the Ministry of Health to address drug use (GOK, 2011). This brings ambiguity and confusion in different arms of government regarding issues of drug use and HIV resulting to increased harassment, arrest and incarcerations of people who inject drugs (NASCOP, 2018). For example people who inject drugs in Nairobi and Mombasa reported constant police harassment and frequent arrest especially around drug using sites and streets (NASCOP, 2014; NASCOP, 2018). These particularly include arrests for the possession of small quantities of heroin or marijuana attributed to Kenya drug laws lack clarity on penalties for possession of various amounts of illicit substances.

Consequently, people who inject drugs often refrain from taking up harm reduction services such as sterile needles and syringes, and often do not safely return their used injecting equipments for safe disposal in turn, this has been exacerbating the high rates of HIV transmission and other harms among this population. The pre-trial detention of people who inject drugs is often reported to be prolonged, especially when there is not enough evidence to bring charges, when a person cannot pay bail, or when bribes for release are not forthcoming. As a result of this practice and many other potential abuses during arrest, detention or police custody, many people who inject drugs fear detection by the police or attack from local “mob justice” groups. This leads them to stay away from services and revert to risk behaviors (NASCOP, 2014).

With the country’s disproportionately punitive drug laws, arbitrary sentencing for drug offences and large numbers of people in pre-trial detention, Kenyan prisons are overflowing with people who inject drugs convicted for, or suspected of, petty drug offenses (UNODC, 2012). However, only one prison is offering harm reduction services or drug dependence treatment, with reports suggesting that those who have been arrested are left to suffer from untreated and protracted drug withdrawal and a total lack of support (NASCOP, 2019; UNODC, 2020).

2.2.4 Programmatic context of injection drug use in Kenya

Although the government of Kenya has enacted punitive drug policies, it has also allowed provision of HIV-focused health services, including harm reduction programs targeting people who inject drugs (NASCOP, 2014). Harm reduction refers to policies, programmes and practices that aim primarily to reduce the adverse consequences of drug use without necessarily reducing drug consumption itself (UNODC, 2012). The United Nations (UN) nine evidence-based interventions for HIV prevention ,treatment and care for people who inject drugs are implemented in Kenya namely Needle and syringe programmes (NSPs), Opioid substitution therapy (OST) and other drug dependence treatment, HIV testing and counseling, Antiretroviral therapy (ART), Prevention and treatment of Sexually Transmitted Infections, Condom programmes for People who inject drugs and their sexual partners, Targeted information, education and communication, Vaccination, diagnosis and treatment of viral hepatitis, Prevention, diagnosis and treatment of tuberculosis (UNAIDs, 2012).

The scale up of the harm reduction programs in Kenya was informed by the Kenya modes of HIV transmission analysis study conducted in 2008 which indicated that 3.8% of all new HIV infections occurred among the people who inject drugs (NASCOP, 2009). In 2009 the KNASP III, 2009/10-2012/13 also supported scale up of harm reduction program in Kenya by identifying People who inject drugs among key populations at high potential of transmitting HIV but who present a lot of challenges due to the hidden and often criminal nature of injection drug use, marginalization and intolerance from even among professional planners and policy makers (NASCOP, 2056). In order to support the recommedations of KNASP III, 2009/10-2012/13, NACC in collaboration with stakeholders developed policy for Prevention of HIV infections among Key Populations (NACC, 2016). The policy seeks to accelerate rolling out of targeted, timely and evidence-based comprehensive prevention and care services for key populations among them People who inject drugs.

In Kenya, the responsibilities for implementing drug- and HIV-related health programmes are divided among NASCOP and NACC which are both under the Ministry of Health (MOH). NASCOP has overall responsibility for implementing/managing key population HIV programmes in the country and NACC is responsible for formulating HIV-related policies, guidance, and monitoring HIV trends (NASCOP, 2014). The Ministry of Health is responsible for implementing the national response to HIV, including harm reduction services, through Civil Society Organizations (CSOs) and conducting national HIV surveillance (NASCOP, 2014). Although the primary focus of NACADA is drug demand and supply reduction, the agency is also responsible, along with the Ministry of interior and coordination of national goverment for operating drug treatment and rehabilitation centres.

Despite the fact that Kenya has implemented evidence-based harm reduction interventions to address HIV among people who inject drugs, scale-up and uptake of HIV prevention interventions has been irregular. For instance, in a national behavioral assessment of key population conducted in 2017, 30% of people who inject drugs engaged in unprotected sex because of unavailability of condoms and 49% could not get any assistance after experiencing violence (NASCOP, 2018).

Although there is high uptake of antiretroviral treatment in Kenya, adherence to such treatment for people who inject drugs was low at only 42% in 2017 attributed to poor service delivery structures (NASCOP, 2018). Relative to men, women who inject drugs experience low uptake of harm reduction services in terms of scale of coverage and accessibility (Mburu *et al.*, 2018). For example, qualitative research conducted in Kenya indicates that uptake of harm reduction services among women is low because women who inject drugs face multiple barriers to access. These include stigma and discrimination from their families, communities, and health service providers, poor knowledge of reproductive and sexual health needs for women who inject drugs among drug-service providers, violence by partners, non-partners and the law enforcers and lack of female-friendly harm reduction programmes (Mburu *et al.*, 2018; 2019; NASCOP, 2018).

In Kenya, in the area of drug control, NACADA under the ministry of national and interior coordination of government and the Ministry of Health have encountered difficulties in ensuring the consistent implementation of laws and policies and in developing collaborative working relationships between law enforcement and the Ministry of Health. 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 (NASCOP, 2016). The Kenya government has simultaneously been implementing harsh drug laws and health focused interventions for people who inject drugs making it challenging to establish enabling environment for the implementation of harm reduction interventions. The marginal environment such as police harrassments disappropriately affects women who inject drugs limiting access to existing HIV-related health and support services (Bhattacharjee *et al.,* 2018).

2.3 The theoretical framework

2.3.1 Theoretical foundations for behavioural HIV research among people who inject drugs

Globally, most of the studies that have been conducted among People who inject drugs have mainly focused on individual level risk factors and theories of behaviour change (Kippax, 2012). Further many of these studies have not used theoretical frameworks. For example, a systematic review of studies on HIV risk among women who use drug (n=69) found that only 38% of the studies had used a theoretical framework (Auerbach & Smith, 2015). In these studies, the dominant theories were individual-level social-cognitive theories and only 19% of the studies went beyond factors operating at individual level to express how dynamics at the social and structural levels intensified women's vulnerability to HIV.

Approaches that focus on individual-level risk factors have the assumption that individuals have sufficient autonomy to mitigate their HIV risk (for example by using condoms or getting clean needles and syringes for injection). Some of the central

cognitive behavioral theories that have been used in HIV behavioral studies include Social Cognitive Theory (Bandura, 1986), Theory of Reasoned Action (Fishbein & Ajzen, 1975) and Health Belief Model (Becker, 1974). These theories suggest that behaviour change occurs predominantly at the individual-level, shaped by factors such as knowledge, attitudes, beliefs, and intentions. This promotes a perspective of behavioral 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 (Baal, 2013). This individual risk-taking perspective places the responsibility and blame of risk-taking almost wholly on the individual. In doing so, it disguises contextual pressures on decision-making and power inequalities related to risk negotiation, which may be related to gender, material, and/or economic inequality (Stoicescu *et al.,* 2018). Outlined limitations of individual-focused theoretical approaches suggest that a more nuanced approach is needed in relation to the exploration of HIV-related health inequalities among drug-using women. Auerbach (2015) argues that HIV risk exists not just at the individual behavioral level but also at the relational and social-structural levels (Auerbach *et al.,* 2015).

Indeed, accruing research from high-income countries 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 physical, social, cultural, economic, and political environments can create, shape, and perpetuate different HIV risk behaviors (Strathdee *et al.,* 2015). When applied to the current aim of this thesis - individual-focused 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).

Among women who inject drugs, 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 & 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 & 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 (that is depression and post-traumatic stress disorder) and the social stigma associated with these experiences (Roberts, *et al.,* 2010). Combined, these multi-level factors can have direct and indirect impacts on women's ability to negotiate safer behaviors and engage with HIV prevention interventions (El-Bassel & 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 life must be understood. The possibility that these factors co-occur, interact, and reinforce each other must also be considered (Strathdee *et al.,* 2015; Stoicescu *et al.,* 2018). 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 using women in Kenya. In identifying factors which both exacerbate HIV risk behaviour and are viable areas of intervention, has a potential to decrease negative health outcomes within this population (El-Bassel & Strathdee, 2015).

2.3.2 Syndemic approach: Understanding interaction of health inequalities

Evidence shows that the risk of HIV transmission and acquisition increases for women who use drugs, who experience multiple, co-occurring health disparities (Meyer *et al.,* 2011). The cumulative and potentially interactive effects of two or more co-morbidities

in a population have been described together as a syndemic (Stoicescu *et al.,* 2018).The concentration and interaction of afflictions, and their contribution to excess burden of health challenges in a given population, tends to occur and be sustained in an environmental context of inequality, stigmatization, and structural violence (Tsai *et al.,* 2017; Singer *et al.,* 2017). Syndemic theory has been used to increase our understanding of health disparities in several populations mainly in high income countries (Tsai & Burns, 2015).

The concept of syndemic was originally developed by medical anthropologist Singer (1996) in the late 1980s and 1990s when low income urban populations of colour experienced an HIV/AIDs epidemic (Gonzalez-Guarda *et al.,* 2011). This experience showed that examining HIV and AIDS in isolation of other diseases and ecological conditions provided a biased view of the many challenges affecting the urban poor.

The analyses found that beside HIV transmission which was the primary component of the epidemic, there was a broader constellation of afflictions that influenced and sustained the crisis. These included, but were not limited to, substance use, suicide, homicide, tuberculosis, hepatitis, and sexually-transmitted infections (Singer, 2006). It was noted that these afflictions were maintained and replicated by social and structural factors such as high rates of poverty, low paying jobs or unemployment, violence, homelessness, racism, and health care inequality.

In empirical investigations of the syndemic theory, two main aspects must be considered namely co-occurrence of disparities in a given population (*disease concentration*) and 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 & Alfredsson, 2005). Interaction is explained through two distinct concepts; statistical interaction, and 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 (Stoicescu *et al.,* 2018). 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 & Alfredsson, 2005). 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 & Atashili, 2006). Additive interaction is a property of causality, and it is defined as the interdependent action of two or more factors to produce an augmented (*synergistic*) or a reduced (*antagonistic*) effect (Stoicescu *et al.,* 2018).

Interactions of risk factors in a syndemic framework are supported by several considerations during applications. First, in situations of limited resources, 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 & 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 & Knol, 2014). 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. 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 & Knol, 2014).

Syndemic theory is especially appropriate for the study of HIV risk among women who inject drugs in Kenya because it provides a useful theoretical framework for

understanding risk factors and their interactions. These factors exist within a context of elevated stigma, limited economic opportunities, low access to HIV prevention services, high unemployment, criminalizing policy contexts, and unequal power relationships.

2.3.3 Further theoretical considerations: The social-ecological model

In addition to the syndemic theory this study drew on the modified social-ecological model to inform the broad conceptual framework and guide the selection of potential confounders. In order to focus on an emerging paradigm shift in public health from behavioral to ecological approaches, Baral proposed a modified social-ecological model, illustrated in Figure 2.1 to conceptualize understanding of HIV vulnerability (Baral *et al.*, 2013).

Similar to syndemic theory, the social-ecological model starts with the principle that the obligation for reducing drug-related HIV risks, and the focus of interventions targeting their enhancement, is not on individuals alone, but also on social and structural factors which may interact with individual-level risk behaviors to influence and replicate such behaviors. The social-ecological approach postulates 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, organizational, 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).

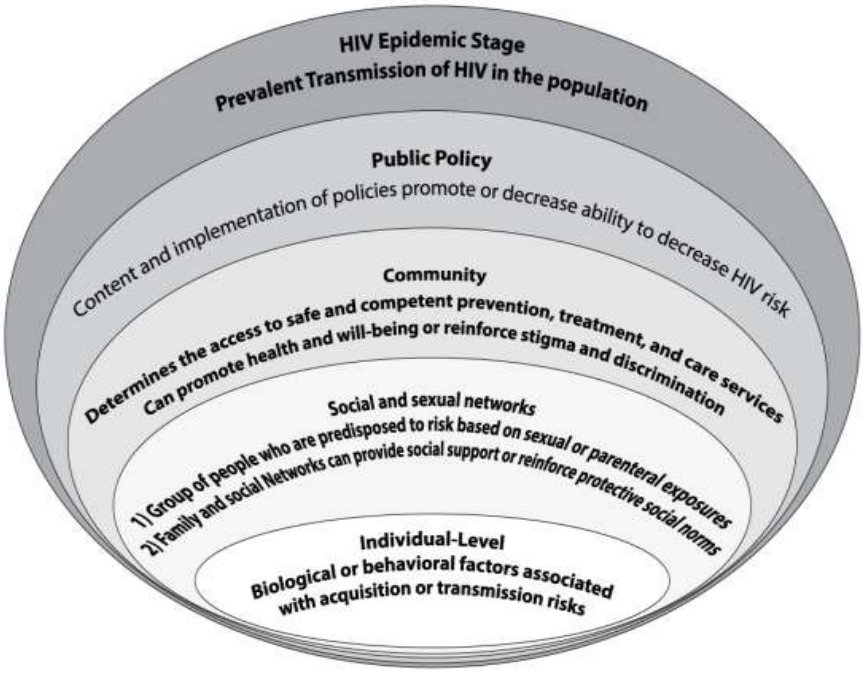

Figure 2.1: Modified social-ecological model for HIV risk in vulnerable populations (Baral *et al.*, 2013)

The social-ecological model positions 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 behavioral 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 behaviors. 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 (that is 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 Kenya, 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 Kenya, the risk of unprotected sexual intercourse 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 (NASCOP, 2018).

2.3.4 Associations and mechanisms linking syndemic processes and HIV

Globally, substance abuse such as injection drug use has had a major impact on the course of HIV epidemics and has been characterized as a sustaining factor for HIV infection and spread (UNAIDS, 2014). Injection drug use may lead to HIV infection through sharing of injecting equipments such as needles and syringes (UNODC, 2017). In Kenya epidemiological studies that have investigated the risk of HIV infection through sharing of needles have found a positive relationship (NASCOP, 2014; Syvertsen *et al.,* 2015). For instance, in a study conducted in Nairobi, people who injected and shared needles were significantly more likely to be HIV positive (NASCOP, 2014). In a similar study conducted in Mozambique persons who shared injecting equipments were 8 times more likely to seroconvert than those who did not share (Baltazar *et al.,* 2019).

The relationship between substance abuse such as injection drug use and risky sexual behaviour has been documented (Koblin *et al*., 2015; Jiwatram-Negrón *et al.*, 2018).

Several pathways documented that injection drug use is related to risky sexual behaviour in various ways. First, many women who use drugs engage in transactional sex for money or drugs, which may occur in power imbalanced circumstances where forced sex is common and ability to negotiate condom use is minimal (Baltazar *et al.,* 2019; Khajedaluee *et al.,* 2015). Secondly, mental impairment associated with drug use may inhibit women from making logical decisions (Iskandar *et al.,* 2012; Azim *et al.,* 2015). For example, in a study conducted in Kenya, the sexual behavior variables that were significantly associated with HIV positive status among people who inject drugs included having sex with persons who injected drugs and were HIV positive, those that reported multiple sexual partners, having unprotected sex with casual sex partners and engaging in transaction sex (NASCOP, 2014). A similar study in Mombasa investigating HIV risk among women who inject drugs found that women who were at significant risk of contracting HIV had sex with people who inject drugs, were involved in sex work, engaged in transactional sex and did not use condoms consistently (Mburu *et al.,* 2019).

Studies have identified significant association between using drugs and experiencing intimate partner violence (Betts *et al.,* 2016; Mburu *et al.,* 2019). A national survey evaluating HIV risk among key populations in Kenya, indicated that 29% of people who injected drugs reported a history of sexual violence and 48% had been exposed to physical and other forms of violence (NASCOP, 2017). Similarly, in the Indonesia a study in a sample of 731 women, drug use was found to double the odds of experiencing a violent assault, while new assaults in turn doubled women's risks of drug use in the subsequent year (Stoicescu *et al.,* 2018). Similarly, a study among women attending a methadone clinic in the U.S.A found that women who reported intimate partner violence were three times more likely to report heroin use than their counterparts who did not report physical and sexual intimate partner violence (El-Bassel *et al.,* 2005).

Several dynamics may explain these associations. First, the psycho pharmacological effects of drugs can influence intimate partner violence perpetration. A recent systematic review confirmed that abuse of heroin, stimulants, and marijuana may intensify feelings of irritability, jealousy, and paranoia as well as impair judgment; these effects in turn

increase the likelihood of intimate partner violence perpetration and decrease the ability to use condoms (Choenni *et al.,* 2017). Furthermore, research indicates that where women are dependent on intimate partners to provide drugs, partners expect sexual favours in return (Stoicescu *et al.,* 2018). In situations where a woman declines to have sex or attempts to negotiate condom use under these heightened expectations, more violence from the partner is seen, especially if he is under the influence of drugs himself or experiencing drug withdrawal symptoms (Betts *et al.,* 2016; Khajedaluee *et al.,* 2015).

Moreover, drug use can weaken cognitive and motor abilities, making it more difficult for women to quickly identify risky situations and negotiate condom use or safer injecting behaviors during such encounters (Choenni *et al.,* 2017).

Women who had experienced intimate partner violence reported elevated risky sexual behaviour, including having multiple sexual partners, engaging in transactional sex, experiencing sexually transmited infections symptoms, and using condoms inconsistently (Dunkle & Decker, 2013; Stoicescu *et al.,* 2018). For instance, studies conducted in low- and middle-income countries showed that women who experienced intimate partner violence 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 intimate partner violence (Dunkle & Decker,2013; Gilbert *et al.,* 2015). In addition, several global studies suggest that physical intimate partner violence alone increases risk for HIV by 28% – 52% among different populations of women, including sub-populations of drug-using women (Li, Marshall *et al.,* 2014). Physical intimate partner violence operates indirectly by building a context of fear and submission, making it difficult for women to negotiate safer sex (Gilbert *et al.,* 2015).

The presence of substance use disorders among people who inject drugs is the most obvious link between mental illness and injection-drug use (Iskandar *et al.,* 2012; Bergenstrom *et al.,* 2010). The most commonly injected drugs in Kenya are opioids and stimulants (NASCOP, 2018; UNODC, 2018). Research studies of current and former

people who injected drugs found that most of them suffer from one or more addictive disorders; they are polydrug users, using both injected and non-injected drugs, including alcohol (Iskandar *et al.,* 2012; Yang et al., 2015). In addition, 40–90% of individuals with a lifetime substance use disorder also have a lifetime history of at least one other mental disorder and vice versa (Morisano *et al.,* 2014). Studies have shown that there are high rates of mental disorders among women who inject drugs who are involved in sex work (Jeal *et al.,* 2018). A study of Nepal sex workers found that the majority reported a high rate of depressive symptoms with 82.4% of the injectors having depressive symptoms as opposed to 26% of the non-injectors (Sagtani *et al.,* 2013).

There are many potential explanations for these association that include drug induced depressive symptoms, mood disturbances following substance withdrawal and use of drugs to cope with depressed moods (Iskandar *et al.,*2012). Depression co-occurs with and has reinforcing relationships with both substance abuse and intimate partner violence thus increasing the risk of HIV transmission. For instance, in a meta-analysis of 16 studies conducted using a longitudinal design, association between intimate partner violence and incident of depressive symptoms was significant in 12 of the 13 studies showing positive direction of association (Devries *et al.,* 2013).

2.3.5 Clustering of substance abuse, depression, IPV, and risky sexual behaviour

Substance abuse, depression, intimate partner violence and risky sexual behaviour interact to form a syndemic (Jiwatram-negron *et al.,* 2018; Gonzalez *et al.,* 2012; Stoicescu *et al.,* 2018.) Syndemics are a set of co-occuring psychosocial conditions that together negatively affect womens'health (Singer, 2006). Such clustering occurs disproportionately among women who inject drugs living in low income settings (Gilbert *et al.,* 2015). For example, a study conducted in Indonesia identified a syndemic of intimate partner violence, substance use, depression on HIV risk (Stoicescu *et al.,* 2018).

In the United States of America, substance use, depression, intimate partner violence in the context of social economic disadvantage interacted syndemically to elevate the risk of HIV among Hispanic women (Gonzalez *et al.,* 2012). Similarly engaging in substance use in the past 6 months, reporting childhood sexual abuse, and experiencing violence as an adult were independently associated with 49%, 12%, and 8% more types of risk behaviors respectively compared to women without these conditions in a study among women in the United States of America (Batchelder *et al.*, 2016). In Kenya tests of syndemic interactions between substance abuse, depression, initimate partner violence and risky sexual behaviour are not available. However, if such tests of a syndemic are confirmed, this could provide informative locus of effective interventions for reducing negative health outcomes among women who inject drugs.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Introduction

This chapter starts by presenting the study design and the sampling approach for the survey. It provides a summary of participants' recruitment and the sampling frame for the study. It then details the study's quantitative and qualitative methodology, including the targeted mobiliser driven recruitment method, measures, analysis, and ethical considerations. It gives details of how the findings of the survey were disseminated.

3.2 Study area

Nairobi County is one of the 47 counties in the Republic of Kenya. It borders Kiambu County to the North, Kajiado County to the South and Machakos County to the East. The County has a total area of 696.1 km2 and is located between longitudes 36"45 East and Latitude 1"18 South. According to the 2009 population census, Nairobi County population is estimated at 3,517,325, comprising 1,718,267 females and 1,799,058 males (KNBS, 2009). Nairobi County has a HIV prevalence of 6.1% which is higher than the national prevalence which is 4.9%.

Nairobi City County hosts a large proportion of key populations (KPs), people who inject drugs who have the highest HIV prevalence rates. The majority of people who inject drugs are concentrated in specific geographical areas in Nairobi mainly in the informal settlement of Mathare, Korogocho, Githurai (NASCOP, 2018) which were the focus of this study.

The Korogocho and Mathare informal settlements are located on the Eastern side of Nairobi City, about 1 km from each other. Korogocho is one of the largest low-income neighborhoods of Nairobi, home to 150,000 to 200,000 people pressed into 1.5 square kilometres, northeast of the city centre. With poor infrastructure, few resources,

overcrowding, and proximity to the dump, health in Korogocho is poor (KNBS, 2009). Mathare valley informal settlements are situated five kilometers northeast of Nairobi's city center and feature one of the most active heroin injecting sites. As one of the largest informal settlements in East Africa and the oldest in Nairobi, Mathare informal settlement is divided into 13 villages with a total population of 102,000 people. It occupies a space of 1.2km^2 and has one of the highest population density indices in the country (KNBS, 2009). Githurai is a low income setting in Nairobi County in Roysambu constituency. It is in the North-Eastern part of Nairobi about 12 km from the city centre. Its population exceeds 800,000 persons. The area residents increasingly face security threats, with a large number of muggings and robberies due to the existence of heroin injecting sites. Many low income women in the area are involved in drugs and sex work to supplement their activities (KNBS, 2009; NASCOP, 2018).

3.3 Study design

A cross- sectional study design was used for the study. It is a type of observational design used in epidemiological studies and is particularly effective for getting information from the kind of subjects represented in this study. The selection of this design was based on this design having scientific rigor, being cost effective, efficient and practical. A mixed methods approach that was explanatory sequential was used in this study.

3.4 Target population

The study targeted all women who injected drugs living in informal urban settlements in Nairobi County.

3.4.1 Study population

The study population comprised of women who had injected drugs in the last twelve months living in selected informal urban settlements in Nairobi County.

3.5 Sampling and sample size determination.

The objective of sample size determination was to produce representative sample of participants in the study to reduce bias.

3.5.1 Sample size determination

Sample size was calculated based on the formula by Cochran, 1967.

$n = z^2 p\ q/d^2$

p = 0.376 prevalence of HIV among Women who inject drugs in Nairobi (NASCOP, 2014)

(HIV prevalence used as a proxy for risky sexual behaviour).

q = 1- p = 0.624

d = 0.05 desired precision

z = 1.96 (standard normal deviate for 0.05 probability)

$n = (1.96^2 \times 0.376 \times 0.624)/ 0.05^2$

= 360 respondents.

3.5.1.1 Inclusion criteria

Women who had injected drugs in the last 12 months, aged above 18 years, had more than one sexual partner continuously for 6 months and willingly gave informed consent were included in the study.

3.5.1.2 Exclusion criteria

Women who could not give consent, unwilling to participate, those who were intoxicated or experiencing withdrawal symptoms were excluded from the study.

3.5.2 Sampling procedure

A list of the drug injecting sites was obtained from Support of Addiction Prevention and Treatment (SAPTA), a Non-governmental Organization working with people who inject drugs in the study area. The list gave the name of the drug injecting site, geographical location of the site, estimated number of women who inject drugs in each drug injecting site, peak day and peak time when most of women would be found in the drug injecting sites and could be easily recruited by the peer educators (Table 3.1).

Table 3.1: List of drug injecting sites in the study area

Drug injecting site	Name of sub-county	Location	No of WWIDs per site	Peak days	Peak time
'Nigeria'	Mathare	Juja Road	300	Wednesday,Friday	8.00am
Kayole	Embakasi Central	Manyanja Road	35	Monday, Friday	8.00am
Mathare	Mathare	Juja Road	70	Wednesday,Friday	8.00am
Odeon	Starehe	Latema Road	150	Tuesday ,Friday	6.00am
Buruburu	Embakasi West	Rabai Road	30	Monday, Friday	9.00am
Bondo	Mathare	Juja Road	20	Wednesday,Friday	8.00am
City Carton	Kamukunji	SOS Road	15	Tuesday, Friday	9.00am
K.P.C.U	Kamukunji	Wakulima Road	40		6.00am
Dam Site	Kasarani	Thika Road-Githurai - Railway line	150	Monday,Thurday ,Saturday	9.00am
Total			810		

Note: WWID stands for women who inject drugs

Purposive sampling was used to sample the study area and the 9 drug injecting sites since there was a program supported by NASCOP implementing an HIV prevention program among people who inject drugs. Probability proportion to size sampling was used to calculate the sample ensuring equal probability of selection irrespective of the size of the site (Table 3.2).

Targeted mobiliser driven sampling (TMDS) was used to recruit study respondents from the sampled drug injecting sites using peer educators from the SAPTA program as mobilisers. A list of women who inject drugs was obtained and systematic sampling was used to recruit every 2nd woman till the sample size was achieved. Each respondent was allocated a unique code to serve as the study identification. This code was used to identify respondents for the focus group discussions and could be regenerated if the subject forgot it.

Table 3.2: Probability proportionate to size sampling for the drug injecting sites

S.NO	Name of drug injecting site	Number of WWIDs per drug injecting	Sample Size
1	'Nigeria'	300	133
2	Kayole	35	16
3	Mathare	70	31
4	Odeon	150	67
5	Buruburu	30	13
6	Bondo	20	8
7	City Carton	15	7
8	K.P.C.U	40	18
9	Dam Site	150	67
	Total	810	360

3.5.2.1 Sampling of respondents for focus group discussions

A sub-sample of the survey respondents was selected for the focus group discussions using simple random sampling. A sample of 48 respondents was selected. This ensured full integration of the quantitative and qualitative methods in sampling.

3.5.3 Independent variables

The independent variables in this study were socio-demographic characteristics (age, number of children, education level, marital status, religion, age when having first child, type of family grew up in, age when started living with a partner, years living in the informal settlement, reason for living in the informal settlement, occupation, amount of income, person who works in the family), Drug use patterns (age of initiation of substance use, person who introduced licit/illicit drugs at initiation of substance use, poly substance use, and mode of drug administration), substance abuse, intimate partner violence and depression.

3.5.4 Dependent variables

The dependent variable for the study was risky sexual behaviour.

3.5.5 Pre-test

A pre-test was carried out in the western region of Nairobi through Médecins du Monde (MDM) an international NGO in Nairobi because the PWIDs in this location were not included in this study. The pre-test involved testing the feasibility of the research protocol, recruitment of the study respondents, testing the measurement instruments and data entry and analysis. The pre-testing highlighted the need to increase the time for interviews due to the effects of substance abuse among the participants. Some respondents could not sign the consent form due to low literacy levels but instead could use a thumb stamp. Use of street language by respondents hindered communication with the research assistants and this was addressed during training of research assistants.

3.6 Data collection tools

During data collection both quantitative and qualitative tools were used.

3.6.1 Structured questionnaire

A structured questionnaire (Appendix I) was used for data collection. The questionnaire covered socio-demographics and socio-economic characteristics, history of substance use, intimate partner violence, depression and risky sexual behaviour. Communication about the study was done through peer educators at the SAPTA drop in centre and at the drug injecting sites. An interview method was used to administer the questionare. The research assistant who was trained to ask questions in both English, Kiswahili and was well versed with the street language commonly used by people who inject drugs administered the questionaire.

3.6.2 Focus group discussion guide

The FGDs comprised of 48 respondents who were randomly selected and led by a trained moderator in a private room in the SAPTA offices. A pre-tested FGDs guide (Appendix II) with open ended questions was administered by a trained moderator for 45 minutes. The FGDs explored in-depth understanding of motivation for substance use, social networks that introduce and maintain licit and illicit substance use among women who inject drugs, and motivation for poly substance and route of administration of heroin, context of substance use, lived experiences of intimate partner violence, and risky sexual behaviour. Integration of data collection tools was achieved in mixed methods since the quantitative and qualitative data collection tools addressed the same substantive issues. The structured questionnaire, quantified the co-occurrence, association and interaction of substance abuse, intimate partner violence, depression and risky sexual behavior. The FGDs helped to unpack the meaning and lived experiences of the same.

3.7 Data management and analysis

Data for the study was acquired using a structured questionnaire and focus group discussions.

3.7.1 Data entry and storage

A data entry template was created in Microsoft Excel and used to enter the data from the structured questionnaire. Using unique identifiers data was entered in duplicate (double entry) for validation and exported to STATA version 15. The data was cleaned, cross-checked for entry errors and range checks. Data storage was done on flash disks and desktops while questionnaires sheets were kept under lock and key.

3.7.2 Quantitative data analysis

Quantitative data was analyzed using STATA version 15. Qualitative data was typed into MS word, coding and analysed based on themes (thematic analysis) and described. Chi-square and Fisher exact tests were used to examine associations between diverse substance use dimensions and descriptive analyses of co-occurrences of psychosocial conditions at the individual level. Standard logistic regression model was used to estimate the magnitude of the relationship between the psychosocial conditions on the one hand and risky sexual behavior on the other. Separate logistic regression models with the count of psychosocial conditions (substance abuse, IPV, and depression) for each study participant as the independent variable and risky sexual behavior as the dependent variable were used to assess the additive effect of the psychosocial conditions on risky sexual behavior. To find out socio-demographic and socio-economic factors associated the substance abuse, IPV and depression and their interaction additional logistic regression models were used.

A recursive partitioning method that builds classification trees was used to better understand how the three psychosocial conditions and the host of underlying socio-demographic and socio-economic variables interacted with each other to predict risky

sexual behavior in women who inject drugs. The classification tree was built via machine learning (ML) using a set of logical if-then conditions (instead of logistic equations in logistic regression) for predicting the outcome.

3.7.3 Qualitative data analysis

Qualitative research methods were used to understand the patterns of drug use from initiation of substance use early at adolescence to full dependency in early adult among women who inject drugs. Focus groups discussions were used to collect data in this study. Focus groups discussions is one of the methods in qualitative research that is recommended when conducting research with understudied populations (Bloomberg, 2012) such as women who inject drugs. Thematic analysis was utilised to identify and describe the codes under each of the themes using deductive approach. Thematic analysis is a good approach to research where you're trying to find out something about people's views, opinions, knowledge, experiences or values from a set of qualitative data. Thematic analysis allows a lot of flexibility in interpreting the data, and allows you to approach large data sets more easily by sorting them into broad themes. A deductive approach involves coming to the data with some preconceived themes you expect to find reflected there, based on theory or existing knowledge (Walsh *et al.,* 2019; Braun & Clarke, 2016). In this study the researcher had preconceived themes based on the quantitative data analysis and knowledge of the target population.

3.7.4 Data presentation

Frequencies and bar graphs were used to present categorical variables. Descriptive statistics including mean, standard deviation, ranges, frequency distribution and proportions were done for different groups such as socio-demographic and socio-economic characteristics, depressive symptoms, route of administration, persons who introduced licit and illicit substance to women who inject drugs at age of initiation and risky sexual behaviour.

3.8 Assumptions

The cross-sectional study design could not allow confirmation of causality and may provide varied findings if the study had been carried out in another timeframe. The retrospective recall of age of initiation of substance use may have been affected by the systematic tendency by most individuals to shift their estimated age of onset upwards as they get older (Chou & Pickering, 1992).

3.9 Reliability and validity

The study applied a standardized, pre-tested questionnaire used for quantitative study method. Peer driven recruitment used in this study was valuable means of building rapport and trust with participants, which in turn enhanced the validity and reliability of self-reported data. Academic and community partners planned research together, developed shared mission and decision-making structure, and formed team with representation of women with lived injecting drug use experience. Framing of research questions and processes were determined in collaboration with principal investigator, academic supervisors, community stakeholders who included peer educators, staff of a community-based organization that works with people who inject drugs and NASCOP staff.

3.10 Dissemination

The findings of this study have been dissemination through two publications in the harm reduction and alcohol/drug journal. The findings were also disseminated in two conferences in 2019 i.e harm reduction conference in Portugal and ICASA conference in Rwanda.

3.11 Ethical considerations

The study protocol was subjected to Ethical Review for approval (Appendix VI ref. for ERC research approval letter) on handling of human subjects by KEMRI, Scientific

Steering Committee. The National Commision for Science, Technology and Innovation (NACOSTI) gave a license for the study (Appendix VII). Participation into the study was voluntary and respondents gave written informed consent (Appendix V) to participate in the study. Participants‟ confidentiality was assured. Their identification data was coded and was not to be released to any third party. The documents with the identifying data were also kept confidentially in a secure location.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents the finding of the study by giving details of the methods and measures used for data collection, as well as the analytical approach applied. The study was conducted among 306 respondents. The non-response rate was 15% because some of the women who inject drugs who met the inclusion criteria experienced withdrawal symptoms during the interview and could therefore not complete the all the survey questions. (Table 4.1).

Table 4.1: Study response rate among women who inject drugs

Survey response tabulation	n	%
Total number of survey respondents	360	100
Number of completed survey responses	306	85
Number of non-response	52	15

4.2 Socio-demographic characteristics of women who inject drugs

The mean age of the respondents was 30 years and the highest proportion 100(32.7%) of the respondents was aged 28-32 years and the lowest proportion 13(4.2%) was aged over 43-47years. Forty percent 123(40.2%) of the respondents had 1 to 3 children. Sixty percent 171(55.9%) of the respondents got their first child between the age of 16 and 20 years. Fifty-four percent 165(53.9%) of the respondents commenced living with a partner when they were less than 18 years. Fifty-one percent 157(51.3%) of the respondents grew up in a conventional nuclear family. Sixty percent 184 (60.1%) of the respondents had attained primary level education, 22(7.2%) never attended school and 100(32.7%) had post primary education. Eighty percent 251(80%) of the respondents

were of Christian faith and only 31(10.1 %) were of Muslim faith. Although 260(85%) of the women were separated they indicated that they were currently in a relationship with male partners, 21(6.9%) were married, 17(5.5%) were divorced, and 8(2.6%) were single. Thirty one percent of the respondents 96(31.4%) had lived in the informal settlements for a period between 21 and 30 years. The time lived in the informal settlements ranged between 4 and 42 years respectively. The respondents either lived in the informal settlement because they were primarily born there 164(53.6%) or due to re-location 142(46.4%) (Table 4.2).

Table 4.2: Background characteristics of women who inject drugs

Socio-demographic Characteristic	n (306)	%
Age group		
18-22	12.7	39
23-27	25.8	79
28-32	32.7	100
33-37	19.3	59
38-42	5.3	16
43-47	4.2	13
Number of children		
0	64	20.9
1-3 children	123	40.2
4-6 children	119	38.9
Education level		
None	22	7.2
Primary	184	60.1
Secondary	85	28
Tertiary	15	4.7
Marital status:		
Single	8	2.6
Married	21	6.9
Divorced	17	5.5
Separated	260	85
Religion		
Catholic	92	30.1
Protestant	159	52
Muslim	31	10.1
No religion	24	7.8
Age at birth of first child		
11-15 years	67	21.9
16-20 years	171	55.9
>20 years	68	22.2
Type of family (Grew in)		
Single parent	101	33
Nuclear (Father & mother)	157	51.3
Extended (Polygamous)	15	4.9
Divorced/Separated	33	10.8
Age when started living with a partner		
Under 18 years	165	53.9
Over 18 years	141	46.1
Years lived in the informal settlement		
1 – 10 years	65	21.2
11 – 20 years	76	24.8
21 – 30 years	96	31.4
>30 years	69	22.6
Reason for living in the informal settlement		
Place of birth	164	53.6
Re-location	142	46.4

4.2.1 Socio-economic characteristics of the women who inject drugs

The 3-monthly mean income in Kenya shillings (Ksh) earned among the respondents was approximately Ksh12, 877. Majority 184(60%) obtained a 3-monthly income of more than Ksh 10,000. The occupation of the respondents ranged from sex work 84(27.5%), self- employment 34(11%), temporary work (23.9) and 115(37.6%) took part in a combination of these occupations. Forty-two percent 129(42.1 %) of respondents indicated that both self and spouse contributed to the family income, 100(32.7 %) indicated that spouses were the main contributors of income, 32(10.5%) depended on relatives and 45(14.7%) depended on self to get an income (Table 4.3).

Table 4.3: Socio economic characteristics among women who inject drugs

Socio-economic characteristic	n (306)	%
Occupation (source of income)		
Self employed	34	11
Sex work	84	27.5
Temporary work	73	23.9
Temporary work & sex work	84	27.5
Self-employed &sex work	31	10.1
Income (every 3 months)		
Kshs 0-10,000	121	39.6
Kshs.10001-20,000	184	60.1
Kshs > 21,000	1	0.3
Person who worked in the family		
Self	45	14.7
Spouse	100	32.7
Spouse & Self	129	42.1
Relatives	32	10.5

4.3 Prevalence of psychosocial conditions and risky sexual behaviour among WWIDs.

4.3.1 Prevalence of substance use disorder among women who inject drugs

Women who inject drugs were asked if they experienced 11 different substance use disorders symptoms fitting into the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria (Appendix 4) as follows: impaired control over use, social impairment, risky use of the substance and pharmacological symptoms. To yield meaningful results, substance use was scored based on the extent of the problem with substance use dependency on the number of symptoms a participant identified fitting in the DSM- 5 criteria for substance use disorder.

Presence of 2 or 3 three symptoms indicated a mild substance use disorder; 4 or 5 symptoms indicated a moderate substance use disorder, and 6 or more symptoms indicated severe substance use disorder. These were further dichotomized as follows: mild was coded as 1; Severe (combination of severe and moderate scores) was coded as 2. Over all 88% of the respondents experienced severe substance abuse (Table 4.4).

Table 4.4: Substance use severity among women who inject drugs

Severity	Number of symptoms	n= (360)	%
Mild	Two to three symptoms	37	12
Moderate	Four to five symptoms	18	6
Severe	Six or more symptoms	251	82

4.3.2 Prevalence of Intimate Partner Violence among women who inject drugs

Physical, sexual, and psychological violence were measured using the revised and modified Conflict Tactics Scale (CTS2). Respondents were asked about seven specific acts of physical violence, two of sexual violence and three of emotional abuse.

Frequency of violence was measured using a likert scale of: Ever (in the lifetime), Often (once a week), Sometimes (Once a month) and not at all (not experienced IPV). Respondents who reported having experienced any physical, sexual or psychological acts of violence by an intimate partner with more severe scales (often) in the preceding year to the study were recorded as having experienced IPV in the past year. The data showed that 231(75.6%) of women who inject drugs had experienced physical violence, 252(82.4%) had experienced sexual violence, and 288(94.1%) had experienced emotional violence. Overall, 257(84%) of the women who inject drugs had experienced intimate partner violence (Figure 4.1).

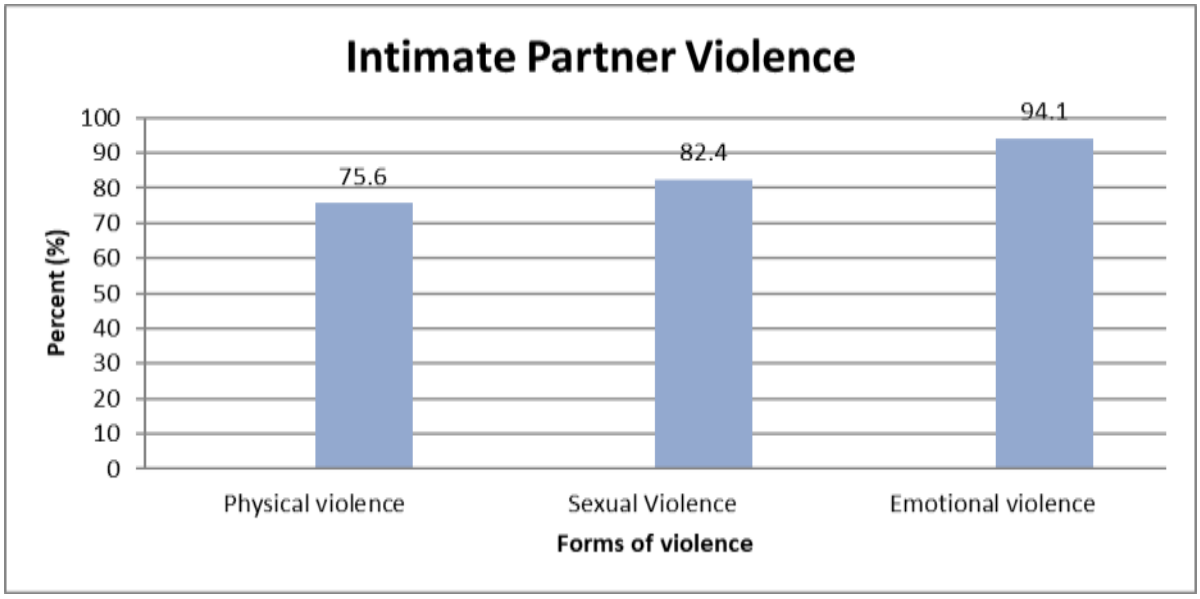

Figure 4.1: Form of violence in 12 months preceding the survey among WWIDs.

Table 4.5: Frequency of IPV 12 months preceding the survey among WWIDs.

	Ever n (%)	Often (%)	Sometimes n (%)	Not at all n(%)
Physical violence (Yes/No)	**92.1**	**75.6**	**24.4**	**8.6**
Pushed her, shook her, or threw something at her	275(89.9) 31(10.1)	220(80)	55(20)	31(10.1)
Slapped her	280(91.5) 26(8.5)	261(93.2)	19(6.8)	26(8.5)
Twisted her arm or pulled her hair	302(98.7) 4(1.3)	243(80.5)	59(19.5)	4(1.3)
Punched her with his fist or with something that could hurt her	280(91.5) 26(8.5)	233(83.2)	47(16.8)	26(8.5)
Kicked her, dragged her, or beat her up	296(96.7) 10(3.3)	196(66.2)	100(33.8)	10(8.5)
Tried to choke her or burn her on purpose	280(91.5) 26(8.5)	130(46.4)	150(53.6)	26(8.5)
Threatened her or attacked her with a knife, gun, or any other weapon	260(85) 46(15)	207(79.6)	53(20.4)	46(15)
Sexual violence (Yes/No)	**89.9**	**82.4**	**17.6**	**10.2**
Physically forced her to have sexual intercourse with him even when she did not want to	295(96.4) 11(3.6)	243(82.4)	52(17.6)	11(3.6)
Forced her to perform any sexual acts she did not want to	255(83.3) 51(16.7)	210(82.4)	45(17.6)	51(16.7)
Emotional violence(Yes/No)	**95**	**94.1**	**5.8**	**5**
Said or did something to humiliate her in front of others	280(91.5) 26(8.5)	276(98.6)	4(1.4)	26(8.5)
Threatened to hurt or harm her or someone close to her	290(94.8) 16(5.2)	245(84.5)	45(15.5)	16(5.2)
Insulted her or made her feel bad about herself	302(98.7) 4(1.3)	300(99.3)	2(0.7)	4(1.3)

Figure 4.2: Frequency of the various forms of violence among women who inject drugs living in selected informal urban settlements in Nairobi.

4.3.3 Prevalence of depression among women who inject drugs

Depressive symptoms were measured using Center for Epidemiologic Studies Scale (Appendix 7.3) consisting of 20 questions. Responses to these questions were summed for a total score ranging from 0 to 60 points and a score of 16 and above indicated likelihood of depression. Results indicated that 236(77.1%) of the respondents had depressive symptoms in this survey.

4.3.4 Prevalence of risky sexual behaviour among women who inject drugs

Risky sexual behaviour for HIV infection was defined as a composite score based on the number of male casual sexual partners in the last 6 months, condom use during intercourse with male casual partners in the past 6 months, exchange of sex for money to buy drugs with a male casual partner in the last 6 months, exchange of sex for drugs with a male casual partners 6 months before the study. Casual partner was defined as" someone with whom the individual had sex one or more times without any regularity".

Result indicated that 198(64.8%) of the women who inject drugs exchanged sex for drugs, 182(59.5%) exchanged sex for money to buy drugs, and 150(48.9%) had sex with casual partners but did not use a condom and 209(68.5%) engaged in sex with multiple casual partners (Figure 4.3).

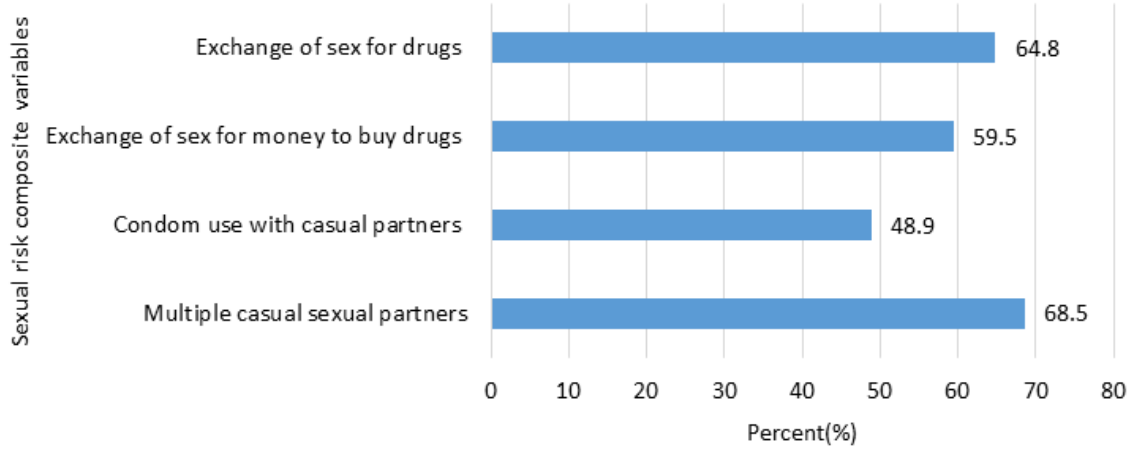

Figure 4.3: Sexual risk composite score among WWIDs living in selected informal urban settlements in Nairobi.

The composite score defining risky sexual behaviour was dichotomized into 2; presence of the risky sexual characteristic and absence of the risk sexual characteristic for each of the respondent so that a participant could have up to 4 points. The final overall score was calculated by the sum of the scores obtained for each individual respondent where a score of 0 indicated no sexual risk and a score of 1 to 4 indicated presence of sexual risk. Over all the results from the risk score showed that 212(69.3%) of the women who inject drugs engaged in risky sexual behaviour (Figure 4.4).

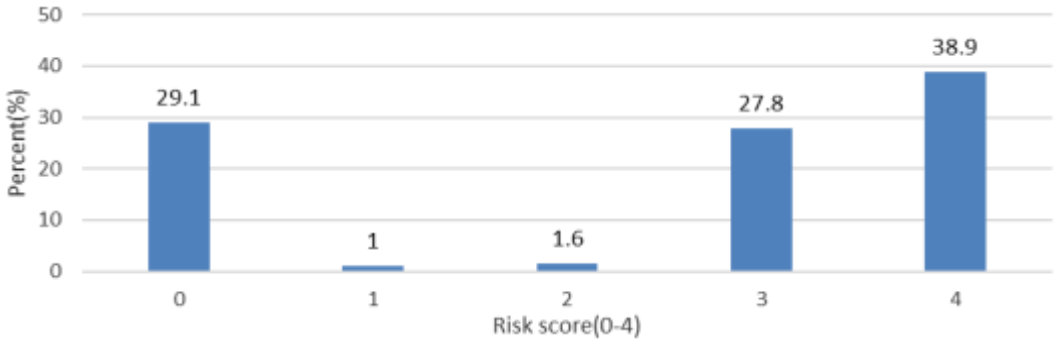

Figure 4.4: Sexual risk score distribution among WWIDs living in selected urban informal settlement in Nairobi

4.4 Drug use patterns among women who inject drugs.

4.4.1 Age of initiation of first substance use among women who inject drugs

The mean and median age at first substance use was 17.6 years (range 11, 30 years) and 17 years respectively. Majority of the respondents 231(75.5%) initiated substance use while below 20 years (Figure 4.5).

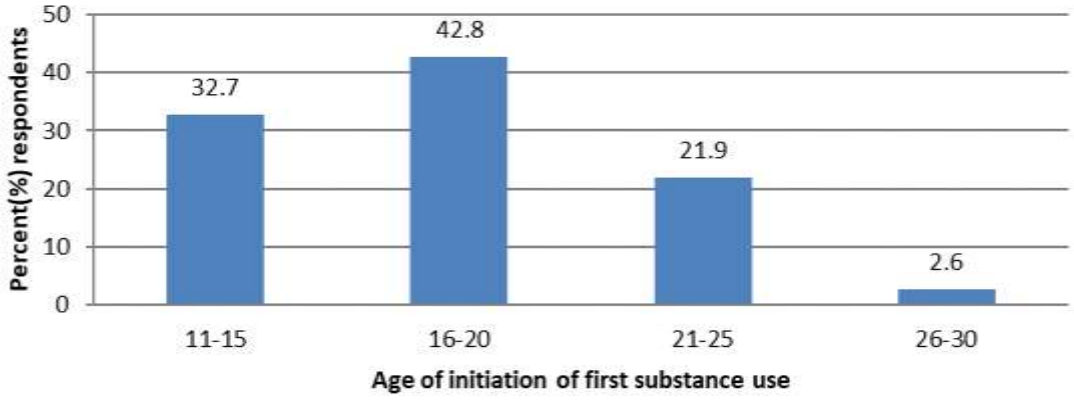

Figure 4.5: Age of initiation of first substance use among WWIDs.

Qualitative data attributed the early initation to drug use to girls dropping out of school at adolescent years. The respondents provided rich description of the context of risk of drug use at adolescence. They described how they dropped out of school because of poverty and got into sexual relationships with male partners who were using licit and illicit drugs. As described by two women:

“I took dom (bhang) at the age of 16 when I dropped out of school in Form 3 in a day school near mathare slums… my boyfriend gave me….he was about 40 years and gave me everything I wanted.....then after some time I learned he was married…unfortunately I was already pregnant….he was not good to me anymore (long pause) he abused me…I cried ..cried.. ” (Participant PFN 003)

“My mother had 8 children and was struggling to raise us all so I dropped out of school in class 6 at 14 years….then I met mark who was my neighbor and we loved each other and moved together as man and wife….but it did not last (long pause) he beat me a lot …was a drunkard…and also used ndom (bhang)” (Participants PSB 012).

4.4.2 Drugs used at initiation of substance use among WWIDs.

Majority 164(57.3%) of the women commenced substance use with combined drugs (poly substance use) relative to single drugs. The largest 62(21.7%) and least 5(1.7%) proportions of women who commenced with a single substance used bhang and heroin respectively (Table 4.6).

Table 4.6: Drugs used at initiation of substance use among WWIDs

ge of initiation of substance use	Alcohol alone, n (%)	Bhang alone n (%)	Heroin alone n (%)	Cigarette alone n (%)	Poly substance use n (%)
11-15	12(4.1)	28(8.7)	2(0.6)	5(1.6)	47(16.4)
16-20	20(6.9)	16(6.6)	2(0.7)	6(2.0)	75(26.2)
21-25	4(1.6)	13(4.5)	1(0.4)	5(2.0)	42(14.7)
26-30	1(0.3)	5(1.9)	0(0.0)	0(0.0)	0(0.0)
Totals	37 (12.9)	62 (21.7)	5 (1.7)	16 (5.6)	164 (57.3)

* Two respondents initiated substance use by consuming of Valium alone at age 19 years and Artane alone at age 17 years; none initiated substance use by use of Rohypnol alone.

Respondents in this study indicated multiple drugs were introduced by various sexual partners. The women describe how after breakup of the first relationships they experienced a lot of hardships because they had to cater for their young children and did not have an income. As a result, they got into relationships with male partners who would support them. The women described how these new male partners introduced them to other licit and illicit drugs which resulted to the women using multiple drugs. As described by one woman:

"I dropped out of school when I was 17 years, we did not have money, got married to my boyfriend….i think he was something like 27 years…….aah at first he was a good man ,had lots of fun together, drunk together…aah then he changed …battered me a lot(Long pause)even when I was pregnant….aah I ran away went back to my parents…after one year…then life was hard(Long pause) very very hard ….aah i hustled …..moved with many men ….drunk more and more alcohol with these men …,ndom(bhang), …but I made money" (Participant GCM 006).

4.4.3 Persons who introduced drugs to WWIDs at initiation of substance use.

A total of 226 (74%) women who inject drugs were introduced to licit and illicit drugs by intimate sexual partners where by 170(56%) were introduced by spouse or regular partner and 56(18%) by casual partner. Introduction to licit and illicit drugs by peer and siblings accounted for approximately 20% (n=60) and 6% (n=20) of women who inject drugs respectively (Figure 4.6).

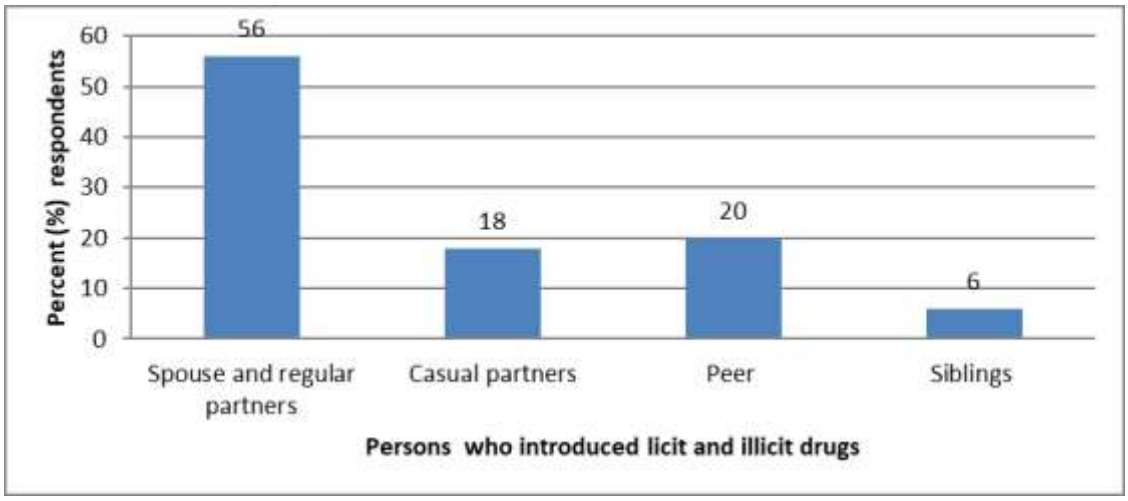

Figure 4.6: Persons who introduced drugs to WWIDS at initiation.

4.4.4 Poly substance use among women who inject drugs

Poly substance use among respondents in this study was defined by combination of the following 7 types of licit, illicit drugs and medical prescription drugs: Alcohol, Cigarette, Bhang, Heroin, Valium, Rohypnol, and Artane. Ninety percent 286(93.5%) of the respondents re-called licit and illicit drugs used at initiation of substance. Fifty seven percent 164(57.3%) of respondents at initiation used a combination of licit, illicit drugs and medical prescription drugs. At six months before and after the time of the survey 303(99%) and 305(99.7%) of the respondents were using heroin with a combination of licit, illicit and medical prescription drugs respectively. Heroin alone as a single drug was used by 6(1.8%) of respondents at initiation of substance use, 3(0.98%) of the

respondents at 6 months before the survey and 1(0.3%) of the respondents at the time of the survey. At initiation of substance use, 2-way combination of drugs had the highest frequency at 76(46.3%) relative to 5(1.7%) at 6 months preceding the study and 36(11.8%) at the time of the study. However, at 6 months preceeding the study and at the time of the study, 4-way combination of drugs had the highest frequency at 140(46.2%) and 104(34.1%) respectively relative to 15(9.2%) at initiation of substance use (Table 4.7).

Table 4.7: Poly substance use among women who inject drugs

Poly substance use combinations	**At initiation of substance use n(%)**	**At 6 months preceding the survey n(%)**	**At the time of the survey n (%)**
	n=164	**N=303**	**n=305**
2-way combination	76(46.3)	5(1.7)	36(11.8)
3-way combination	51(31.1)	57(18.8)	80(26.2)
4-way combination	15(9.2)	140(46.2)	104(34.1)
5- way combination	10(6.1)	78(25.7)	60(19.7)
6- way combination	8(4.9)	15(5.0)	17(5.6)
7- way combination	4 (2.4)	8 (2.6)	8(2.6)

The women described how the violence, hardships of providing for the young children and rejection from the family resulted to a lot of stress that led them to take more drugs by themselves so that they could medicate the stress. As described by one woman:

"…….then something happened after a while (long pause) then he could not provide for us anymore…started beating me…one time he broke my arm(Long Pause),I thought he would kill me….my sister came to my rescue….. after that life was hard…had a baby to provide for but I did not have money ... my family hated me…(long pause) ..it was all pain …stress …I took more and more ndom(cannabis) to feel better"(Participant PSM 004).

The respondents described how they graduated from one illict drug to another and finally got heroin from the male partners. Since heroin was expensive the women said the male partners could not purchase it for them so they had to find ways of getting money to buy heroin. The women described how the male partners became violent everytime they asked for heroin yet they had introduced this illicit drug to them. They explained how depressed they felt as a result of the violence from the male partners. The women narrated how they could steal and engage in sex work to get money to buy heroin. As narrated by one woman**:**

"I took ndom (cannabis) for a long time… then one day my boyfriend gave me stuff (heroin) which I smoked together with ndom (cannabis)…..it was a very good feeling…pause…..but it was expensive….my boyfriend told me I had to get heroin myself if I wanted to smoke it…I would insist …but he was violent ….i felt bad …very depressed…I felt hated …. but i did not have money….so I shop lifted , stole but it was dangerous…I was beaten up by police …then I started sleeping with men and got paid…I bought heroin" (Participant PEG 009).

4.4.5 Route of administration at 6 months preceding the study and time of the study

Varied routes of heroin use were mentioned including injection, smoking and sniffing alone and two way and three-way combinations of these. Routes of heroin use changed substantially between 6 months preceding the survey and during the survey. While majority of the respondents 175(57.2%) injected heroin 6 months preceding the survey, only 32(10.5%) injected heroin at the time of the survey. In the two-way combination of route of administration there was a near equivalent distribution at 6 months preceding the survey 66(21.6%) and at the time of the survey 77(25.2%) (Figure 4.7)

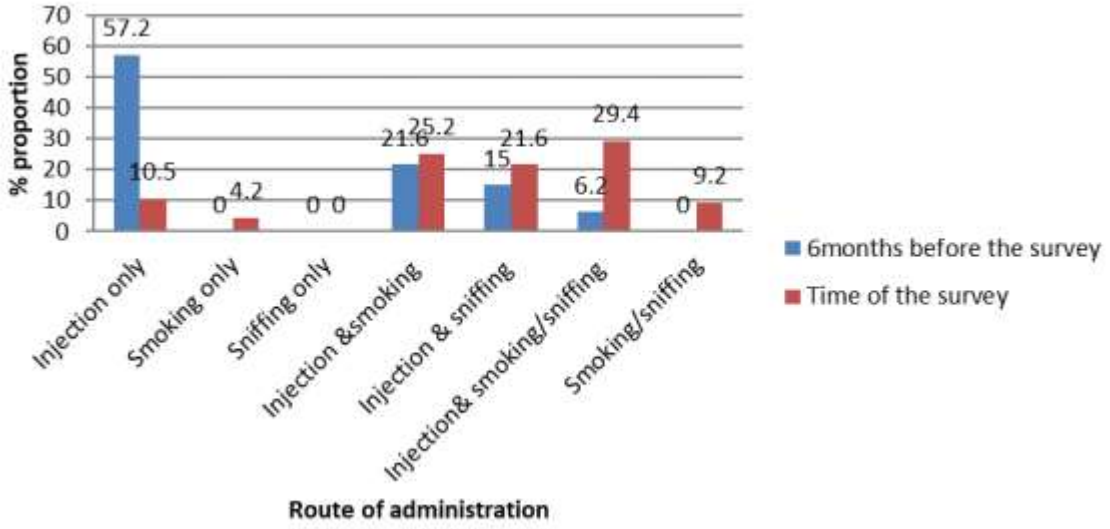

Figure 4.7: Route of heroin administration 6 months preceding the study and at the time of the study among WWIDs.

The respondents narrated how they continued to use heroin by either smoking or injecting. The women explained that they used heroin together with the other drugs and with prescription drugs. They described the motivation of using heroin together with other drugs and prescription medications. As explained by the women:

"I smoke heroin but also inject sometimes….. I take bhang, Ropypinol, especially when I don't have enough heroin…..i mix heroin, rohypinol, valium… I get the courage to shop lift. Many times am successful but a few times am caught. When I cannot sleep I take valium….You know lack of heroin makes you not have sleep ….when you have not taken. …Sometimes I can sleep for only 5 minutes then my mind shows me I have slept for 24 hours. It's horrible…scaring" (Participant GJM 011).

"Stuff (heroin) when it is strong I smoke because I will use a little….. when the stuff (heroin)is weak…I inject" (Participant PMH 002)

“Last year I was arrested and sent to prison for 3 months for shop lifting. In prison I only got heroin once when my friend brought me. When left I came back to the den(drug using site) and started smoking and injecting but soon after I realized I was pregnant and I stopped injecting until I gave birth…”(Participant GBW 005).

4.4.6 Hierarchical illustration of the themes around patterns to drug abuse.

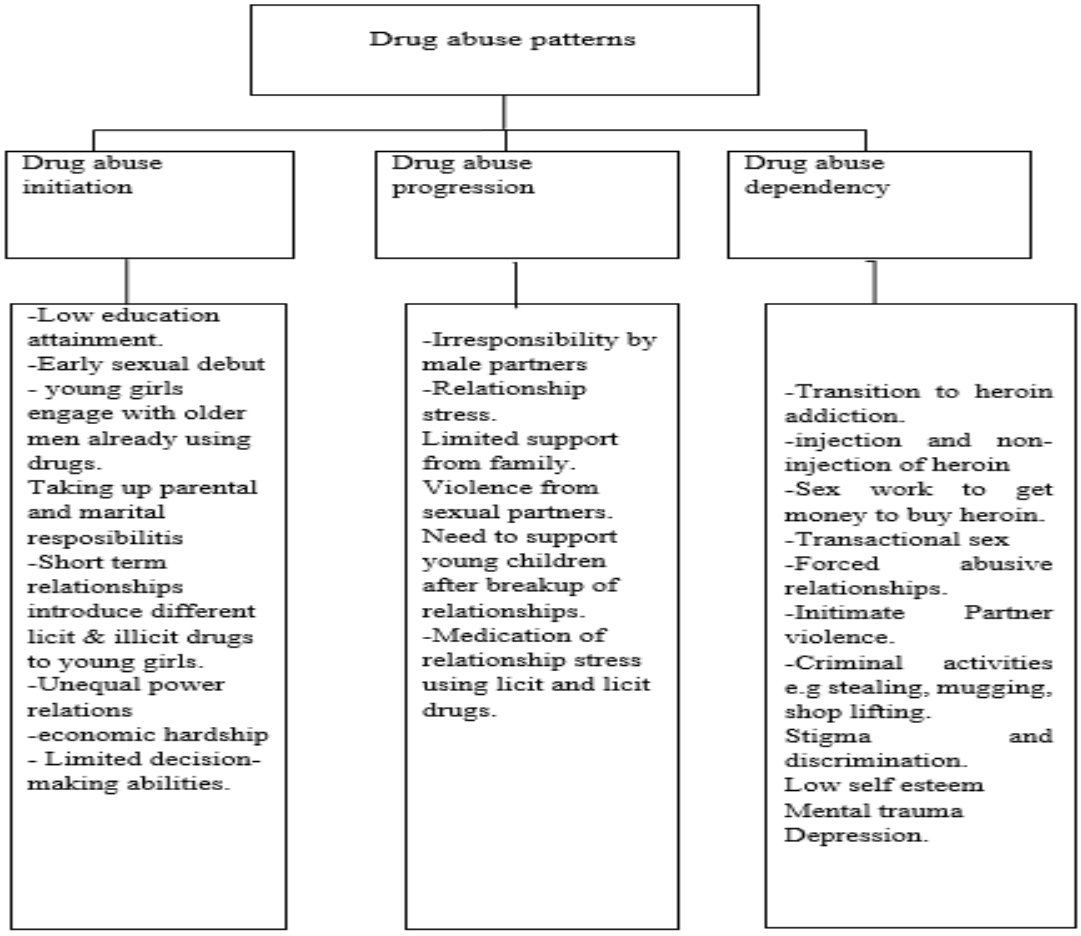

Figure 4.8: Hierarchical illustration of the basic and organizing themes around patterns to drug use.

4.4.7 Associations between individual level variables during intiation of substance use

Age of initiation of substance use was not associated with drugs used at initiation of substance use (P=0.208), persons who introduced the drugs at initiation of substance use (P=0.240) and current poly substance use (P=0.799). Drug used at initiation of substance use was also not associated with the persons who introduced (P=0.947) and current poly substance use (P=0.115). However, persons who introduced drug used at age of initiation was associated with current poly substance use (P=0.0001) Table 4.8.

Table 4.8: Associations between individual level variables during intiation of substance use

Individual characteristics	Age of initiation	Drug used at initiation	Persons who introduced drugs
Drug used at initiation	0.208	N/A	0.947
Persons who introduced drugs	0.240	0.947	N/A
Current poly substance use	0.799	0.115	0.0001*

* Variable significant at P≤0.05

Further analysis was carried out to understand the differences in categories of the persons who introduced drugs used at initiation by current poly-substance use. These analysis revealed there was no significant difference between (1) Spouse/regular partners and peers (P=0.415) (2) regular partner and siblings (P=0.143), (3) casual partners and siblings (P =0.220) (4) peer and sibling (P=0.673) on the number of substances used at the time of the survey. However, there was a statistical difference between (1) regular and casual partners on the number of substances used at the time of the survey (P=0.000), (2) casual partners and peers (P=0.01).

4.5 Co-Occurrence of Psychosocial Conditions and Risky Sexual Behaviour

The highest 2-way co-occurrence 221(72.2%) of psychosocial conditions among the study respondents was reported in substance abuse and depression. The highest 3-way co-occurrence 189(62%) was reported in substance abuse, depression, and risky sexual behaviour (Table 4.9).

Table 4.9: Co-occurrence among psychosocial conditions and risky sexual behaviour

2-way co-occurrence	**n**	**%**
Depression + substance abuse	221	72.2
Depression + IPV	202	66.0
Depression + risky sexual behaviour	192	62.7
Substance abuse + IPV	217	70.9
Substance abuse + risky sexual behaviour	200	65.4
IPV + risky sexual behaviour	174	56.9
3-way co-occurrence		
Depression + Substance abuse + IPV	185	60.5
Depression + Substance abuse + risky sexual behaviour	189	61.8
Substance abuse + IPV + risky sexual behaviour	167	54.6
Depression + IPV + risky sexual behaviour	163	53.3

4.5.1 Associations among psychosocial conditions and risky sexual behaviour

Study respondents who met the threshold for depression were 4 times more likely to report substance abuse and 16.7 times more likey to report risky sexual behaviour but not IPV. Likewise, study respondents who reported substance abuse were 13.9 times more likely to report risky sexual behaviour (Table 4.9).

Table 4.10: Strength of associations between psychosocial conditions and risky sexual behaviour

	Depression	IPV	Substance abuse
IPV			
Substance abuse	OR = 4.0	NC	
	AOR = 4.2		
Risky sexual	OR = 16.7		OR = 13.9
Behaviour	AOR = 17.5		AOR = 16.6

4.5.2 Additive effect of psychosocial conditions and risky sexual behaviour

A count of the number of psychosocial conditions (depression, IPV and substance abuse) experienced by each study participant was associated with increased risky sexual behaviour. There were 6-fold odds of increased risky sexual behaviour (95% confidence interval [CI], 3.8, 8.9) for each additional psychosocial condition experienced (Likelihood Ratio $\chi 2$ (d.f = 1) = 83.21, P = 0.000).

4.6 Socio-demographic and Socio-economic variables associated with psychosocial conditions and risky Sexual Behavior.

4.6.1 Interaction effect of psychosocial conditions and socio-demographic and socio-economic factors on risky sexual behaviour

A logistic regression analyses that included risky sexual behaviour as the dependent variable and pairwise interactions of each of the psychosocial conditions (depression, IPV and substance abuse) socio-demographic and socio-economic factors as independent variables returned only one significant interaction (Depression*Substance abuse, *P*=0.00) and two socio-demographic and socio-economic variables. These variables were “Age when delivered the first child” and “Income” (Table 4.11).

Table 4.11: Logistic regression model predicting risky sexual behaviour

Variable	Likelihood ratio test χ^2 value	P value
Depression	0.06	0.81
IPV	1.67	0.20
Substance abuse	1.41	0.23
Depression*IPV	0.89	0.35
Depression*Substance abuse	15.19	0.00€
IPV*Substance abuse	1.71	0.19
Age	1.35	0.24
Time lived in informal settlement	0.54	0.46
Reason for living informal settlement	0.36	0.55
Education	1.15	0.28
Religion	2.10	0.15
Marital status	1.13	0.29
Number of Children	1.80	0.18
Age when delivered the first child	4.81	0.03€
Type of family grew up in	0.1	0.75
Source of income	1.92	0.17
Income	4.43	0.03€
The one who works for income	0.41	0.52
Age started living with partner	1.62	0.20

€variable significant at P≤0.05

4.6.2 Classification tree analysis for the risky sexual behaviour

The resulting model (or the tree) considered five variables and, therefore, had five splits yielding six leaves. The tree represented a 5-level interaction because five variables were considered jointly to obtain the predicted value of risky sexual behaviour. Depression and substance abuse had highest influence on risky sexual behaviour in this study. Interactions involving variables "Time living in informal settlement", "Type of family grew in" and "Number of children" were also influential in predicting risky sexual behaviour.

The following partitions were classified as presenting high risky sexual behaviour (1) those who met the cut-off for depression with severe substance abuse and had lived in the informal settlements for either between 1 and 10 years or 21 to 30 years or >30 years (55.9% of study respondents), (2) those who met the cut-off for depression with severe substance abuse and had lived in the informal settlements for between 11 and 20 years grew up in divorced, or separated or single parent families (7.5% of study respondents) and (3) those who met the cut-off for depression with severe substance abuse, and had lived in the informal settlements for between 11 and 20 years, and grew up in extended or nuclear families, and with 1 to 3 children (3.3% of study respondents). The following partitions were classified as presenting low risky sexual behaviour (1) those who didn't meet the cut-off for depression only (22.9% of study respondents), (2) those who met the cut-off for depression but with mild substance abuse (6.2% of study respondents) and (3) those with severe substance abuse, and had lived in the informal settlements for between 11 and 20 years, and grew up in extended or nuclear families, and with either no children or 4 to 6 children (4.2% of study respondents) (Figure 4.9)

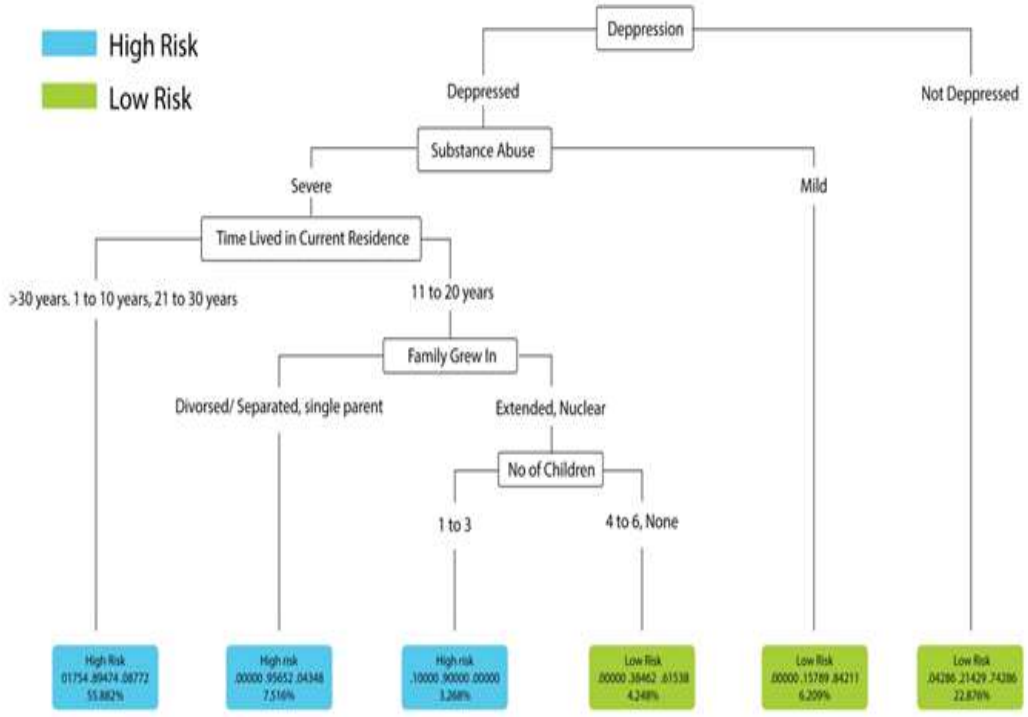

Figure 4.9: Classification tree analyses for the risky sexual behaviour.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMEDATIONS

5.1 Introduction

This chapter presents the discussion, conclusion, and recommendation of the survey. The discussion, conclusion and recommendations sections summarise and contextualise the results within existing literature, and consider implications for policy and practice.

5.2 Discussion

5.2.1 Prevalence of substance abuse, intimate partner violence, depression and risky sexual behaviour among WWIDs.

The prevalence of substance abuse, intimate partner violence, depression and risky sexual behaviour was significantly higher than in women in the general population and men who use drugs (NASCOP, 2018; NASCOP, 2015; NASCOP, 2014; UNAIDS, 2016). These results were consistent with other research (Syvertsen *et al.,* 2015; Eluwa *et al.,* 2013; Lepretre *et al.,* 2015; Nyandindi *et al.,* 2014). The findings of this study indicated that women who inject drugs-initiated substance abuse during adolescence in context of sexual relationships with older men who were using drugs and were often violent. Relationship violence led to breakups and the women moved on to other shorted-lived sexual relationships where they experienced more violence and mental stress as they took up parental and marital duties at a young age. Consequently, this study showed that early substance use presented an opportunity where women experienced intimate partner violence, depression and engaged in risky sexual behaviour at adolescence and as they transtioned to adulthood. These results are consistent with other research (Clark *et al.,* 2020; Nkansah-Amankra & Minelli, 2016; Pringle *et al.,* 2017; Tarter *et al.,* 2012; Doku, 2012). The findings suggest the need for substance abuse prevention interventions targeting girls at adolescent age and community senstitization targeting parents and other key members of the community. Further, there

is need for an intergrated approach in addressing these psychososcial conditions later in the life of the women who inject drugs.

5.2.2 Patterns of injection drug use among women who inject drugs

This study identified broad patterns in injection drug use among women who inject drugs in Kenya, finding that >75% of them commenced use between the adolescent age of 11 and 20 years either by combining various licit and illicit drugs. At initiation of substance use majority of the women who inject drugs (74%) were introduced to licit and illicit drugs by intimate sexual partners. On a mean time of 12 years after initiation of substance use (range 2 to 34 years, 6 months prior to the current survey), all the respondents were already on heroin use with >98% on poly substance use. At the time of the survey, 85% of the respondents were combining injection and non-injection modes of heroin use such as smoking and sniffing. This is the first study to conceptually identify and explore the complex landscape of gateway substance use, temporal poly substance use and poly route patterns among women who inject drugs in sub-Saharan Africa.

The findings suggest that mitigation strategies targeting early onset of substance use and inadequate sexual health information need to be integrated with health policies and programs that scale up harm reduction interventions among women who inject drugs in developing countries. In particular, the findings underscore the need to better understand how combined early onset of substance use and early sexual debut serve as frontrunners to substance dependency and risky sexual behaviour resulting in accelerated HIV and other blood-borne viruses' transmission along the age continuum.

Findings from this study indicated that low educational attainment (early school dropout) and underage natal of the first child, were both attributed to socio-economic disadvantage. It is noteworthy that these adverse outcomes happen during the adolescent phase of life, a unique developmental period generally characterised by immature cognitive control that imposes limited regulatory influence over rational decisions on the

girls (WHO, 2011; McAteer *et al.,* 2017; Pringle *et al.,* 2017; Skinner *et al.,* 2015; Baams *et al.,* 2015; Ewing *et al.,*2015; Girma & Paton, 2015). Incidentally, this time coincides with the phase of heightened sexual consciousess due to hormonal changes. While all these happen in resource-limited contextual settings, they place the girls at an increased vulnerability that results in early sexual debut. Often, the adolescent girls take up marriage and parental responsibilities or engage in spontaneous short-lived relationships that present opportunities for licit and illicit drugs exposure by casual or regular male sexual partners (Moore *et al.,* 2014; Maswikwa *et al.,* 2015; Ewing *et al.,* 2015; Clark *et al.,* 2018). Commencing substance use in this context is referred to as gateway to substance dependence (Nkansah-Amankra *et al.,* 2016).

The gateway pattern of substance use is a normative sequence to poly substance use, beginning with alcohol and tobacco use, followed by cannabis and later transits to other illicit drugs (Nkansah-Amankra *et al.,* 2016; Tarter *et al.,* 2012; Doku, 2012). However, the findings deviated from this clear sequential order of progression. Besides differences in study settings and design, the reasons for the inconsistent substance progression patterns are perhaps attributable to the greater influence that the intimate sexual partners have on vulnerable girls relative to individual choices of the girls at the onset of substance use (Yakubu & Ibrahim, 2018). Casual sexual partners had least influence on poly substance use at the time of the survey as compared to other persons who introduced drugs of abuse to women who inject drugs at onset probably because of the limited duration of the sexual contact with the girls and possible future engagements. The high proportion of 4-way substance combinations observed in this study 6months before the study and at the time of the study was perhaps attributable to the need for medication of heroin withdrawal symptoms and the quest for a better “high” over time. This was further evidenced by use non-medical use of non-medical prescription drugs such as valium and rohypnol that in this study.

As described in the focus group discussions factors such as substance availability can also affect the described ‘atypical’ sequence of substance use. In the developed world, ‘atypical’ patterns of sequence such as the ones we found in this study have been

reported and more so from individuals from disadvantaged backgrounds (Nkansah-Amankra & Minelli, 2016). Equally important is the nature of frequent short-term sexual relationships each introducing a different substance(s) to the adolescent girl. The short-term relationships are characterized by unequal power relations as outlined in the focus group discussions. To medicate or alleviate the stress and pain that results from the relationship break ups, the adolescents are further trapped by the need to use licit and illicit drugs as described on the focus group discussions.

In many developing countries, Kenya included, many existing policies on substance use prevention, safe reproductive and sexual health target downstream interventions when adverse health outcomes have already been experienced by women (Rhodes, 2016). Limited awareness and understanding about these issues have led to the general populations being replenished with new substance-dependent individuals and thereby generating a vicious cycle of early motherhood and perpetuation of socio-economic deprivation (WHO, 2011). Our findings suggest that immense opportunities exist in reorienting downstream policies in form of integrated interventional packages in the adolescent phase. This package ought to consist of identifying adolescent girls at risk, substance use and sexual health education, improved educational attainment and progressive social policies that target socio-economically disadvantaged girls. The global health community needs to partner with developing countries in employing sustainable strategies that focus on the above-mentioned policies. Nonetheless, and given the inherent limitations of our cross-sectional design, further studies are needed in similar settings to authenticate these patterns to better inform upstream intervention policies.

Consistent with other studies (Jordan & Andersen, 2017; Betts *et al.*, 2016; Nkansah-Amankra & Minelli, 2016) there was reported increase in combinations of substance used with >50% of the women having transited from single substance or two-way substance combinations to ≥3 substance combinations from initiation of substance use to the time of the survey. Poly substance use was motivated by the need for a better “high”, need to medicate withdrawal symptoms that resulted from limited availability of heroin

such as lack of sleep, experimentation and belief in the ability of greater risk-taking effect produced by combination of heroin, other illicit drugs and non-medical prescription drugs as explained in the focus group discussions. Yet, research has shown that poly substance users have greater levels of mental disorders and other psycho-behavioral problems, such as major depression, panic disorder and memory loss and risk of overdose toxicity and fatality (Gomes *et al.,* 2014 ; Bonello *et al.,* 2014).

Pronounced discrepancies in the route of administration of heroin were evident at 6 months prior and at the time of the survey. Choice of route of administration among respondents in this study was influenced by specific factors as expounded during the qualitative interviews. The specific factors cited included heroin availability, quality of heroin, the need for a better "high", physiological factors including pregnancy and sicknesses, availability of finances, interruptions of heroin use such as happens during period of incarceration as explained during the FGDs.

Contrary to foundational notions in injection drug use patterns that heroin is majorly injected, the findings of the study demonstrate that use of heroin, as relates to route of administration, is neither a static phenomenon nor does it progress through a predictable sequential pattern from non–injection to injection routes nor from single route to poly route. This broadly agrees with previous studies ((Jiwatram-negron *et al.,* 2018; Gonzalez *et al.,* 2012; Stoicescu *et al.,* 2018.) but in the developed world (Des Jarlais *et al.,* 2007).

5.2.3 Co-occurrence of substance abuse, Intimate Partner Violence, depression and risky sexual behavior among WWIDs.

Findings from this study demonstrate that substance abuse, Intimate Partner Violence and depression co-occur and interact to predict risky sexual behaviour and occur under adverse social contexts among low-income urban women who inject drugs in Kenya. This pattern is consistent with prior research among low-income urban women in other countries (Jiwatram- negrón *et al.,* 2018; González-Guarda *et al.,* 2011; Illangasekare *et*

al.,2014 ; Koblin *et al.,* 2015). Besides, this pattern has been described and interpreted as reflecting a syndemic (Singer *et al.,* 2006; Jiwatram-negron *et al.,* 2018; Meyer *et al.,* 2011; Mendenhall, 2017)

A stringent interpretation of syndemic theory requires an empirical demonstration of three concepts: co-occurring psychosocial conditions in geographical contexts; interaction between the co-occurring psychosocial conditions that results in magnified adverse health and social consequences; and the influence of social contexts under which these psychosocial conditions occur. In seeking to meet these criteria, this study applied multiple methodologies whose outcomes concurred in finding the possible presence of a syndemic. While previous studies have documented findings similar to this study (Larney *et al.,* 2015; Iskandar *et al.,* 2012; El-Bassel *et al.,* 2012), this is the first study to identify and quantify a syndemic among a sample of low-income women who inject drugs in Kenya.

This study found high prevalence of psychosocial conditions at the individual level with approximately more than two thirds (67%) of the studied women who inject drugs having either of each of the psychosocial conditions (substance abuse, Intimate Partner Violence, depression). Furthermore, at the individual level, more than half (50%) of them had 2-way combination of substance abuse and or Intimate Partner Violence and or depression. Equally at the individual level, more than half of them had 3-way combination of these conditions. Each of these conditions, alone or in combination, co-occurred with risky sexual behaviour. Previous studies have reported that risky sexual behaviour mediates the relationship between psychosocial conditions and HIV transmission (El-Bassel *et al.,* 2011; Buckingham *et al.,* 2014 ;Erfan *et al.,* 2010 ; Gu *et al.,* 2010 ; Mburu *et al.,* 2018). Consequently, findings of this study suggest a clustered risk for HIV transmission among this population and fulfilled the first core feature of the syndemic concept. These co-occurrences could be bi-directional without a concrete understanding of what comes first, for instance, depression and the risk of undergoing and committing Intimate Partner Violence may be aggravated by substance abuse and vice versa (Devries *et al.,* 2013). One of the key reasons of co-occurrence at both

individual and population levels is their insidious onset accompanied with inadequate recognition and delayed attention suggesting a need for programming and longitudinal research that addresses this co-occurrence.

Depression and risky sexual behaviour considerably co-occurred in women who inject drugs in this study. Depression, which was not a component in the original syndemic concept consisting of substance use, violence and AIDs (Singer, 1996) since its elaboration >20 years ago, is emerging in recent research as an important element in syndemic involving increased HIV risk (Jiwatram-negrón *et al.,* 2018; Illangasekare *et al.,* 2014; Gu *et al*., 2010; Tsai *et al.,* 2015; Pettes *et al.,* 2015). Previous studies suggest a higher frequency of depressive symptoms among people who inject drugs compared with the general population (Pettes *et al.,* 2015). Further, bi-directional relationships between depression and risky sexual behaviour have been reported with risky sexual behaviour as a risk factor for depression (Waller *et al.,* 2006) and depression escalating vulnerability to risky sexual behaviour (Rao, 2006). Whichever direction taken, depression may harm brain-based skills needed for memory and to carry out tasks, lead to uncharacteristic social and or physical behaviors that may be harmful to others with adverse social consequences; contribute to psychosocial harm, reduced motivation and unhealthy peer relationships (Rao, 2006; Lehrer *et al.,* 2006). An external pathway to depression has also been hypothesized. This involves progressive criminalization of substance abuse and sex work that may lead to compounded stigma resulting in depressive symptoms and poor health seeking (Mburu *et al.,* 2018). This study did not have capacity to measure these psychological and physical sequels of depression (stigma) but nevertheless remains an area of promising research to establish cause-effect relationships.

Further analyses using logistic regression in this study found that depression and substance abuse interacted multiplicatively to increase the likelihood of risky sexual behaviour among women who inject drugs in the study settings. This analytical approach has been adopted in testing of syndemic (Senn *et al.,* 2010). The study logistic regression findings are consistent with previous studies (Iskandar *et al.,* 2012;

Buckingham *et al.,* 2014; Gu *et al.,* 2010; Tsai *et al.,* 2015) that women who inject drugs experiencing depression engaged in unprotected sex, transactional sex for money or drugs, sexual relationships with partners who inject drugs as well disproportionately higher number of sex partners in their life course. Incidentally, these were the parameters that were adopted in this study in defining risky sexual behaviour among women who inject drugs.

Generally, an additional aspect of interaction of these psychosocial conditions under the syndemic concept is that the conditions should manifest dose-response relationships such that a higher risky sexual behaviour is reported among study respondents who report a greater number of psychosocial conditions (Senn *et al.,* 2010). In this study, each additional psychosocial condition (substance abuse and depression) experienced by women who inject drugs was associated with approximately 6-fold odds of increased risky sexual behaviour which was clearly consistent with the conventional dose-response relationship (Singer *et al.,* 2006; Jiwatram-negrón *et al.,* 2018). Consistent with previous research, simultaneous presence of depression and substance abuse is elevated in women with sexual risk-taking histories by impairing judgment (Batchelder *et al.,* 2016; Pettes *et al.,* 2015). Additional research suggest that substance abuse may serve as a form of self-medication for depression (Cornford *et al.,* 2012). These findings on interaction of psychosocial conditions to predict risky sexual behaviour fulfilled the second criterion of a syndemic from multiplicative (logistic regression) and additive (dose-response relationship analyses) data analytic approaches.

5.2.4 Socio-demographic and socio-economic variables associated with substance abuse, intimate partner violence, depression and risky sexual behavior

Consistent with the third criterion in syndemic theory (Singer *et al.,* 2017), this study found that the syndemic was associated with social economic disadvantage variables of income and age at delivery of first child. Occurrence of psychosocial conditions alone may not always lead to adverse health outcomes. Rather, consistent with previous research, conditions associated with living in low income settings, such as

overcrowding, underemployment, financial and other stress, and exposure to violence exacerbate at both individual- and population-levels to influence early sexual risk taking (Singer *et al.,* 2017). By identifying social variables of income and age at delivery of first child, this study underscored the importance of a life course perspective that considers critical periods, in this case teen pregnancies, and household economies for better understanding of processes, pathways, and stages of syndemic development.

This study expected to identify intimate partner violence as a significant psychosocial condition in the syndemic as reported in other studies (Stoicescu *et al.,* 2018) but this was not the outcome. Indeed, intimate partner violence alone has been reported to escalate the risk for HIV transmission in women, including those engaging in (Gilbert *et al.,* 2015). Further studies are needed to characterize intimate partner violence in this population given our finding of its co-occurrence with other psychosocial conditions but fell out in regression and interaction analyses.

In wanting to generate empirical support for the theory of syndemic, this study operationalized the concept of syndemic interaction pattern using global (logistic regression) and classification tree models. The overarching justification for applying multiple methodologies was to not only fill the gaps in knowledge existing in women who inject drugs interventions but also provide an evidence-based needed for inclusion of joint interventions that address co-occurring and interacting conditions, hitherto known or unknown, that can lower HIV-related risky sexual behaviour. To broadly test for the syndemic effect, the study introduced an interaction term into the logistic regression and in addition used classification trees (models that employ recursive binary splits to relate an outcome and predictor variables). Both methodologies concurred in identifying the interaction between depression and substance abuse in predicting risky sexual behaviour and demonstrated the practicality of considering a comprehensive syndemic framework.The implication of the latter finding is that an intervention addressing depression would be predicted to have a greater preventive impact if integrated with an intervention addressing substance abuse than would otherwise be predicted by analyses without the interaction term. These findings are an important

addition to the existing policies that focus on an integrated prevention approach in HIV prevention among key populations in Kenya where routine screening of depression among people who inject drugs in sub-optimal.

5.3 Conclusions

1. The prevalence of Substance abuse, intimate partner violence, depression and risky sexual behaviour were 88%, 84%, 77.1% and 69.3% respectively.
2. Injection drug use patterns determined were early age of substance use, poly substance use, substance use introduction by male sexual partners, non-normative drug progression, varied routes of heroin use.
3. Highest 2-way and 3-way co-occurrence was reported in substance abuse, depression and substance abuse, depression, risky sexual behaviour respectively.
4. Socio-demographic and socio-economic variables determined were age when delivered the first child, Income, Time lived in informal settlement, Type of family, number of children.

5.4 Recommendations

There is need to:

1. Design strategies to reduce the high prevalence of psycho-social condition through policy and educational program that create awareness.
2. Address substance abuse and injection drug use patterns early in the life of the women through targeted community sensitizations
3. Formulate integrated prevention responses that simultaneously address risky sexual behaviour, depression and substance abuse among girls
4. Design interventions to address low social economic status and low education attainment such as sustainable livelihood projects and educational support.
5. Carry out further research to establish pathways to drug dependence among women who inject drugs.

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APPENDICES

Appendix I: Questionaire for data collection

This questionnaire will be administered to all respondents who have passed the screening and have consented to be participated in the study.

SUBJECT IDENTFICATION

Study no. _____ Date: _____

Interview site: ……..……..……..

Interviewer‟s Name: …… Code: …….

Supervisor signature: …….. Date: …….……..

SECTION 1: BACKGROUND CHARACTERISTICS **First, I would like to ask you a few questions on your background, including information on your age, education, jobs and income.**			
No	**Questions and Instructions**	**Coding categories**	**Skip**
1.01	How old are you? (In completed years)	Years _____ (DOB):_____	

1.02	How long have you been living countinuously in the current resident?(at least one year)	Years ……	
1.03	How did you come to live in the informal settlment?	My place of birth…….……1 Moved here with my friends.....2 Moved here when I got married……...….....3 Other…….……96	
1.04	Have you ever attended school?	Yes…….……..….……..1 No…….....2	If no go to qns 1.06
1.05	What is the highest level of education you completed?	None……..…….…....…1 Primary……..……..……...….....…2 Secondary…….……..……....3 Tertiary……..…….....…….....4 Don't know…….…...…….....88	
1.06	If you never attended school, state the reasons for not	I refused to attend…….…….....1 My parents could not afford…….....2 Nobody could take me to school…….3	

	attending school	Other……..……...96	
1.07	Who works in the family so that you can get some family income?	Self……..……....……...1 Spouse…….…..…….2 Spouse & self…….....3 Siblings……..…..……4 Relatives……...…….....5	
1.08	What type of work do you or your partner do to make money?. *Multiple responses*	Self-employed ……...…….……...1 Mugging …….. 2 Stealing ……...……...3 Sex work …….....4 Shop lifting ……....5 Other ……..……..…….…….....96	
1.09	In the last 3 month, what was the average income of your	KShs.0 -5000…….…….…...….1 Kshs.50001-10,000……..…….…….…....2 Kshs.10,001-15,000…….…….3	

	household? (Kenya Shillings)?	Kshs.15,001-20,000……..……..4 Kshs.20,001-25,000……..……..5 >25,000……..……..6	
1.10	What is your religion?	Roman catholic…….....……..1 Protestant/other Christian…….....2 Muslim……...……..…….. 3 No religion…….....…….....4 Other…….…….....96 Specify	
1.11	What is your marital status?	Single ……..….....1 Married ……...…..…….…….2 Cohabiting …….…….……...3 Divorced…….4 Separated……....5	
1.12	When you first started living with a partner/married, how old were you?	Below 18 year…….1 Above 18 years……....……...2	

1.13	How many children have you given birth to?	……	If no child go to question 1.15
1.14	How old were you when you got your first child? (Age in complete years)	……	
1.15	What type of family did you grow up?	Single parent…….…….....1 Nuclear(Father & Mother)……..…2 Extended (polygamous)……..3 Divorced/separated parents…….……...……4	

SECTION 2A: SUBSTANCE USE DISORDER CRITERIA

Am going to ask you some questions about how you have acted or behaved after taking /stopping or reducing use of drugs.

Instructions:Indicate yes or No after every statement

2.01	**Symptoms of substance use disorder**	Yes =1 No=2	Skip

	Impaired control over substance use.		
2.01(1)	I take substance in larger amounts or over a longer period than was originally intended		
2.01(2)	I express a persistent desire to cut down or regulate substance use and may report multiple unsuccessful efforts to decrease or discontinue use.		
2.01(3)	1spend a great deal of time obtaining the substance, using the substance, or recovering from its effects .In some instances virtually all of the individual's daily activities revolve around the substance.		
2.01(4)	I experience an intense desire or urge for the drug that may occur at any time but is more likely when am in an environment where the drug are was obtained or used		
	Social impairment		
2.01(5)	My recurrent substance use may results in a failure to fulfill major role obligations at work, school, or home		
2.01(6)	I continue to with substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance.		
2.01(7)	I have given up or reduced participation in important social, occupational, or recreational activities because of substance use.		
	Risky use of the substance		
2.01(8)	I have continued to use susbtances of abuse in situations in which it is physically hazardous.		
2.01(9)	I continue to use substances despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance.		
	Pharmacological effect of substance use		

2.01(10)	I experience tolerance which is signaled by requiring a markedly increased dose of the substance to achieve the desired effect or a markedly reduced effect when the usual dose is consumed.		
2.01(11)	I experience withdrawal symptoms once I stop or significantly reduce use of the substances of abuse.		

SECTION 2B: SUBSTANCE USE HISTORY

Now I would like to ask you questions about your history of substance use.

No	**Questions and Instructions**	**Coding categories**	**Skip**
2.02	Have you ever used any substance of abuse?	Yes……1 No……2	If no go to 3.01
2.03	How old were you when you first used the substances of abuse? (Complete years)	…….	
2.04	Who introduced you to the substances of abuse? (*Multiple responses allowed*)	Husband……1 Regular partner……2 Casual sexual partner……3 Sibling(sister/brother)……4 Peer/friend……5 Other ……96	

2.05	Which substances of abuse did you first use among the following? (Multiple responses allowed).	Alcohol(changaa,spirits)…….....1 Bhang (Ndom,marijuana, weed)..…….....2 Heroin(,daba,unga,kete)…….....3 Cigarette……4 Valium …….……..5 Rohypynol……..……6 Other……...……...7	
2.06	In the last 6 months have you used any substance of abuse?	Yes……..…….....……....1 No……..……...……...2	If no go to qsn 3.01
2.07	What substance of abuse among the following were you using in the last 6 months? *Multiple responses allowed*	Alcohol(changaa,spirits)…….....1 Bhang (Ndom,marijuana,weed..….....2 Heroin(,daba,unga,kete)…….....3 Cigarette……...……..4 Valium ……..……5 Rohypynol…….……6 Other……...7	
2.08	If you were	Oral……..…….……...……...1	

	using heroin in the last 6months what was the mode of administration? *Multiple responses allowed*	Injection……..…….…….....2 Smoked……..……...…….3 Sniffed……..…….....4 Other….……...…….…….....5	
2.09	What substance of abuse are you currently using among the following? *Multiple responses allowed*	Alcohol(changaa,spirits)…….....1 Bhang (Ndom,marijuana,weed..….....2 Heroin(,daba,unga,kete)…….....3 Cigarette…….....4 Valium …….……..5 Rohypynol…….....6 Other(specify)……..……..7	
2.10	If you are currently using heroin what is the mode of administration? *(Multiple*	Injection…….…..…….…….....1 Smoked……..……..……..……..2 Sniffed……..…….…….....3 Other….……...…….…….....4	

	responses allowed)		
2.11	How many times per day do you inject heroin?	……..	
2.12	How long have you used the substance/s of abuse in your enire life?	……..……	

SECTION 3: INTIMATE PARTNER VIOLENCE.

Now I would like to ask you questions about intimate partner violence

No3. 01	**Question and instruction**	**Coding categories**	Skip
Physical Violence			
3.01 3.01(1)	Does/Did your (last) husband/partner ever:	**How often did this happen during last 12 months** **Often** **some times** **Not all**	

3.01(2)	Push you, shake you, or throw something at you?	**Yes -1** **No-2**	**1**	**2**	**3**	
3.01(3)	Slap you?	**Yes -1** **No-2**	**1**	**2**	**3**	
3.01(4)	Twist your arm or pull your hair?	**Yes -1** **No-2**	**1**	**2**	**3**	
3.01(5)	Punch you with his fist or with something that could hurt you?	**Yes -1** **No-2**	**1**	**2**	**3**	
3.01(6)	Kick you or drag you or beat you up?	**Yes -1** **No-2**	**1**	**2**	**3**	
3.01(7)	Try to choke you or burn you on purpose?	**Yes -1** **No-2**	**1**	**2**	**3**	
	Threaten or					

	attack you with a knife, gun, or any other weapon?		
3.02	**Sexual Violence**		
3.02 3.02(1) 3.02(2)	Does/Did your (last) husband/partner ever: Physically force you to have sexual intercourse even when you did not want to? Force you to perform any sexual acts you did not want to?	**How often did this happen during the last 12 months?** **Often sometimes not at all** **Yes -1** **1** **2** **3** **No-2** **Yes -1** **1** **2** **3** **No-2**	
3.03	**Emotional Violence**		
		How often did this happen during the last 12 months?	

3.03(1)	Does/Did your last husband ever:		**Often**	**some times**	**Not all**	
3.03(2)	Say or do something to humiliate you in front of others?	**Yes -1** **No-2**	**1**	**2**	**3**	
3.03(3)	Threaten to hurt or harm you or someone close to you?	**Yes -1** **No-2**	**1**	**2**	**3**	
	Insult you or make you feel bad about yourself?	**Yes -1** **No-2**	**1**	**2**	**3**	

SECTION 4: SEXUAL RISK HISTORY.

I would now like to ask you a few questions about your sexual history

No **4.00**	**Question and instruction**	**Coding categories**	Skip
4.01	How many casual sexual partners have you had in the last **6** months	……	
4.02	In the last 6 months how often have you had	None……..……...….1 1 to 3 times a month……..….2 About once a week……...…….....3	

	intercourse with male casual partner?	2 to 3 times a week…….….....4 4 to 6 times a week…….....…….....5 About once a day……...…...6 2-3 times each day…….....7 4 or more times each day……...8 Refused…….…….....98	
4.03	In the last 6 months how often did you use condoms when having intercourse with your casual partners of the opposite sex?	None……..……..…...1 1 to 3 times a month……..……..…...2 About once a week……..…...….....3 2 to 3 times a week…….....4 4 to 6 times a week…….....……..5 About once a day……...…….6 2-3 times each day…….....7 4 or more times each day……...8 Refused……...…….....98	
4.04	In the last 6 months how often have you had **sex** with a casual partner so that you can get **money to buy drugs**?	None……..…….....……1 1 to 3 times a month……..……..……2 About once a week……..…...….....3 2 to 3 times a week……..….....4 4 to 6 times a week…….....….....5 About once a day……...……..6 2-3 times each day…….....7 4 or more times each day……..…….8 Refused……...……..….....98	

4.05	In the last 6 months how often have you had a casual partner who gave you **drugs for sex**?	None……..……..…..1 1 to 3 times a month…….....…..2 About once a week……...…….....3 2 to 3 times a week…….....4 4 to 6 times a week…….....…….....5 About once a day…….....…...6 2-3 times each day…….....7 4 or more times each day……...8 Refused…….....…….…….....98	

SECTION 5: DEPRESSION

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week

	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)	Most or 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 or friends.	☐	☐	☐	☐

4. I felt 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 dislike me.	☐	☐	☐	☐
20. I could not get "going."	☐	☐	☐	☐
Thank you for your corporation …….END……				

Appendix II: Focus Group Discussion Guide

Introduction: My name is …… Am conducting a survey for my PhD studies. The purpose of this study is to collect information on drug use patterns, selected psychosocial conditions and associated risky sexual behavior among women who inject drugs living in low income urban settings in Nairobi.

Interviewers name……Date…….……...

Unique number of particpants…….....

Instructions

- As communicated earlier am going to ask you a few questions which are a follow up to the questions that you were asked last time during the survey.
- The discussion will be recorded to ensure that we capture correctly the discussion. All the information you give will be confidential.
- We will set the rules for this discussion together so that we can communicate effectively.

Questions

1. When did you first take any type of licit or illicit drugs? How did it start and where did it happen?
2. How did you start using heroin? How old were you when you started using heroin? How much does heroin cost? Where do you get money to buy heroin?
3. Have you ever stopped using heroin?
4. Apart from heroin which other drug do you use and why do you use them?
5. From the answers that you gave me last time I noted that sometimes women inject heroin and other times they smoke and sniff. Explain why this happens.
6. Why do you take these prescription drugs like Rohypinol, Artaine, valium?
7. How much does Rohpynol, artaine and valium cost? Where do you buy them from?
8. During the face to face interviews last time you indicated that you have regular partners /husbands and casual partners. Let us discuss your relationship with casual partner. Who is a casual partner? How do you get in contact with casual partners? Describe your relationship with the casual partner, why is a casual partner important to you? Do you use a condom when having sex with a casual partner?

-Let us now discuss your relationship with Regular partners/husbands. Who is a regular partner, who is a husband? Describe your relationship with regular partner and husband, why is a regular partner and husband important to you? Do you use a condom when having sex with a regular partner, husband?

9. Now I want us to discuss this violence from the regular partners/husbands and casual partners. How does the violence occur? Why does the violence occur? Could someone narrate a violence incidence? What do you do when you are violated? Do you think it is okay for a woman to be beaten once in a while?
10. Have you ever told anybody about the violence that you are experiencing?
11. Who did you tell about the violence? Were you helped?

Appendix III: Center for epidemiologic studies depression scale (CES-D), NIMH

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.				
	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)	Most or 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 or friends.	☐	☐	☐	☐
4. I felt 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 dislike	☐	☐	☐	☐

me.				
20. I could not get “going.”	☐	☐	☐	☐

Appendix IV: DMS-5: Screening criteria for Substance Use Disorder

Impaired control over substance use (Criteria 1-4).

1. The individual may take the substance in larger amounts or over a longer period than was originally intended.
2. The individual may express a persistent desire to cut down or regulate substance use and may report multiple unsuccessful efforts to decrease or discontinue use.
3. The individual may spend a great deal of time obtaining the substance, using the substance, or recovering from its effects .In some instances of more severe substance use disorders, virtually all of the individual's daily activities revolve around the substance.
4. Craving is manifested by an intense desire or urge for the drug that may occur at any time but is more likely when in an environment where the drug previously was obtained or used

Social impairment (criteria 5-7)

5. Recurrent substance use may result in a failure to fulfill major role obligations at work, school, or home.
6. The individual may continue substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance
7. Important social, occupational, or recreational activities may be given up or reduced because of substance use. The individual may withdraw from family activities and hobbies in order to use the substance.

Risky use of the substance (Criteria 8-9).

8. This may take the form of recurrent substance use in situations in which it is physically hazardous.
9. The individual may continue substance use despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance. The key issue in evaluating this criterion is not the existence of the problem, but rather the individual's failure to abstain from using the substance despite the difficulty it is causing.

Pharmacological criteria (Criteria 10 and 11).

10. Tolerance is signaled by requiring a markedly increased dose of the substance to achieve the desired effect or a markedly reduced effect when the usual dose is consumed.

11. Withdrawal is a syndrome that occurs when blood or tissue concentrations of a substance decline in an individual who had maintained prolonged heavy use of the substance.

Severity and Specifies of substance use disorders

Severity	**Specifies**	**Score**
Mild	Two to three symptoms	
Moderate	Four to five symptoms.	
Severe	Six or more symptoms	

Appendix V: Consent Form

My name is ……., a student at JKUAT undertaking a Doctor of Philosophy Degree in Public Health. I am conducting a study to get information on drug use patterns, selected psychosocial conditions and associated risky sexual behavior among women who inject drugs living in low income urban settings in Nairobi.

Purpose of the study: The purpose of the study is to get information on drug use patterns, substance abuse, intimate partner violence, depression and associated risky sexual behavior among women who inject drugs living in low income urban settings in Nairobi.

Procedure: You will be asked questions about your background, history of substance abuse, your history of Intimate partner violence, depressive symptoms and sexual behaviour by a trained research assistant. The SAPTA program clinician and counselor will give support to respondents for depression and Intimate partner violence but this will be voluntary. Your participation in this study is voluntary; you can refuse to participate now or at any time during the interview. You are free to refuse to answer any questions. All your answers will be kept strictly confidential.

Benefits

There will be no direct benefits to the study participants. However, the outcome of the study will help design new strategies that will help reduce HIV/AIDs among women who inject drugs.

Risks

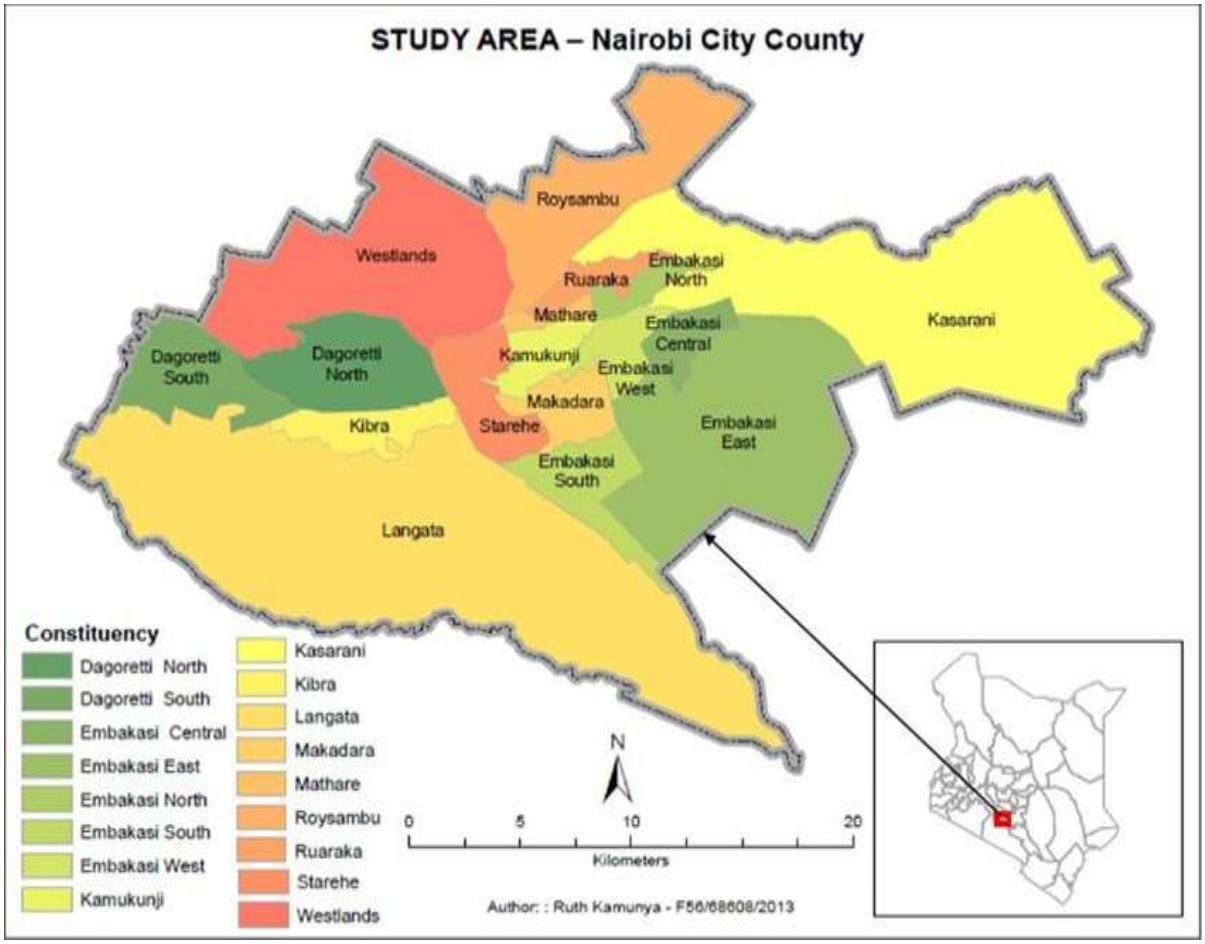
Participant will have no risks involved but in case any participant does not feel comfortable answering any of the questions, they will be allowed to withdraw from the study to avoid embarrassment or any form of discomfort. All the information you give will be held in strict confidentiality. Your names will not appear in the questionnaires and the information will only be linked with a code which will only be accessible to study staff.

At this time do you want to ask anything about the survey? Yes/ No.

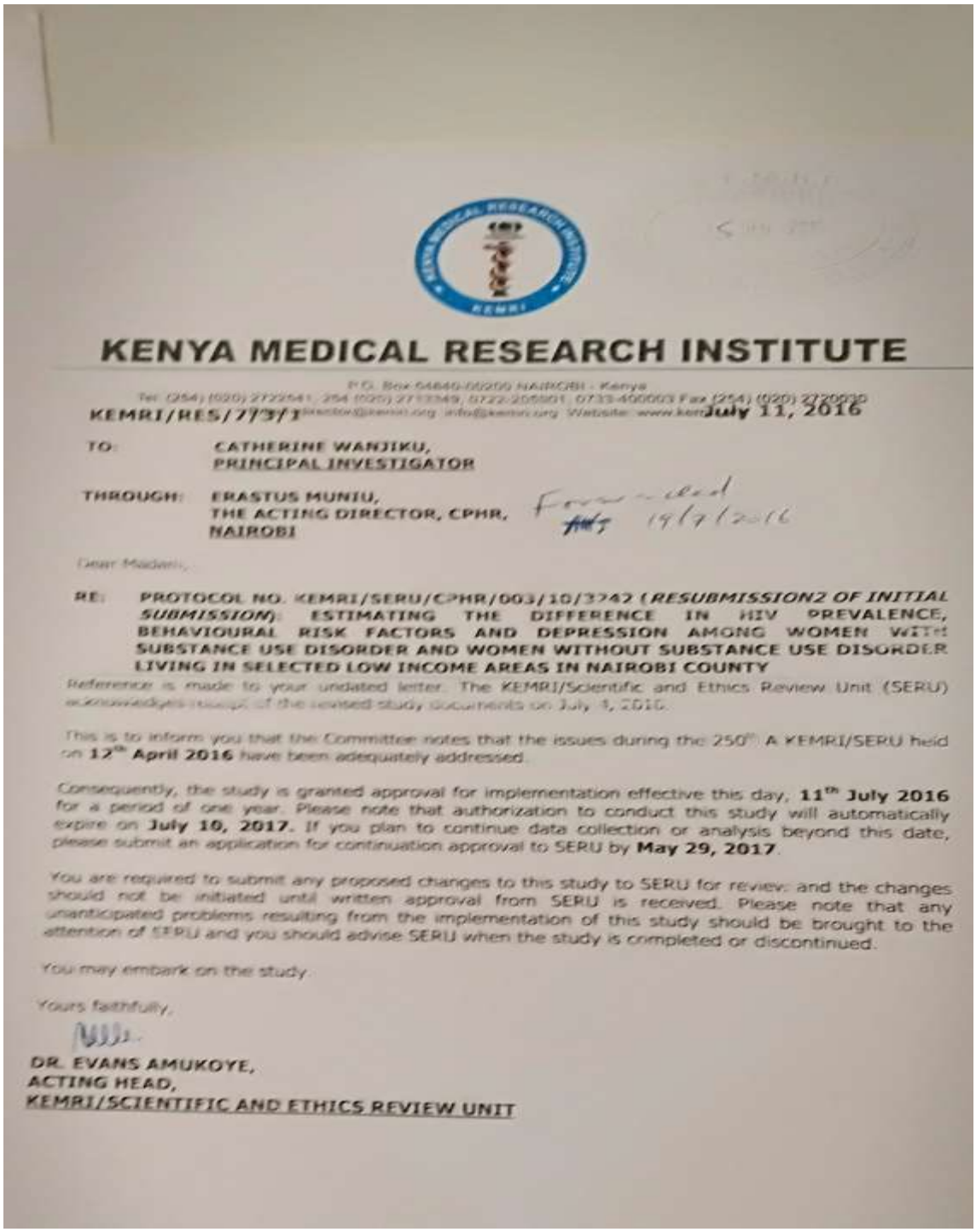
If you agree to participate please append your

Name:_____
signature_____Date_____
Witness_____Signature _____

Appendix VI: Map of Kenya showing Nairobi County



Appendix VII: Ethics and research committee approval letter



KENYA MEDICAL RESEARCH INSTITUTE

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KEMRI/RES/7/3/1 July 11, 2016

TO: CATHERINE WANJIKU,
PRINCIPAL INVESTIGATOR

THROUGH: ERASTUS MUNIU,
THE ACTING DIRECTOR, CPHR,
NAIROBI

Received 19/7/2016

Dear Madam,

RE: PROTOCOL NO. KEMRI/SERU/CPHR/003/10/3742 (*RESUBMISSION2 OF INITIAL SUBMISSION*): ESTIMATING THE DIFFERENCE IN HIV PREVALENCE, BEHAVIOURAL RISK FACTORS AND DEPRESSION AMONG WOMEN WITH SUBSTANCE USE DISORDER AND WOMEN WITHOUT SUBSTANCE USE DISORDER LIVING IN SELECTED LOW INCOME AREAS IN NAIROBI COUNTY

Reference is made to your undated letter. The KEMRI/Scientific and Ethics Review Unit (SERU) acknowledges receipt of the revised study documents on July 4, 2016.

This is to inform you that the Committee notes that the issues during the 250th A KEMRI/SERU held on **12th April 2016** have been adequately addressed.

Consequently, the study is granted approval for implementation effective this day, **11th July 2016** for a period of one year. Please note that authorization to conduct this study will automatically expire on **July 10, 2017.** If you plan to continue data collection or analysis beyond this date, please submit an application for continuation approval to SERU by **May 29, 2017**.

You are required to submit any proposed changes to this study to SERU for review and the changes should not be initiated until written approval from SERU is received. Please note that any unanticipated problems resulting from the implementation of this study should be brought to the attention of SERU and you should advise SERU when the study is completed or discontinued.

You may embark on the study.

Yours faithfully,

DR. EVANS AMUKOYE,
ACTING HEAD,
KEMRI/SCIENTIFIC AND ETHICS REVIEW UNIT