

**Retention in care among HIV-positive clients on Anti-Retroviral Therapy who inject drugs
in three South African districts.**

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ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ART	Anti-retroviral therapy
COSUP	Community-Oriented Substance Use Programme
HIV	Human Immunodeficiency Virus
IQR	Interquartile Range
LTF	Lost to follow-up
MOU	Memorandum of Understanding
NDoH	National Department of Health
NGO	Non-Governmental Organisation
NSP	Needles and Syringe Programme
OST	Opioid Substitution Therapy
PWID	People who Inject Drugs
PWUD	People Who Use Drugs
SES	Socio-Economic Status
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
TIER	Three Interlinked Electronic Registers
US	United States
VL	Viral Load

OPERATIONAL TERMS

Lost to follow-up: Failure to attend regular clinic visits within a specified interval after the previous visit (Berheto, Haile & Mohammed, 2014)

Retention in care: Attending regularly scheduled ART visits after initiation of ART and adhering to cohort laboratory monitoring of blood and collection of anti-retroviral drugs as required (Long *et al.*, 2020).

Anti-retroviral therapy: A combination of several anti-retroviral medications prescribed for people living with HIV (Long *et al.*, 2020).

People who Inject Drugs: A medically and socially vulnerable population that uses drugs through the intravenous route (WHO, 2019).

Substance abuse: Excessive use of psychoactive drugs that can affect individuals physically, emotionally, and socially (WHO, 2019).

Needle and Syringe Programme: An essential factor in harm reduction for people who inject drugs. The objective is to prevent blood-borne diseases through the distribution of sterile needles and safe returns of used or contaminated needles (Fernandes *et al.*, 2017).

Opioid Substitution Therapy: Intervention used to assist illicit drug users with a replacement drug that is prescribed to reduce illicit opiate use (Kermode *et al.*, 2021).

Viral Load Suppression: When the HIV Ribonucleic acid (RNA) is undetectable in the blood of an HIV-infected person on anti-retroviral therapy (Okoli *et al.*, 2021).

ABSTRACT

Background: South Africa is part of numerous trade routes for illicit drugs and this has led to increased drug trafficking over the years. Furthermore, South Africa also has the highest prevalence of human immunodeficiency virus (HIV) globally. People who inject drugs (PWID) are identified as a key population in the fight against the HIV pandemic. It is well noted that PWID report poor adherence and low retention in care on anti-retroviral therapy (ART). Optimal adherence to ART and remaining engaged in care are critical for people living with HIV to achieve viral suppression. The current study aimed to determine retention in care and its risk factors among PWID initiated on ART in three South African district municipalities.

Methodology: A retrospective cohort study was conducted with 333 PWID, aged 18 years and older, who were initiated on ART between July 2022 and March 2023 in three district municipalities. Routine health data and opioid substitution therapy (OST) data were extracted from Tier.net database for each participant. Descriptive and inferential statistics were done using Statistical Package for Social Sciences (SPSS) version 28. Survival analysis was conducted using Stata 15. Cox proportional hazard model was used to determine factors associated with retention in care.

Results: Retention in care for PWID after six months on ART was low at 40% (n=132). In the bivariate analysis, duration on ART ($p<0.001^*$), baseline CD4 count ($p=0.0002^*$), and treatment support ($p<0.001^*$) for those on OST were all significantly associated with retention in care. From the Cox proportional analysis, only housing and enrolment in OST were predictors of loss to follow-up. The probability of loss to follow-up increased with unstable housing (Adjusted Hazards Ratio (AHR) = 4.94; CI: 2.35–10.35) and was significantly lower among those enrolled in OST (AHR = 0.25; CI: 0.10–0.60).

Conclusion: PWID on ART are challenged to remain engaged in care. It is imperative that more effective methods of implementation of harm-reduction strategies such as OST be developed for PWID on ART. The precarious housing stability needs of PWID are critical and should be addressed urgently in South Africa.

KEYWORDS: Adherence, AIDS, Anti-Retroviral Therapy, Harm reduction, HIV, Loss to follow-up, Opioid Substitution Therapy, People who Inject Drugs, Retention in care, Viral suppression.

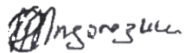
DECLARATION

I declare that *Retention in care among HIV-positive clients on Anti-Retroviral Therapy who inject drugs in three South African districts* is my work and has not been submitted for any degree or examination at any other university, and all the resources I have used have been indicated in text and acknowledged in the reference list.

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Globally, 38.4 million people were diagnosed with and were living with Human Immunodeficiency Virus (HIV) at the end of 2021, with 650,000 deaths owing to HIV-related complications (Ugwu & Ncayiyana, 2022). Two-thirds of the population were from the sub-Saharan African region (Ugwu & Ncayiyana, 2022). Globally, 84% of people who were HIV-positive knew their HIV status, of individuals who were aware of their HIV status, 87% were receiving antiretroviral therapy (ART), while 90% of those on ART were retained in care with suppressed HIV viral load (WHO, 2019). In South Africa, 22% of the 59 million were estimated to be living with HIV in 2021 (Ugwu & Ncayiyana, 2022).

The injection of drugs has been documented in about 158 countries; with 123 of those reporting HIV infections among drug injectors (Larney *et al.*, 2017). People who inject drugs (PWID) have been regarded as being at high risk of exposure to HIV because of the sharing of injecting equipment (Larney *et al.*, 2017). However, these populations remain marginalised and out of reach of health and social services (Colledge-Frisby *et al.*, 2023). Global statistics indicate that out of 12 million PWID worldwide, close to 1.6 million (13%) of them are living with HIV (Colledge-Frisby *et al.*, 2023). In 2015, more than 150,000 PWID became newly infected with HIV with 60,000 people dying of AIDS-related illnesses in the same year (Degenhardt *et al.*, 2017).

Data on PWID in South Africa are severely lacking (Scheibe *et al.*, 2016). According to Scheibe *et al.* (2016) over the past decade, only a limited number of studies, , have investigated HIV and associated risk behaviour among PWID in South Africa (Parry & Pithey 2006; Plüddemann *et al.*, 2008; Dos Santos *et al.*, 2011a) However, merely two of these studies recruited more than 50 PWID. In 2004, one of these studies engaged 57 PWID in Cape Town as part of a broader survey targeting heroin users in that area (Plüddemann *et al.*, 2008). Despite the notable growth in the illicit drug trade to South Africa, there are no recent studies conducted on HIV among PWID and associated risk factors in South Africa.

A study in three large South African cities (Cape Town, Johannesburg, and Pretoria) found that 14% of people living with HIV were PWID (Scheibe *et al.*, 2016). Drug use is also directly and indirectly associated with violence, crime and high-risk sexual practices (Scheibe *et al.*, 2016). Harm reduction is an evidence-based method that focuses on involving people who use and inject drugs and providing them with life-saving equipment and information to create behaviour change (Peckham & Young, 2020). It was estimated that doing away with non-sterile injection equipment can prevent 43% of HIV incidence in

PWID between 2018 and 2030 (Peckham & Young, 2020). Furthermore, there is substantial evidence that harm-reduction initiatives save money and are cost-effective, improving mental, physical, and social well-being of PWID (Peckham & Young, 2020).

Harm reduction is a fundamental tool for organising the fight against the opioid crisis, HIV/AIDS, viral hepatitis and other illnesses (Peckham & Young, 2020). South Africa has only four harm reduction projects aimed at managing HIV in people who use and inject drugs (Scheibe *et al.*, 2016). This is still the case in the year 2024. These projects function separately as non-governmental organisations with limited to no integration with public primary healthcare facilities (CDC, 2021).

Centre for disease Control and prevention (2021) highlights the risk of sharing needles or other injecting equipment which requires effective harm-reduction interventions, including the distribution of sterile needles and syringes, treatment literacy, the strengthening of psychosocial support and enrolment in Opioid Substitution Therapy (OST). Interventions to scale up retention in care among PWID should be strengthened and adopted by the National Department of Health (NDoH) as part of the health services offered to this vulnerable population. The consequences of poor retention in HIV care increase HIV incidence, contributing to the rapid transmission of the virus and progression to AIDS, and, ultimately, mortality. Muwanguzi *et al.* (2021) stated that treatment failure and high mortality rates are the consequences of non-adherence to ART.

1.2 PROBLEM STATEMENT

Retention in care is crucial for improved treatment and health outcomes in people living with HIV (Mousavian *et al.*, 2021). Loss to follow-up among PWID is especially high owing to drug dependency, persistent relocations, incarceration, lack of transportation to the medical sites, and financial constraints (Mousavian *et al.*, 2021). However, little information is available on PWID on ART in sub-Saharan Africa regarding retention and viral load suppression (Scheibe *et al.*, 2016). Adherence to ART and retention in care among this at-risk population is important to achieve the goal of ending AIDS. The TB HIV Care, a non-governmental organisation, delivers different key population programmes (such as PWID) in collaboration with public health care services in several South African cities. Despite the implementation of harm-reduction strategies, gaps in the continuation of care are still a challenge for PWID because of incarceration and regular movements of clients with no direct engagement with the health facilities in

prisons and public primary health facilities. TB HIV Care provides harm-reduction strategies to improve HIV testing, ART initiation, and retention in care among PWID. The challenges that are experienced include poor retention in care, discontinuation of ART, high rate of loss to follow-up and re-initiation of ART, rapid progression from one World Health Organisation' (WHO) clinical stage to another, and death. It is therefore essential that the effects of harm-reduction programmes be evaluated in terms of achieving ART outcomes. To date, there no studies on retention in HIV care for PWID in South Africa.

1.3 AIM AND OBJECTIVES

The proposed study aims to determine retention in care among PWID who are initiated on ART in three South African districts.

The objectives of the proposed study are:

- To describe the socio-demographic and clinical profile of PWID initiated on ART;
- To determine the rate of retention in care among PWID after six months on ART; and
- To identify risk factors for the retention in care among PWID on ART.

1.4 OUTLINE OF THESIS

The thesis is divided into the following chapters:

Chapter 1: Explained the background and problem statement of this study.

Chapter 2: Explored the literature on factors associated with retention in care among PWID globally and in the sub-Saharan African region, including South Africa.

Chapter 3: Presents the methodology of the study. The methodology outlines the study design, the setting, study population and sampling, data-collection method and analysis, how validity and reliability were adhered to, concluding with ethical considerations.

Chapter 4: The study findings are presented, outlining both descriptive and analytical results in detail to facilitate interpretation and to draw conclusions.

Chapter 5: Discusses the results of the study. Furthermore, the results of this study are compared to the results of other similar and related studies in the literature.

Chapter 6: Concludes the study and makes recommendations in line with the findings and limitations of the research.

1.5 SUMMARY

The reviewed studies indicate that HIV is a significant global public health issue, with Sub-Saharan Africa experiencing the highest prevalence rates. Moreover, the global population aware of their HIV status and those receiving antiretroviral therapy (ART) were both below the UNAIDS' 2030 90-90-90 targets within the same year. People who inject drugs (PWID) were reported in 81% of countries worldwide (158 out of 195), with approximately 13% of PWID living with HIV. Despite the well-documented high HIV prevalence among this at-risk population, they remain underserved by tailored HIV management services.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

In this literature review, the introduction looks at the people who inject drugs (PWID), global estimates, Human Immunodeficiency Virus (HIV) prevalence, definitions of retention in care and the impact of harm reduction for PWID on retention in care. Moreover, socio-demographic, clinical and psychosocial factors are explored.

Globally, 12 million people are estimated to inject drugs, and, of these, 13% (1.6 million) are also infected with HIV (WHO, 2019). HIV has a significant impact on individuals who inject drugs. Initial evaluations of the 2013 Global AIDS Response Progress Reporting data suggest that PWID contribute to approximately 30% of new HIV infections outside of sub-Saharan Africa (WHO, 2019). Little has been published on drug injection use in sub-Saharan Africa, where HIV continues to be a leading cause of death and disability. An estimated 5 million South Africans are receiving antiretroviral therapy (ART) out of an estimated 7.9 million persons living with HIV, making it the largest national ART programme globally (Zanoni *et al.*, 2023). An estimated 21% of the PWID are living with HIV with only 40.5% accessing ART (Zanoni *et al.*, 2023).

2.2 DEFINITION OF RETENTION IN CARE

Retention in care has diversely been defined as the ‘spectrum of the continuum of care packages starting from the diagnosis of HIV infection till lifelong services, assessed at intervals post-initiation and has not died, transferred out, stopped treatment or been loss to follow-up’ (Umeokonkwo *et al.*, 2018, p. 3). Retention in care is an important component of viral suppression, yet it persists as a significant challenge across numerous sub-Saharan African countries, including South Africa (Holtzman *et al.*, 2015).

Harm-reduction services for PWID have contributed to a decrease in HIV incidence in ten United States (US) states (Krawczyk *et al.*, 2022). Furthermore, PWID on ART were likely to be retained in HIV care, and virally suppressed while in the harm-reduction programme; however, there is limited coverage of these services globally (Krawczyk *et al.*, 2022). Despite the evidence on the positive impact of harm-reduction strategies for PWID as reviewed in high-income countries, there are currently no studies conducted on retention in care among PWID in South Africa. This indicates a gap in knowledge and a need for more research to be conducted.

2.3 SOCIO-DEMOGRAPHIC FACTORS

According to Vo *et al.* (2023), sociodemographic is the combination of social and demographic characteristics that define members of a certain group or population. Socio-demographic variables that are associated with retention in HIV care include age, gender, geographical location, housing and socio-economic status (SES) (Mou *et al.*, 2022). These socio-demographic factors impacting on retention in care are discussed below.

2.3.1. Age

Studies found that age plays a role in retention in care (Muwanguzi *et al.*, 2021). In 2018, PWID aged between 25 and 34 years in the US accounted for the highest (35%) new HIV infections compared to other age groups, namely 13–24 (12%), 35–44 (24%), 45–54 (17%) and ≥ 55 years old (12%) (CDC, 2021). This was due to the high use of injected drugs and low utilisation of HIV-prevention strategies in this age group. This study does not disaggregate data further on linkage and retention in care by age. Moreover, no studies were conducted on age and retention in care among PWID in sub-Saharan Africa and South Africa. Therefore, studies from the general population were analysed to compare retention rates by age.

A cross-sectional study conducted on retention in care among the youth aged 18–24 in rural Uganda found that only 65% of young adults were retained in care at 12 months on ART which was below the UNAIDS' 90% target (Muwanguzi *et al.*, 2021). This study aligns with the one conducted in South Africa, in the province, KwaZulu-Natal, on linkage to HIV care and early retention, which found that participants aged between 25–34 years were more likely to be retained in care (28%) at 12 months of ART compared to 21% retention rate in those aged 18–24 years (Nicol *et al.*, 2023).

Some of the barriers to retention in HIV care in younger adults were identified as internalised stigma, fear of judgment or rejection by healthcare providers, and a lack of adolescent and youth-friendly services in most primary healthcare facilities (Green, Goldbach & Raymond, 2018). Key population-tailored interventions, such as universal implementation of adolescent and youth-friendly zones, and harm-reduction strategies for PWID, are imperative to the improvement of retention in care.

2.3.2 Gender

Globally, the prevalence of injecting drugs among men was far higher compared to women (Biondi *et al.*, 2020). Among 15.6 million PWID globally, only 3.2 million were women (Valencia *et al.*, 2020). The percentage varied across regions, from 3.1% to 33% of all PWID (Biondi *et al.*, 2020). These findings align with the National HIV Behavioural Surveillance conducted in 23 United States (US) cities which found that men accounted for 69% of the PWID population compared to 30% of women and 1% of transgender women (Smith *et al.*, 2018). This means that PWID are most likely to be men. Moreover, a respondent-driven sampling conducted in Nairobi found that 91% of PWID were male and only 9% of the PWID were female (Knight *et al.*, 2019).

In 2018, men who injected drugs in the US, accounted for the highest (37%) new HIV infections compared to gay and bisexual men who inject drugs (36%) and women who inject drugs (27%) (Smith *et al.*, 2018). This means that while the behaviour of injecting drugs is most likely found in men, so is the highest rate of new HIV infections (Smith *et al.*, 2018). It is worth noting that the utilisation of HIV care service is generally low in PWID; however, there is a notable difference in utilisation between male and female PWID. Tapp *et al.*'s (2011) study found that female PWID were less likely to be retained in care owing to survival activities such as the sex trade. This literature is, however, outdated with no recent study indicating similar findings. Handanagic (2021) found that the linkage to ART initiation (60%), retention in care (47%) and viral suppression (50%) among male PWID was lower compared to female PWID who had a better ART initiation rate (69%), retention rate (54%) and viral suppression (57%).

Generally, women have higher rates of HIV compared to men, but they tend to exhibit better adherence (Valencia *et al.*, 2020). A study conducted in Kwa-Zulu Natal on retention in care found that from 1194 HIV-positive participants, 71% were female and 66% were male participants. Moreover, out of 46% of participants that were retained in care at 12 months on ART, the proportion of females was higher (50%) compared to 38% in men (Nicol *et al.*, 2023). The disproportionate rate of HIV infection among women is due to women's low socio-economic standing which perpetuates unequal gender power dynamics and therefore forces women to engage in relationships (such as transactional sex) that heighten their risk of HIV infection (Mabaso *et al.*, 2019). A study conducted on HIV treatment among men in uThukela, a high HIV burdened district in KwaZulu-Natal province, found that men have significantly lower testing rates (78%), linkage, and retention (67%) in HIV care compared to women (89% and 72% respectively) (Hlongwa *et al.*, 2022). The study found that additionally, barriers to accessing HIV care were due to

dominant masculine norms, stigma and the widespread focus on women over men in the expansion of HIV testing and treatment (Hlongwa *et al.*, 2022).

2.3.3 Geographical location

Nicol *et al.* (2023) highlighted the fact that for participants from a general population residing in rural areas, lack of transportation to the health facilities had emerged as barriers to the retention in HIV care among people living with HIV. This was more common in remote rural areas where mobile clinics and decentralised medication deliveries (DMD) were not available (Nicol *et al.*, 2023). Participants who accessed healthcare services using public transport were more likely to be retained in care after 12 months compared to those who accessed care by arriving on foot (Nicol *et al.*, 2023). Many PWID are homeless and unemployed with no financial assistance which makes it challenging for them to access healthcare services that are located far from them (Scheibe *et al.*, 2020).

2.3.4 Housing

Frequent relocation is common among drug-dependent individuals owing to the lack of secure and stable housing and displacement as a result of participation in criminal activities (Koirala *et al.*, 2017). Consequently, these barriers contribute to high rates of missed clinic appointments and result in a loss to follow-up of those who are on ART (Koirala *et al.*, 2017). Furthermore, homelessness is a substantial barrier to maintaining recommended HIV care consistently as well as accessing and adhering to ART, leading to challenges in achieving sustained viral suppression. Consequently, this situation heightens the risk of transmission and morbidity (Wainwright *et al.*, 2020).

Several studies reported that PWID who were homeless had a higher prevalence of HIV and poor retention in care compared to PWID who did not experience homelessness and lived in informal dwellings (Wainwright *et al.*, 2020; Arum *et al.*, 2021). Furthermore, clinical outcomes such as high viral load and low CD4 counts were found in homeless PWID living with HIV in contrast to those with stable housing (Wainwright *et al.*, 2020). Moreover, homelessness correlates with increased engagement in activities that raise the risk of HIV acquisition and transmission, such as injected drug use and involvement in sex work (Arum *et al.*, 2021). This vulnerability is compounded by limited access to healthcare for essential treatments like ART and ongoing engagement in care (Wainwright *et al.*, 2020).

2.3.5 Socio-economic status (SES)

Socio-economic factors are also vital social determinants of health (Rój, & Jankowiak, 2021). SES such as poverty can be a barrier to accessing healthcare services, treatment, and remaining engaged in HIV care, thereby exacerbating the deterioration of an individual's state of health (There are currently no studies that have been conducted on the SES of PWID and retention in HIV care, therefore studies from the general population were reviewed to understand how SES affects retention in care.

A study conducted in South Africa on HIV prevalence in the general population found that low SES was associated with higher (59%) rates of HIV infection compared to 46% and 18% in those with middle and high SES respectively (Mabaso *et al.*, 2019). This recent study aligned with an old study that was conducted on socio-economic inequality and HIV, which found that HIV prevalence was highest among the poor with an estimated 21% compared to 16% and only 5% in people with middle class and high SES respectively (Wabiri & Taff, 2013).

Another study conducted in Cape Town, South Africa, reported that approximately 17% of households reside in informal dwellings, as reported in the 2021 General Household Survey (Leung *et al.*, 2023). Furthermore, an estimated 23% of households in Cape Town face food instability, while 21% lack access to piped drinking water in their dwellings (Leung *et al.*, 2023). Individuals with a lower SES are especially susceptible to stressors like poverty and food insecurity, which have been linked to heightened sexual risk-taking behaviours and an increased likelihood of acquiring HIV (Leung *et al.*, 2023).

2.4 CLINICAL FACTORS

Clinical factors refer to physiological characteristics that can affect treatment outcomes for people living with HIV (Tresker 2020) which are discussed below.

2.4.1 Baseline CD4 cell count

According to Buthelezi (2023), CD4 cell count is an indicator used to assess the immune function of people living with HIV and is used to determine the need for opportunistic infection prophylaxis or treatment such as cotrimoxazole in those with lower CD4 counts (<100 cells/mm³) and fluconazole for those with a positive cryptococcal antigen test.

WHO (2007) divided the CD4 count measures into the following categories, namely:

- Severe immunodeficiency: <200 cells/mm³,
- Advanced immunosuppression: 200–349 cells/mm³,
- Mild immunosuppression: 350–499 cells/mm³,
- Non-HIV associated immunodeficiency: >500 cells/mm³.

Several studies have shown that the relationship between CD4 count and viral load suppression differs according to the severity of HIV-associated immunodeficiency (Bennett *et al.*, 2002; Bonnet *et al.*, 2005; Grabar *et al.*, 2005). For example, people starting ART with advanced immunosuppression (200–349 cells/mm³) had better virologic outcomes compared to those with severe immunodeficiency (<200 cells/mm³) (WHO, 2007). This may be attributed to other opportunistic infections such as tuberculosis and cryptococcal meningitis among patients with severe immunodeficiency (Yehia *et al.*, 2014). Moreover, these infections not only exacerbate illness but also contribute to pill burden, which can negatively impact on engagement in care (Yehia *et al.*, 2014). No studies were found on the association between baseline CD4 count and retention in care among PWID.

2.4.2 Enrolment in Opioid Substitution Therapy (OST)

PWID living with HIV experience many barriers to retention in HIV care (Low *et al.*, 2016). Some studies suggest that enrolment in OST could facilitate the engagement of the PWID population in HIV services (Mohapatra, Nayak & Dash, 2017). These results support the integration of OST and HIV services to improve the HIV care continuum among the PWID population. A systematic review found that OST was associated with a 69% increase in linkage to ART and a 54% increase in ART coverage, while viral load suppression increased by 45% with reduced odds of attrition (Low *et al.*, 2016). Roux *et al.* (2009) highlight the fact that the longer the PWID clients are retained on OST, the more likely they are to be retained in HIV care with suppressed viral loads. It is reported that ART coverage increased in PWID that were on OST compared to those who were not on OST (Mukandavire *et al.*, 2017).

2.5 PSYCHOSOCIAL FACTORS

Aspects that affect a person's social and psychological elements of life are known as psychosocial factors (Thomas *et al.*, 2020). Social networks and support are considered to be the cornerstone of protective psychosocial resources and psychological risk factors (Thomas *et al.*, 2020). A study conducted in Pakistan on adherence to ART among PWID found that adherence to ART was low with high loss to follow-up (Ali, Nisar & Nawab, 2018). Furthermore, it is proposed that family cohesion and support are

essential for promoting adherence to ART (Ali, Nisar & Nawab, 2018). Another study that was done in Cape Town, South Africa, also reported a positive impact of treatment supporters towards adherence and retention in care (Duwell *et al.*, 2013).

2.6 SUMMARY

In summary, the reviewed studies show that retention in care is a challenge globally. Furthermore, the results presented similar findings on the association between retention in care and gender where women were found to be more at risk of HIV infection but exhibiting better retention compared to men. A younger age group (18–24) was associated with lower retention rates. Some studies found that homelessness was a barrier to remaining engaged in care and that living in stable housing resulted in better adherence, retention and viral suppression. Enrolment in OST as a harm-reduction strategy was found to be an effective strategy for keeping PWID retained in care. In the review of SES, individuals with a low SES were identified as being more susceptible to missing clinic appointments and a failure to follow-up. This could be related to challenges accessing healthcare facilities. Studies have shown that a low CD4 count was associated with unsuppressed viral load and poor retention in care, while those with a high CD4 count were more likely to be retained in care with a suppressed viral load.

CHAPTER 3: METHODOLOGY

3.1 STUDY DESIGN

A quantitative retrospective cohort study design was used to analyse routinely collected electronic data of all people who inject drugs (PWID) and who were initiated on anti-retroviral therapy (ART) in Tshwane, eThekweni, and Ehlanzeni district municipalities. Retrospective cohort studies look backward in time to examine the connection between the exposure and the outcome (Setia, 2016). The retrospective study design allowed the researcher to systematically access routine data to determine retention in care by looking at the treatment outcomes based on records of ART appointment visits that occurred in the past. The use of available routine health data is relatively inexpensive and efficient for this type of study.

3.2 STUDY SETTING

The study was conducted at three TB HIV Care key population sites, namely Tshwane, eThekweni and Ehlanzeni municipal districts. The programme focuses on HIV prevention and management among PWID through the implementation of harm-reduction strategies. The programme employs recovering drug injectors as peer educators among health professionals to promote relatability, advocacy and targeted service provision to the PWID population.

Tshwane District is situated in Gauteng Province, Pretoria. In 2017, Tshwane district had an estimated population of 3 555 741 across all seven Tshwane sub-districts with an HIV prevalence of 10.5% and 141 436 people enrolled in ART (City of Tshwane, 2024). The City of Tshwane is the largest district municipality in size when compared to the City of Johannesburg and Ekurhuleni in Gauteng Province. The biggest share is concentrated in Region 1 (Ga-Rankuwa, Soshanguve, Mabopane, and Rosslyn) at 27%, and Region 3 (Pretoria CBD, Hercules, Danville, Atteridgeville, Laudium, Saulsville and Lotus) at 22% respectively, according to region (City of Tshwane, 2024).

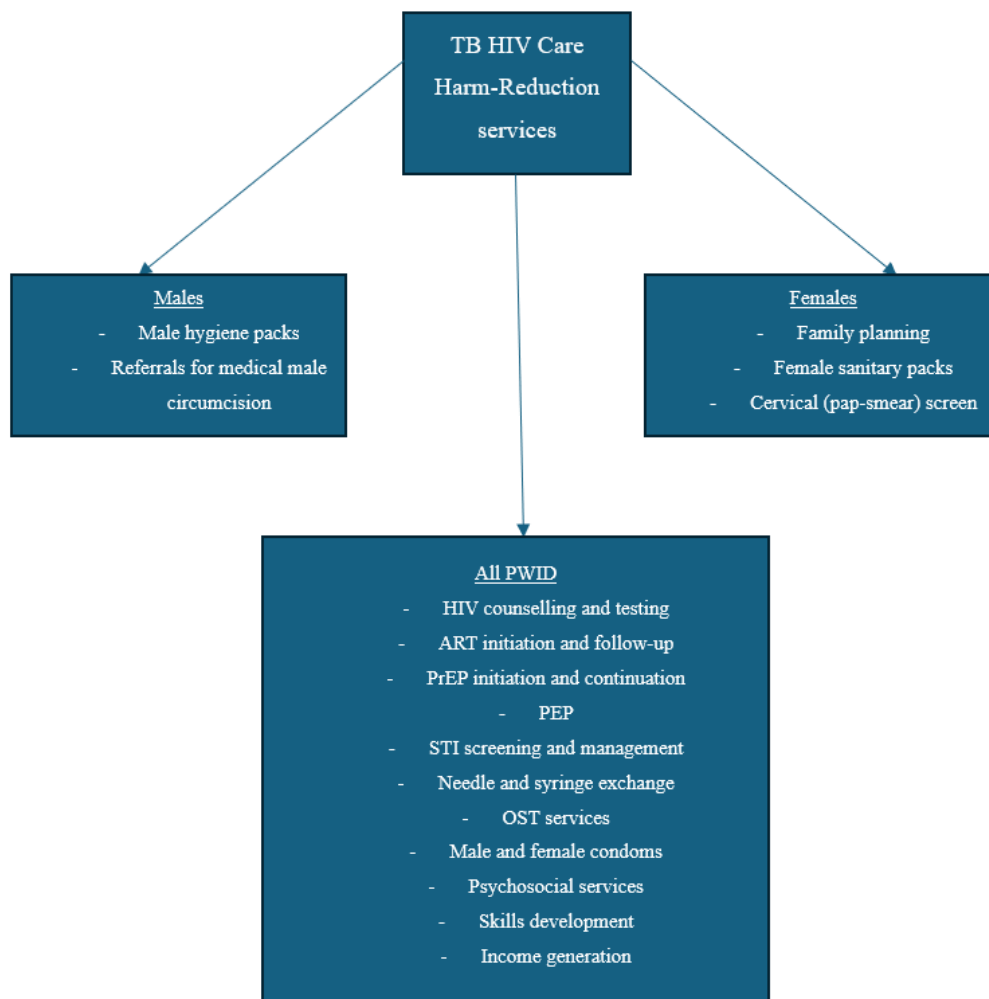


Figure 3.1 Services offered at TB HIV Care PWID sites (Source: [Key Populations Programme - TB HIV Care](#))

The estimated population of PWID in Tshwane is 2 896, which was estimated through mapping done by the TB HIV Care PWID Programme in 2019. Mapping is reviewed quarterly (owing to a lack of specified data). In Tshwane, TB HIV Care is the only referral site for HIV management and harm-reduction services designed specifically for PWID as a key population.

eThekweni is situated in KwaZulu-Natal Province. It has the country’s largest port with a population of 3 702 231 estimated in 2016 (Dada, Harker-Burnhams & Erasmus, 2018). In 2019, an estimate of 1 245 PWID was used to inform the programme in the district. The district accounts for 17% of the KwaZulu-Natal Province (Govere, Kalinda & Chimbari, 2022).

Ehlanzeni is situated in Mpumalanga Province, with four municipalities, namely the city of Mbombela, Bushbuckridge, Nkomazi and Thaba Chweu. The estimated population was 1 917 082 in 2019 (STATSSA, 2019). The HIV prevalence in the Mpumalanga Province was 17.3% with 20% in Ehlanzeni District (Simbayi *et al.*, 2019).

3.3 STUDY POPULATION AND SAMPLING

The population for this study was based on all eligible PWID, aged 18 years and older, who had tested positive for HIV and were enrolled and initiated in ART in the three settings identified between July 2022 and March 2023. These clients were followed up until September 2023 to review the retention status at six months on ART. This period was chosen owing to the commencement of a Memorandum of Understanding (MOU) and Service Level Agreement (SLA) between TB HIV Care Organisation and the three districts. The MOU and SLA were effective from 1 July 2022 to serve the PWID population. The population size in the specified study period was 333. An all-inclusive census-sampling technique was used to recruit PWID who met the inclusion criteria as follows:

- PWID,
- were 18 years and older at the time of the study,
- tested positive for HIV,
- were initiated on ART at TB HIV Care sites during the study period,
- both males and females, whether or not enrolled in Opioid Substitution Therapy (OST).

3.4 DATA COLLECTION

The patient information that was analysed had been documented in the patient paper-based folder by the Nurse-Initiated Management of Anti-Retroviral Therapy (NIMART), who are made up of qualified and certified professional nurses. The information is then captured in an electronic database by trained data capturers as routine health data. In South Africa, a three-tiered approach is used which consists of paper-based registers, an electronic version of the paper register and a full electronic medical record software known as the Three Interlinked Electronic Registers (TIER.net). Tier.net consists of all the applicable patient data, that is demographic data, patient consultation summaries, laboratory data (CD4 cell count, VL, Creatinine, and so on.) and pharmacy data. This database was linked to the District Health Information

System (DHIS) and provincial health information system. All three settings indicated in the study have adopted TIER.net for easy monitoring of large cohorts.

Owing to the TIER.net restrictions from downloading an export in two of the three settings, the data were exported to an MS Excel spreadsheet. In addition, an OST Excel spreadsheet was reviewed to determine the OST status of all the clients on ART during the study period. The OST spreadsheet consisted of treatment support information captured for every participant that was enrolled in OST. Data on treatment support were only measured in participants that were currently enrolled in OST.

Data on housing variables were also extracted from the TIER database. Participants living in stable housing had captured home addresses with verified locations while participants with unstable housing or homeless were captured as homeless with an area name where they reside, for example; Homeless (Mandela bridge).

A piloted data extraction form was used to reflect all data extracted from the electronic database and OST Excel spreadsheet.

3.5 DATA ANALYSIS

Descriptive and inferential statistics were analysed using the Statistical Package for Social Sciences (SPSS) version 28. Descriptive statistics was used to summarise and describe the features of the main data collected, that is, socio-demographic, clinical and psychosocial data. For continuous variables (for example, age, CD4 cell count) the mean with standard deviation or the median with interquartile range were calculated. For categorical data, frequencies and percentages (for example, gender, housing, enrolment in OST, and availability of treatment supporter) were estimated. The collected data were reviewed for completeness and accuracy.

Additionally, a survival analysis was conducted using Stata 15. We constructed crude survivor curve graphs to visually depict the survivor function (loss to follow-up) of selected variables. We employed log-rank tests to test associations with retention in care. After this initial exploration, a further investigation aimed at identifying risk factors and determinants associated with retention in care and loss to follow-up at six months was undertaken utilising Cox proportional hazard models, both in their crude and adjusted

forms. Adjusted hazard ratios and their corresponding 95% confidence intervals were calculated to quantify the strength of these associations.

3.6 VALIDITY AND RELIABILITY

An all-inclusive sampling was used in the study to prevent selection bias. All loss to follow-up outcomes were reported to measure the number of participants that were not retained in care. This was done to highlight the extent of the problem in retaining PWID on ART. The study researcher made use of the inclusion criteria to extract data from the electronic database. This ensured uniformity and consistency in data collection and that the participants were representative of the target population (Patino & Ferreira, 2018).

To minimise measurement bias and to ascertain that the data extraction form captured all variables of the study, the form was piloted. The monitoring and evaluation (M&E) specialist responsible for the programme data, strategic information and business development director, who is also a research specialist at TB HIV Care, the professional nurse responsible for the documentation of the information in the patient's clinical charts, and the data capturer responsible for capturing data in the electronic database, reviewed the form. Piloting is important in determining whether a research method is reliable, testing whether the study instrument is asking the intended question, and if the selected validated tool is appropriate for the target population (Srinivasan & Lohith, 2017).

A Routine Data Quality Assessment (RDQA) report was reviewed together with the M&E specialist, to check the reliability of the data captured on the routine database. This reduced measurement bias. When a study is conducted, it is important to reduce measurement error as it leads to more effective outcomes and prevents the negative effect on the accuracy of the results (French *et al.*, 2021). RDQA tools are designed to routinely verify the quality of data being reported (Lemma *et al.*, 2020). It is done to review the database for any errors in data such as duplications, incomplete data, completeness, and accuracy of data entered. This assessment is conducted every month at TB HIV Care Organisation. The dimensions of data quality include: accuracy or validity, reliability, precision, completeness, timeliness, integrity, and confidentiality (Lemma *et al.*, 2020).

3.7 ETHICAL CONSIDERATIONS

The study was approved for degree purposes by the University of the Western Cape's (UWC) Senate Higher Degrees Committee and ethics clearance was obtained from the UWC Biomedical Research Ethics Committee (Appendix 2).

Permission to review patient medical files and access electronic ART information on the Tier.net database was granted by the research head and strategic information and business development director at TB HIV Care Organisation (Appendix 3).

Individual consent was not required as routine health information was used. To protect participants' privacy and confidentiality, Section 26 of POPIA regulations was implemented through the use of de-identified data whereby a re-identification code was used and the personal identifying data such as name, surname and ID number were removed. Moreover, the data extracted from the Tier.net database was password-protected and computerised.

In the next chapter, the results of the study will be discussed.

CHAPTER 4: RESULTS

4.1 INTRODUCTION

This chapter presents the results of the study. The sociodemographic, clinical and psychosocial characteristics of the study sample are described, as well as the rates of retention in care over the observation period. The chapter also includes the results of the Cox proportional analysis by socio-demographic, clinical, and psychosocial characteristics.

4.2 REALISATION OF THE STUDY SAMPLE

Between 1 July 2022 and 30 March 2023, Ehlanzeni, Tshwane and eThekweni districts tested 1 469 PWID. A total of 28% (n=410) tested positive across all three districts, with an ART initiation rate of 81% (n=333). The data for all three districts were extracted from patient records of PWID that were initiated on ART at the TB HIV Care PWID programme sites (n=333). Figure 4.1 illustrates how the study sample was obtained and drawn from the eligible study population.

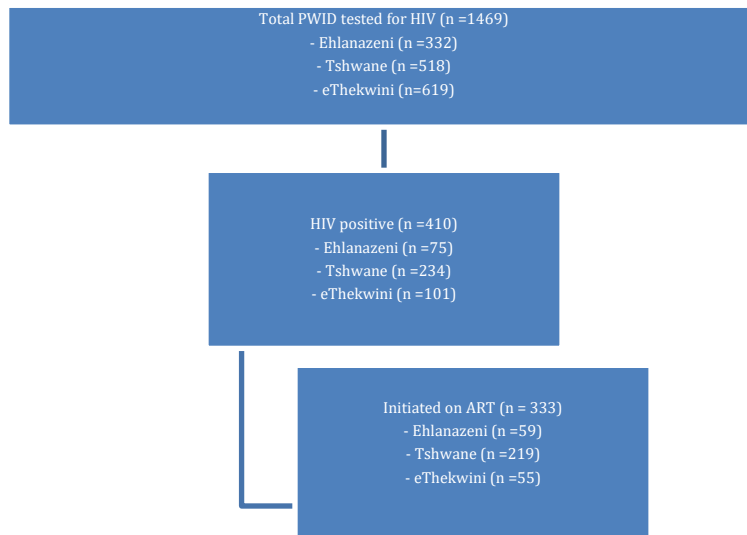


Figure 4.1 Realisation of the study sample

4.3 CHARACTERISTICS OF THE STUDY PARTICIPANTS

Table 4.1 describes the sociodemographic, clinical and psychosocial characteristics of PWID in this study which will be described further below.

4.3.1 Sociodemographic characteristics

The median age and interquartile range (IQR) of the participants were 33 and 8 years, respectively. More than half of the participants were aged between 25–34 years (55%; n=184); while 38% (n=127) were between 35–49 years. Young adults (18–24 years) accounted for 5% (n=17) and older adults (50 years and older) made up 2% (n=5) of the sample. The minimum and maximum ages were 18 and 54 years, respectively.

The majority of the study participants were male (93%; n=310), and many participants (56%, n=187) reported that they either lived in unstable housing or were homeless.

4.3.2 Clinical and psychosocial characteristics

The median duration of ART was five months (IQR = eight months). Slightly more than half (53%; n=177) of all study participants were newly initiated on ART (less than six months) during the study period, while 34% (n=112) were on ART between 6–12 months, and 4% (n=12) were on ART for more than 12 months (Table 4.1 and Figure 4.2).

Baseline CD4 counts were recorded for 58% (n=192) of participants only (Table 4.1). Of those participants with baseline CD4 count recorded 50% (n=96), were between 200 and 500 cell/mm³ (advanced immunosuppression), while 34% (n=66) had a CD4 count >500 (healthy immune system or non-HIV associated immunodeficiency) and 16% (n=30) with CD4 count <200 (severe immunodeficiency).

About two-thirds of all the participants (67%; n=224) were not enrolled in Opioid Substitution Therapy (OST). Out of those who were enrolled in OST, 72% (n=78) declared having a treatment supporter.

At six months after being initiated on ART, only 40% (n=132) were still active in care; with 48% (n=159) lost to follow-up, 11% (n=40) transferred out and 1% (n=2) recorded as dead.

These statistics are illustrated in Table 4.1.

Table 4.1: Socio-demographic and clinical characteristics of PWID on ART in three districts in South Africa (n=333).

	Category	Frequency	Percentage
Age (in years)	18–24	17	5
	25–34	181	54
	35–49	130	39
	≥50	5	2
Gender	Male	310	93
	Female	23	7
Housing	Stable	146	44
	Unstable/homeless	187	56
Duration on ART (in months)	<6	177	53
	6–12	112	34
	>12	44	13
Baseline CD4 count (n=192)	<200	30	16
	200–500	98	51
	>500	66	34
Retained in care	Active	132	40
	Loss to Follow-up	159	48
	Transferred out	40	11

	Category	Frequency	Percentage
	Died	2	1
Currently enrolled in OST	Yes	109	33
	No	224	67
Treatment supporter (n=109)	Yes	76	70
	No	33	30

4.4 FACTORS ASSOCIATED WITH RETENTION IN CARE

Table 4.2 presents the results of the bivariate analysis of sociodemographic, clinical and psychosocial factors by retention in care. There were no statistically significant associations observed between age and retention in care ($p=0.436$) or gender and retention in care ($p=0.922$). On the other hand, housing ($p<0.001$), being currently enrolled in OST ($p<0.001$), baseline CD4 count ($p<0.0002$), and the availability of treatment supporter ($p<0.001$) were significantly associated with retention in care.

Participants with stable housing ($n=110$) had a higher probability of being retained in care compared to those with unstable housing (83% vs 18%; $p<0.001$). At month three post-ART initiation, all participants who lived in stable housing were retained in care compared to 75% of those in unstable housing. At months six and 12, the probability of being retained in care was approximately 85% and 80% of those participants in stable housing, respectively, compared to 27% and 22% of those who were living in unstable housing.

From Table 4.1, almost half (47%, $n=156$) of participants dropped out of care before six months on ART. Retention in care was highest for those participants who were on ART between six and 12 months (67%, $n=88$), but declined to 33% ($n=44$) for those on ART for more than 12 months.

These statistics are illustrated in Table 4.2.

Table 4.2: Retention in care at six months of PWID on ART in three districts in South Africa (N=333).

		Retained in care n = 132 (40 %)	Not retained n = 201 (60 %)	p-value [±]
Age (in years)	18-24	9 (7)	8 (4)	0.436
	25-34	69 (52)	112 (56)	
	35-49	54 (41)	76 (38)	
	≥ 50	0 (0)	5 (2)	
Gender	Male	123 (93)	187 (93)	0.922
	Female	9 (7)	14 (7)	
Housing	Stable	110 (83)	36 (18)	<0.001*
	Unstable	22 (17)	165 (82)	
Duration on ART (in months)	<6	0 (0)	177 (88)	<0.001*
	6-12	88 (67)	24 (12)	
	> 12	44 (33)	0 (0)	
Baseline CD4 count (n=194)	< 200	8 (6)	22 (11)	0.0002*
	200-500	62 (47)	36 (18)	
	> 500	46 (35)	20 (10)	
Currently enrolled in OST	Yes	84 (64)	25 (12)	<0.001*
	No	48 (36)	176 (88)	
Treatment supporter (n=109)	Yes	71 (54)	5 (2)	<0.001*
	No	13 (10)	20 (10)	

*denotes statistical significance at $p < 0.05$. ± Chi-square test used.

Figure 4.4 illustrates the trend in retention in care by housing type ($p<0.001^*$).

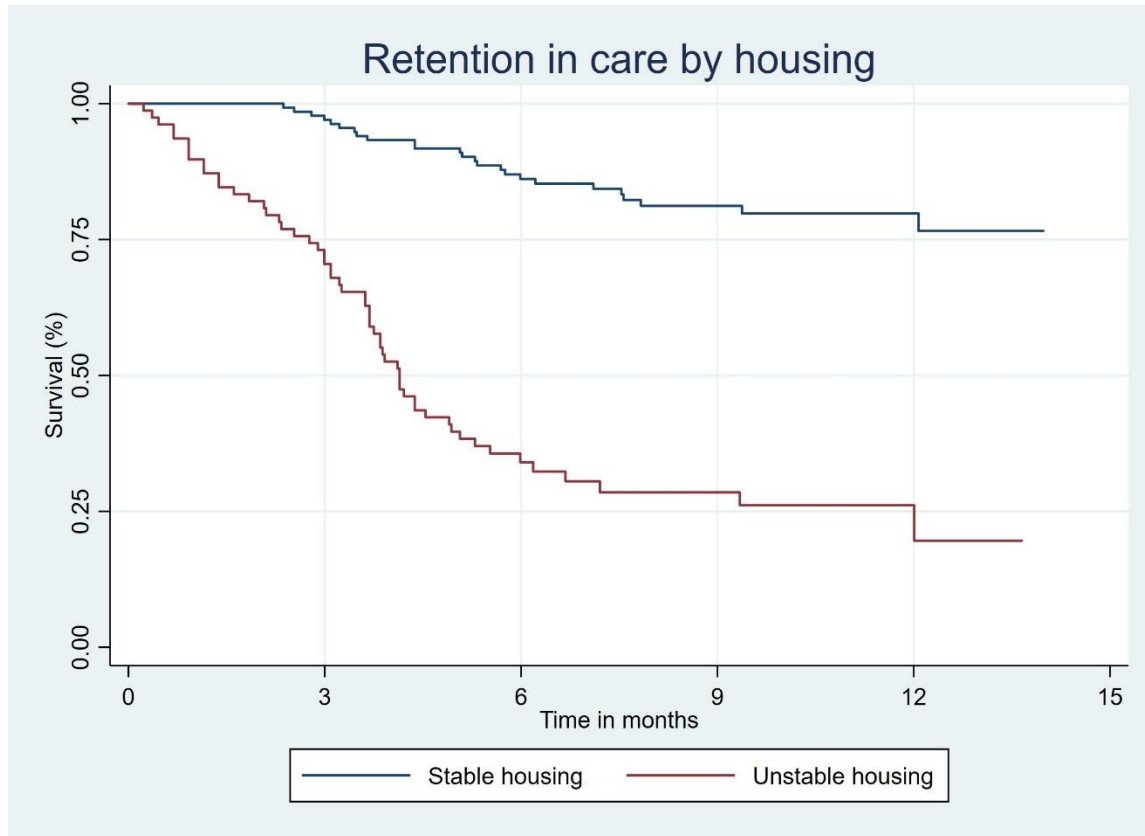


Figure 4.4: Retention in care by housing at three, six, and 12 months

Being on OST is strongly associated with retention in care ($p<0.001^*$). At month three post-initiation on ART, the probability of being retained in care was 98% for those on OST, compared to 80% for those participants who were not on OST.

At month six, approximately 90% of those participants on OST were retained in care, compared to 50% for participants not being on OST.

At month 12, approximately 85% of participants who were on OST were retained in care compared to less than 25% of those who were not on OST.

Figure 4.5 illustrates the trends in retention in care by being on OST (yes/no) ($p<0.001^*$)

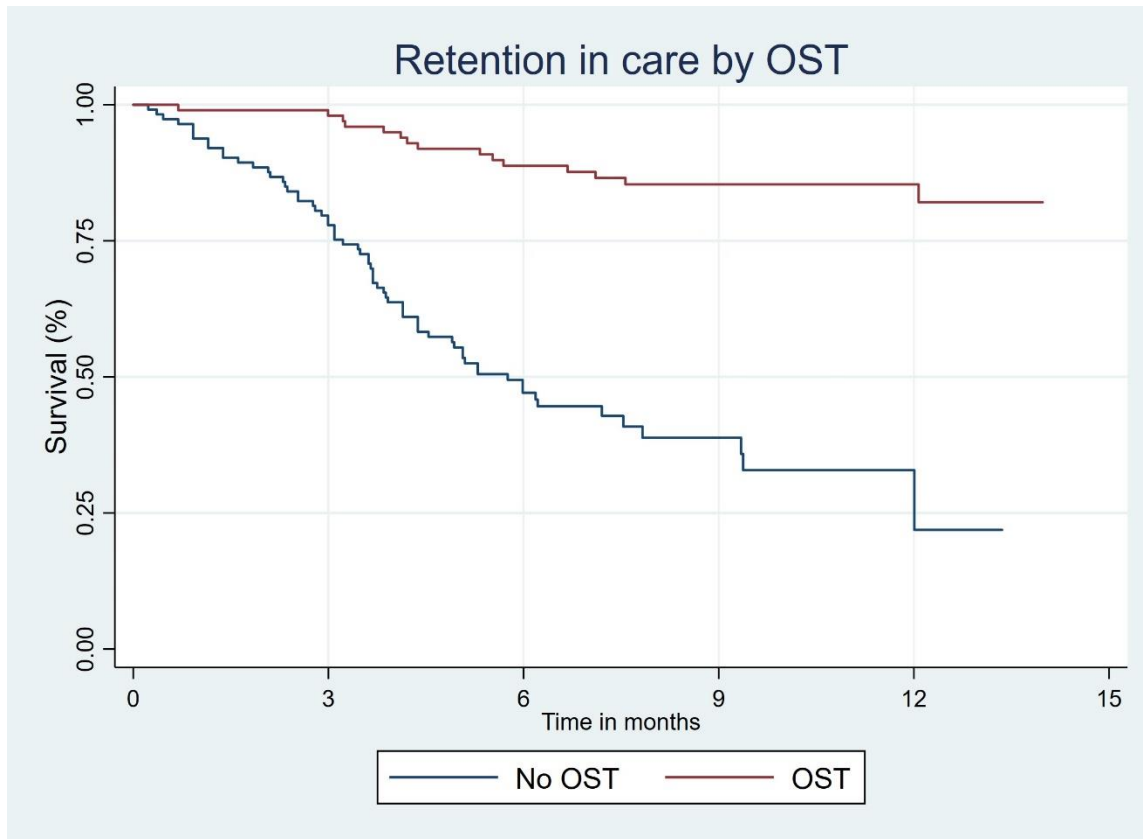


Figure 4.5: Retention in care by Opioid Substitution Therapy at three, six and 12 months.

Baseline CD4 count was significantly associated with retention in care ($p=0.0002^*$), with those participants with higher CD4 counts more likely to be retained in care. At month three post-initiation on ART, the probability of being retained in care was 95% and 98% for those participants with a CD4 >500 cell/mm³ and 200–500 cell/mm³ count (advanced immunosuppression), respectively; compared to 76% for those participants with severe immunodeficiency (CD4 <200 cell/mm³).

At month six, approximately 90% of those with CD4 >500 cell/mm³ were retained in care, with a 75% retention rate in those with CD4 200–500 cell/mm³. A high decline in retention in care (46%) was noted in those with a severe immunodeficiency (CD4 <200 cell/mm³).

At month 12, the probability of being retained in care in those with CD4 >500 and 200–500 cells/mm³ were 85% and 65% respectively. The retention in care rate among participants with CD4 <200 cell/mm³ (severe immunodeficiency) remained below 50% during the same period.

Figure 4.6 illustrates the trends in retention in care by CD4 count category.

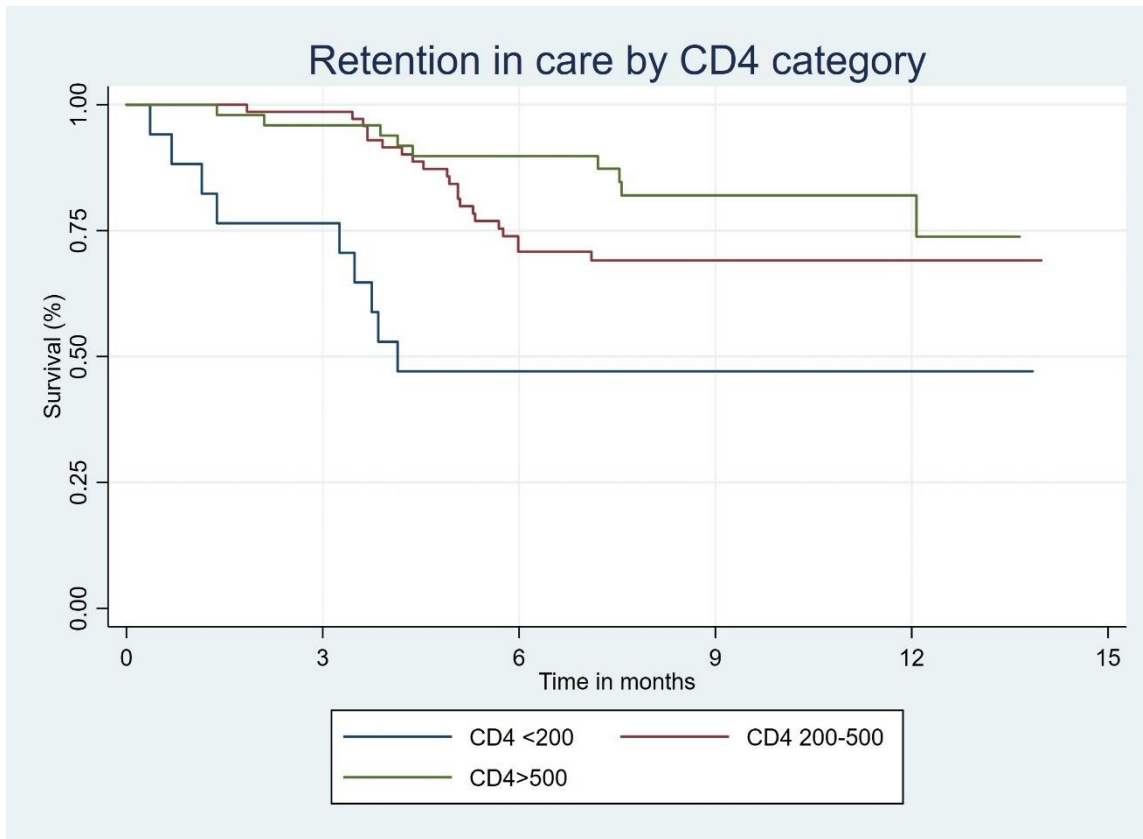


Figure 4.6: Retention in care by CD4 count at three, six and 12 months (N=192)($p=0.0002^*$)

Having a treatment supporter for those on OST was significantly associated with retention in care ($p<0.001$).

At month three post-ART initiation, the probability of being retained in care was 100% for those with treatment supporters, compared to 90% of those participants who did not have treatment supporters.

At month six, approximately 98% of those participants with treatment supporters were retained in care compared to 60% of those with no treatment supporters. At month 12, the probability of being retained in care was 90% among those with treatment supporters compared to 60% for those without treatment supporters.

Figure 4.7 illustrates the trends in retention in care by having a treatment supporter.

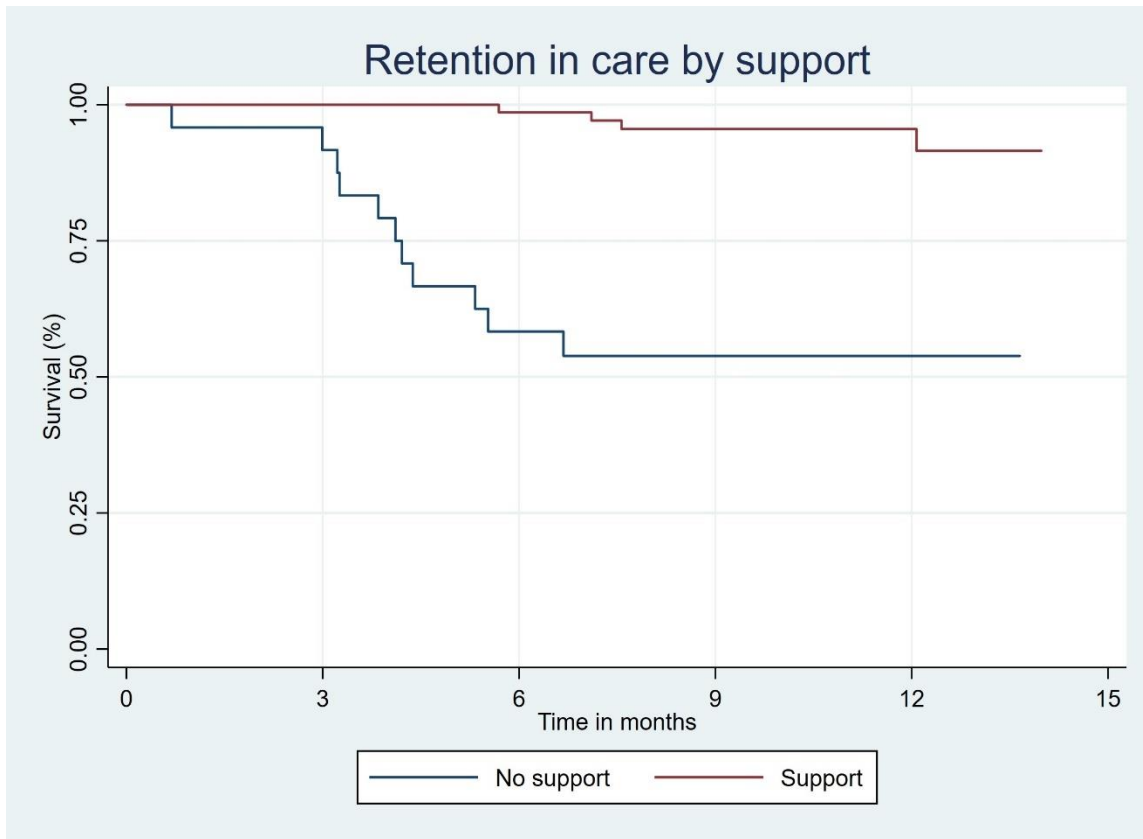


Figure 4.7: Retention in care by support in OST-enrolled participants at three, six and 12 months (n=109)($P<0.001^*$).

4.5 DETERMINANTS OF RETENTION IN CARE AMONG PWID ON ART

The sociodemographic and clinical characteristics that were found to be associated with retention in care and therefore included in the model were housing and enrolment in OST. After adjusting for potential confounders, age, and sex were not significantly associated with retention in care.

In the Cox proportional analysis, those on OST were less likely to be a loss to follow-up (HR: 0.256, 95% CI: 0.108–0.608) compared to those who were not on OST, holding all other variables constant.

Those with unstable housing were almost five-fold more likely to be a loss to follow-up (HR: 4.943, 95% CI: 2.359–10.358) compared to those with stable housing, holding all other variables constant. CD4 categories were significantly associated with retention in care ($p=0.0002^*$).

Table 4.3 shows the results of a Cox proportional hazard analysis, testing the hypothesis that demographic and clinical characteristics (independent variables) are associated with retention in care (dependent variable) among PWID.

Table 4.3: Predictors of loss to follow-up of PWID on ART in three district municipalities in South Africa (n=333).

		Crude Hazard Ratio (95% CI)	Adjusted Hazard Ratio (95% CI)
Housing	Stable	1	1
	Unstable	6.81 (4.227 - 11.021)	4.94. (2.359 - 10.358)
OST	No	1	1
	Yes	0.148 (0.083 – 0.264)	0.256 (0.108 – 0.608)

4.6 CONCLUSION

Retention in care for PWID is below the global target of 95%. With forty percent (n=132) retention rate and sixty percent (n=201) loss to follow-up. The next chapter discussed the study findings and related literature.

CHAPTER 5: DISCUSSION

5.1 INTRODUCTION

This chapter discusses the study findings concerning each variable and related literature review. There are currently no studies conducted on retention in care among people who inject drugs (PWID) on anti-retroviral therapy (ART) in South Africa.

5.2 SOCIODEMOGRAPHIC PROFILE OF PWID IN SOUTH AFRICA

The age group with the most participants was 25–34 years old (n=181; 54%). The minimum and maximum ages were 18 and 54 years old. Participants aged ≥ 50 years old accounted for only 2% (n=5) of the PWID population. This study's results aligned with the National HIV Behavioural Surveillance (NHBS) conducted in 23 United States (US) cities in 2018, where it was found that more PWID were between 25 and 34 years old and accounted for the highest number (35%) of new cases of Human Immunodeficiency Virus (HIV) (CDC, 2020).

In this study, the majority of participants were male (n=320; 93%). The NHBS conducted in the US in 2018 found the prevalence of injecting drugs was highest among males (69%) compared to females (30%) and 1% in transgender women (CDC, 2020). Furthermore, HIV positive results were reported in 68% of male PWID, 28% in females and 4% in transgender women (CDC, 2020). These findings are consistent with a respondent-driven sampling survey conducted in Nairobi and coastal regions of Kenya which found that 91% of PWID were male and 9% female (Oguya *et al.*, 2021).

Most of the participants (n=187; 56%) in the current study were homeless or living in unstable housing with 44% (n=146) living in stable housing (CDC, 2020). These findings are consistent with those from the NHBS which found that 68% of PWID in the three US cities were homeless with only 32% living in stable housing (CDC, 2020). Among those who were homeless, 64% of them were living with HIV while 36% of the homeless PWID were HIV-negative (CDC, 2020).

5.3 CLINICAL PROFILE OF PWID IN SOUTH AFRICA

Results in this study revealed that a higher CD4 count at baseline was associated with retention in care. PWID with a CD4 count of 200–500 cells/mm³ had a better chances of being retained compared to those with a CD4 count <200 cells/mm³ (severe immunodeficiency). These results are similar to those of a cross-sectional study in the US which revealed a 23.8% retention rate in participants with a CD4 count <250

cell/mm³, 34.1% in 250–500 cell/mm³ and 31% for those with a CD4 count >500 cell/mm³ (Lee *et al.*, 2018).

CD4 count is an important indicator used to monitor the depletion of CD4 cells, efficacy of ART and disease progression (Garcia & Guzman, 2023). Strengthened outreach services to the PWID population, HIV education, early HIV case findings and effective linkage to care will enhance early initiation of ART reducing ART initiation at advanced HIV stages.

In this current study, data on baseline CD4 count was obtained for only 58% (n=194) of the participants. Difficulties in obtaining blood samples from PWID have been identified in some studies. Huyck *et al.* (2023) indicated that venous degradation is a common complication of prolonged injection and high heroin formulation for PWID. This can lead to thrombophlebitis which makes vascular access difficult in clinical settings. As a result, missing data on a CD4 cell count may be experienced in health settings that service PWID (Huyck *et al.*, 2023). Furthermore, this challenge causes significant delays in care when compared to non-injecting people living with HIV. An example of delay in care is the initiation of cotrimoxazole among clients with a CD4 count below 200 cells/mm³ (Huyck *et al.*, 2023).

The current study showed that enrolment in Opioid Substitution Therapy (OST) was strongly associated with retention in care. Results in this study revealed that current enrolment in OST was associated with a lower probability of becoming lost to follow-up (AHR= 0.25; CI: 0.10-0.60). This study's results align with Mukandavire *et al.*'s (2017) meta-analysis which suggests that OST increased the uptake of ART, retention in care, and viral suppression among PWID. Furthermore, this study advocated the concurrent scale-up of OST and ART to enhance retention in care. Goeieman *et al.* (2023) also reported that enrolment in OST improves adherence and retention in HIV care and reduces high-risk practices.

Over the last four decades, Western countries and those in Southeast Asia have made strides in research, resource development and governing political support to broaden treatment approaches by integrating OST into national strategies amidst the opioid crisis (Goeieman *et al.*, 2023). However, in South Africa, although the National Department of Health (NDoH, 2019) has outlined an OST plan for future provision, nationwide implementation has yet to be achieved (Goeieman *et al.*, 2023). Consequently, only a select few have access to OST through personal finance or community-driven efforts, leaving many without this vital treatment which has proved to enhance retention in HIV care among PWID (Goeieman *et al.*, 2023).

This study confirmed the association between treatment support and retention in care. Results revealed that participants with treatment supporters were retained in care. Studies have shown that people living with HIV require robust family and societal support. Additional research indicates that the assistance offered by family members yields various beneficial effects on both people living with HIV and family dynamics, fostering positive health outcomes (Casale, 2015). Other studies revealed that people on OST, owing to opioid dependence, require social network support, namely family, a partner, and peers (Marks, Scheibe & Shelly, 2020). These social networks are important in fostering treatment adherence and retention thus improving health outcomes of PWID (Kumar *et al.*, 2017).

Enrolment in ART adherence clubs is another treatment support intervention aimed at improving adherence and retention to treatment. A retrospective cohort study conducted by Bock *et al.* (2019) revealed that the loss to follow-up was lower (AHR = 0.25, 95% CI: 0.11-0.56) in participants who were part of ART adherence clubs. Such interventions could be adopted by PWID-focused programmes and the health ministry to strengthen efforts to retain PWID in care.

A non-randomised community intervention study investigated a package of social support interventions to enhance adherence to ART. The results of the study revealed that ART adherence was positively related to social support (Li *et al.*, 2018).

The importance of treatment support for PWID on ART needs to be strengthened and emphasised as evidence has proved that social networks and family cohesion have an impact on retention in care.

5.4 RETENTION IN CARE AMONG PWID

This study found that 40% of PWID were retained in care. This finding is much lower compared to Ryan *et al.*'s (2021) prospective study of PWUD and PWID on ART in Madrid, Spain, where 80% of the participants were retained in HIV care at the end of one year. The retention rate decreased to 62.9% at the end of 2020 (Ryan *et al.*, 2021). A cross-sectional survey of HIV-positive PWID and poor health outcomes in Atlanta in the United States (US), also reported low (77%) retention in care among PWID (Dasgupta *et al.*, 2021).

PWID traditionally experience poorer clinical outcomes and higher mortality rates. Mutai *et al.*'s (2024) global meta-analysis on suboptimal retention in drug users reported a 65.6% retention rate among PWID on ART, with lower viral suppression (61%) compared to the general population.

Findings suggest that the PWID population in South Africa is far from reaching the UNAIDS' 2030 targets of 95–95–95. Therefore, this study provides evidence for the need for strengthened harm-reduction services for PWID to improve the HIV cascade of this key population in South Africa.

5.5 FACTORS ASSOCIATED WITH RETENTION IN CARE

The findings for gender and retention in care must be interpreted with caution because of the lower number of female participants enrolled in this cohort study. The Cox proportional analysis in this study revealed that retention (93% vs 7%) and the loss to follow-up (93% and 7%) rates were equal in both male and female participants. Although there was no association between gender and retention in care, a study conducted by Tapp *et al.* (2011) demonstrated that female PWID are approximately 30% less likely to be retained on ART owing to being more vulnerable and engaged in survival activities, such as the sex trade. Furthermore, the study was considered the first long-term study to assess key demographic and behavioural factors associated with ART among PWID (Tapp *et al.*, 2011). This study is in contrast with a study from a general population which found that women exhibit better retention compared to men. There are currently no recent studies conducted on gender differences and retention in HIV care among PWID.

It is widely recognised that maintaining optimal levels of adherence and retention to ART is crucial (Nelson, 2023). Ensuring that marginalised and disadvantaged communities have equitable access to ART is imperative both for the well-being of individuals and for public health at large (Nelson, 2023). A thorough analysis of barriers hindering retention in care among PWID on ART globally and in South Africa is essential for informing advocacy efforts. Future studies could bridge this gap (Nelson, 2023).

In this study, housing was a significant determinant of retention in care among PWID. This finding is supported by a systematic review from 16 countries that was conducted on homelessness and the risk of HIV and poor retention in care among PWID (Arum *et al.*, 2021) which revealed that PWID are more likely to be homeless. Furthermore, this systematic review revealed poor outcomes related to ART adherence and viral suppression (Arum *et al.*, 2021). Our results also relate to a cross-sectional survey on HIV-positive PWID and HIV-positive people who do not inject drugs in the US (Dasgupta *et al.*, 2021). The study revealed that HIV-positive PWID were more likely to be homeless (29.1% vs 8.1%) (Dasgupta *et al.*, 2021). Housing is a social determinant of health and well-being for all populations. Social development and healthcare systems need to strengthen housing service provision for homeless PWID in

the form of shelters and interventions to reunite PWID with their families. This will help improve retention in care in this key population.

In the next chapter, the objectives of this study will be revisited and the limitations to the study and recommendations will be discussed.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

The following research objectives have been addressed. The objectives of the study were:

- To describe the socio-demographic and clinical profile of PWID initiated on ART;
- To determine the rate of retention in care among PWID after six months on ART; and
- To identify risk factors for the retention in care among PWID on ART.

These objectives were addressed in the results chapter and further discussed in the discussing chapter in relation to the literature review.

6.2 CONCLUSION

It is clear that retention in care among people who inject drugs (PWID) on anti-retroviral therapy (ART) in the three South African districts (Ehlanzeni, Tshwane and eThekweni) is still below the 95% target. Notably, PWID are often left behind in effectively accessing Human Immunodeficiency Virus (HIV) services. This is evident in the retention rates observed in this study regarding the achievement of the UNAIDS'95-95-95 targets. This study has shown that participants enrolled in Opioid Substitution Therapy (OST) and living in stable housing were more likely to be retained in care.

Achieving HIV epidemic control necessitates addressing the factors driving new infections, including PWID female sex workers (FSW), men who have sex with men (MSM), and transgender individuals. While drug use is criminalised in South Africa, with harm-reduction strategies not mobilised in public health facilities, the universal implementation and strengthening of harm-reduction strategies for PWID is critical to ensure retention in HIV care.

PWID are particularly susceptible to HIV and can serve as a conduit for HIV transmission to the general population. Common practices such as needle sharing and other risky behaviours, including 'flash blood' (individuals who are unable to afford heroin inject the blood of a recently injected PWID), are prevalent.

If high-quality combination prevention programmes for PWID, including Needle and Syringe Programmes (NSP), OST and ART initiation and retention, are swiftly implemented on a public health scale, there is the potential to manage the ongoing epidemic. However, the success of this endeavour may depend significantly on service coverage for NSP, OST, and ART.

6.2 LIMITATIONS

This was a retrospective cohort study that involved the extraction of data from the Tier.net database. This restricted the scope for exploring additional variables such as social, behavioural, and economic factors that could also affect retention in care.

The major limitation was that some of the records on baseline CD4 count variable were missing. The analysis was therefore done on the available baseline CD4 count data (n=194). Furthermore, results about retention in care by gender must be interpreted with caution owing to a smaller number of female participants. This could have resulted in our findings being less discriminative in identifying factors influencing retention in care among male and female PWID. Moreover, conclusions were drawn based on the available data which may have affected the overall analysis of retention in care.

The strength of the study was the inclusion of all TB HIV Care PWID key population programme sites in the three districts where the organisation is the main PWID-focused programme. Therefore, the results provide a near-truth reflection of retention in care among PWID in these districts. Furthermore, these findings are generalisable to PWID initiated on ART outside the time period of this study and in different settings.

6.3 RECOMMENDATIONS

Over the past decade, there has been a notable increase in South Africa's supply of illicit drugs that are injected, specifically heroin and methamphetamine. Considering the growing rate of illicit and injected drugs, interventions focusing only on drug awareness strategies to prevent the use of drugs are not impactful on those who are already affected and dying from drug overdose, Hepatitis C and HIV-related complications.

Based on the findings of the current study, the researcher makes the following recommendations to improve retention in care among PWID:

- There is a need to explore the knowledge and practices of healthcare workers who work directly with PWID living with HIV.
- Harm-reduction services for PWID and People Who Use Drugs (PWUD) should be mobilised in public health facilities by creating and sustaining key population-friendly primary healthcare (PHC) services where PWID are located where they reside through mobile outreach, fast-tracked services in PHC facilities to prevent longer waiting times.
- There is a need for a large study aimed at exploring the barriers and facilitators to retention in care among PWID, such as sociodemographic and economic factors.
- There is a need for an interventional study aimed at improving retention in care among the PWID population in these three districts
- There is a need to evaluate the implementation of harm reduction strategies as outlined in the South African National Drug Master Plan (NDMP) which details access to OST, rehabilitation centres, and shelters for homeless recovering drug-users.

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Data extraction tool

Province:	Date of collection:
District:	Person collecting data:
UID:	
Socio-demographic information	
Age: Gender: <input type="checkbox"/> Male <input type="checkbox"/> Female Housing: <input type="checkbox"/> Stable <input type="checkbox"/> Unstable	
Clinical characteristics	
Baseline CD4 count: <input type="checkbox"/> <200 cell/mm ³ <input type="checkbox"/> 200-500 cell/mm ³ <input type="checkbox"/> >500 cell/mm ³ Duration on ART: <input type="checkbox"/> <6 months <input type="checkbox"/> 6-12 months <input type="checkbox"/> > 12 Currently enrolled in OST: <input type="checkbox"/> Yes <input type="checkbox"/> No	
Psychosocial data	
Treatment supporter: <input type="checkbox"/> Yes <input type="checkbox"/> No	

Directorate: DVC: Research and Innovation

Research and Postgraduate Support

Tel: +27 21 959 4111

Email: research-ethics@uwc.ac.za

20 October 2023

Mrs PC Mngomezulu

School of Public Health

Faculty of Community and Health Sciences

BMREC Reference Number: BM23/8/5

Project Title: Retention in care among HIV positive clients on antiretroviral Therapy who inject drugs in three South African Districts.

Approval Period: 19 October 2023 – 18 October 2024

I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the above-mentioned research project.

Any further amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit an annual progress report at least two months before expiry date. Failure to submit your annual progress report on time will result in the immediate lapse of your ethics approval and you will have to resubmit an entirely new ethics application.

For permission to conduct research using student and/or staff data or to distribute research

surveys/questionnaires please apply via: <https://sites.google.com/uwc.ac.za/permissionresearch/home>

The permission letter must then be submitted to BMREC for record keeping purposes.

The Committee must be informed of any serious adverse event and/or termination of the study.

Ms Patricia Josias

Coordinator: Research Ethics

University of the Western Cape NHREC Registration Number: BMREC-130416-050

University of the Western Cape, Robert Sobukwe Road, Bellville 7535, Republic of South Africa



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28 July 2023

Ms Phumzile Mngomezulu
Site Manager: People Who Inject Drugs Programme, Tshwane
TB HIV Care

Permission to Conduct Master's of Public Health (MPH) Research at TB HIV Care

Dear Ms Mngomezulu,

Thank you for your interest in conducting your MPH research at TB HIV Care.

This letter confirms permission to conduct the proposed research, entitled "Retention in care among HIV positive clients on Anti-retroviral therapy who inject drugs in three South African Districts".

Thank you for assuring TB HIV Care that you will adhere to all ethical considerations, and that you will share your findings with TB HIV Care and other relevant stakeholders.

We also request that TB HIV Care be acknowledged in any publications that result from your research.

I wish you all the best with this important and interesting work.

Sincerely, *

Dr Joel Steingo
Strategic Information and Business Development Director
TB HIV Care

DECLARATION

WordProof

DR CA ROBERTSON

MA (Critical Linguistics *cum laude*). DPhil (Curriculum Studies) (Stellenbosch)

LANGUAGE PRACTITIONER: WRITER, PROOFREADER, LANGUAGE AND ACADEMIC EDITOR

Research Associate: Stellenbosch University

Managing Editor: JOVACET¹

Accredited Member: Professional Editors' Guild (PEG)

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Date:

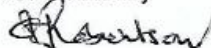
 Editing of Master's for Phumzile Cynthis Mngomezulu

I confirm that I have edited the following document submitted by P C Mngomezulu in partial fulfilment of the requirements for the degree of Masters in Public Health in the Faculty of Public Health at the University of the Western Cape, South Africa.

Research title	<i>Retention in care among HIV positive clients on anti-retroviral therapy who inject drugs in three South African districts</i>
Document type	Thesis
Editing services	Editing of chapters 1 – 6: correcting spelling and grammar mistakes; editing for consistency, style and flow; inclusion and accuracy of references, cross-referencing and citations.

The edited document was emailed to P C Mngomezulu on Tuesday, 4 June 2024 with all the changes marked up using MSWord's Review (Track Changes). Mrs Mngomezulu is responsible for accepting the editor's changes and finalising the references. She is also responsible for the quality and accuracy of the final submission. I am not accountable for any changes made to this document by the author or any other party subsequent to my edit.

Yours faithfully



C A ROBERTSON

¹ Journal of Vocational, Adult and Continuing Education and Training