HIV care continuum in prison: initiation, adherence and outcomes of antiretroviral therapy amongst prisoners in South Ethiopia

By

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ABSTRACT

Introduction: Incarcerated people bear a disproportionately high burden of HIV infection relative to general populations. However, they often have sub-optimal outcomes across the HIV care continuum (HCC) (i.e., timely initiation of antiretroviral therapy (ART), adherence and viral suppression) and little is known about the contributing factors to this particularly in low-and middle-income countries. The aim of this thesis was to identify and explore circumstances affecting the HCC in the South Ethiopian prison system relative to the local community-based settings and prison systems at an international level.

Methods: A mixed methods approach was employed involving both quantitative and qualitative methods. The quantitative arm encompassed meta-analysis of 17 eligible international studies and a prospective cohort study involving 76 incarcerated and 319 non-incarcerated people living with HIV (PLWH). The qualitative arm involved in-depth interviewing of 11 inmates living with HIV (ILWH) and 11 relevant service providers. Various univariate and multivariate regression models were used to analyse cohort data and a phenomenological approach to abstract meanings attributed to the lived experiences of in-depth interview participants.

Results: The meta-analysis identified a lower likelihood of ART initiation in ILWH who had a higher baseline CD4 count, lacked belief in ART and in those with more recent diagnosis. The odds of adherence were lower in ILWH who experienced depression, lacked self-efficacy to consistently use ART and in those who lacked social support. Male ILWH were significantly less likely to have viral suppression compared to female ILWH.

The prevalence of delay in ART initiation in prisoners (20%) was comparable to non-incarcerated people. However, a significantly low number of prisoners (19%) were able to initiate ART on the test date relative to their non-incarcerated counterparts (50%). Rural residence, being a daily labourer, failure to disclose HIV status and missing a pre-ART appointment were significantly associated with lower odds of ART initiation independent of imprisonment. Female gender, perceived social stigma and having HIV diagnosis due to ill-health independently predicted failure to commence ART on the test date in both incarcerated and non-incarcerated people. The qualitative study revealed four main themes as barriers to early ART initiation in prisoners: a lack of access to HIV testing, poor linkage to care due to insufficient health staff training, uncooperativeness of prison officers and loss of privacy regarding HIV status. Nonetheless, peer education and support, and an opportunity created by the prison environment to gain vicarious experiences, and to easily access HIV-infected

individuals appeared to facilitate early initiation of ART in prisoners.

While ILWH had a significantly higher pharmacy refill adherence compared to non-incarcerated PLWH (89% vs 75%), they had a slightly lower dose adherence (81% vs 83%). The prevalence of viral failure was also slightly higher (6%) in ILWH compared to non-incarcerated PLWH (4.4%). The overall dose non-adherence was significantly associated with missing ART appointments, level of satisfaction with ART services, patient ability to comply with a medication schedule and the types of methods used to monitor the schedule. In ILWH specifically, accessing ART services from a hospital compared to a health centre, inability to always attend clinic appointments, experience of depression and a lack of social support predicted non-adherence. Viral failure was significantly higher in males, people aged 31 to 35 years and in those who experienced social stigma, regardless of their incarceration status.

Several themes emerged in the qualitative study in relation to barriers of adherence amongst prisoners, some of which are essentially akin to those influencing ART initiation; limited access to ART services, insufficient health care provider support, uncooperative security system, loss of patient privacy, a lack of status disclosure due to social stigma, depression related to imprisonment and food supply insufficiency negatively influenced adherence. Themes that emerged as facilitators of adherence included: ILWH's self-efficacy to disclose their HIV status and cope with the negative influences of social stigma, the presence of peer support and a unique environment created by imprisonment for some ILWH to refrain from health damaging behaviours.

Conclusions: The prevalence of sub-optimal HCC outcomes in the South Ethiopian prison system is generally high, representing lower achievements with regard to reaching international targets. A multitude of interrelated factors including: structural, inter-institutional, institutional, interpersonal and intrapersonal circumstances influenced the HCC in this HIV key population requiring multilevel interventional approaches as suggested in this thesis.

DECLARATION

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed.....Terefe Fuge.....

Date.....14/12/2021.....

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PAPERS PUBLISHED OR SUBMITTED FOR PUBLICATION

Fuge TG, Tsourtos G, Miller ER. Systematic review and meta-analysis of initiation, adherence and outcomes of antiretroviral therapy among incarcerated people: a systematic review protocol. *PROSPERO*. 2019.

Fuge TG, Tsourtos G, Miller ER. A systematic review and meta-analysis on initiation, adherence and outcomes of antiretroviral therapy in incarcerated people. *PLOS ONE*. 2020;15(5):e0233355.

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INTRODUCTION

Human immune deficiency virus (HIV) infection remains a leading public health threat worldwide and presents a particular burden in sub-Saharan Africa (SSA). From more than thirty-seven million people currently living with the virus globally, over two-thirds reside in SSA. Ethiopia, in SSA, has the highest HIV burden with estimated 670, 000 people (actual number lying between 510,000 and 860,000) living with HIV (PLWH).[1, 2]

In recent years, there has been a steep decline in the number of new HIV infections and associated deaths in the general population worldwide, however key populations such as prisoners remain disproportionately affected by the epidemic, accounting for more than half of all new infections.[2] The global prevalence of the infection amongst prisoners is estimated to be 3.4%,[3] which is more than four times the prevalence in the general population (0.8%).[1] There is considerably higher HIV prevalence in the prisons of SSA, reaching up to 35% in some countries.[4] An HIV prevalence of greater than 4% has been documented in Ethiopian prisons,[5] which is more than four times higher than the prevalence in the general Ethiopian population, and one of the highest HIV prevalences in prison populations in SSA relative to the general population.[2]

Antiretroviral therapy (ART) has significantly reduced HIV-associated morbidities and mortality. ART is also believed to prevent HIV transmission by suppressing viral load in infected individuals.[6-8] However, these public health benefits are dependent on the extent to which PLWH are able to start treatment as early as possible and are motivated to adhere to medication instructions.[9] A number of factors may influence PLWH's utilisation of ART, but those related to structural circumstances play a pivotal role in resource-limited settings such as SSA. Population groups with limited access to community health care, such as prisoners, experience particular challenges in accessing and adhering to ART. The few available studies on this public health problem show that prisoners in such settings experience considerably sub-optimal outcomes of the HIV care continuum (HCC) including delayed ART initiation, poor adherence and associated clinical complications.[10-13] Although there have been significant improvements in terms of expansion of ART services in Ethiopia, population groups commonly referred to as Most at Risk Groups (MARPS) for HIV (including prisoners) remain with restricted access.[14] It has been unclear to what extent imprisonment affects each component of the HCC within the context of SSA prions. There is also a lack of clarity regarding the

underlying mechanisms as to how imprisonment affects the HCC. No published studies have previously investigated the issue of HIV care in Ethiopian prisons.

Given the high risk of HIV infection amongst incarcerated people and the potential transmission to others in the community after their release, the use of ART as an infection prevention strategy in the prison population is of a critical public health importance. In addition to high risk for infection during incarceration, prisoners often originate from population groups bearing a disproportionate HIV burden such as substance users, sex workers and men who have sex with men (MSM).[15-17] As access to HIV care for these groups is often challenging in the community, due to competing basic needs, unstable housing, mental health issues and social stigma,[18, 19] correctional facilities could create a favourable setting to implement such interventions. It has been shown that despite the difficulties of custodial environment, prisoners can respond well to ART at least at a comparable level to their community counterparts, in settings where interventions ensuring standard care have been implemented.[4, 20-22] Context specific factors, however might adversely influence the HCC in prison settings, including in SSA, thus calling for urgent investigation. This thesis identified structural, sociocultural and behavioural circumstances affecting HCC in the South Ethiopian prison system. The participants in this study included both the population at risk and other relevant stakeholders.

CHAPTER ONE
AN OVERVIEW OF HIV CARE CONTINUUM

Introduction

This chapter provides a brief overview of HIV infection and the impact of antiretroviral therapy on the overall infection process, including acquired immunodeficiency syndrome (AIDS)-related morbidities and mortality as well as community transmission. The basic components of the HIV care continuum and their utilisation within the context of sub-Saharan Africa is described in comparison with the 95-95-95 goal of the Joint United Nations Programme on HIV/AIDS (UNAIDS).

1.1 HIV infection

Since being first identified in 1981,[23] HIV has infected more than seventy-five million people globally and almost half of these infected people have died of AIDS-related conditions.[1] Almost one percent (0.8%) of adults aged 15 to 49 years worldwide have now been infected with the virus, with annual numbers of new infections and deaths being 1.6 and 0.67 million, respectively. Sub-Saharan African (SSA) countries account for the largest proportion of new global infections (61%), with almost twenty-six million people (3.9%) currently living with the virus.[1, 2] Southern SSA countries such as Swaziland, Lesotho, South Africa, Zimbabwe, Mozambique, Namibia and Zambia are hardest hit by the epidemic, all recording prevalences of more than 10%.[2]

Ethiopia is an SSA country that has faced a huge burden in relation to the HIV epidemic. As shown below in Figure 1.1-1, although there has been a significant decline in prevalence, incidence and AIDS-related deaths in the country over the last two decades, the absolute number of people of living with HIV (PLWH) remains substantial.[24] Estimated 670,000 people (actual number lying between 510,000 and 860,000) or 1% (0.7-1.2%) of the general Ethiopian population are currently living with the virus, of whom 15,000 (8100-26,000) were newly infected in 2019 with an annual incidence of 0.16 (0.08-0.27) per 100, 000 population.[2] Larger prevalences have been documented in men aged 40 to 49 years and women aged 40 to 44 years.[24]

In Ethiopia, HIV prevalence also varies across geographical areas with urban areas estimated to have almost seven times the prevalence of rural areas. Lower prevalence was documented in South Ethiopia (0.4%) relative to other regional states such as Gombella, the west coastal part of Ethiopia, which has been hit hard by the infection (4.8%).[24] However, epidemiological trends have shown shifts and expansions over the last decade toward the regions which were previously known to be least affected, including South Ethiopia.[25] Despite a steep decline between the years 2011 and 2016 at national level, particularly in urban areas, the prevalence remained steady in rural areas,[25] which forms the most part of South Ethiopia. Moreover, there is evidence that most incarcerated people in the regional state are from rural localities.[26]

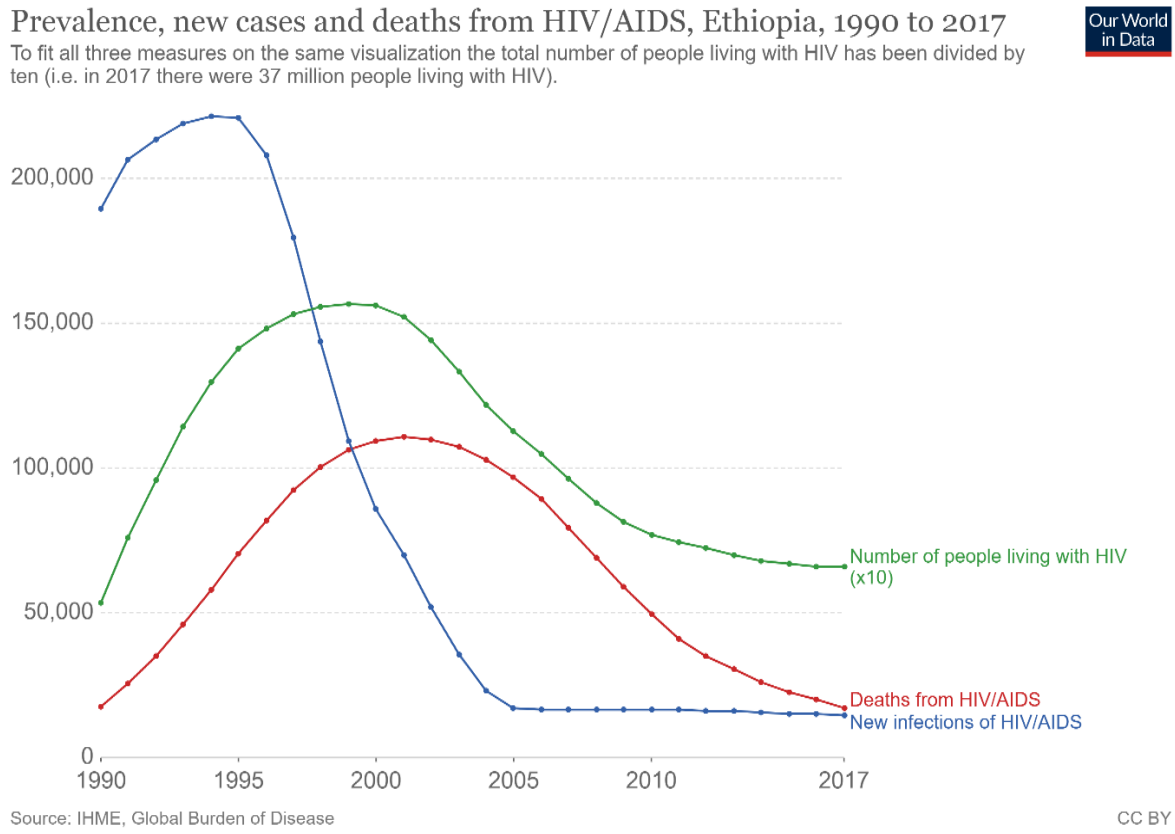


Figure 1.1-1: Number of people living with HIV, new infections and deaths from HIV/AIDS in Ethiopia (1990-2017) *(Source: Institute of Health Metrics and Evaluation (IHME), Global Burden of Disease (GBD), 2018, available at: ourworldindata.org/hiv-aids).*

1.2 The virus

HIV is a retrovirus, under the genus of *Lentivirus*, the infection of which can progress to AIDS, which is characterised by severe immune suppression and subsequent opportunistic infections.[27] There are two known human retroviruses, HIV-1 and HIV-2. While the former is epidemiologically predominant and responsible for the majority of global HIV pandemics, the latter is limited to West Africa.[28] HIV exists in many body fluids in infected individuals with varying infectious potential. Vaginal, cervical and rectal secretions, semen, blood and breast milk often contain an infectious dose. Accordingly, transmission is largely through sexual intercourse (both heterosexual and homosexual), infected blood transfusion, from mother to child (during pregnancy, birth or breast-feeding) and via contaminated sharp materials.[29]

HIV transmission patterns vary across geographical regions, with the heterosexual route being the predominant mode of transmission in SSA with women and young adults being at highest risk of infection.[2, 30, 31] There has been scarce information concerning homosexual transmission and via injecting drug use in SSA, however the available data indicate a high likelihood of infection in men who have sex with men (MSM)[32, 33] and in people who inject drugs (PWIDs).[2, 34, 35] Similar patterns exist in Ethiopia, with unprotected heterosexual intercourse, including having multiple sexual partners (often involving paid sex) combined with low awareness of the need to use condoms during sex being the main risk factors. Other common transmission modes in the country include vertical transmission from mother to child, and via sharing of infected sharp materials.[2, 24, 36] Higher transmission risk is noted in female sex workers, mobile workers, prisoners and sero-discordant couples in Ethiopia.[37]

The mode of HIV transmission also differs amongst prison populations across the world. While homosexual unprotected sex and injection drug use (IDU) are the most commonly reported modes in high-income countries,[2, 38, 39] prisoners in SSA are more often infected prior to incarceration due to unprotected heterosexual intercourse.[40, 41] Other transmission modes in SSA prisons include sharing of shaving, piercing and drug injection equipment, and unprotected sex with other male inmates.[41, 42] Despite occurrence of sexual violence and IDU in the prisons, most SSA countries prohibit condom provision and harm reduction strategies (such as clean needles and bleach provision) and this further increases the risk of infection in combination with relatively low prisoners' awareness about HIV prevention methods generally.[4, 41-43]

1.3 Prevention of HIV infection

Given that there is no single most effective population level strategy, a combination of behavioural and biomedical intervention approaches are usually employed for HIV prevention.[44] Promoting abstinence and having a single sexual partner showed potential for mitigating the risk of sexual transmission, however this approach has been found to be unsuccessful when not consolidated with other interventions.[45] Protective barriers, such as condoms, are widely practiced and effective where social, economic, and psychosocial barriers to their use are minimal.[46]

As well as allowing for diagnosis, HIV testing has a potential for infection prevention, on the assumption that infected individuals would be cautious about transmitting the infection to other people once they are aware of their sero-status and receive appropriate counselling.[47] However, despite tremendous efforts that have been made towards the expansion of voluntary counselling and testing (VCT) services,[48] the proportion of cases potentially remaining undiagnosed is thought to be substantial, particularly in resource-limited countries.[49]

Community-based needle and syringe programs (NSP) and opiate substitution therapies have been adopted in some countries to prevent transmission amongst PWIDs, but the various government policies amongst countries have represented a significant impediment to the implementation of such strategies globally.[50] There are also issues of feasibility for their implementation in resource-limited countries.[51] Pre-exposure prophylaxis (of antiviral medications) has also been used as a standard care but only in the case of persons identified as at high risk of exposure such as sex workers, MSM, PWIDs and transgender people.[52, 53] To date, early initiation of antiretroviral therapy (ART) for all HIV-infected individuals has been a promising approach to consolidate the existing methods of HIV prevention provided that high levels of detection, treatment adherence and viral suppression are maintained.[54]

1.4 ART as an HIV treatment and preventative measure

Since its advent, ART has significantly mitigated AIDS-related morbidities and mortality[8] by essentially translating HIV infection from an inevitably fatal condition to a manageable chronic disease. The life expectancy of infected individuals has substantially been elongated.[55] ART has also been shown to significantly reduce new infections by suppressing viral concertation in the infected individuals so that further transmission in the population can be halted.[54] Consequently, high coverage of ART in the community has been strongly associated with a decline in risk of HIV incidence[6, 7] in both heterosexual and homosexual populations.[56, 57]

To ensure the public health benefits, PLWH need to be diagnosed promptly, linked to and engaged in care, and initiated and adherent to effective ART. These sequential stages of medical care are collectively referred to as the HIV care continuum (HCC). Different approaches have been used to assess the success of HCC. The most traditional model involves four basic steps including diagnosis, linkage to and engagement in pre-ART care, initiation and adherence (viral suppression) to ART.[58] An alternative approach involves a longitudinal assessment of these stages adding loss to follow-up and death cases occurring during the course of ART.[59] This thesis is guided by the former model, as the vast majority of international guidelines and studies use the same approach. Figure 1.4-1 describes the relationship between each stage of the HCC and its importance for reducing HIV infection in the community.

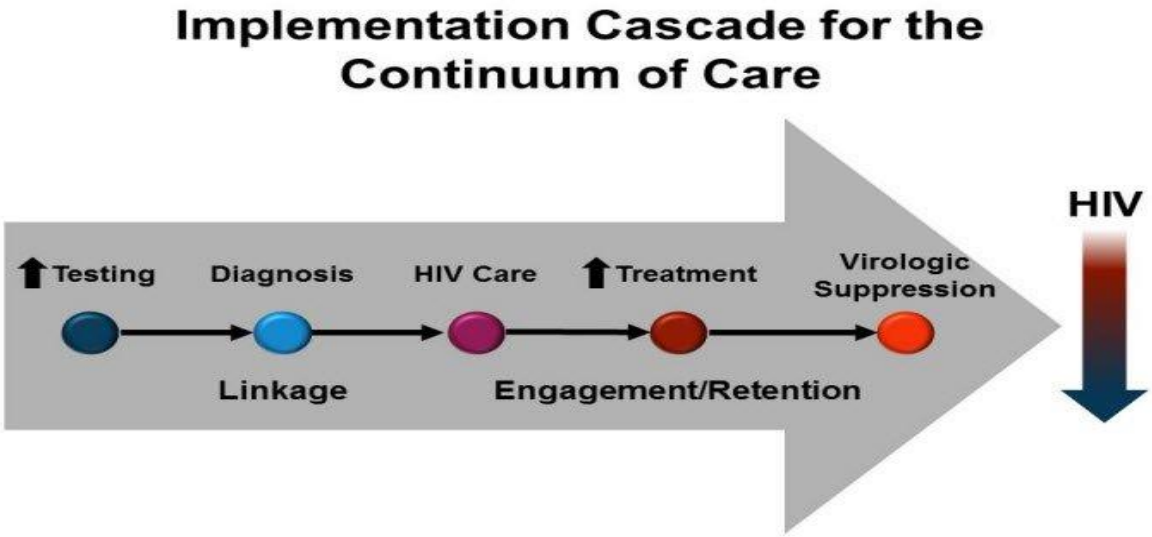


Figure 1.4-1: Stages of HIV care continuum *(Source: Prevention of HIV Acquisition: Behavioural, Biomedical, and Other Interventions, Medscape Education HIV/AIDS 2012).*

PLWH in sub-Saharan African countries have been marked by sub-optimal HCC outcomes which can adversely impact on the proposed benefits of ART. This can also affect the efforts to meet the 95-95-95 UNAIDS target of diagnosing 95% of infected people, treating 95% of the diagnosed people and attaining viral suppression in 95% of the treated individuals individuals,[60] which has been adopted to attain the ambitious goal of the World Health Organization (WHO); ending AIDS as a public health threat by 2030.[9, 61] Early case detection strongly predicts timely linkage to care and is an essential gateway to the entire HCC.[62] However, almost a quarter of HIV-infected people in SSA are thought to be unaware of their serological status.[2] The identified people are often initiated on ART when they have severely debilitated immunity (CD4 <200cells/mm^3) and are developing AIDS-related complications (i.e. when they reach the WHO clinical stages of III or IV).[63-65] Approximately 41% of detected individuals remain uninitiated on ART and more than half (51%) of initiated individuals are not virally suppressed.[2] Figure 1.4-2 depicts the HIV testing and treatment cascade outcomes in SSA in 2018. Attritions at each stage of the HCC also exacerbate potential drug resistances, leading to increased use of costly second line drugs.[66-68]

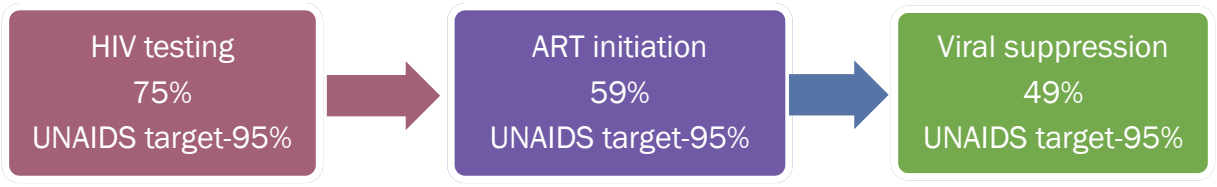


Figure 1.4-2: HIV care cascade outcomes in sub-Saharan Africa, 2018

Significant amendments have been made in ART enrolment criteria in Ethiopia since the introduction of the therapy in 2003 and the implementation of free medication in 2005.[69] In the earlier years, from 2005 to 2007, ART was only provided to the most in need people with CD4 count<200cells/mm^3 and/or with HIV progression at the WHO clinical stage III or IV, essentially due to shortage of drugs and trained health care providers.[70] The eligibility criteria were subsequently changed to the cut-off of CD4 count <350 cells/mm^3 in 2008, and then to <500 cells/mm^3 in 2011.[70] The improvements were attributed to decentralisation of the service out to primary health care facilities through a task shifting approach, a strategy involving training of nurses and community health agents, and endorsement of robust community engagement approaches.[71, 72]

In more recent years, the National Ministry of Health has adopted the new WHO approach to initiate all HIV-infected individuals on ART regardless of CD4 count and clinical stages (also known as 'Test and Treat' approach).[9, 70] The number of PLWH who are aware of their HIV status in Ethiopia has now reached 79%, and 65% of these access ART.[2] Although these figures are well over the SSA average (see Figure 1.4-2), they are way behind the UNAIDS 95-95-95 targets. There are no nationally representative data on viral suppression in the general Ethiopian population, but the proportion of virally suppressed individuals is also estimated to be below UNAIDS target.[73] It is assumed that population groups known to be at highest risk of HIV infection, such as prisoners and sex workers,[2, 5, 24] might account for the largest proportion of undiagnosed and untreated cases in the country.[14] In these population groups, no data are available on any of the HCC components.

1.5 HIV care continuum: overview conclusion

Most countries in SSA have been able to achieve significant reductions in new HIV infections and AIDS-related deaths over the last two decades. ART has played a substantial role in this progress by reducing HIV-associated morbidities and preventing community transmissions. Improvements have also been seen in the region in terms of identifying infected individuals, initiating infected individuals on treatment and achieving viral suppression in those who are on treatment. However, there is still a long way to go to achieve the 95-95-95 UNAIDS goals as the proportion of undiagnosed and untreated PLWH in the region is estimated to be high. At risk population groups, such as prisoners, are likely to contribute considerably to this gap. As prisoner populations account for the largest proportion of the epidemic in SSA and globally, they potentially represent an important reservoir for HIV infection and contribute to its persistence in the community. While there is a scarcity of information on the whole HCC in the prisons of SSA, the available data demonstrate high prevalences of sub-optimal HCC outcomes in incarcerated people, which may in turn account for a large part of the unachieved UNAIDS goal in the region.

CHAPTER TWO
THE HIV CARE CONTINUUM IN INCARCERATED PEOPLE

Introduction

Investigation of the comprehensive outcomes of HIV care continuum (HCC) in prison populations has been challenging to date relative to the general population.[22] Lack of a complete and comprehensive care package in most prison systems,[11, 12, 74, 75] and the only relatively recent endorsement of standard care in some settings,[20, 21, 76] has seemingly discouraged research on the whole HCC in prison populations. Determination of each outcome of the HCC requires a considerable amount of time. The highly mobile nature of prison populations, amongst institutions and between prison and outside community, greatly restricts opportunities to develop a clear picture of the HCC outcomes in prison settings. Moreover, prisoners have long been amongst the most neglected populations in terms of access to health care systems,[77-79] which is coupled with limited research and evaluation into remediating this significant public health problem.

This chapter describes trends in imprisonment at global and sub-continental (sub-Saharan Africa) levels and their impact on HCC. A brief account is provided on HIV prevalence in prison populations relative to general populations, and the provision of HIV care within correctional settings. The chapter also provides a detailed description of the South Ethiopian prison system, which encompasses the target population of this thesis.

2.1 Worldwide trends in incarceration rates

Incarceration rates have been rising rapidly in most countries in the world. Between 2000 and 2018, rates increased by 24% globally and by 40% in Africa. There are currently more than ten and a half million people living in prison worldwide.[80] Imprisonment rates vary considerably between continents and across countries within continents. The African continent accommodates more than one million prisoners, with a yearly average imprisonment rate of 97 per 100, 000 population, slightly less than the global rate of 145 per 100, 000 per year. The United States of America (USA) has the highest national prison population rate in the world (655 per 100,000 population per year), whereas Rwanda has the highest incarceration rate in Africa, despite the rate having significantly declined in recent years (464 per 100, 000

population).[80] In Ethiopia, there are currently 113,727 people in prison giving an annual imprisonment rate of 127 per 100,000 population, which is one of the highest rates in East Africa. The imprisonment rate increased by 30% in the country between 2000 and 2018.[81]

Factors influencing incarceration rates are often related to criminal law and policies, and socioeconomic disparities. Stringent criminal law in some countries have contributed substantially to the rise in incarceration rates.[82] For example, criminalisation of drug offenders in the USA following 'war on drug' policy has resulted in a dramatic increase in the nation's prison population.[83, 84] Additionally, prison entrants are often from deprived social groups in both high- and low- income countries. People who are poor, unemployed, under-educated, those from racial or ethnic minorities and/or who are involved in substance use constitute the majority of incarcerated populations globally.[15, 77, 84, 85] In the sub-Saharan African (SSA) context, socioeconomic circumstances are even more important drivers of incarceration, as there exist high levels of unemployment and economic inequalities in the community. Factors such as a rapid rise of urbanisation and widespread conflict have also been proposed as drivers of high rates of incarceration in the region.[86] Ethiopia is one SSA country that has experienced a series of political contests in recent years, which has resulted in a surge of prison population rates.[87]

2.2 Prison populations and HIV care

The majority of prison systems worldwide are characterised by insufficient health care financing that leads to inadequate facilities as well as lack of trained health care staff.[43, 77, 79, 88] Although incarceration limits a person's liberty, prisoners retain a human right to the highest possible standard health care that is at least equivalent to that in the non-incarcerated community in which the prison is located.[40, 77, 88, 89] Despite this principle, limited efforts have so far been made to adopt strategies to successfully implement effective prevention and treatment interventions for infectious diseases such as HIV in prison settings.[77, 78] Integration between community and prison healthcare systems is often regarded as poor, which potentially contributes to the sub-optimal health care utilisation in prison systems.[78, 88, 90]

The burden of HIV infection on prison populations varies greatly across WHO geographical regions, with an average prevalence ranging from 0.2% in Middle East and North Africa to 17% in eastern and southern Africa. The prevalence in other regions is estimated to be 14% in the USA, 2% in the Caribbean, western and central Africa and eastern and central Europe, and 1% in Asia and the Pacific and Latin America.[2] Most of these prevalences are higher compared to the prevalence in the respective general populations[2, 39] and the discrepancy differs across countries.[3, 39] Eastern and southern African countries have relatively high community HIV prevalence and also have higher prevalence in their prison populations. For example, prison prevalences of 35% were reported in Swaziland, 31% in Lesotho, 28% in Zimbabwe, 27% in Zambia, and 24% in Mozambique. Mauritius, Angola and Ethiopia are the three countries in the region with the highest prevalence of HIV in prison populations relative to the general population; thirteen times higher in Mauritius, eight times higher in Angola and four times higher in Ethiopia.[2, 5] Table 2.2-1 presents the national prevalence of HIV in prison and general populations in selected countries in eastern and southern Africa. Other prison studies in the region reported a prevalence of 23% in Zambia[91], 17% in South Africa[92] and 11% in Uganda.[42] An HIV prevalence of approximately 6% was reported amongst prisoners with suspected tuberculosis (TB) in Gondar, northern Ethiopia[93] and 3% in Jimma, southwest Ethiopia.[94]

Table 2.2-1: The prevalence of HIV in prison and general populations in eastern and southern African countries (2014-2018)

Country	HIV prevalence in the general population (%)	HIV prevalence in the prison population (%)
Angola	2.0	15.9
Eritrea	0.7	1.3
Swaziland	27.3	34.9
Ethiopia	1.0	4.2
Lesotho	23.6	31.4
Madagascar	0.3	0.3
Malawi	9.2	16.0
Mauritius	1.3	17.3
Mozambique	12.6	24.0
South Africa	20.4	8.9
Uganda	5.7	15.0
United Republic of Tanzania	4.6	6.7
Zambia	11.3	27.4
Zimbabwe	12.7	28.0

Source: UNAIDS HIV Data 2019; UNDOC final project report (2017): HIV and AIDS Prevention, Care, Treatment Support in Prison Settings, sub-Saharan Africa.

Although prisoners bear a particularly high burden of HIV infection and are considered one of the key priority populations by international guidelines,[54] only a few countries have implemented a comprehensive HIV prevention, treatment and care package in prison settings internationally and only rarely are their prison HIV care programmes linked to public health care programmes.[2, 54, 90] This package is also recommended for prisons in low-and middle-income countries,[90] however most countries in SSA lack comprehensive policies that support its implementation, with interventions such as antiretroviral therapy (ART) being rarely available.[4, 43] Although there is a dearth of evidence on each outcome of the HCC, the available data indicate that late diagnosis and initiation of ART, sub-optimal adherence and associated clinical consequences are common amongst prisoners in SSA.[10-13]

Despite the inherent health care challenges associated with the prison environment, structured implementation of HIV care in such settings is proven to be both successful and feasible.[95] It has been demonstrated that achieving optimal HCC outcomes amongst prisoners is possible, in both high- and low-income countries, when an acceptable standard care is made available. For example, Voluntary Counselling and Testing (VCT) has been shown to be acceptable to inmates in many prison settings in SSA and elsewhere when approached in a way that avoids social stigma.[20, 42, 91, 96] When integrated with VCT services and provided within a prison system, inmates are generally more likely to be linked to care and commence ART, in some cases even earlier than people in the general community.[20-22] Once initiated on ART and receive appropriate adherence support, people living with HIV (PLWH) can achieve optimal viral suppression during incarceration.[13, 20, 21, 97]

2.3 The South Ethiopian prison system

South Ethiopia – also administratively known as Southern Nations, Nationalities and People's Region (SNNPR) – has the third largest population of the nine regional states in Ethiopia, after Oromia and Amhara Regional States. There are seventeen zones (the third level of government structure after Federal and Regional Governments) and seven districts (locally called 'Special Woredas') in the SNNPR. The districts have equivalent administrative power to that of the zones but with smaller population sizes and landmasses.[98] Figure 2.3-1 shows the zones and districts in the SNNPR.

The SNNPR is home to 23 of 126 prisons present in Ethiopia.[99] The SNNPR prisons include one regional, sixteen zonal and six district level correctional facilities. The prisons serve people convicted of crimes in zonal or regional level courts as well as those transferred from temporary detention centres ('jails'). All the prisons serve both male and female prisoners in separate units. Each male unit holds an average of 150 inmates in a single 100m^2 area (holding capacity of ≥150%).[100] No specifications have been made for the correctional facilities regarding the level of security or holding capacity.

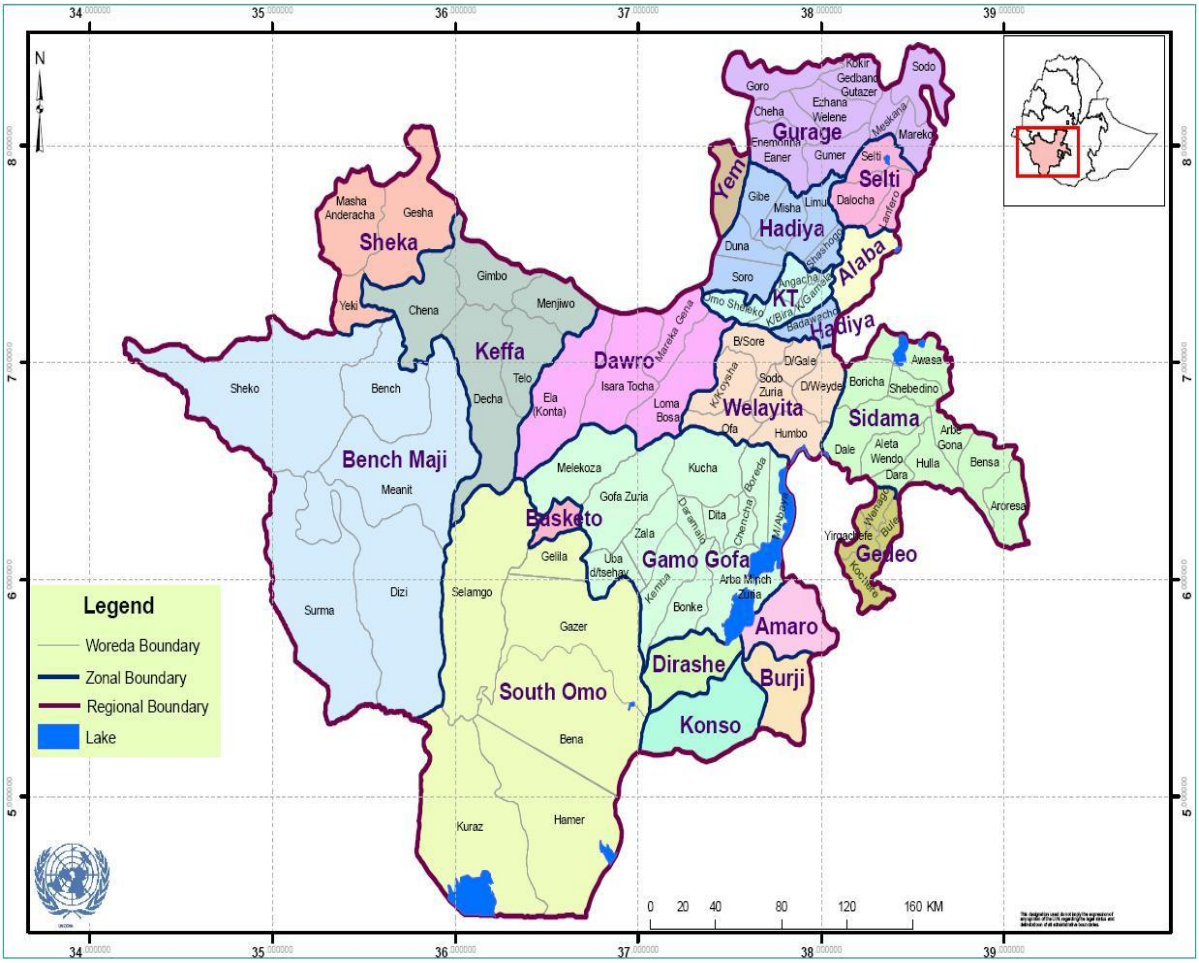


Figure 2.3-1: Zones and districts of SNNPR *(Source: ethiodemographyandhealth.org (accessed 19/05/2020)).*

According to SNNPR Prison Commission data,[101] the annual imprisonment rate in the regional state was 100.3 per 100,000 population in 2019. The rate increased to 104.1 per 100,000 population in 2020, with a total prison population of 24,628 – an approximate increase of 27% in the imprisoned population. Per 100,000 population, the imprisonment rate was 228.7 for males and 9.6 for females. Approximately 38% of the incarcerated people in the SNNPR were on rigorous imprisonment (more than ten years of sentence, including life sentences) and 15% were on remand.[101]

The stated aim of the SNNPR prison system is to enable inmates to understand the seriousness of crime and reform them to be productive and law-abiding citizens.[102] To this end, prisoners access various services including education and training programs. Each prison has a formal primary school (1-8th grade), and trainers from external educational agencies such as Technical and Vocational Education and Training (TVET) colleges provide skills development training in various aspects including woodwork, metal work, weaving etc. After having received the training, prisoners form entrepreneurial groups to undertake different business activities. While the prison administrations facilitate loans from local microfinances for the business groups, prisoners can run different private businesses such as entertainments (e.g., table tennis) with their own initiatives.[100]

2.3.1 Health care in the South Ethiopian prison system

The prisons all have health clinics, which are equipped with basic health care materials and health care staff including psychologists. The prison health care staff mostly consist of nurses, health officers and laboratory technicians. The health care staff provide basic care, including first level diagnostic and treatment services for acute and emergency cases, as well as illnesses commonly encountered in Ethiopia such as malaria and tuberculosis (TB). None of the clinics operate comprehensive ART services, however they occasionally offer HIV counselling and testing services and refer HIV-infected inmates to nearby ART facilities for treatment initiation.[103]

HIV diagnoses in the SNNPR prisons are primarily made on an opt-in basis (also known as 'risk-based approach'), which is provided on the inmates' request for testing. Occasionally, prisoners are diagnosed when they visit either the prison clinic or external health care facilities for non-HIV illnesses, through an approach referred to as 'opt-out', [alternatively called 'provider-initiated testing and counselling' (PITC)]. Local health agencies and non-governmental organisations (NGOs) rarely conduct voluntary counselling and testing (VCT) campaigns in the prisons. Prisoners who are already aware of their HIV-positive status prior to incarceration are usually linked to care when they report their status to the prison clinic. Once identified through either approach, HIV-infected inmates are linked to nearby ART sites.[103]

Most zonal and district hospitals as well as selected district health centres provide ART services in the SNNPR. ART service providers are trained health professionals who undertake counselling, care engagement and treatment monitoring activities. Following the national ART guidelines,[14] all PLWH (including prisoners) are enrolled in HIV care after being assessed for baseline information including HIV positivity recheck, CD4 count, comorbidities, treatment awareness and HIV transmission risk behaviours. PLWH who defer starting ART in the first offer are given subsequent weekly appointments until they are ready to accept the therapy. Once initiated, they make subsequent health facility visits for drug pick up and adherence support for as long as they remain on ART: every week in the first two visits, fortnightly in the third visit, monthly in the next three visits, two-monthly in the seventh visit and six-monthly thereafter.[14]

The current project encompassed approximately one quarter of the correctional facilities present in the SNNPR and respective public health care facilities offering ART services for the prisoners – namely, Durame, Sodo, Alaba, Hossana, Wolkite and Worabe prisons. As will be described in Chapter 5 (section 5.2), four of the prisons (Sodo, Hossana, Wolkite and Worabe prisons) were involved in the qualitative stage of the project. The prisons were chosen based on the number of inmates they house and sociocultural diversity amongst prisoners, in order to increase the generalisability of the findings beyond the included individuals. The prisons are located in the central part of Ethiopia (see Figure 2.3-1), residence to people originating from diverse areas of the region and the country, including rural areas. The six prisons had a daily average number of about 5,500 inmates, with an average daily entry of 15 persons in each prison.[101] Table 2.3-1 describes characteristics of adult prisoners in the selected prisons.

Table 2.3-1: Characteristics of prisoners in six selected prisons in the SNNPR, 09/03/2020

Prison	Location	Total (n)	Males n (%)	Females n (%)	Sentenced n (%)	Remand prisoners n (%)
Hosanna	Hadiya Zone-Hossana Town	840	785 (93.5)	55 (6.5)	661 (78.7)	179 (21.3)
Sodo	Welayita Zone-Sodo Town	1391	1320 (95.0)	71 (5.0)	1119 (80.4)	272 (19.6)
Durame	Kembata Tembaro Zone-Durame Town	540	519 (96.1)	21 (3.9)	502 (93.0)	38 (7.0)
Worabe	Silte Zone-Worabe Town	729	702 (96.3)	27 (3.7)	637 (87.4)	92 (12.6)
Wolkite	Gurage Zone-Wolkite Town	675	661 (97.9)	14 (2.1)	646 (95.7)	29 (4.3)
Alaba	Alaba Zone-Alaba Town	262	249 (95.0)	13 (5.0)	191 (72.9)	71 (27.1)

Source: SNNPR Prison Commission data, 2020.

CHAPTER THREE
LITERATURE REVIEW

Introduction

This chapter describes the available literature on HIV care continuum (HCC) in non-incarcerated populations in sub-Saharan Africa (SSA) and in incarcerated populations worldwide. The literature on HCC in the non-incarcerated populations was reviewed to identify potential structural and sociocultural factors in the outside community, which might also have implications for circumstances influencing the care continuum in the prison populations of SSA. An overview of the literature is presented first for non-incarcerated populations, while studies focusing on the HCC in incarcerated populations are discussed in more detail in a later section.

The literature review was made on studies that were obtained from systematic searches. The student researcher conducted the systematic searches to identify all relevant qualitative and quantitative studies that focused on factors affecting one or more of the following HCC components: linkage to care, antiretroviral therapy (ART) initiation, adherence and outcomes (viral suppression and immunologic progression). Two separate search strategies were used for incarcerated and non-incarcerated populations to identify studies from seven relevant databases including: Emcare, Medline, PubMed, Scopus, Web of science, Cinahl and Cochrane Library. The search strategy used the concepts 'HIV/AIDS', 'ART' and 'Incarceration' for incarcerated populations and 'HIV/AIDS', 'ART' and 'names of countries in SSA' for non-incarcerated populations. The search strategies were developed with the guidance of a qualified librarian. A full description of the search strategies along with terms used in each category is provided under Appendix 3.1. Some of the quantitative studies identified using the first search strategy also formed a meta-analysis of factors affecting the HCC in prison populations, which will be described in detail in Chapter 5 (section 5.1). For both searches, reference lists of the retrieved studies and published systematic reviews were manually searched to identify relevant studies that may have been missed and were included in the review when found to be eligible.

Studies were screened based on their relevance to the components of the HCC. Studies conducted in HIV-infected adults (those older than 19 years of age) and published since 2015 were reviewed for the general population. 2015 was the time when most countries in SSA began to implement the new 'Test and Treat' strategy recommended by international guidelines.[9] No such publication time restrictions were made for prison studies. The reviewed studies were those published in English language and indexed up to 01 April 2021.

The literature review is structured in six sections based on the stages of the HCC. The first section provides definitions for components of the care cascade. The second and the third sections respectively describe prevalences of poor care cascade outcomes and circumstances influencing the HCC in the general populations in SSA and in prison populations worldwide. The final three sections provide a summary and theoretical framework developed from the conclusions on the literature review and a description on significance and originality of the project.

3.1 Definitions of the components of HIV care continuum

3.1.1 Definitions of late linkage to care and delayed ART initiation

Various methods have been used in the literature to estimate late linkage to care and delayed ART initiation. In general, CD4 count and/or World Health Organization (WHO) clinical staging is used to determine late linkage to care on the patient's first clinic visit, and delayed ART initiation during treatment commencement. While WHO clinical stage III or IV is often used to define both sub-optimal care outcomes,[12, 74, 104-110] different CD4 count thresholds have been used as a result of variation in treatment eligibility criteria between countries, and continuous modifications that have been made over time.[65, 104, 108, 109, 111-113] For example, the lowest CD4 count threshold for late linkage to care and delayed ART initiation in the literature ranges from 100 cells/mm^3 to 500 cells/mm^3. Length of time since HIV testing (including 'same day treatment' i.e. initiation of treatment on the test date) is also used to estimate both outcomes,[20, 114-118] and length of time since linkage to care or treatment eligibility (based on guidelines available at a particular period of time) to estimate delated ART initiation.[20, 63, 72, 119-124]

3.1.2 Definitions of non-adherence and poor ART outcomes

Due to lack of consensus on a standard measure of adherence to ART,[125, 126] patient's adherence to dose and medication schedule is measured using various methods which have different detection capacities. Dose adherence refers to the extent to which a patient follows health care provider's instructions to take pills that are prescribed for a particular time whereas medication schedule adherence indicates how much a patient sticks to medication time.[127]

Measuring dose adherence is the preferred approach in the literature and is usually determined by patient self-report.[128-141] Other methods, such as home- or clinic-based pill count[132, 142-145] and medication possession ratio (MPR),[125, 133, 134, 146-149] are less frequently used. Each of these methods are discussed further in Chapter 4 (section 4.5.3.2). Most reviewed studies set a threshold for non-adherence at <95% as recommended by WHO.[127]

ART outcomes are estimated by measuring virological and immunologic failures following treatment initiation (details provided in Chapter 4, section 4.5.3.2).[150] Definitions of virological failure (VF) are inconsistent in the literature, although there are standard definitions provided by international guidelines. The difference is partly attributed to the viral load detection limits of the available technologies that are often used as a threshold for VF. WHO[150] defines VF as plasma viral load above 1000 copies/mL based on two consecutive viral load measurements within three months. However, the lowest viral load limit for VF or viral non-suppression in the literature varies from >40 copies/mL[76, 151, 152] to >1000 copies/mL.[66, 153, 154] Similarly, only a few studies[66, 151, 155, 156] defined immunologic failure (IF) as recommended by WHO[150] i.e. falling of CD4 count to or below the baseline or persistent CD4 levels below 100 cells/mm^3. Other studies described a change in CD4 count between two points in time (e.g., between the date of ART initiation and the last CD4 count measurement or between prison entry and exit).[13, 20, 97, 143, 157-160]

3.2 HIV care continuum in the general populations in SSA

3.2.1 Linkage to care and ART initiation

This sub-section describes a systematic narrative review of risk factors for late linkage to care and delay in ART initiation amongst adults in SSA. The review was conducted based on a protocol published in advance at the International Prospective Register of Systematic Reviews (PROSPERO; Number: CRD42021264398)[161] (see Appendix 3.2). Details of the review procedure and results of a quantitative synthesis are presented in a paper submitted to *BMC Systematic Reviews* for publication (see Appendix 3.3).

3.2.1.1 Prevalence of late linkage to care and delayed ART initiation

The review showed that although there are substantial disparities across nations and between settings within a nation, the prevalence of both sub-optimal care outcomes in SSA is generally high. For instance, a 78% prevalence of late linkage to care was reported in South Africa[64] and 67% and 23% in southwest Ethiopia[104] and Kenya,[113] respectively, with more conservative criteria were used to define the outcome in the latter cases (CD4 count <200 cells/mm^3 and ≤100 cells/mm^3 respectively compared to ≤500 cells/mm^3 in the former case). Only 24% of people living with HIV (PLWH) were linked to care within three months of diagnosis in Tanzania[124] and 46% within twelve months in South Africa,[114] although more recent studies reported greater rates of linkage to care.[162, 163]

Of scarce evidence available regarding 'same day' treatment, a prevalence ranging from 20% to 40% was reported in South Africa.[117, 118] While 72% of PLWH commenced treatment within one month of diagnosis in South Africa,[117] 52% initiated within three months in Rwanda.[115] Among studies that reported the rate of ART initiation after linkage to care, 50% of PLWH initiated within first month in South Africa,[164] and 66% and 81% within three months in Malawi[165] and in Tanzania[124] respectively although all PLWH who were linked to care might not be eligible for ART. In studies that determined the rate of ART initiation in eligible PLWH within one, two and three months of eligibility, the rate varied from 41% in Rwanda[119] to 48% in Ethiopia[72] within the first month, 75% both in Kenya[120] and South Africa[123] within the second month, and from 67% in South Africa[63] to 78% in Senegal[121] within the third month. In a study that reported delayed ART initiation (defining as CD4 count <150 cells/mm^3 or WHO Stage IV) in the Oromia region of Ethiopia, 31% of PLWH were found to be delayed initiators.[108]

3.2.1.2 Factors associated with late linkage to care and delayed ART initiation

Barriers to HIV care linkage and ART initiation in SSA have mostly been reported to be multifactorial. Health service delivery issues, sociocultural as well as personal factors appear to play a crucial role in patients' engagement to care. Although there has been a rapid expansion of ART services in most nations, distance to the ART site remains a challenge for PLWH in accessing care.[63, 113, 124, 166] PLWH usually tend to engage in care more when they are able to access it easily. For instance, individuals who are diagnosed at community or mobile HIV testing sites (non-ART sites) are less likely to engage in care and start treatment compared to those who are diagnosed at health care facilities because of challenges primarily related to accessing care.[113, 122, 124, 165, 167-169] A study by Plazy et al [63] demonstrated that male PLWH, who generally had lower care engagement rates compared to females (details given in the following paragraphs), were found to have higher rates of ART initiation when they resided within shorter distances from the nearest ART site. PLWH who have lower socioeconomic status are less likely to be engaged in care[63, 112] and more likely to be discontinued from care due to inability to meet transport costs to ART sites.[170]

Other health care delivery factors, such as insufficient numbers of trained HIV care providers as well as the nature of relationship between the available care providers and patients, affect ART initiation. Several studies in SSA reported disengagement from per-ART care[170-172] and delay in ART initiation[108, 115, 119, 120, 173] due to service provider-related problems such as long waiting times and poor treatment. Insufficient numbers of trained HIV care providers in SSA continues to be the main challenge as the number of PLWH eligible for treatment has substantially increased as the result of 'Test and Treat' strategy.[2] This leads to an inappropriate provision of care by the available HIV care providers, which in turn causes potential delays in ART initiation. Studies show that the more PLWH understand information provided by service providers and are satisfied with pre-ART care, the greater the likelihood of ART initiation.[108, 120, 174] In many settings, clinic operating hours are inflexible to patients' daily routines, such as work hours, making employed PLWH forego clinic visits and eventually interrupt care.[105, 106, 114, 166, 170]

Psychosocial characteristics play an important role in PLWH's engagement in care. PLWH who are capable of obtaining information, material and/or emotional support take less time to engage in care.[114, 175] The source of support also matters and those who receive support from close intimates such as family members (e.g., from a partner), or close relatives (particularly from a house member previously on ART) are more likely to be linked to care and decide to start treatment.[63, 106, 117, 164, 176-178] PLWH who are able to disclose their status to someone else and access emotional support can therefore reduce the effect of perceived social stigma (i.e. imagined fear of social discrimination) on ART initiation.[106, 109, 112, 114, 163, 168, 179]

The tendency to disclose one's HIV status can itself be influenced by the level of HIV-related stigma in society.[170] People may distinguish and label PLWH because of society's negative view of HIV infection, which is primarily related to fear of contagion and inaccurate perceptions that HIV is only acquired by socially stigmatised forms of behaviour, such as having sex with commercial sex workers, homosexual relationships, and sharing of needles with people who inject drugs (PWIDs).[180, 181] PLWH may then suffer social, economic and health care discrimination from people who have social power,[182] and may not have the ability to disclose their status in fear of such social ostracism.[181]

Mixed findings have been reported about the relationship between psychological distress and HIV care utilisation. Studies in South Africa[162] and Ethiopia[108] reported more delays in care linkage and treatment initiation in psychologically distressed PLWH compared to non-distressed PLWH, while other studies found no or even a protective effect.[183, 184] The prevalence of depression is generally higher amongst HIV-infected people, and newly diagnosed individuals are at greater risk[183, 185] often facing difficulty in seeking or accessing regular care.[185, 186] Depressed PLWH are also at particular risk for substance misuse, which can lead to late care engagement.[185, 187] However, stress due to HIV infection may sometimes induce self-motivation to seek care.[183, 184] This could be related to a greater worry about the consequences of the infection and risk of transmission to others, and perception that receiving treatment would minimise this risk.[184, 188]

Perceptions of HIV infection and ART affect engagement in care and initiation of treatment. PLWH at asymptomatic stages often hesitate to start ART due to the belief that they are not sick enough to warrant treatment,[167] as opposed to those who are tested because of illness.[108] Similarly, a number of studies found more delays in care linkage and ART initiation in PLWH having higher baseline CD4 count and lower WHO clinical stages (I/II) as they feel healthy or asymptomatic[63, 72, 114, 120, 122, 165, 189-192] with the exception of those who are unable to make clinic visits due to severe medical conditions associated with the advancement of the disease.[104, 178] Conversely, a desire for good health has a positive impact on care engagement[193, 194] as PLWH commence ART hoping that their general health would be improved as opportunistic diseases such as tuberculosis (TB) could be prevented,[195] which could ultimately minimise enacted stigma (i.e. previous experience of unfair treatment) due to HIV-related illnesses.[175]

HIV-infected people may become indifferent to accept positive test results requiring repeated diagnosis, which may affect linkage to care and ART initiation.[122, 176, 196, 197] This mostly occurs due to a doubt about their HIV-positive result.[196] While perception of normalising HIV infection in the presence of ART encourages care engagement and treatment initiation,[175, 179] fear of the lifelong endeavour that ART entails and its possible side-effects often encourages PLWH to prefer spiritual or traditional medicines,[171] where there is hope that traditional medicine can cure HIV in a short period of time.[166, 174]

Contradicting findings exist regarding the effect of HIV-related comorbidities on care engagement. While Bachmann et al [192] observed a significant decrease in time to ART initiation when there was a prior TB infection, Nash et al [108] and Larsen et al [123] found more delays in ART initiation amongst PLWH with a history of TB treatment. Other studies also linked the presence of TB co-infection with late linkage to care.[113, 197] In spite of HIV/TB treatment guidelines' recommendation to initiate ART after the commencement of TB treatment,[198] PLWH with TB infection may perceive an additional burden in terms of drug interactions, pill burden and drug side-effects, and therefore forgo initiation of ART.[199, 200]

There is a growing body of knowledge that gender and age are key sociodemographic characteristics affecting linkage to care and ART initiation. Most included studies investigating the relationship between gender and HIV care utilisation in SSA indicated higher rates of linkage to care and ART initiation (including same day treatment) in females than males.[62, 64, 108, 112-114, 117, 170, 176, 177, 190] Several studies reported an association between younger age (younger than 30 years) and late linkage to care and ART initiation.[62, 72, 106, 113, 114, 119, 122, 169, 170, 176, 177, 190, 197] Although sociocultural norms such as masculinity could play a role in hampering health seeking behaviour in males,[201] females are generally more likely to engage with healthcare systems possibly because of programs focusing on reproductive health.[108, 170] People in the younger age group, on the other hand, are less likely to be aware of their HIV status as they often harbour more recent infections.[202] However, older patients may also present to health care services with more advanced clinical stages because of age-related disease progressions.[64, 65, 118]

3.2.2 ART adherence and outcomes

3.2.2.1 Prevalence of non-adherence and poor ART outcomes

As will be discussed in the following sections, beyond specific circumstances, the prevalence of non-adherence to ART differs according to the types of methods used to measure adherence. For example, pill count and medication possession ratio (MPR) often yield a much higher prevalence than self-report.[125, 132, 142] Although this hinders making direct comparisons between settings, studies that used the same method found higher prevalence of non-adherence in SSA than other regions. A bi-regional cohort study[203] showed 52% more prevalence in SSA compared to the prevalence in Asia using patient self-report. A study which encompassed three East African countries (Tanzania, Uganda and Zambia)[147] reported a prevalence of 3% by self-report and 40% using MPR. At an individual country level, higher prevalence of non-adherence was reported in Kenya (44%), Zambia (33%) and Tanzania (29%)[134] using MPR. In Ethiopia, the prevalence ranges from 5% in northeast Ethiopia[128] to 32% in northwest Ethiopia[145] as determined by patient self-report. In other parts of the country, prevalences of 15% and 27% were reported in eastern Ethiopia[129] and western Ethiopia[144] respectively using patient self-report.

Countries in SSA bear more burden of viral failure (VF) than low- and middle-income countries in other regions of the world. In a systematic review of cohort studies in 35 low- and middle-income countries,[154] SSA countries were found to have 52% and 60% more VF at sixth and twelfth months of ART respectively than countries in Asia. A prospective cohort study including two East African countries (Uganda and Kenya)[204] reported VF in 23% of PLWH by six months and in 14% by twelve months since ART initiation. The highest prevalences of VF at an individual country level were reported in Kenya (43%),[153] South Africa (39%)[159] and Mozambique (24%).[66] There is limited information about the prevalence of VF in Ethiopia. One study in Addis Ababa[151] found VF in 10% of PLWH who received ART for at least six months.

Immunologic failure (IF) is also found to be an important clinical problem amongst PLWH in SSA who are on ART. For example, 16% of PLWH experienced IF in Mozambique[66] and 7% in Tanzania.[155] Almost one-third (31%) of PLWH had CD4 count lower than 200 cells/mm^3 after twelve months of ART in South Africa[159] and 15% had less than 50 cells/mm^3 after six months in Senegal.[205] Higher prevalence of IF was reported in Ethiopia compared to other countries in SSA. A prevalence of 20% was reported in southwest Ethiopia[156] and 12% in Addis Ababa.[151]

3.2.2.2 Factors associated with non-adherence and poor outcomes of ART

Most factors influencing ART adherence and outcomes in SSA are essentially related to the same circumstances that influence care linkage. The factors range from the inherent antiretroviral (ARV) side-effects to clinical, socio-structural and individual level behavioural patterns.

ARVs may cause various adverse-effects that could hamper PLWH's adherence to ART. The most commonly reported side-effects include: bloating, nausea, diarrhoea, fatigue, headache, dizziness, mood swings, insomnia and nightmares.[206-208] PLWH experiencing fewer ARV adverse reactions are generally better adherent to ART[132, 209] compared to those who frequently face difficulties in managing the side-effects.[210] Concomitant medications, particularly of those related to opportunistic infections, impose additional burden on ART adherence.[129, 209] The likelihood of adherence among PLWH who start ART at advanced stages of HIV is, therefore, significantly lower.[211]

Lower immunologic status and/or late stage of HIV infection at ART initiation significantly affects subsequent CD4 count and viral suppression. These clinical conditions are found to substantially elongate immune reconstitution time after the start of ART.[66, 155] When the disease has reached an advanced stage, the immune system may lack regeneration capacity due to prolonged damage.[212] Similarly, a number of studies[66, 151] have identified both lower baseline CD4 count and advanced stage of HIV infection as risk factors for virological failure (VF) later in the course of the treatment. This may indicate the importance of an intact immune system in the control of viral progression, which is often absent in immunocompromised individuals.[213]

As one might expect, reciprocal relationships exists between ART adherence, viral suppression and CD4 count. PLWH with higher viral load and lower CD4 count at ART initiation are more likely to be non-adherent[209, 214, 215] and the rate of change in CD4 count and in viral suppression prospectively increase when an average adherence increases.[143, 151, 216, 217] While maintenance of ART adherence is crucial for subsequently achieving viral suppression and immunologic progression,[218-220] potential increases in pill burden and associated drug interactions at an advanced stage of the infection (as mentioned above) may cause sub-optimal adherence.[129, 147, 203, 220] However, PLWH who have a high CD4 count and are in good health have been reported to be hesitant to strictly adhere to medication schedules, being overly satisfied with the health benefits that they perceive they have so far obtained from ART.[145]

Psychosocial characteristics, such as depression and social stigma, influence ART adherence and immunologic progression. Unlike its effect on ART initiation, where there have been inconsistent findings,[108, 183, 184] there is strong evidence that medically diagnosed depression significantly lowers PLWH's self-efficacy to adhere to medication instructions once treatment has been initiated.[135, 221] Although poor adherence itself can cause depression,[131] hopelessness, lack of motivation and cognitive impairment due to depression may limit the ability of PLWH to consistently take their prescribed medication.[129, 203]

Social stigma can also adversely influence PLWH's adherence to ART.[147, 210, 222] This could be the result of the real experience of social alienation and discrimination following an individual's HIV status disclosure or his/her imagined fear of negative reactions by society.[181] However, the effect of both depression and social stigma on ART adherence and immunologic progression can be minimised through disclosure of HIV status to a family member, friends, health care providers and community members, as it potentially creates a conducive environment for PLWH to obtain social support.[155, 220] Conversely, the lack of such support can greatly increase the risk of non-adherence.[142, 215]

Another potential barrier to ART adherence in SSA is the use of traditional or alternative medicine.[147, 210] One study in Ethiopia[128] reported using traditional medicine in addition to ART in more than half of PLWH, and those who used traditional medicine held fivefold higher likelihood of sub-optimal adherence compared to non-users. The reasons for the use of traditional medicine are typically akin to those for rejection of ART initiation,[171, 195] but here, PLWH use it to avoid ARV side-effects that they may have experienced and sometimes hoping to get spiritual relief.[128]

Socioeconomic circumstances appear to be important determinants of ART adherence and immunologic progression among PLWH in SSA. Circumstances such as unemployment, rural residence and associated low socioeconomic status are strong predictors of non-adherence[134, 220, 223] and immunologic failure (IF).[157, 224] PLWH with lower socioeconomic status are often challenged by issues pertaining to transport to a health care facility as distance to ART sites is one of the main barriers to accessing HIV care in SSA.[63, 166]

While PLWH who start ART with a good nutritional status,[143] and those who are able to adhere to food instructions during treatment, are generally more likely to be adherent to ART,[145] PLWH with low socioeconomic status frequently face food insufficiency, which leads to medication interruption.[133, 210, 222] Food insecurity may cause medication interruption through different mechanisms. PLWH tend to give up ART perceiving that it may not be effective or may cause harm in the absence of food.[225] They may also be forced to choose between meeting their families' food demands and paying for healthcare expenses, which results in missing their medication.[225, 226] However, being employed (as discussed) can also be a risk factor for poor adherence as working PLWH could be preoccupied with other routines which results in missing

medication and clinic appointments unless clinic operating hours are well tailored to their working commitments.[133, 166, 170, 211]

Sociodemographic characteristics, such as age and gender, are also associated with non-adherence and poor ART outcomes. Although both PLWH in older age (older than 50 years) and younger age (below 35 years) groups are at higher risk for non-adherence,[129, 134, 145, 203, 209] the latter group are at additional risk for VF as well.[151, 160, 204, 227, 228] While people in the younger age groups are more likely to engage in substance misuse and report experiencing more intense social stigma,[202] older people may have cognitive impairments that could lead to missing medication schedules and clinic visits,[136] in addition to having significant declines in CD4 count and sub-optimal immune reconstitution during the course of ART.[157, 205, 224] Moreover, the high prevalence of delayed ART initiation in both age groups may also contribute to poor adherence and VF (see section 3.2.2.1).[64, 65, 114, 176] Females have better adherence to ART and immunologic progression compared to males.[145, 203, 209] Again, this could be related to relatively more rapid care engagement and ART initiation in females relative to males.[64, 114, 176]

3.3 The HIV care continuum in incarcerated populations

This section presents a systematic narrative review of global studies on factors influencing the HIV care continuum (HCC) in incarcerated people, which also formed the basis of a paper published in *PLOS ONE*[229] (see Appendix 3.4). Details of the review procedure will be described in Chapter 4 (section 4.4) and results of a quantitative synthesis presented in Chapter 5 (section 5.1).

3.3.1 Linkage to care and ART initiation

The pattern of care linkage and ART initiation in prison populations largely follows the presence of standard HIV care in the prison systems. Inmates living with HIV (ILWH) are generally able to engage in care when it is available within a prison system and easily accessible to them. Therefore, determinants of care engagement and ART initiation amongst ILWH vary across geographical regions and appear to be more related to issues of availability of care in low-and middle-income countries and context-specific structural, psychosocial and behavioural characteristics, globally.

Studies show that ensuring standard HIV care within prison offers an opportunity for early detection and treatment of HIV infection in people who might not have otherwise accessed the service. An HIV opt-out screening and care continuum evaluation study in the USA[20] reported that almost all (99%) of 135 HIV-infected inmates who were tested in eight prison reception centres engaged in care within three months of diagnosis, with a majority of these (91%) starting ART. A systematic review of prison HIV care studies in the USA and Canada[22] identified more linkage to care (76%) and ART acceptance (65%) during incarceration than before (72% and 54% respectively) and after incarceration (36% and 37% respectively). Other studies in the USA and elsewhere also reported higher percentages of prisoners ever taking ART after prison entry but a decrease in care engagement after release.[137, 230, 231]

There is significant variation in care linkage and ART initiation between prisons in settings where there is a relatively good standard HIV care. A national study in the USA[116] reported lower rates of linkage to care relative to those reported above; approximately 68% of ILWH were linked to care within any time frame after testing and 40% within 90 days. Again in the USA, two other studies[232, 233] reported lower prevalences of ART initiation in jail inmates (58% and 46%, respectively). One study in Spain,[234] where ILWH were accessing HIV care from a

separate unit at a public health care facility, reported one third the utilisation of ART by incarcerated people compared to their non-incarcerated counterparts. However, these studies did not identify an individual level difference in HIV care utilisation or circumstances that contributed to optimal or sub-optimal utilisation beyond issues related to access to care.

There is limited information about the outcomes of the HCC in the prisons of low- and middle-income countries. The available evidence indicates a lack of standard HIV care as the main risk factor for late linkage to care and delayed ART initiation amongst ILWH. For instance, Wilson et al [110] described the experience of providing HIV prevention and treatment services (supported by Medicine Sans Frontieres (MSF)) in two Thai prisons. Of 165 ILWH engaged in the pilot intervention program, almost three-quarters (74%) were in an advanced stage of the disease (at WHO clinical stage III and IV), which is defined as late linkage to care. The authors described a complete absence of HIV care and lack of trained health care providers in the prison system until the program was launched. ILWH receiving ART through the program gained comparable immunologic progressions to community groups, suggestive of positive ART outcomes in prison populations when standard care is provided, despite the fact that the comparison was not based on statistical confirmation.

A qualitative study in India[75] in formerly incarcerated male PWIDs and other key informants reported a total absence of HIV care practice in the prison system. ILWH were often reported to have a delayed ART initiation at external health care facilities or when provided by local non-governmental organisations (NGOs). Similarly, two descriptive cross-sectional studies, one in Malaysia[74] and the other in Brazil[96] showed low HIV care utilisation amongst ILWH due to inaccessibility of ART services resulting from limited resource allocations for prison HIV care compared to the one in the outside community. In the Malaysian study, of 221 male ILWH (most of them being PWIDs), only 17% had access to ART. Out of 164 ART eligible ILWH, according to the national guidelines at the time, less than half received ART and about a quarter developed acquired immunodeficiency syndrome (AIDS). In Brazil, fewer than half of 34 ILWH started ART within six months of diagnosis, which compares poorly to the 91% achieved in three months in California, USA.[20]

There is a dearth of data regarding HIV care practice in the prisons of SSA. A national HIV survey in Malawi[12] indicated that ILWH accounted for 0.1% of all PLWH receiving ART in the country. The survey did not provide sufficient information about whether this proportion indicates optimal utilisation of HIV care amongst ILWH, it seems to be a very low proportion, given that more than a million Malawians (of less than 14 million total population at the time) were HIV-infected and more than a 250, 000 people pass through the nation's prisons each year.[235, 236] Moreover, the survey reported that the majority (93%) of ILWH in the country were initiated on ART at the WHO defined stage III or IV due to a limited access to HIV care.

Studies in Zambia[11] and South Africa[237] also highlighted minimal allocation of healthcare resources for the prison systems compared to that available in the outside communities, which has led ILWH to late care engagement and treatment initiation. The latter study reported linkage to care only in less than half (48%) of ILWH within twelve months of diagnosis and lower rate of ART initiation (46%) in those who were eligible for treatment. In contrast, a multisite intervention study in these same countries[238] identified high levels (86%) of ART acceptance amongst PLWH after they were offered same day treatment, further supporting the importance of correctional facilities to implement effective ART programs. Table 3.3-1 summarises the literature findings regarding the prevalence of late linkage to HIV care and delayed ART initiation in prison populations at an international level.

In addition to issues related to availability of care, some context specific circumstances have been identified to affect care linkage and ART initiation amongst prisoners. High security levels in the prison environment means that inmates' HIV care utilisation is predominantly dependent on institutional structures, particularly in settings where ILWH are obliged to obtain the service from external health care facilities. However, ILWH often face discriminatory treatment by prison officers and health care providers and, in some settings, protracted structural processes and denial of health care facility visits.[11, 74, 75, 239-241] While ILWH who are satisfied with a prison healthcare system and have trust in health care providers are more likely to accept ART,[137, 138, 231] potential loss of privacy during navigation of the system and use of medication render them hesitant to start treatment.[239] ILWH are often released back to the community without being initiated on ART because of lack of discharge planning, particularly in the case of jail inmates,[232, 233] as such settings hold people who are pre-trial or serving short-term sentences, often for less than one year, compared to prisons or long-term correctional facilities.[232]

Self-perception of HIV status as well as of the health benefits of ART influences treatment initiation amongst ILWH. Those who perceive HIV-related social stigma are less likely to start ART.[242] Social stigma in correctional facilities is multidimensional, whereby ILWH may encounter being stigmatised during interactions with correctional staff and prison inmates. In a qualitative study in Chicago, USA,[239] recently released male PLWH reported an experience of fear of stigmatisation from prison officers and other fellow inmates affecting their motivation to start ART during their stay in prison. ILWH who perceive that ART is inefficient, unsafe, and potentially causes adverse-effects and stigmatisation are less likely to use ART.[137, 138, 242, 243] These perceptions are also known to adversely influence treatment initiation in the general population in SSA[175, 195] (see section 3.2.1.2), although there is sparse evidence for their role in the prison populations.

Time to care linkage is significantly longer in ILWH who are newly diagnosed during prison entry compared to those previously aware of their status.[20, 233] There is also a higher probability of accepting ART amongst ILWH with lower baseline CD4 count[137, 232, 233] (see Table 3.3-1). This could be related to ILWH's adoption of perceived need for medical treatment through evaluation of disease stage[231], which is consistent with the concept that asymptomatic stages of the infection and associated higher baseline CD4 count impact on ART initiation in the general population[72, 114, 165, 167, 171] as discussed in (section 3.2.1.2).

Table 3.3-1: Studies investigating the prevalence and factors associated with late linkage to HIV care and delayed ART initiation in prison populations

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
Seth et al [116]	2015	USA	841 newly HIV diagnosed prisoners	Cross-sectional	-Rate of linkage to HIV care -Linkage to care defined as attendance at first medical appointment after diagnosis.	67.5% linked within any time frame after testing; 37.9% linked within 90 days; 72.3% in older people (≥50years) at any time; 43.8% in younger people (18-29 years) within 90 days of diagnosis.	No statistically significant associations were observed.
**Lucas et al [20]	2016	USA	135 HIV-infected prisoners	Cross-sectional	-Rate of linkage to HIV care and ART initiation -Linkage to care defined as receiving a CD4 or viral load test within 90 days of HIV diagnosis.	-99% linkage to care and 91% ART initiation within 90 days of diagnosis. -Initiation of ART at CD4 count ≥500cells/mm^3: 90% in previously diagnosed; 50% in newly diagnosed.	Longer duration of time (median 28 days) to linkage to care in newly diagnosed cases compared to previously diagnosed cases (median 0 days) ($P<0.0001$). * opt-out screening and care approach at prison entry achieved higher rates of linkage to care during incarceration but higher rates of care interruption after release.

Table 3.3-1 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
Mostashari et al [137]	1998	USA	102 ART eligible women prisoners	Cross-sectional	Prevalence of ART acceptance	ART acceptance in 75% overall.	Acceptance of first offer of ART associated with completed education lower than high school (AOR: 3.5, 95%CI: 1.2-10.7) and belief in medication safety (AOR: 4.3, 95%CI: 1.3-13.7). -Current acceptance of ART associated with trust in medication efficacy (AOR: 3.2, 95%CI: 1.2-8.6) and safety (AOR: 4.3, 95%CI: 1.4-12.9).
**White et al [232]	2001	USA	77 HIV-infected jail inmates	Cross-sectional	Prevalence of ART initiation	ART initiation in 58% overall; 57% in males; 71% in females; 73% in patients with CD4 count ≤500cells/mm^3; 33% in those with CD4 count ≥500cells/mm^3.	Lower baseline CD4 count (<500cells/mm^3) associated with higher prevalence of ART initiation (P<0.017).
**Altice et al [138]	2001	USA	205 HIV-infected prisoners eligible for ART	Cross-sectional	Current ART acceptance defined as being prescribed ART at the time of the interview.	ART acceptance in 80% overall.	Mistrust of medication (AOR: 0.3, P<0.001) and trust in physician (AOR: 1.08, P<0.0001) were associated with ART acceptance.

Table 3.3-1 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
Perez-Molina et al [234]	2002	Spain	804 non-incarcerated and 104 incarcerated HIV-infected individuals	Cross-sectional	Comparison of ART utilization between incarcerated and non-incarcerated people	No descriptive results reported.	Incarcerated people utilized ART three times fewer than non-incarcerated people (AOR: 2.95, 95% CI: 1.5-6.0).
Makombe et al [12]	2007	Malawi	103 HIV-infected prisoners	Retrospective cohort (2004-2006)	-Prevalence of delayed ART initiation -Late ART initiation defined as WHO stage III or IV.	Delayed ART initiation in 93% overall.	No statistical analyses were performed. *Low access to HIV care (challenge: accessing HIV care from outside prison system).
**Jaffer et al [233]	2012	USA	224 newly identified and 593 known HIV-infected jail detainees	Cross-sectional	Prevalence of ART initiation	17% in newly identified; 76% in know HIV patients within 14 days of jail entry.	Reasons for not starting ART; short stay (49%) and high CD4 count (39%) in newly identified people; short stay (38%) and being treatment naïve (17%) in known HIV-positive people.
Monarca et al [243]	2015	Italy	338 HIV-infected prisoners	Cross-sectional	Prevalence of ART use	81.4% of the prisoners were on ART.	Refusal (69.2%), ongoing medication assessment (23.1%), fear of medication side-effects, lack of privacy, religious/ethnic beliefs (7.7%) were reported as reasons for not initiating ART.

Table 3.3-1 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
Sgarbi et al [96]	2015	Brazil	34 HIV-infected prisoners	Cross-sectional	Rate of ART initiation	47% of the prisoners started ART within 6-months of diagnosis.	No statistical analyses were performed.
Bick et al [74]	2016	Malaysia	221 HIV-infected male prisoners	Cross-sectional	Prevalence of ART initiation	34.4% of ART eligible and 22.8% with advanced AIDS not started ART.	No statistical analysis were performed. *Insufficient resource allocation for HIV treatment and care.
**Culbert et al [242]	2016	Indonesia	102 HIV-infected prisoners	Mixed method	Prevalence of ART initiation	A quarter of ART eligible prisoners didn't start ART.	-ART utilization associated with higher score of attitude towards ART efficacy and safety (AOR: 1.90, 95 % CI: 1.03–1.16). * Inmates who endorsed the attitude that ART is inefficient, unsafe, and causes adverse-effects and stigma were less likely to use the treatment.
Iroh et al [22]	2015	USA and Canada	15 studies on HIV care cascade	A systematic review	Prevalence of HIV care linkage and ART initiation during prison entry, incarceration and after incarceration	72% and 54% during prison entry, 76% and 65% during incarceration and 36% and 37% after incarceration respectively.	No statistical analyses were performed.
Wilson et al [110]	2007	Thailand	165 HIV-infected prisoners	Intervention study	-Prevalence of delayed ART initiation	Delayed ART initiation in 74% overall.	No statistical analyses were performed.

Table 3.3-1 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
					-Delayed ART initiation defined as WHO stage III or IV.		
Stevenson et al [237]	2020	South Africa	3184 HIV-infected prisoners	Cross-sectional	Rates of linkage to care and ART initiation within twelve months of diagnosis	Linkage to care 48.3% in overall; ART initiation 45.5% in those who were eligible for ART.	No statistical analyses were performed.
Herce et al [238]	2020	South Africa and Zambia	975 HIV-infected prisoners	Cross-sectional	Rate of ART inition	ART initiation 86% in overall within 18 months of diagnosis including same day ART.	No statistical analyses were performed.
Culbert et al [231]	2019	Indonesia	150 HIV-infected prisoners	Cross-sectional	ART utilisation defined as any consumption of ART within the previous 30 days.	ART utilisation in 73.3% overall.	Satisfaction with health services (AOR: 3.2, 95%CI: 1.7–6.2) and perceived need for medical treatment (AOR: 1.6, 95%CI: 1.1–2.5) were positively associated with ART utilisation.

AIDS: Acquired immunodeficiency syndrome; AOR: Adjusted odds ratio; ART: Antiretroviral therapy; CI: Confidence interval; USA: United States of America; WHO: World Health Organization

**Studies included in the meta-analysis

3.3.2 ART adherence and outcomes

Imprisonment creates a conducive environment to achieve optimum HIV treatment outcomes in PLWH when standard care is implemented. Significant changes in viral suppression and immunologic progression can be obtained after PLWH enter a prison system where there is optimum HIV care. In California USA, Lucas et al [20] retrospectively identified a higher rate of viral suppression (88%) and a significant increase in CD4 count (median increase, 160 cells/mm^3) within 10-months of ART initiation after prison entry. The positive ART outcomes in the study were partly attributed to an opt-out HIV screening program implemented at prison entry, which resulted in timely linkage to care and ART initiation, as delayed ART initiation is an important precursor to prospective virological (VF) and immunologic (IF) failures during the course of the treatment).[157, 160, 204, 224]

In a retrospective study in Connecticut, USA, Meyer et al [97] demonstrated a significant increase in viral suppression (from 30% to 70%) and mean lymphocyte count (mean increase, 98 cells/mm^3) between prison entry and release. Again in Connecticut, the same authors[244] found similar results using a larger sample size that the rate of viral suppression and mean CD4 count increased from 33% and 344.5 cells/mm^3 at prison entry to 71% and 449.5 cells/mm^3 at release, respectively. These results support earlier findings by Springer et al [245] in the same county that showed mean change in CD4 count and viral load of 74 cells/mm^3 and -0.93log$_{10}$ copies/mL respectively during incarceration. The authors attributed the good ART outcomes to organised care delivery systems present in correctional facilities, in which ILWH with adherence problems would have received prompt support and completed a minimum recommended follow-up examinations.

Other prison HIV care studies also showed relatively good rates of viral suppression and immunologic progression amongst PLWH during incarceration. A national survey in Italy[243] reported that almost three-quarters (74%) of 275 ILWH on ART achieved undetectable viral load with the majority (91%) having a CD4 count of greater than 200 cells/mm^3. Despite provision of HIV care at an external health care facility, ILWH attained better ART outcomes in a South African prison.[13] Among 148 ILWH receiving ART, almost three-quarters (73%) had undetectable viral load, and median CD4 count increased from 122 cells/mm^3 during ART initiation to 356 cells/mm^3 after 96 weeks of treatment, which was found to be comparable to the general population.

Much better rates of viral suppression were reported from prison settings in SSA, where HIV care was provided on-site. In another South African study, Telisinghe et al [21] identified 93% viral suppression in ART naïve prisoners at the twelfth month and 72% in ART prisoners at the sixth month after ART was provided on-site. A study that encompassed South African and Zambian correctional facilities[238] reported viral suppression in 97% of ILWH after ART was provided on-site. Similarly, a level of 95% viral suppression was reported in Malawi,[76] where ILWH received HIV care from a well-established prison HIV clinic. Nonetheless, it is noteworthy that the above mentioned studies used different viral load detection limits to define viral suppression (ranging from <40 copies/mL to <1000 copies/mL) so direct comparisons are difficult. Furthermore, only a few analysed the outcomes with respect to social and individual level factors, which will be seen in the following paragraphs.

The context surrounding processes of imprisonment substantially affect ART adherence and outcomes. Although a history of previous incarceration was negatively associated with ART adherence, viral suppression and immunologic progression,[148, 246-251] PLWH staying longer in prison attained significantly higher rates of each HCC outcome.[97, 149, 244, 246] A systematic review by Iroh et al [22] demonstrated subsequent variation in rates of adherence and viral suppression before, during and after incarceration. Accordingly, average adherence and viral suppression increased from 34% and 27% at entry to prisons to 58% and 51% during incarceration, and then declined to 40% and 26% after release, respectively.

The importance of the process of imprisonment in the HCC can be explained further by the effect of recidivism on ART adherence and outcomes. Several studies showed differences in ART adherence and outcomes between PLWH with and without experiences of recidivism. Analyses of longitudinal data on HIV-infected PWIDs in Canada, by Milloy et al [148] demonstrated a significant increase in the odds of non-adherence to ART as the number of incarceration episodes increases. PLWH who had experienced more than five incarceration episodes had a threefold higher risk of poor adherence compared to those without a history of incarceration. Lim et al [252] similarly explained how frequent jail incarcerations influenced viral suppression in PLWH in New York City. Compared to PLWH with no episodes of jail incarceration, those with frequent incarcerations had a lower prevalence of viral suppression (41% vs 26%). Prior USA studies[245, 253, 254] also showed significant increases in viral suppression and immunologic progression during incarceration but decreases in both ART outcomes in re-incarcerated PLWH. These retrospective studies did not explore the reasons for the observed

differences in ART adherence and outcomes in incarcerated and non-incarcerated PLWH, and between incarcerated and re-incarcerated PLWH. However, the authors suggested that lower ART outcomes in PLWH with a history of incarceration and recidivism might not only be due to their stay in prison, but may also be contributed to by poor linkage to community care after release.

Notwithstanding the opportunity that incarceration may offer to attain optimal outcomes of HCC, the prevalence of poor adherence and viral non-suppression during incarceration remains high in many countries. For example, a pooled non-adherence prevalence of 45% was reported amongst ILWH in a systematic review and meta-analysis of studies in eleven different countries.[255] A prevalence ranging from 55% to 58% was reported in Spain[139, 140] and from 11% to 38% in the USA[137, 149] during incarceration. In Greece, 56% of ILWH were found to be non-adherent to ART.[141] Table 3.3-2 presents the prevalence of non-adherence in prisoners in different countries. Of note, except a recent study by Culbert et al [231] in Indonesia, which reported a very high prevalence of non-adherence (75%), no other studies analysed the prevalence in prison populations in low- and middle-income countries including SSA.

Table 3.3-1: Studies investigating the prevalence and factors associated with non-adherence to ART in prison populations
Table 3.3-2 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
*Mostashari et al [137]	1998	USA	102 HIV-infected female prisoners	Cross-sectional	Adherence defined as taking medication for ≥6 days/week, and not missing any doses per day.	Non-adherence in 38% overall.	Satisfaction with patient-physician relationship (OR: 3.0, 95%CI: 1.1-8.5) and seeking emotional supports from others (OR: 3.1, 95%CI: 1.1-9.4) were associated with adherence.
***Altice et al [138]	2001	USA	164 HIV-infected prisoners taking ART	Cross-sectional	Adherence defined as taking 80% or more of the prescribed drugs.	Non-adherence in 16% overall.	Composite variable of medication side-effects and stopping medication when side-effects occur (AOR: 0.09, P=0.0001), social isolation (AOR: 0.08, P=0.0005) and complexity of antiretroviral regimen (AOR: 0.33, P=0.01) were negatively associated with ART adherence.

Table 3.3-2 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
Palepu et al [246]	2004	Canada	101 HIV-infected people with a history of incarceration and 1645 without a history of incarceration	Retrospective cohort (1997-2002)	Adherence defined as number of days patients received antiretroviral therapy refills divided by number of days of follow-up in the first year after starting therapy (cut-off, 100%).	Non-adherent in 40% overall; 10% in incarcerated, 3% in non-incarcerated.	Non-adherence was positively associated with a history of incarceration (AOR 2.40, 95%CI: 1.54–3.75).
**Soto Blanco et al [256]	2005	Spain	177 HIV-infected prisoners	Cross-sectional	Non-adherence defined as missing at least 2 doses or schedules in the last 5 days.	Non-adherence in 24.3% overall; 14% in females; 16% in males; 68% in those not-visited by people from outside; 35% in those reported robbery as a reason for incarceration.	Fewer than one family visit in a month (AOR:2.21, 95%CI:1.10-4.46), reporting robbery as a reason for imprisonment (AOR:2.36, 95%CI:1.01-5.50), difficulty in taking medication (AOR:3.64, 95%CI:1.78-7.43), having anxiousness and/or depression (AOR:2.43, 95%CI:1.15-5.13) and receiving methadone treatment (AOR:2.74, 95%CI:1.08-6.93) were associated with non-adherence.

Table 3.3-2 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
**Soto Blanco et al [139]	2005	Spain	281 HIV-infected prisoners	Cross-sectional	No-adherence defined as more than two doses missed in the last week, or more than 2 days of total non-medication in the last 3 months.	Non-adherence in 54.8% overall; 64.6% in prisoners lacking support from officers; 66.7% in prisoners having difficulty in taking medication; 85.7% in prisoners unable to continue medication; 63.6% in mentally ill; 83.3% in prisoners lacking support from outside prison.	Having difficulty in taking medication (AOR: 1.94, 95%CI: 1.05–3.57), inability to continue with the medication (lack of self-efficacy) (AOR: 5.37, 95%CI: 2.06–13.94), lack of support from outside prison (AOR: 3.97, 95%CI: 1.19–13.23) and feeling anxious or depressed (AOR: 2.07, 95%CI: 1.18–3.66) were associated with non-adherence.
White et al [257]	2006	USA	31 HIV-infected prisoners	Cross-sectional	Adherence defined as the proportion of prescribed doses taken.	No descriptive results reported.	Access to ART (correlation coefficient (r) = 0.43, P< 0.05), attitude towards taking ART (r = 0.53, P<0.05), coping scale (r = 0.49, P< 0.05), emotional wellbeing (r = 0.37; P< 0.05) and physical functioning (r= 0.44, P< 0.05) were associated with adherence.

Table 3.3-2 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
Ines et al [140]	2008	Spain	50 HIV-infected prisoners	Cross-sectional	Non-adherence defined as missing at least 2 medication doses or schedules in the last 5 days.	Non-adherence in 58% overall.	Predictors of non-adherence**:** previous injecting drug use (AOR: 8.86, 95%CI: 1.52– 51.77); predictors of adherence: having job in prison (AOR: 5.56, 95%CI: 1.12 - 27.02), absence of HIV-related symptoms (AOR: 7.81, 95%CI:1.01 – 62.5), good or average acceptance of treatment (AOR: 10.10, 95%CI: 1.23 – 83.33) and higher academic background (AOR: 5.20, 95%CI: 1.05 –26.31).
Milloy et al [148]	2011	Canada	271 HIV-infected PWIDs	Retrospective cohort (1996-2008)	Adherence defined as number of days ART dispensed divided by number days that a patient eligible for ART (cut-off, ≥95%).	Median level of adherence 61%.	Non-adherence was associated with number of incarceration; 1-2 incarceration events (AOR: 1.49, 95%CI: 1.03–2.05); 3–5 events (AOR: 2.48; 95%CI: 1.62–3.65); >5 events (AOR: 3.11, 95% CI: 1.86–4.95).
Paparizos et al [141]	2013	Greece	93 HIV-infected prisoners	Longitudinal record review (2001-2011)	Adherence defined as medication intake according to regimen (cut-off, >95%).	Non-adherence in 56% overall.	Age <40 years was associated with non-adherence (P<0.015).

Table 3.3-2 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
Subramanian et al [149]	2016	Canada	58 HIV-infected prisoners	Retrospective cohort (2007-2011)	Adherence defined as number of months for which ART was dispensed divided by the number of months of follow-up.	Mean adherence 57.3% one year before incarceration; 88.7% during incarceration.	Adherence during incarceration was significantly higher than adherence before incarceration (P<0.00).
Uthman et al [255]	2017	Worldwide	11 international studies	Systematic review and meta-analysis	Pooled adherence defined as >95%.	Pooled adherence in 54.6% overall.	No analyses were performed with respect to specific factors.
*Iroh et al [22]	2015	USA and Canada	15 studies on HCC	A systematic review	Adherence defined as missing no more than one dose per week or taking at least 80% of prescribed medications.	Adherence 34% at entry, 58% during incarceration and 40% after release.	No statistical analyses were performed.
*Culbert et al [231]	2019	Indonesia	150 HIV-infected prisoners	Cross-sectional	Adherence defined as taking all prescribed medicine on time within the last 30 days.	Adherence in 25.5% overall.	Adherence was associated with perceived personal safety (β: 0.21, 95%CI: 0.01–0.40) and methadone use (β: 0.84, 95%CI: 0.10–1.67).

AOR: Adjusted odds ratio; ART: Antiretroviral therapy; CI: Confidence interval; HCC: HIV care continuum; r: Correlation coefficient; PWID: People who inject drugs; USA: United States of America; β: unstandardized beta coefficient

*Studies included in other categories; **Studies included in the meta-analysis; ***Studies included in other categories and in the meta-analysis

Very high prevalences of viral non-suppression were reported during incarceration in some countries, as summarised in Table 3.3-3 below. A prevalence of 54% was reported in both Spain[139, 140] and Brazil,[258] and a non-suppression prevalence of 32% was reported in England.[152] Iroh et al [22] identified detectable viral load in 49% of PLWH during incarceration in the USA and Canada.

Various institutional circumstances have been suggested to influence ART adherence and outcomes during incarceration (see Tables 3.3-2 & 3.3-3). Several qualitative studies described institutional factors as barriers to ART adherence amongst ILWH. In Canada, Small et al [259] identified protracted institutional processes involved in the provision of ART service, leading to delayed prescription and missing doses. Similarly, in an investigation of recently released PLWH's experience of ART use in prison in the USA, Culbert [239] identified delayed medication prescription and intermittent dosing – particularly during lockdowns, which was attributed to uncooperative prison officials. Other studies also described temporary interruptions to access to ART during lockdowns and lockups.[260, 261]

In SSA, Shalihu et al [10] identified prison officers' discriminatory threatening of ILWH in a Namibian prison, causing "frustration, humiliation and discouragement" to use ART. The authors (on page 971) cited a description made by one of the prisoner participants about how the prison officers treat ILWH: *"Oh! Are you also on AIDS treatment? 'I don't care if you die or your life just depends on medication only."* In some other resource-limited settings, ILWH are often persuaded to interrupt ART due to a lack of transport and denial of permission by prison officials to go to external health care facilities where they receive HIV care.[11, 75] Insufficient food supply is also a major barrier in such settings, predisposing ILWH to missing doses and treatment interruption due to concerns related to exacerbation of drug side-effects. A study by Shalihu et al [10] discussed the presence of increased hunger amongst ILWH, which resulted in them skipping medication doses. Other studies in SSA[11] and elsewhere[141, 262] reported ILWH's non-adherence to ART due to hunger resulting from poor quality of food.

The type of ART service delivery also influences inmate ART adherence. Despite its association with positive ART outcomes in some prisons,[263] the 'directly observed therapy' (DOT) approach seems to be ineffective for ART delivery in many correctional settings, particularly in terms of maintaining adherence. Although DOT may give an opportunity for ILWH to remember their medication schedule and have regular contact with health care providers, medication privacy can be severely breached due to long periods spent waiting in line, conspicuous dispensing of ARVs, and inflexible dispensing times.[257, 261, 264] This may potentially discourage ILWH from making clinic visits and increase the likelihood of missing doses.

Accessing ART services from external health care facilities substantially affected medication privacy amongst ILWH in resource-limited settings. Shalihu et al [10] described serious losses of privacy for ILWH during medication collection. ILWH were conspicuously taken to public health care facilities on a truck so that those who feared that others would be aware of their status tended to avoid clinic visits and miss treatment doses. One of the study participants (HIV-infected prisoner) described the situation as (page 970): *"Going to the hospital at ARV clinic in a big group in the same car, this has revealed people's status indirectly. This has caused some of my colleagues to stop taking their ARVs."* ART adherence in prison populations is also affected due to transfer of ILWH between prisons and into the community during release. Several studies reported ART interruptions due to unplanned or uncoordinated transfers and release of ILWH.[139, 230, 261]

HIV care provider support appears to be crucial for maintaining ART adherence in prisoners. While having a good relationship with HIV care providers motivates ILWH to properly use medication,[137, 260, 261] poor HIV care provider support discourages optimal adherence.[10, 262] Studies in Canada[259] and USA[239, 261] reported insufficient (prison) health staff knowledge regarding ART services and provision of inappropriate care and support for ILWH, which affected their ART adherence.

Psychosocial characteristics such as social support, stigma and depression may play a greater role in determining ART adherence in ILWH compared to PLWH in the outside community. This is because prisoners lead a controlled and congregated life, which often provides ILWH with little emotional support and leads to social isolation, which may restrict their intent to use medication. In the USA, Mostashari et al [137] found that female ILWH with access to emotional support from others when feeling "down" were three times more likely to be adherent to ART

compared to those without such support. In another USA study, Altice et al [138] reported a 12-fold increase in the risk of poor adherence in ILWH who suffer from social isolation. In Spain, Soto Blanco et al [139] identified positive impacts of prison officers' cooperativeness on ILWH's adherence to ART, with ILWH reporting flexibility of prison officers in assisting when they forget to take their medication achieved more adherence.

ILWH's capability to adhere to ART can be enhanced through engagement in various activities involving social interaction. Again in Spain, Ines et al [140] reported a more than fivefold likelihood of adherence in ILWH who were involved in social activities within the prison system. Social support of people external to a prison environment is also important for ILWH's adherence to ART. Soto Blanco et al [256] identified more optimal adherence amongst ILWH receiving at least one monthly visit from people outside. The association persisted when the same authors conducted another study involving more ILWH from different correctional facilities.[139] A systematic review of global studies[255] also showed more non-adherence in ILWH who lacked social support.

The effect of social stigma on ART adherence in prison environments is usually linked to a lack of patient privacy during medication collection and use. Roberson et al [261] illustrated the effect of social stigma on ART adherence amongst female ILWH who missed doses due to enacted stigma resulting from prison officers' and fellow inmates' awareness of their HIV status (disclosed while collecting ARVs in distinctive vials through DOT). Small et al [259] described high levels of discrimination, violence and denial of resources, such as drugs and syringes, by fellow inmates when ILWH's HIV status was revealed. Consequently, ILWH were forced to discreetly take their medication or forgo when privacy was lost. In some cases, they faced verbal and physical abuse from fellow inmates, including stone throwing, as a result of being observed taking their medication, which discouraged them from taking their medication.[10, 260] Farhoudi et al [260] (on page 3) quoted an HIV-infected prisoner's reaction to the situation in an Iranian prison as:

> *"I'm the only person with HIV in our cell. The others do not know that I am HIV-positive and when the correctional staff calls me, I tell the cellmates it is because of my kidney problems! If the others know that someone is HIV-positive, they wear mask and treat badly! This illness is highly stigmatised and makes us reluctant to take the drugs----------"*

Due to the high prevalence of depression in HIV infection[265] and in incarcerated people,[78] ILWH hold a double burden of psychiatric problems[78] and its effect on their ART adherence and outcomes can be substantial. In two Spanish studies,[139, 256] the risk of poor adherence was more than double in ILWH who experienced depression or anxiety compared to those without depression. Other global and local studies reported depression as one of the main predictors of non-adherence in prison populations.[255, 257, 260] Further, Meyer et al [97] found that the likelihood of viral suppression was 50% more in PLWH with lower psychiatric disorder severity than those with higher severity during incarceration.

Experience of ARV side-effects and underlying health conditions are associated with poor adherence amongst ILWH. A number of studies reported more frequent missing of doses and treatment interruption in prisoners who experienced ARV adverse reactions.[138, 139, 230, 260, 262] Underlying health conditions also determine ART adherence in ILWH that the presence of any disease symptoms increases the likelihood of non-adherence.[140, 260] Moreover, poor adherence to ART lessens the likelihood of viral suppression and immunologic progression in ILWH,[140] as it is the case in the general population (see section 3.2.2.2),[209, 214, 215] but there is no evidence in this case whether the HCC outcomes have a reciprocal relationship.

There is relatively scant information available about personal determinants of the HCC in prisoners. The available evidence has shown that behavioural patterns influence ART adherence and viral suppression. For instance, having a history of injecting drug use is negatively associated with ART adherence and viral suppression.[140, 255, 260] In some prison settings, ILWH with a history of injecting drug use had almost nine times higher risk of poor adherence compared to those without a history of injecting drug use.[140] Injecting drug use has both direct and indirect effects on ART outcomes. Drugs such as morphine and cocaine can directly promote the replication of HIV in peripheral blood and affect the effectiveness of ART.[266, 267] In its indirect effect, PLWH who inject drugs often have limited access to care[268, 269] and have increased risk for comorbidities such as hepatitis C virus coinfections[270] and drug interactions,[269] which may substantially hamper ART adherence and viral suppression.

Studies in Namibian[10] and Iranian prisons[260] reported ILWH's lack of knowledge about HIV and the health importance of ART, which encouraged them to discontinue medication and use ARVs inappropriately. Higher likelihood of non-adherence has also been reported amongst ILWH with low self-efficacy to consistently follow their dose instructions and medication schedules.[139, 256] Conversely, ILWH who perceived that ART would help them live longer (efficacious) and causes no harm (safe) are more likely to be adherent,[140, 231, 257] and also more likely to commence treatment in the first place (see section 3.3.1).[137, 242]

Differences in ART adherence and outcomes have been seen according to the sociodemographic characteristics of ILWH. Similar to the general populations of SSA (see section 3.2.2.2),[145, 203, 209, 227, 228] ILWH in younger age groups (below 40 years) and of male gender are at increased risk for non-adherence[141, 255] and viral non-suppression.[97, 244] Meyer et al [97] found that male and female PLWH had comparable viral suppression at prison entry, however, females had an 80% higher odds of achieving viral suppression during incarceration. When the authors further investigated this relationship with a larger sample,[244] female PLWH remained more likely to achieve viral suppression compared to males during incarceration. Although gender specific determinants were not reported in the studies, the female prisons had relatively stable prison populations due to minimal inter-institutional transfers compared to men's prisons and this might have created conducive environment for women ILWH to properly utilise HIV care. Furthermore, female PLWH have generally better care engagement compared to their male counterparts in community studies.[64, 114, 176]

Table 3.3-1: Studies investigating the prevalence and factors affecting viral suppression and immunologic progression in prison populations

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
***Palepu et al [246]	2004	Canada	101 HIV-infected people with a history of incarceration and 1645without a history of incarceration	Retrospective cohort (1997-2002)	Viral suppression defined as at least two consecutive viral load of <500 copies/mL.	Viral suppression in 96% of people without a history of incarceration; 89% in people with a history of incarceration.	History of incarceration was negatively associated with viral suppression (AHR: 0.68, 95%CI: 0.51–0.89); whereas longer time spent in prison was positively associated with viral suppression (AHR: 1.06, 95%CI: 1.02–1.10).
*Soto Blanco et al [139]	2005	Spain	281 HIV-infected prisoners	Cross-sectional	-Viral suppression defined as viral load <$\log_{10}$ 1.6 copies/mL. -CD4 count	Viral suppression in 60.5% overall; mean viral load, $\log_{10}$ 4.69 copies/mL; mean CD4 count, 381 cells/mm^3; mean viral load 4.68 in adherent; 5.12 in non-adherent; mean CD4 count, 390.55 cell/mm^3 in adherent; 373.53 cells/mm^3 in non-adherent.	No individual factors were associated with viral suppression and mean CD4 count.

Table 3.3-3 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
*Ines et al [140]	2008	Spain	50 HIV-infected prisoners	Cross-sectional	-Virological failure defined as viral load >50 copies/mL. -Change in CD4 count after treatment	Viral suppression in 46% overall; change in CD4 count within 6-months of ART 119.71 ± 29.75 overall; mean HIV-RNA levels 1.68 ± 0.26 log_{10} copies/mL in adherent patients; 1.33 ± 0.33 log_{10} copies/mL in non-adherent; change in CD4 count 188.21 ± 55.83 cells/mm^3 in adherent and 70.10 ± 28.84 cells/mm^3 in non-adherent patients.	Adherence was significantly associated with undetectable viral load (P< 0.004) and increase in CD4 count (P<0.048).
***Subramanian et al [149]	2016	Canada	58 HIV-infected prisoners	Retrospective cohort (2007-2011)	-Viral suppression defined as viral load <40 copies/mL. -Change in CD4 count during incarceration	Viral suppression in 50% overall at prison entry; 77.8% at exit; CD4 count of <200 cells/mm^3 57.1% at entry; 61.9% at exit.	CD4 count significantly improved during incarceration (P<0.02).
*Iroh et al [22]	2015	USA and Canada	15 studies on HCC	A systematic review	Viral suppression defined as viral load <500 copies/mL.	Average viral suppression 27% at entry, 51% during incarceration and 26% at 6 months post release.	No statistical analyses were performed.

Table 3.3-3 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
**Palepu et al [247]	2003	Canada	234 HIV-infected PWIDs	Retrospective cohort (1996-2001)	Viral suppression defined as viral load <500 copies/mL in two consecutive measurements.	Viral suppression in 19% in those with a history of incarceration; 40% in those without a history of incarceration.	Incarceration was negatively associated with viral suppression (AOR: 0.22, 95%CI: 0.09–0.58).
Springer et al [245]	2004	USA	1866 HIV-infected prisoners	Retrospective cohort (1997-2002)	-Viral suppression defined as viral load <400 copies/mL. -Change in viral load and CD4 count during incarceration	Viral suppression in 59% overall; mean CD4 count increased by 74 cells/mm^3 and the mean viral load decreased by 0.93 log_{10} copies/mL during incarceration; mean CD4 count decreased by 80 cells/mm^3, and the mean viral load increased by 1.14 log_{10} in re-incarcerated.	Significant decrease in viral load (P<0.0001) and increase in CD4 count (P<0.0001) during incarceration, whereas significant increase in viral load (p< 0.0001) and decrease in CD4 count (P< 0.0001) at re-incarceration.

Table 3.3-3 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
**Stephenson et al [253]	2005	USA	15 re-incarcerated and 30 incarcerated HIV-infected males	Retrospective cohort (1997-1999)	-Viral suppression defined as viral load <400 copies/mL. -Change in CD4 count over the follow-up period	Viral suppression at the beginning 53% in re-incarcerated; 50% in non-re-incarcerated; 20% in re-incarcerated at the end of two and half years follow-up; 47% in non-re-incarcerated; mean CD4 count at the beginning 224 cells/mm^3 in re-incarcerated; 446 cells/mm^3 in non-re-incarcerated; 157 cells/mm^3 in re-incarcerated at the end of the follow-up; 560 cells/mm^3 in non-re-incarcerated.	Re-incarceration was associated with poor immunological (P<0.003) and virological (AOR: 8.29, 95%CI: 1.78, 38.69) outcomes.

Table 3.3-3 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
**Westergaard et al [249]	2011	USA	437 HIV-infected PWIDs	Prospective cohort (1998-2009)	-Virological failure defined as viral load >400 copies/mL. -CD4 count	Virological failure 53.3% in those incarceration reported; 24.8% in those no incarceration reported; CD4 count of <200 cells/mm^3 24% in never incarcerated; 26.5% in at least once incarcerated; viral load of >1000 copies/mL 37.4% in never incarcerated; 43.6% in at least once incarcerated.	Brief incarceration (7-30 days) was associated with virological failure (both at 400 and 1000 copies/mL cut-offs) (AOR: 7.7, 95%CI: 3.0–19).
Davies and Karstaedt [13]	2012	South Africa	148 HIV-infected prisoners	Retrospective cohort (2004-2008)	-Viral suppression defined as viral load <400 copies/mL. -Change in median CD4 count over the ART period	Viral suppression in 73% overall; median CD4 count 122 cells/mm^3 at ART initiation; 356 cells/mm^3 after 96 weeks of treatment.	No statistical analyses were performed.

Table 3.3-3 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
**Meyer et al [97]	2014	USA	882 HIV-infected prisoners	Retrospective cohort (2005-2012)	-Viral suppression defined as viral load <400 copies/mL. -Change in CD4 count between prison entry and release	Viral suppression in 29.8% overall during entry; 70% during release; 68.% in men; 79.1% in women; 63.6% in psychiatric patients; 72.1% in non-psychiatric patients; mean increase in CD4 count 98 cells/mm^3 during incarceration; mean decrease in viral load 1.12 log_{10} during incarceration.	Viral suppression was correlated with female gender (AOR: 1.81, 95%CI: 1.26-2.59) and low psychiatric problem (AOR: 1.50, 95%CI: 1.12-1.99); significant increase in CD4 count ($P < 0.001$) and decrease in vital load ($P< 0.001$) during incarceration.
**Meyer et al [254]	2014	USA	497 HIV-infected prisoners	Retrospective cohort (2005-2012)	-Viral suppression defined as viral load <400 copies/mL. -Change in viral load and CD4 count between release and re-incarceration	Viral suppression in 70% overall before release; 52% in recidivists before release; 31% in recidivists on re-incarceration; mean loss of CD4 count 50.8 cells/mm^3 between release and re-incarceration; mean viral rebound 0.4log_{10} between release and re-incarceration.	Recidivism was negatively associated with viral suppression ($P<0.0001$); increase in age (AOR: 1.04, 95%CI: 1.01-1.07) and having higher level of medical or psychiatric comorbidity (AOR: 1.16, 95%CI: 1.03-1.30) were associated with viral suppression during re-incarceration.

Table 3.3-3 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
*Monarca et al [243]	2015	Italy	338 HIV-infected prisoners	Cross-sectional	-Viral suppression defined as viral load <50 copies/mL. -CD4 Count	Viral suppression in 73.5 % overall; CD4 count of >200 cells/mm^3 in 90.6% overall.	No statistical analyses were performed.
**Meyer et al [244]	2015	USA	1,089 HIV-infected prisoners	Retrospective cohort (2005-2012)	-Viral suppression defined as viral load <400 copies per/mL. - Change in CD4 count during incarceration	Average viral suppression, 32.7% at entry; 70.6% during release; 80% in females; 68.7% in males; mean CD4 count, 344.5 cells/mm^3 at entry; 449.5 cells/mm^3 during release.	Significantly more viral suppression rate in women than men during pre-release (P<0.002).
Chan et al [152]	2015	England	74 HIV-infected prisoners	Cross-sectional	Viral suppression defined as viral load <40 copies/mL.	Viral suppression in 68% overall.	No statistical analyses were performed.

Table 3.3-3 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
*Lucas et al [20]	2016	USA	83 HIV-infected prisoners	Cross-sectional	-Viral suppression defined as viral load <200 copies/mL. -Change in CD4 count during incarceration	Viral suppression 88% in overall after ten months of incarceration; median increase in CD4 count 160 cells/mm^3 overall.	Significant change in viral suppression (P<0.0001) and CD4 count (P<0.0001) during incarceration.
**Nasrullah et al [248]	2016	USA	443 HIV-infected people with a history of incarceration and 8077 without a history of incarceration	Cross-sectional	Viral suppression defined as viral load <200 copies/mL.	Viral suppression 55.8% in incarcerated; 74.2% in non-incarcerated people.	Recently incarcerated persons were significantly less likely to achieve viral suppression (AOR: 0.90, 95%CI: 0.86-0.95).
Telisinghe et al [21]	2016	South Africa	404 HIV-infected prisoners	Retrospective cohort (2007-2009)	Viral suppression defined as viral load <400 copies/mL.	Viral suppression 94.7% in ART naïve prisoners at 6^{th} month; 92.5% at 12^{th} month; 72.1% in ART experienced prisoners at 6^{th} month.	No statistical analyses were performed. *Provision of on-site ART service contributed to a higher prevalence of viral suppression.

Table 3.3-3 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
**Eastment et al [250]	2017	USA	202 HIV-infected people with a history of jail booking and 6788 without a history of jail booking	Retrospective cohort (2014)	-Viral suppression defined as viral load of < 200 copies/mL or no viral load report. -CD4 count	-Proportion of CD4 count <200 cells/mm^3, 25% in people with a history of jail booking; 7% in people without a history of jail booking. -Viral suppression 62% in people with a history of incarceration (one year after release); 79% in non-incarcerated people.	History of incarceration was associated with lower CD4 count (P<0.001).
Mpawa et al [76]	2017	Malawi	262 HIV-infected prisoners	Cross-sectional	Viral suppression defined as viral load <40 copies/mL.	Viral suppression in 95% overall.	No patient characteristics were associated with viral suppression.
Lim et al [252]	2015	USA	1698 HIV-infected (jail) incarcerated and non-incarcerated people	Retrospective cohort (2001-2005)	Viral suppression defined as viral load <400 copies/mL.	Viral suppression in 29% overall; 41% in non-incarcerated; 26% in incarcerated.	Lower viral suppression prevalence in those with extensive incarceration experience (PR: 0.62, 95% CI: 0.43, 0.88) compared to those with sporadic, brief occurrences of incarceration (PR: 0.67, 95% CI: 0.50, 0.90).

Table 3.3-3 *(Continued)*

Author	Year	Country	Population	Study Design	Measurement	Findings	Conclusions
Ickowicz et al [251]	2019	Canada	716 HIV-infected PWIDs	Prospective cohort (2005-2014)	Viral suppression defined as viral load <50 copies/mL.	Viral suppression in 35.9% overall.	Custodial (AOR: 0.61, 95%CI: 0.45–0.82) and non-custodial (AOR: 0.78, 95% CI: 0.62–0.99) criminal justice involvement was negatively associated with viral suppression.

AHR: Adjusted hazards ratio; AOR: Adjusted odds ratio; ART: Antiretroviral therapy; CI: Confidence interval; HCC: HIV care continuum; PR: Prevalence ratio; PWID: People who inject drugs; USA: United States of America

*Studies included in other categories; **Studies included in the meta-analysis; ***Studies included in other categories and in the meta-analysis

3.4 Literature Review: conclusion

Research investigating the HCC in prison populations is largely limited to high-income countries, despite the high burden of HIV infection in low- and middle-income countries. While there has been a large volume of emerging data in SSA on contextual barriers to HCC outcomes in the general population, there is only limited information available about the situation in SSA prison populations.

The majority of studies conducted in prison settings, where there exists an acceptable standard of HIV care (mostly in high-income countries), have reported optimal HCC outcomes. Most ILWH in such settings were likely to take ART after prison entry and demonstrated appropriate times to care linkage and ART initiation; often improved on their pre-incarceration care linkage and ART initiation. Rates of viral suppression and immunologic progression increased significantly during incarceration, indicating that imprisonment can create a good opportunity for PLWH who might not have access to care in the community.

Notwithstanding this advantage, nearly all studies in low- and middle-income countries, including a very small number of studies in SSA, reported higher prevalences of late linkage to care and delayed ART initiation in ILWH compared to the prevalence in the general population and ILWH in high-income countries. Limited access to standard HIV care in prison systems has been reported to be the main reason for this. The reviewed studies revealed an association between the lack of standard of HIV care in the prison settings and inappropriate distribution of health care resources between prison and community healthcare systems. This disparity has been exacerbated by a rapid expansion of ART services in the community settings that has not occurred within prison systems.

High prevalences of poor adherence and viral non-suppression were reported during incarceration in several high-income countries, however only limited data are available regarding the prevalence of non-adherence, virological and immunologic failures amongst prisoners in low- and middle-income countries.

Various factors have been found to affect the HCC in prison populations beyond circumstances related to availability of care. As ILWH in low- and middle-income countries usually access HIV care from external health care facilities, institutional factors such as cooperativeness of prison administrators and health care providers is crucial in motivating inmates to start and adhere to ART. Institutional circumstances are also important in prison settings where HIV

care services exist, given the inmates' ability to seek care is substantially determined by security systems. Approaches used to deliver ART services (for example provision of ART via DOT or transporting ILWH to external ART sites) influence ART initiation and adherence, as this may expose ILWH to unwanted status disclosure and privacy loss. The nature of relationships between an inmate and an HIV care provider also has an impact on ART adherence.

Another structural factor that substantially affects the whole HCC in ILWH is the transfer of prisoners between correctional facilities and to the community on release. Correctional facilities often lack pre-release plans and coordination with each other and with public health care facilities to ensure continuation of ART during transfer and on discharge. The lack of integration between prison and community healthcare systems is well reflected in the impact of recidivism on the HCC. While prisoners who are incarcerated longer were able to achieve optimal ART adherence and viral suppression, those with a previous history of incarceration or recidivism had a higher likelihood of poor adherence and viral non-suppression.

Psychosocial factors appear to be more influential in relation to the HCC in prison populations compared to the general population. ILWH who receive social support (be it material, emotional or information support), either from inside or outside of a prison, are more adherent to ART than those who do not. Alternatively, social stigma perpetuated by prison staff and fellow inmates affects ART initiation and adherence. ILWH often have a much higher prevalence of depression than other PLWH and its adverse-effect on their ART adherence and viral suppression is substantial.

Only limited data exist regarding personal factors affecting the HCC in prisoners. The available studies have indicated that self-perceptions of HIV status and the health benefits of ART and its potential consequences are associated with delayed ART initiation and non-adherence, which is also the case in the general population. For instance, ILWH who perceive that ART is inefficient and has side-effects are less likely to initiate and adhere. The odds of non-adherence is higher in ILWH who have experienced more frequent ARV side-effects and other underlying disease symptoms; and ILWH with poor adherence are, in turn, less likely to achieve viral suppression. Having a history of injecting drug use is the only major behavioural factor that is statistically confirmed to be negatively associated with ART adherence and viral suppression in ILWH. Other personal characteristics reported to be associated with poor adherence and viral non-suppression are younger age (below 35 years) and male gender both

in prison populations and the general population. The effect of age and gender on ART initiation has not been investigated in prisoners, although they have shown a similar pattern in adherence and viral suppression to the general population.

The majority of prison studies included in the literature review did not consider possible variations of the HCC outcomes at an individual level because analyses were undertaken mostly at a population level. Moreover, structural, sociocultural and behavioural factors that have been shown to affect the HCC in the general population were not well addressed in prison populations. When reported, their impact on the whole continuum was not assessed, and for factors to which assessments were undertaken, the findings lack representativeness and statistical confirmation. None of the studies directly compared the outcomes between prison populations and the general populations from which the prisoners were sourced, despite reporting a disproportionate distribution of health care resources between the populations, particularly in SSA. Furthermore, beyond the dearth of information about the HCC in prisoners in SSA as whole, the systematic search strategy and manual search of the literature did not identify any studies in Ethiopia.

3.5 Aims and Objectives

The literature review led the student researcher to the following four main aims and associated specific objectives (as summarised in Table 3.5-1) in answering an overarching research question, "What circumstances influence the HCC in incarcerated people compared to their non-incarcerated counterparts in South Ethiopia?"

Table 3.4-1: Aims and objectives of continuum of HIV care in prison study in South Ethiopia

Aims	Objectives	Method	Data collection
1. Determine the effect of imprisonment on ART initiation in South Ethiopia	1. Compare the magnitude of delay in ART initiation between prison and community-based populations	Quantitative study	Interviewer administered survey and medical record review
	2. Identify and compare factors affecting ART initiation between incarcerated and non-incarcerated people	Quantitative study	Interviewer administered survey
2. Determine the effect of imprisonment on ART adherence in South Ethiopia	1. Compare ART adherence between incarcerated and non-incarcerated people	Quantitative study	Interviewer administered survey and medical record review
	2. Identify and compare factors associated with non-adherence to ART between incarcerated and non-incarcerated people	Quantitative study	Interviewer administered survey
3. Analyse health-related outcomes of ART in prison populations in South Ethiopia	1. Compare rates of viral suppression and immunologic progression between prison and community-based populations	Quantitative study	Laboratory examination-record review
	2. Identify and compare factors associated with viral and immunologic failures between incarcerated and non-incarcerated people	Quantitative study	Interviewer administered survey
4. Explore barriers to and facilitators of HIV care continuum in the prison systems of South Ethiopia, and to inform intervention strategies	1. Investigate facilitators of HIV care continuum in prisoners	Qualitative study	In-depth interview
	2. Explore structural, sociocultural and behavioural barriers to HIV care continuum in prisoners	Qualitative study	In-depth interview
	3. Identify gaps in policies, guidelines and systems in the provision of HIV care for prisoners	Qualitative study	In-depth interview and scanning of available policies and guidelines

3.6 Theoretical framework

The literature review shows that multiple levels of interrelated concepts affect the outcomes of HCC in prison populations including: intrapersonal, interpersonal, organisational, community and policy-related factors, all of which is reflected in the premises of the Ecological Model of Health Behaviour as presented in Figure 3.6-1.[271]

At an intrapersonal level, an individual's favourable perception to identify health care needs are crucial for accessing care and accomplishment of health-related behaviours.[271-274] This perception can be shaped by the level of knowledge about health and health services (e.g., information regarding the presence of health services), as well as belief in the outcomes of health behaviours.[272-275] People adopt perceptions of health behaviours through reinforcements of the consequences of their appraisal and the outcomes of the consequences, which can be learnt either through direct experience or by observing others' behaviour.[273] In line with this proposition, ILWH who lack knowledge about and adopt unfavourable perceptions of ART (e.g., that it causes adverse reactions and is associated with social stigma) utilise it poorly compared to those who have favourable appraisals of its health benefits.[10, 137, 141, 242, 243, 257]

The extent to which people believe that they have an operative competency (self-efficacy) to perform a health behaviour determines the likelihood of its successful accomplishment.[272, 273, 275, 276] For example, ILWH who possess self-efficacy to strictly follow their medication schedule and seek social support when feeling down are more likely to be adherent to ART.[137, 139, 140, 256] Efficacy of performing a behaviour could in turn be influenced by previous successful accomplishments, vicarious experiences and emotional arousal (physical well-being).[273] ILWH who have experiences of ARV side-effects, psychological distress and underlying health conditions are less likely to adhere to ART.[139, 140, 256, 257, 262]

Interpersonally, social pressure from other individuals or groups influences the ability of a person to seek care and approve a health behaviour.[271-275] Although such social relationships can provide important sources of emotional, instrumental and information supports for healthful choices, they also have the potential to influence undesirable health-related behaviours.[271] While the presence of social support promotes the HCC amongst ILWH,[137, 139, 140, 255, 256] social stigma and discrimination by members of prison communities discourage its effectiveness.[10, 259, 261]

Organisational settings, such as prisons, are important sources and transmitters of social norms and values which might positively affect health behaviours, however, the nature of their structure and processes may also provide negative health influences.[271] Management style, rules and regulations may all impact the health behaviour of people in a given organisation.[271] A number of institutional circumstances appear to influence the HCC in prison populations, including poor management style, ineffective ART service delivery and unfavourable environments in terms of ART use (e.g., loss of medication privacy and insufficient supply of food).[10, 11, 75, 239, 257, 259, 261]

Communities of various social levels to which an individual belongs play a pivotal role in changing health behaviour.[271] Community at its mediating structural levels between individuals and the larger social environment has an important influence. Social structures such as families, neighbourhoods, churches, friendship and other social networks are important immediate sources of norms and values that affect an individual's health seeking behaviour.[271, 274] PLWH may encounter various social networks during and after incarceration that may positively or negatively influence the HCC. A community also influences a health behaviour in terms of relationships between organisations with similar or related service provision. Relationships that correctional facilities have with each other and with public health care facilities determine the success of HCC in incarcerated population.[20, 22, 148, 230, 246, 248, 253] A community has a power to allow public use of interventions. For instance, when a health problem such as HIV is considered by the community to be a primary issue, it is more likely that its prevention and treatment interventions will be provided for population groups at high risk of the infection such as prisoners.[271]

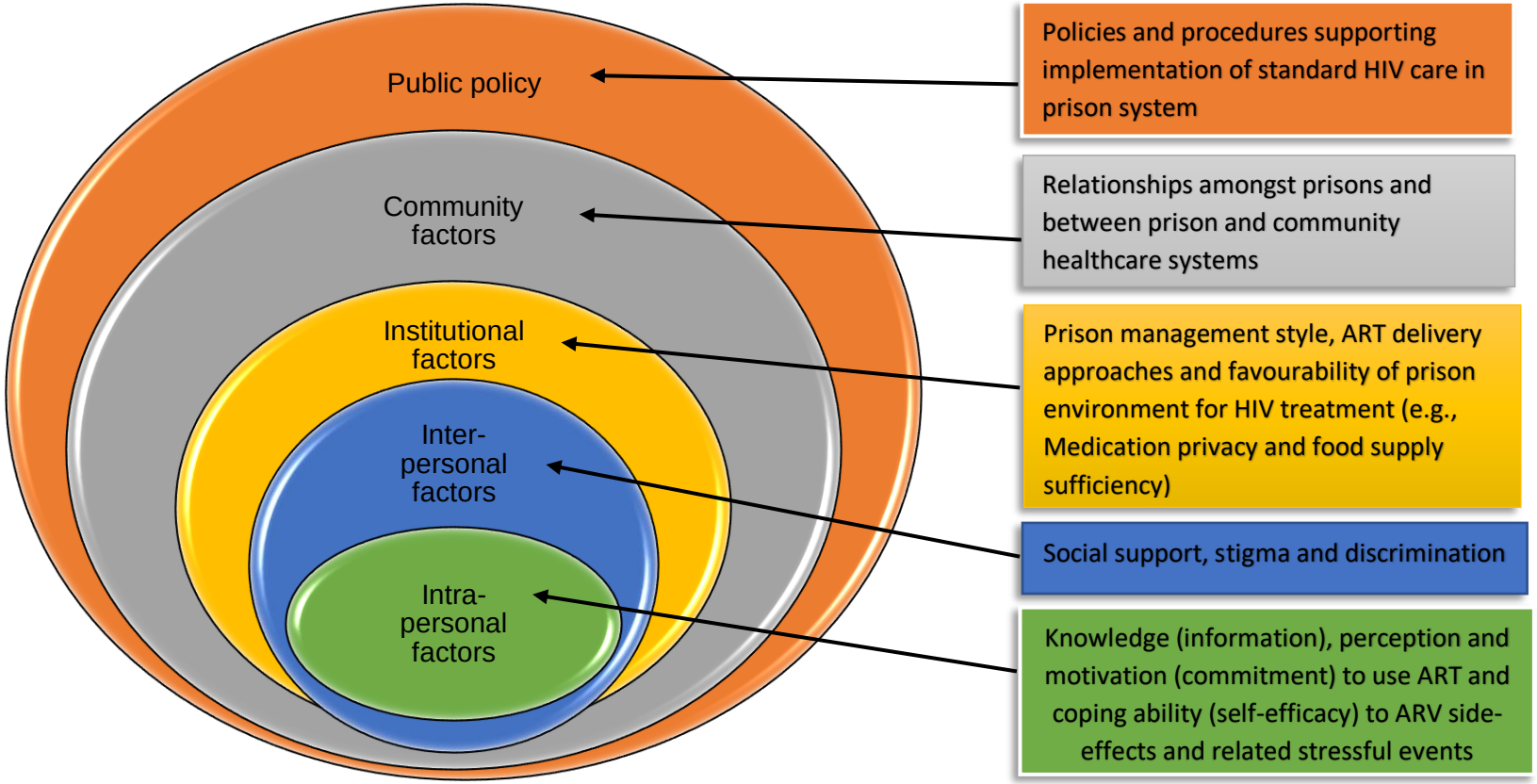


Figure 3.6-1: Theoretical framework of factors affecting continuum of HIV care in prison populations

ART: Antiretroviral therapy; ARV: Antiretroviral

Application of policies, procedures, and laws contributes to change in health-related behaviours of people[271] and increases the availability of health services, which then enhances access to care.[274] Access to health services would be restricted when there is a lack of policy ensuring even distribution of health care resources across populations.[274] Literature shows that the presence of policies and procedures that support the implementation of community standard of HIV care in prison system enhances optimal HCC outcomes in prison populations.[11, 20, 74, 97, 110, 244] In contrast, in settings where there is an imbalance of resource allocation between incarcerated and non-incarcerated populations, the prevalences of sub-optimal HCC outcomes such as delayed initiation of ART and associated clinical complications are higher in ILWH compared to the general population.[11, 12, 74] This suggests the importance of the existence of a set of principles that ensure appropriate distribution of health resources across social structures, as no one in a just social scheme should be advantaged or disadvantaged due to social circumstances.[277] Punishment such as imprisonment can never be justified in a way that inflicts suffering on others, and conflicts with other goals of a society such as public health.[278]

3.7 Significance and original contribution to knowledge

This is the first project at an international level to prospectively investigate the outcomes of HCC in prison populations and make direct comparison between incarcerated and non-incarcerated people. Being the first in SSA to comprehensively analyse barriers to each component of the HCC, this project provides a new insight into how ILWH access HIV care and respond to ART in South Ethiopia, which can then be extended to other similar settings. The thesis applied a combination of methods involving multiple groups of participants, including incarcerated and non-incarcerated people and relevant stakeholders. This enhances understanding of the HCC in prisoners from different perspectives in order to establish a ground for application of intervention strategies.

Given the overall high prevalence of HIV in prisoners, most of whom will reintegrate into the general community, improving HCC in people with criminal justice involvement contributes substantially to the successful implementation of ART as an HIV prevention strategy. In this regard, this thesis provides insights about the possibility of HIV transmission within and outside prisons due to sub-optimal HCC outcomes. Discrepancies that were identified in terms of access to standard HIV care and outcomes of the HCC between incarcerated and non-incarcerated people provide evidence for designing interventions to ensure universal access to ART in South Ethiopia and in other similar settings. This thesis identified circumstances that influence the HCC at different stages of the incarceration trajectories (during arrest, stay in jail and/or prison and release), which allows development of targeted interventions.

Ethiopian national guidelines recognise prisoners as one of the high risk groups for HIV infection.[14] However, a lack of comprehensive data regarding contextual barriers to the HCC in the prison systems has limited the implementation of interventions that are effective at community settings in a contextually responsive manner. This thesis uncovered barriers and enablers that are common to prison and community populations and specific to the prison contexts, which may help facilitate more successful implementation of the existing interventions and development of new strategies. The findings also added novel information on the change that the new ‘Test and Treat’ approach that Ethiopia has recently adopted has brought in terms of improving ART initiation, adherence and viral suppression /immunologic progression both in the community and prison populations.

Finally, international guidelines[40, 54, 77, 88, 89] recommend that prisoners should have access to the highest possible standard care that equals the care available in the surrounding community. This thesis contributes considerably to efforts to close gaps in this regard by revealing any structural and policy predicaments that could hinder implementation of comprehensive HIV prevention, treatment and care programs in correctional facilities.

CHAPTER FOUR
METHODS

Introduction

This chapter presents methodological assumptions and methods that were used to answer the research questions and consists of eight sections. The first three sections describe the epistemological and methodological stances of the research and the study designs which were developed based on the stances. The study used a mixed methods approach comprising three study designs including a systematic review and meta-analysis, prospective cohort design and qualitative interviewing, each of which is subsequently detailed in the next three sections. The chapter concludes in a brief description of ethical considerations that were made throughout the research process.

4.1 Epistemology

This thesis was informed by the stance of critical realism, which preserves realist ontology (the existence of reality independently of individuals' perceptions) while adopting constructivist epistemology (variation in understanding of this reality).[279] With the realist assumption, the study conceptualised the existence of circumstances influencing HIV care continuum (HCC) in prison contexts independently of individuals' constructions, but could be perceived differently depending on their perspectives. The circumstances were thus considered as both real and social constructs.

Opposing the views of positivist empiricism, which posit that one cannot understand causal relationships between phenomena but rather observes regularities in associations between inputs and outputs,[280] the current study considers causes for the outcomes of HCC as discoverable mechanisms that are involved in the occurrence of the outcomes. It also recognises the reality of social relations, contexts and mental phenomena, and their possession of causal power and relevance to causal explanations.[279] The use of a realist approach therefore deepened the student researcher's understanding of determinants of the HCC in the prison populations from physical, mental and social perspectives.

4.2 Methodological assumption

The concept of critical realism complies with the essential assumptions of qualitative as well as quantitative paradigms, which allowed the student researcher to employ a mixed methods approach important to deal with exploratory and comparative research questions such as: "What circumstances influence the HCC in incarcerated people compared to their non-incarcerated counterparts in South Ethiopia?" Critical realism accepts the complementarity of quantities and meanings that a mixed methods research requires to generate insights and depth of understanding about particular phenomena.[281] It appreciates strengths of both qualitative and quantitative paradigms while identifying some specific limitations of each so that the qualitative stance minimises the bias inherent in universalising and variable-oriented quantitative approach whereas the latter offers systematic evidence for diversity and reduces focus on typical phenomena that leads to the ignorance of complexity.[279] The issue of methodological validity, one of the main reasons for conflicts between qualitative and quantitative researchers, has been addressed by considering the connection between the extrapolation and the concept that the extrapolation is about regardless of the type of method used.[282]

This thesis is based on the premise that literature-derived research questions dictate methods and connect purpose of a study with methods.[283] This allowed selection of varieties of methods, designs and tools that are relevant to the research question.[284] The research question principally aimed to examine the relationship between incarceration and the outcomes of HCC. In order to answer this question, the level of HCC outcomes were compared between incarcerated and non-incarcerated people using a quantitative approach,[285] and perceptions of barriers to optimal HCC outcomes in incarcerated people were explored using meaning simultaneously generated by a qualitative study.[283, 286] Figure 4.2-1 depicts the procedure how quantitative and qualitative methods were employed concurrently to answer the research question.

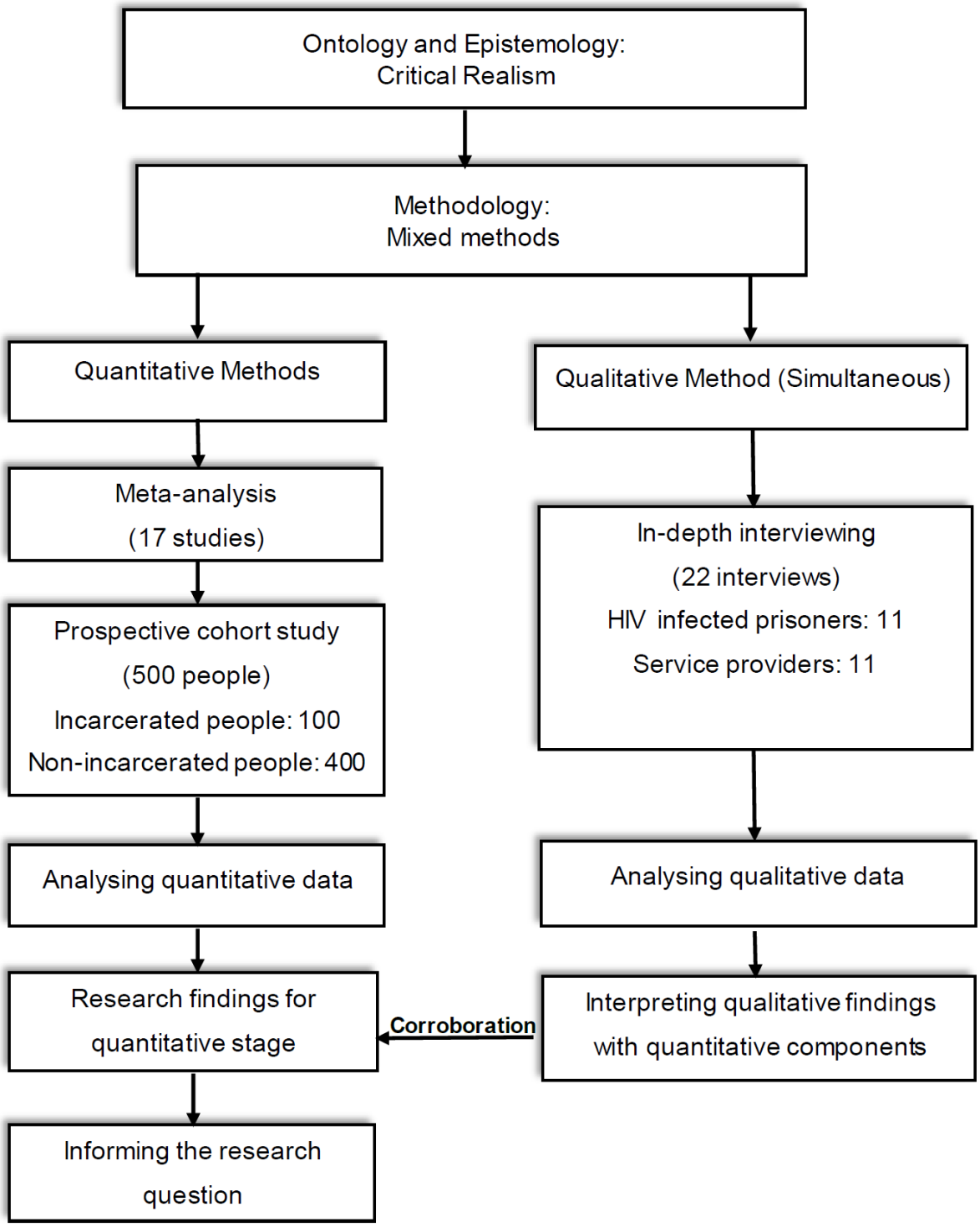


Figure 4.2-1: Methodological procedure for prison HIV care continuum study

4.3 Study design

The current thesis made a comparative claim between incarcerated and non-incarcerated people regarding the outcomes of HCC. It also aimed to explore the potential barriers to, and facilitators of HCC in prison populations in particular. Based on the principle that the type of inference and conclusions to be made determine research designs,[287] a systematic review and prospective cohort designs were used to address the comparative component and qualitative in-depth interviewing to examine the barriers and facilitators, as described in the following sections.

4.4 A systematic review and meta-analysis

A systematic review and meta-analysis of global studies were conducted to assess factors affecting the outcomes of HCC in incarcerated people. Studies relevant to the review question were systematically identified and critically appraised in compliance with a protocol published in advance[288, 289] at the International Prospective Register of Systematic Reviews (PROSPERO; Number: CRD42019135502)[290] (see Appendix 4.1). The review identified gaps in the current evidence and variation in practice regarding the HCC amongst prison populations, and enabled the student researcher to shape the overall direction of the project.[288, 291] The results of selected quantitative studies were synthesised using meta-analysis in order to enhance precision in showing the direction and size of prediction identified by the individual studies.[289, 292, 293] While the narrative synthesis of the findings of both qualitative and quantitative studies is presented in the literature review (Chapter 3, section 3.3), pooled outcomes generated through the meta-analysis are described in Chapter 5 (section 5.1). The review was reported based on the Preferred Reporting Items for Systematic Reviews and meta-analysis guidelines (PRISMA)[294] (see Appendix 4.2). Findings from this systematic review have been published in *PLOS ONE*[229] (see Appendix 3.4).

4.4.1 Participants and variables of the meta-analysis

All quantitative studies in participants with a history of incarceration or currently being incarcerated were considered for meta-analysis. Findings of studies exploring structural, psychosocial and individual level determinants of the HCC amongst prisoners were synthesised. Studies analysing factors related to incarceration, such as the number of imprisonments; psychosocial determinants, such as depression and social support; behavioural determinants, such as attitudes towards HIV treatment; health and medication-related factors,

including immunological or clinical status; and sociodemographic factors, including gender were assessed. Studies reporting one or more of the HCC outcomes including initiation of antiretroviral therapy (ART), adherence to and outcomes of ART in terms of change in CD4 count and viral suppression were included in the meta-analysis without restrictions based on the definition of the outcomes. Non-incarcerated people were considered as a control group when comparisons were made.

Inclusion criteria

All quantitative studies reporting the above-mentioned outcomes were included in the meta-analysis without restriction based on type of study design, publication date and geographical region. However, studies published in English language were included in the analysis due to resource and time constraints. The included studies were indexed up to 26 October 2018.

Exclusion criteria

Studies conducted on specific populations such as certain ethnic groups or populations identified as at high HIV risk or as vulnerable groups (e.g., transgender people, men who have sex with men) were excluded in order to reduce potential confounding, as these groups have been associated with low utilisation of care in community and other settings.[295, 296]

4.4.2 Data collection

4.4.2.1 Information sources and search strategy

Systematic searches were carried out on the following databases: Emcare, Medline, PubMed, Scopus, Web of Science, Cinahl and Cochrane Library. The concepts HIV/AIDS, ART and Incarceration were used to construct the search strategy. The search strategy used only terms related to exposure (incarceration) and outcomes (HIV care components). The terms were combined with MEDLINE filter for the concepts under search and adapted for use with other databases in combination with database-specific filters for the concepts, where these are available. Full search strategies for each database are provided under Appendix 3.1.

4.4.2.2 Study selection and risk of bias assessment

Articles were initially screened for relevance with their titles and abstracts. After removal of duplicate and irrelevant articles, a full text review was performed on the retrieved articles based on the predefined protocol.[290] The student researcher (TGF)[229] performed the initial screening and selection of all papers including the quality assessments whereas GT and ERM independently conducted the quality assessments (each assessing half of the studies) initially

undertaken by TGF. The quality assessment was conducted using the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies (see Appendix 4.3) by considering the following characteristics: representativeness of participants (selection bias), study design, control of potential confounders, validity and reliability of data collection methods and completeness of outcome data (withdrawals and dropouts). Disagreements between the reviews regarding the quality assessment results were resolved by discussion.

4.4.2.3 Data abstraction

Data were extracted using a format adapted from the Cochrane Systematic Review Checklist for Data Collection (see Appendix 4.4). Separate data extraction formats were used for each HCC outcome category. Information in the data extraction form included author, year, geographical location, population, method, measurements, exposures, findings and conclusions. Corresponding authors of two primary studies were contacted for missing information on the number of participants with and without ART initiation and/or non-adherence versus exposure variable of interest.

4.4.3 Data synthesis

Meta-analysis was conducted for each outcome when two or more studies assessed the exposure variable. A Fixed Effect Model was employed to pool the outcomes with odds ratios and calculated 95% confidence intervals. A Fixed-Effect Model was chosen due to small numbers of studies (n<5) involved in the meta-analysis of particular outcomes, which made an estimation of between study variance impossible.[297] In addition, in the analyses, a single study had substantially larger sample sizes relative to the other(s), so that generalisation of the findings could not be claimed beyond the included studies.[293] Heterogeneity between studies with effect measures was determined using Chi^2 test and I^2 statistic. An I^2 value of 75% was considered as high heterogeneity.[298] Mantel-Haenszel statistics were applied to calculate pooled odds ratios and results are presented in forest plots (see Chapter 5, section 5.1). The meta-analysis was conducted using RevMan-5 software.[299]

4.5 Cohort study

A prospective cohort study was conducted between June 1, 2019 and July 31, 2020 to compare the outcomes of HCC between HIV-infected incarcerated and non-incarcerated individuals. Although incarceration was considered the main risk factor for sub-optimal HCC outcomes in this study, which were expected to be prevalent in the study population,[12, 13] the prospective design allowed assessment of various risk factors at a time for multiple HCC-related outcomes.[300, 301] It also enabled investigation of potential causal relationships between exposure to incarceration and the HCC outcomes.[300] Comparable results might have been obtained by applying the relatively inexpensive retrospective cohort design, but this would have required a complete record of potential risk factors, which may have been difficult to obtain in the study settings. Further, retrospective designs can complicate the examination of causal associations between exposure and outcome variables.[300]

4.5.1 Participant recruitment

All HIV-infected prisoners who were present during the study enrolment period were eligible for participation in the cohort as a risk group. The comparison groups included HIV-infected non-incarcerated people who were receiving care from the same ART clinics and had similar ART history as the prisoners at each HCC stage. More specifically, the comparison group for the ART initiation component consisted of non-incarcerated individuals who were diagnosed with HIV at the most similar possible time as the prisoners, whereas those for ART adherence and outcomes components were non-incarcerated people who had a comparable durations of HIV treatment.

The enrolment period varied depending on the HCC component measured (see Appendix 4.5). Individuals who were already aware of their HIV status but had not yet started ART, and those newly diagnosed within the 12-months of the enrolment period were included in the ART initiation follow-up. As well as existing ART clients, those who were initiated on the therapy within the first six months of the study period took part in the adherence and outcomes components. Figure 4.5-1 shows the process of participant recruitment for the cohort. As the population pool for non-incarcerated people was much larger than incarcerated people, a simple random sampling technique[300] was used to recruit a sample of non-incarcerated participants that quadrupled the number of prisoner participants in each component. To assist in this, lists of patients in pre-ART and ART registers (for ART initiation and adherence/outcomes,

respectively) served as sampling frames to select potential participants using a table of random numbers.

Inclusion criteria

Participants of the cohort study were HIV-infected people aged 18 years and above who had the mental capacity to provide written informed consent. They were also receiving HIV care from the selected ART clinics in South Ethiopia.

Exclusion criteria

Incarcerated and non-incarcerated people living with HIV (PLWH) who were seriously unwell (as determined by ART service providers) and unable to provide complete information were excluded from the entire cohort and those for whom there was no record of their first positive diagnosis were excluded from the ART initiation stage. Non-incarcerated PLWH with a previous history of imprisonment were excluded from any part of the cohort, inmates living with HIV (ILWH) who had already developed non-adherence, immunologic (IF) and/or virological failure (VF) before incarceration were excluded from the adherence and outcomes stages (as confirmed through clinical chart reviews). Both groups of participants were required to be on ART for at least six months to participate in the adherence and outcomes arms, and ILWH were required to remain imprisoned for at least one month (details provided in section 4.5.3.2).

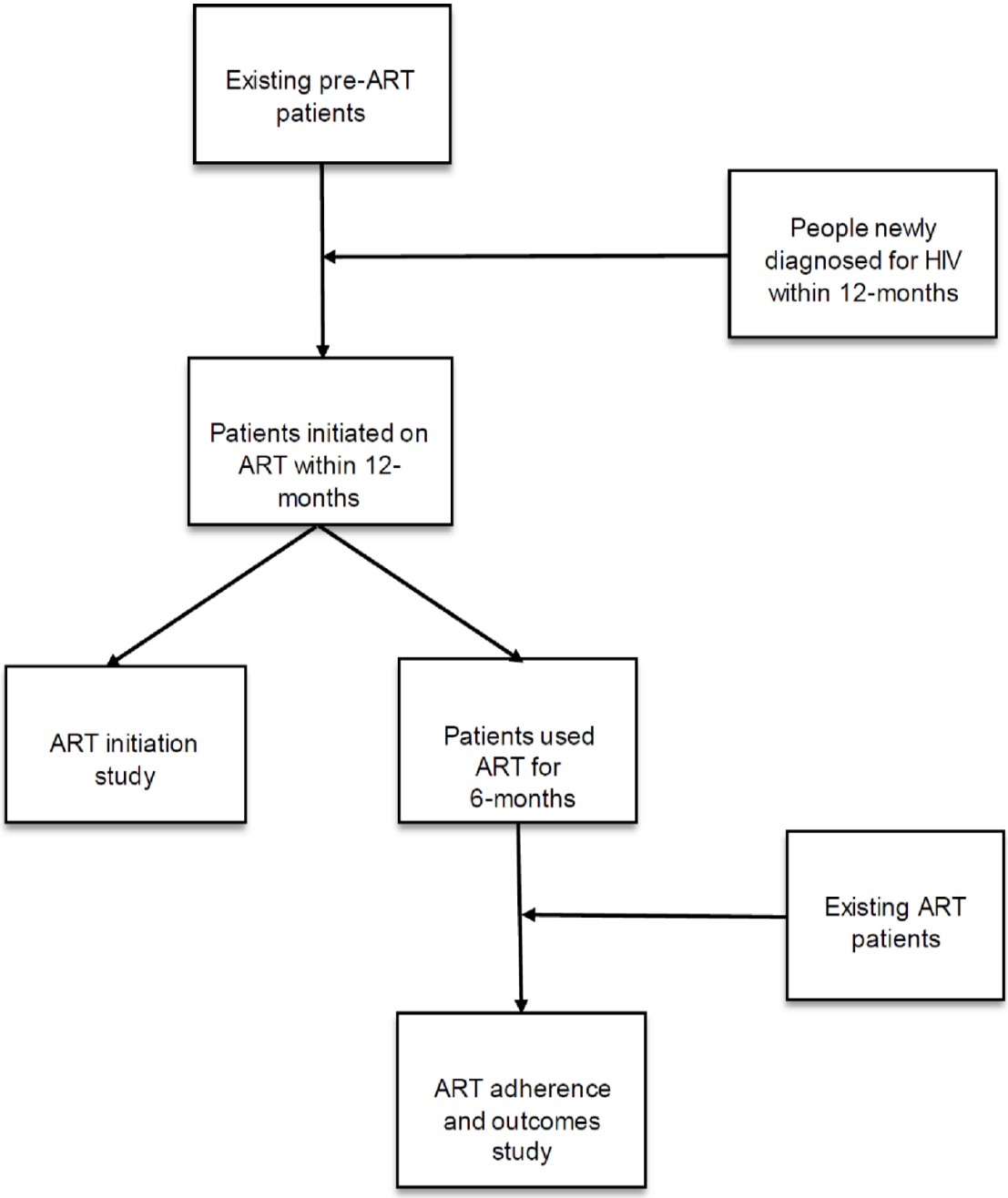


Figure 4.5-1: Participant recruitment process for the cohort stage
ART: Antiretroviral therapy

4.5.2 Sample size determination

The difference in the proportions of delayed ART initiation and non-adherence between incarcerated and non-incarcerated people was considered to determine a minimum sample size required to identify an estimated prevalence ratio for each component of the cohort. Proportions which yield the smallest difference were considered to calculate the measures using a formula for independent cohort studies;[300] assuming 95% of level of confidence, 80% power, a 5% level of significance and unexposed to exposed group sample ratio of four. Considering a proportion of 27.3% delayed ART initiation in the general Ethiopian population[108] (unexposed group) and a prevalence ratio of 2.06 in incarcerated people[74] (exposed group), a minimum sample of 26 inmates was required for the ART initiation component. Similarly, using a proportion of 24.4% non-adherence in the general population in Ethiopia,[143] and a prevalence ratio of 1.67 in the incarcerated population,[141] a minimum sample of 74 inmates was required for the ART adherence/outcomes component. As four times the number of incarcerated participants was required for the non-incarcerated group, a final sample size of 500 participants was recruited from both populations.

In HIV studies, high non-response rates are frequently reported amongst prisoners. Studies in the USA[137, 264] reported non-response rates of 15% and 20% in the investigations of ART acceptance and adherence. However, two Ethiopian studies[93, 302] involving blood drawing reported a 100% response rate. The cross-sectional nature of these studies might have limited the probability of non-response as frequent contact with participants was not required.[300] Considering the relatively long interview times and the requirement for more than one contact with participants (for adherence/outcomes component) in this cohort study, a five percent non-response rate for ART initiation and ten percent for adherence/outcomes components was anticipated.

Based on the literature,[303] it was expected that up to nine percent of the participants would be severely depressed and therefore not meet the inclusion criteria. Prisoner movements, in and out and between prison facilities, have been known to be rapid in most prison systems. While the number that was lost due to release during the enrolment periods was assumed to be balanced by the number entered, it was assumed that up to 25% of prisoner participants would be lost to follow-up due to release within the post enrolment periods[26] and discontinuation of ART.[13] The effect of transfer between the study prisons in this study was not considered to be significant as prisoners were enrolled at the destination correctional facility. However, a

transfer out of two percent was expected to occur to other prisons, assuming an overall inter-facility transfer rate of 11%.[13]

Accounting for the likely exclusions (e.g., 41% for ART initiation and 46% for adherence/outcomes components), the estimated number of prisoners to be approached was 145. However, 24 prisoners commenced ART within the first six months of the study period and met criteria for involvement in both ART initiation and adherence/outcomes stages (see section 4.4.2). Thus, a total of 121 prisoners were approached to attain the calculated final sample size of 100.

4.5.3 Data collection procedure

ART service providers at the participating public health care facilities (see Chapter 2, section 2.3.1) invited potential participants to see a research assistant in a separate room. The invitation occurred when PLWH made their regular clinic visit. The research assistants were certified HIV counsellors who had a tertiary qualification in health-related disciplines. The student researcher provided three days training for the research assistants on: aims of the study; techniques of obtaining consent and maintaining participant confidentiality; the interviewing process; and the keeping of daily records. They were also instructed on how to make prompt communications with the student researcher, who provided fortnightly supervisory support at each study site, overseeing the process of data collection and providing immediate feedback on any gaps identified.

Participants underwent Paper and Pencil Interviewing (PAPI) once they gave consent for participation to the research assistant (see Appendices 4.6 & 4.7). The PAPI questionnaire consisted of structured questions focusing on the background information and clinical characteristics of participants as detailed in the following paragraphs. Although collection of data using Computer Assisted Personal Interviewing (CAPI) may increase response rates and ability to get more confidential data, PAPI is more applicable in areas where there is irregular electricity and internet such as Ethiopia.[304] The effect of the language barrier on the accuracy of PAPI data was minimised by translating the questionnaire, which was initially prepared in English language and then translated into Amharic, a commonly spoken language in the study area (see Appendices 4.6 & 4.7). The questionnaire was also presented verbally by the research assistants during interviewing in other local languages, for participants who could not understand Amharic. To ensure this, the research assistants were recruited based on their ability

to fluently speak the language of the prison's locality. Completed questionnaires were then translated back into English at the end of the data collection process.

Pre-testing was conducted to ensure context validity (i.e., clarity, meaningfulness and difficulty) of questionnaire items with a group of participants representing five percent of the study sample size; using incarcerated and non-incarcerated PLWH at ART clinics remote to the study sites. As lay experts,[304] one ART service provider from each study health facility evaluated the face validity of the questionnaire. To perform this, the ART service providers were provided with the questionnaire ahead of the data collection process. Although some items of the questionnaire were obtained from previously validated instruments (as described below), newly developed items were tested for internal consistency using Cronbach's α,[305] and corrections were made by removing less consistent items based on the 'α' values of the pre-test data.

4.5.3.1 Background information

In the questionnaire, cohort study participants were asked about their sociodemographic, socioeconomic, psychosocial (social support, stigma and depression), behavioural, and incarceration-related characteristics. Sociodemographic data collected were age, gender, educational and marital status, place of residence and history of homelessness. Socioeconomic information items included monthly income and employment history. Information related to individual behaviour, such as knowledge and attitude of HIV and ART and circumstances that may influence individual's ability to use ART (e.g., cigarette smoking, khat chewing and other substance use) were gathered. To estimate the risk of HIV transmission within and outside of prison, participants were asked about their past and present HIV risk behaviours, such as number and type of sexual partners, pattern of condom use, and sharing of sharp objects (e.g., razor blades, nail clippers, injecting equipment etc.) with others. Information on imprisonment history, including length of sentence and number of incarcerations as well as transfers between correctional facilities, was recorded for prisoner participants.

Social support issues related to HIV care are multidimensional and vary across settings.[306] They require comprehensive measurement scales that can address the core components including emotional, informational, tangible, affectionate and positive social interactions.[307] The lack of context specific instruments[308] and the relatively lengthy nature of the available scales made their supplementary use challenging.[307, 309] White et al [257] developed a multi-item scale with fair internal consistency (α=0.79) to measure psychosocial factors of ART adherence from

inmates and care provider perspectives. Beyond its brevity, the scale covered constructs pertaining to social support as well as access to care. The current study used nine items, part of which were adapted from the multi-item scale. The items were checked for reliability and showed an acceptable Cronbach's α value (α=0.66). Participant responses were graded using a five-point Likert's scale (strongly disagree, disagree, neutral, agree, strongly agree), a higher score in each item reflecting higher level of social support or care.

Various validated scales have been developed to measure the four manifestations of HIV-related social stigma: internalised (negative self-image), enacted (personalised), perceived (concern with public attitude) and concerns with status disclosure.[310] Some of the scales embrace all four of these components,[311, 312] while others focus on one or more of the elements.[313-315] Reinius et al [312] developed a 12-item scale, a shortened version of the 40-item scale by Berger et al,[310] which is believed to facilitate the inclusion of issues of HIV-related social stigma in multifaceted studies such as the present one. The scale has comparable psychometric property to the full-length scale (α>0.7) for each component with slightly less sensitivity. Participant responses were scored using a five-point Likert's scale ranging from 1, "Strongly disagree" to 5, "Strongly agree".

There have been many validated instruments used for the measurement of non-specific psychological distress.[316-318] However, few are sufficiently brief for use as supplementary material in questionnaires aiming to address a number of different variables.[319, 320] Kessler et al [319] developed ten and six-item depression measurement scales for the US National Health Interview Survey (NHIS), which had severe time and space constraints. Both scales (referred to as the K-10 and K-6) were found to have good precision as well as consistent psychometric properties (α=0.93 and 0.89, respectively), discriminating well between depressed and non-depressed community cases. Depression in this study was assessed through the K-6 questions where responses were scored using a four-category scale (most of the time, some of the time, a little of the time, none of the time).

Knowledge and attitudes of HIV and ART, as well as self-efficacy in medication use were assessed using items generated from the literature review. The knowledge scale consisted of eight items and the attitude and self-efficacy scales each consisted of three-item questions. The scales showed good Cronbach's α values; 0.78 and 0.65 for the knowledge and attitude constructs, respectively. Whereas responses for the knowledge items were scored by assigning one point for every correct response and zero for an incorrect answer, a five-point response

scale was used for the attitude and self-efficacy items. In each measurement scale, scores were summed to determine the overall score, and the interquartile range was calculated to categorise results.

4.5.3.2 Clinical data

4.5.3.2.1 ART initiation follow-up

Delay in ART initiation was measured by calculating the time since diagnosis to the first prescription of the medication[115, 150] and using baseline World Health Organization (WHO) clinical stage and CD4 count at the start of ART (delayed ART initiation defined as WHO stage III/IV or CD4 count <150 cells/mm^3)[108, 109] (see Appendix 4.8). Although the determination of the interval of time between the date of infection and date of treatment initiation is considered to be the most accurate measure of delays in treatment initiation,[176] identification of the precise time of exposure is generally difficult. It is rather more practical to measure the time span between first HIV diagnosis and first medication prescription as this has routinely been used at HIV care facilities to determine time of ART commencement.[150] In addition, determination of baseline WHO clinical stage and CD4 count allows for the estimation of how delayed a client is in presenting for care after acquiring the infection.[65, 108] As such, after identifying the date of first HIV diagnosis from pre-ART care registers at ART clinics, participants of this group were followed up until they started ART within 14-months of the follow-up period. At the start of ART, participants were asked about potential structural, sociocultural and individual level risk factors for late treatment initiation (see Appendices 4.6 & 4.7). Initiation of ART on the date of diagnosis was also assessed according to the 'Test and Treat' approach[9] (see Chapter 1, section 1.4).

4.5.3.2.3 Adherence to ART

Adherence was measured using participants' self-report and pharmacy refill records. Relatively reliable measures of adherence have been developed, for example "Electronic monitoring devices", which records frequency of dose taking and dose timing through a microprocessor attached to a device, but their applicability has been questioned due to high cost.[126, 321] Consequently, alternative methods including self-report and pharmacy refill have widely been used, particularly in resource-limited settings. These methods are often criticised for their potential limitations in terms of social desirability and recall bias in the case of self-report[322, 323] and over reporting in pharmacy refill (as there is a possibility that patients pick up pills but do not use it).[159, 321] Nonetheless, using both methods in combination is recommended

to estimate patient adherence to ART in resource-limited countries with the assumption that the weakness of one approach could be offset by the strength of the other.[150, 322] In this study, participants were assessed once for six-monthly ART adherence using both self-report and pharmacy refill methods within 12 months of the follow-up period. Six months adherence measurement was used in order to rule out a particular risk of poor adherence during the earlier months of ART.[145]

Self-reported adherence was determined by calculating the proportion of pills taken of the number of pills prescribed in the previous four days, an ideal time interval to minimise possible recall and social desirability bias.[323] Variation in the medication possession ratio (MPR) was determined by dividing the number of days a patient was late for pharmacy refills by the total days on ART, and then subtracting this proportion from 1.[133, 226] i.e.

$$Self-reported\ adherence\ = \frac{number\ of\ pills\ taken\ in\ the\ last\ four\ days}{number\ of\ pills\ prescribed\ for\ the\ last\ four\ days} x100$$

Whereas,

$$MPR = 1 - \frac{number\ of\ days\ late\ for\ ARV\ pickup}{Total\ number\ of\ days\ between\ the\ two\ most\ recent\ ARV\ pickups} x100$$

For both methods, the adherence threshold was defined as ≥95%.[127, 324] Participants were also asked to self-report on their adherence to dose schedules and medication instructions in the previous four days or more and complete a brief survey on potential risk factors for non-adherence (see Appendices 4.6 & 4.7).

4.5.3.2.4 Outcomes of ART

Outcomes of ART can be determined either directly from the extent to which viral replication is suppressed or indirectly through an estimation of how much the patient's immunity has recovered. The indirect method is particularly useful in resource-limited settings where monitoring of viral replication is challenging. Suppression of viral replication is determined by measuring plasma viral load whereas patient's immunologic progression can be estimated through CD4 cell count.[150]

ART clients in Ethiopia provide a blood specimen for viral load measurement after six months of ART initiation and every 12 months thereafter. They also provide blood samples for estimating CD4 count at the time of ART initiation (for determination of baseline immunologic profile) and during the course of ART as a supplementary test to a viral load measurement.[14] ART laboratories in South Ethiopia perform CD4 counts but draw blood to transport to the Regional Public Health Laboratory (RPHL) for viral load determination.[103] Results of these investigations undertaken within 12 months of the study period were prospectively extracted from the laboratory registers using patient medication identification numbers (see Appendix 4.8). Immunologic (IF) and virological (VF) failures in this study were defined as CD4 count at or below 100 cells/mm^3 and viral load above 1000 copies/mL after six months or longer duration of ART respectively, which is partly adapted from WHO definitions for IF and VF in adults (see Chapter 3, section 3.1.2).[150]

All ART laboratories and the RPHL follow standard operating procedures (SOPs) while collecting, transporting and processing biological specimens for each assay procedure to maintain the quality of results.[325] ART laboratories undertake internal quality control activities regularly, including calibration of equipment and performing positive and negative control tests prior to any assay procedure. The RPHL carries out periodic external quality assessments concerning staff proficiency as well as reagent and equipment quality at each ART laboratory.[326] Moreover, laboratory personnel responsible for particular procedures always document pre-assay quality control results.

4.5.4 Data analysis

Data obtained from the cohort participants were manually checked for completeness, consistency and cleanness before entered into an EpiData (version 4.6) template, and then exported to Stata (StataCorp. 2019. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC.) for analysis.[327] Participant characteristics were initially described in terms of frequencies and percentages for categorical variables, while summary statistics such as means, medians, standard deviations and quartiles were calculated for continuous variables, as appropriate. Bivariate associations amongst categorical variables were estimated using Chi-square (Chi^2)[328] and Fisher's exact tests,[329] depending on the frequencies of expected values.

The probability of delayed ART initiation after the first HIV-positive test was estimated using Kaplan-Meier estimate of survival, and the survival time was compared across different covariates using log rank test.[330] The effect of incarceration and other factors on the timely initiation of ART was estimated using Cox proportion hazards model.[331] The likelihood of ART initiation on the test date (same day treatment) was assessed using a logistic regression model.[332]

ART adherence was analysed in two ways: as a continuous outcome (or a proportion) restricted to the interval between 0 and 1, and a binary outcome categorised as adherence and non-adherence (see chapter 4, section 4.5.3.2). In the first case, as the data included the upper and lower bounds [0, 1], a fractional regression model was used to estimate the results with logit as a link function.[333] Associations between non-adherence (as a binomial outcome) and exposure variables were determined using a logistic regression model.[332]

Similarly, baseline and treatment monitoring CD4 counts and plasma viral load results were first considered as count outcomes occurring within a varying period of time (given a variation in the amount of time participants stayed without or on ART) and were analysed using non-parametric (local-linear) kernel regression.[334] Covariates of delay in ART initiation based on bassline CD4 count and WHO clinical stage estimates, immunologic (IF) and virological (VF) failures were determined using a logistic regression model.[332] Moreover, the pattern of condom use amongst HIV-infected individuals during sex (categorised as never, sometimes and always) was assessed using ordered logistic regression model.[335]

The models were developed through a purposeful selection approach.[332] Each variable was initially independently tested using a bivariate regression model to identify eligible variables for a multivariate regression model. A relatively less stringent inclusion criterion ($P<0.2$) was used to ensure the consideration of all potentially important covariates in the analyses. Variables which did not contribute to the model at the traditional significance level ($P<0.05$) as well as those which did not appear to have a significant confounding effect ($\beta<20\%$) were eliminated.[332] Interaction terms were considered when they were found to have a statistically significant effect.[336] Multicollinearity between continuous covariates was tested thorough scatterplots and a bivariate linear regression, whereas a correlation coefficient as well as a variance inflation factor was determined for both continuous and categorical variables.[336] All the covariates included in the models had a variance inflation factor value of less than 1.5. A

significance of associations between covariates and the outcome variables was determined at a $P<0.05$ with 95% confidence interval.

Model diagnostics were undertaken for all regression analyses described above except for non-parametric kernel regression analyses (of CD4 count and plasma viral load), as none of the models was found to be statistically significant. Cox proportional hazards assumption was assessed using a proportional hazards (ph) test[331] whereas goodness-of-fit for the logistic regression models was assessed using Hosmer and Lemeshow Ch^2 test.[332] The model fit for the fractional regression analyses was tested using a generalized linear model applying logit as a link function which produced both the Akaike's information criterion (AIC)[337] and the Bayesian information criterion (BIC).[338] Goodness-of-fit for the ordered logistic regression was assessed using an ordinal version of the Hosmer–Lemeshow test[339] with the proportionality of odds across the categories tested using proportional odds assumption test.[340] In all cases, the models fit the data well (see Appendix 4.9).

Missing values were observed within several dependent and independent variables in the dataset. The dependent variables with missing values included baseline CD4 count (11%), WHO clinical stage (9%), follow-up CD4 count (24%) and plasma viral load results (3%) and the independent variables were monthly income (1%) and length of current sentence (11%) for prisoner participants. For variables included in the analysis models, Little's test was used to check whether the missingness occurred completely at random (MCAR), independent of observed and unobserved values.[341] The test identified that the pattern of missingness varied across the variables and violated the assumption of MCAR (see Appendix 4.10). Thus, multiple imputation technique (m=20) was applied to take into account the effect of missing values, in which the results obtained from each completed-data analysis were combined to produce a single multiple-imputation result. The number of imputations (m) was determined by considering 99% level of statistical power for testing an association given the amount of missing data.[342] The fit of the imputation models was checked using a graphical method [343] and the distribution of the observed and completed values (produced by combining observed and imputed values) appeared to be comparable (see Appendix 4.11).

4.6 Qualitative interviewing

A qualitative in-depth interviewing approach was used to explore and develop a deepened understanding of circumstances influencing the HCC in the prison context and to assist with the development of explanations for relationships observed in the quantitative stage. Qualitative-based research questions often emerge as the study progresses and as more is understood about the phenomena of interest.[283] However, pre-structuring the method based on the literature review also enables comparison of data across sources and studies.[344] Literature derived, but contextually constructed semi-structured interviewing was used to explore the lived experiences of inmates regarding HIV care use across incarceration trajectories (during arrest, stay in jail and/or prison) and obtain relevant service providers' experiential account of the existing care provision strategy.

The qualitative interviewing enabled exploration of the participants' experience and subjective understanding of barriers to, and facilitators of, the HCC by creating interpersonal interactions between the student researcher and the participants.[345, 346] It was found to be an effective method to explore and understand the socially sensitive topic of HIV in prisoners, which otherwise might have been difficult to discuss in a group environment, such as in focus group discussions.[347]

4.6.1 Participant recruitment

Interview participants were purposively selected ILWH and relevant service providers. ILWH participants were those who had been continuously incarcerated and using ART for at least six months at the prisons in which the interview was conducted (see Chapter 2, section 2.3.1). These prisoners were assumed to have sufficient institutional experiences with which to generate dense and focused information on structural, social and personal barriers to HCC in the prison context.[348] In addition, the prisoner participants were required to have been fluent in Amharic language in order to maintain verbal fluency and clarity of ideas to the student researcher who conducted the interview.

The service provider group included prison health care staff, ART service providers, prison officers, and prison and health administrators. Participants of this group were selected based on their role in the process of HIV care provision for people with criminal justice involvement.[346] The prison health care staff were health professionals who had been working within the prison healthcare system and had experiences of performing HIV tests and linking

HIV-infected prisoners to care, whereas the ART service providers were those who were providing HIV treatment for incarcerated and non-incarcerated PLWH at the selected public health care facilities. The prison officers were members of prison security who were often involved in the facilitation of prisoners' access to HIV care. The prison administrators were the higher officials of the prisons who managed the overall administration of the institutions including the provision of HIV care. The health administrators were health agents in the respective Zonal Health Departments who provided technical and material support for the prison healthcare system. Service provider participants were required to have at least six months' working experience in their respective positions.

The number of participants for the qualitative interview was determined based on theoretical saturation and a diversity of participants with regard to prison settings, role in the provision of care as well as range of experience.[348] Twenty-two participants from the four selected prisons and their respective supporting health care facilities participated in the qualitative interview. More specifically, the interview participants consisted of eleven prisoners, two prison health care staff, three ART service providers, two prison officers, two prison administrators and two health agents.

4.6.2 Qualitative data collection

Although much of the interaction between the student researcher and participants was open-ended, in order to create sufficient room for reflections,[345, 346] an interview guide was used to preserve the focus of the discussions on issues and processes related to the HCC in the prison context (see Appendix 4.12). The interview guide was constructed with a list of short sentences drawn from the literature review and was essentially aimed at revealing barriers to and facilitators of the HCC amongst prisoners.

The interview guide for prisoners asked questions related to structural, social and personal contexts promoting and hindering the HCC in the prison system. The structural aspect addressed issues related to access to standard HIV care and institutional contexts influencing this. While the social component addressed both encouraging and discouraging social networks from inside and outside prison, personal contexts focused on inmate's understanding and perception of ART.

Service provider participants were asked to provide accounts of what they had experienced during their direct or indirect engagement with the provision of HIV care for incarcerated people. This would add diverse points of view to prisoners' perspectives on the HCC in the prison environment. In view of deepening understandings of the policy perspective of HIV care in the prison system, administrative bodies of both the prisons and the health sector were asked to discuss the pros and cons of the existing strategy and the way forward. They also explored policies and procedures that could support collaborations between prison and community healthcare systems to ensure standard care for people with criminal justice involvement.

Due to security concerns in prison settings, prison health care staff guided the student researcher to contact the prisoners in order to obtain consent for voluntary participation when they made their regular clinic visits. To facilitate this, the student researcher initially retrieved clinic appointments of all eligible prisoners from medical registers. This was believed to minimise a potential bias due to the involvement of the health care staff in the participant selection process. The interviews were undertaken in a privacy secured place; either in a prison clinic or a room near to it. Service provider participants were identified by contacting the prison and health administrations. The study eligibility criteria (see above) were presented to the respective administrations in order for them to help the student researcher find potential participants. All service providers were approached during their office hours and interviewed in their respective offices in private, after they gave informed consent for participation. Prisoner interviews took 45-60 minutes whereas that of the service providers took 40-50 minutes. All interviews were audio recorded and field notes were taken on observations (tacit knowledge), comments, unclear ideas and emerging insights as these could help in data analysis process.[346, 347] The audio recorded interview data were initially transcribed verbatim in Amharic language and then translated into English for analysis by the student researcher.

A variety of strategies was used to ensure reliability and credibility of the interview data. The interview guide was initially piloted with individuals (two for ILWH participants and one for each category of service provider participants) having similar characteristics that were used to select the actual participants, at institutions other than the study sites. This allowed identification of elements which supported the objectives of the study, inclusion of relevant concepts which had not been considered previously and modification of those which were found to be incomprehensible to the participants. The pilot interviews also enabled the student researcher to explore unanticipated circumstances involved in the interviewing process within the prison context.[345] Rapport was established with the participants through sharing of the

student researcher's experience in issues related to HIV care while retaining the distance essential to explore their views. Participants were provided with the summary of the results and asked to verify the accuracy of the results (member-checking) when data interpretation was completed [345, 349, 350]. Whereas prisoner participants were provided with the results through their prison's postal address, an email address was used for service provider participants. All participants verified the accuracy and agreed with the results.

4.6.3 Data analysis

Analysis of the in-depth interview data was carried out iteratively throughout the interviewing process. The analysis employed a phenomenological approach so as to abstract meanings attributed to the lived experiences of the participants regarding HIV care provision and use in the prison context, and to understand how they made sense of the reality (as presented to the student researcher's subjective consciousness).[351, 352] Meaning of individual items, as Giorgi [352] (on page 5) said these 'meaning units', was initially elucidated to arrive at the holistic meaning related to HIV care use in the prison context. This was achieved by pooling the item meanings together and making inferences based on the relevant behavioural theories. The use of relevant antecedent theories permitted identification of units of information with similar concepts so that an essential structure of the experience was made. Meaning in this analysis, therefore, was attached to the phenomenon by the participants but inferred from external sources.[351]

Procedurally, data were initially understood through repeated readings of transcripts and review of field notes for tacit information. Group-specific sociocultural contexts were elucidated by deeply engaging with the data and iterative cycling between observations and interpretations until the concept was sufficiently understood.[353] Meaning units were then detected whenever there was a transition in meaning in the description. The student researcher initially coded and recoded the emerging meaning units to check if there was any intrapersonal inconsistencies in the coding process. Final themes were decided after triangulating different interpretations and reaching a consensus between the student researcher and the project supervisors through subsequent discussions and review of the themes. NVivo12 qualitative data analysis software[354] was used to code and juxtapose the themes in a chronological order of events and conceptual relationships. Memos and displays were used to identify relationships between the concepts and make a concise presentation of the data.[344, 355]

Interpretations were made by comparing supporting and opposing concepts horizontally within and between the different categories of participants (i.e. amongst prisoner participants and between prisoner and service provider participants), prison settings and phenomena, and vertically between the themes (emic categories) and theoretical concepts (etic categories) in terms of recurrence, patterns and relationships.[344, 346] This facilitated consideration of the empirical data in a range of different dimensions to verify its credibility. It also enabled approval or disapproval of existing theories and generating new ones through triangulation of supporting concepts from the multiple data sources.[344-346, 351, 353] Drawing inferences from the data using theories may allow extending the accounts of the study participants regarding the HCC in prion environments beyond the settings and populations encompassed by this study.[282]

Reflexivity was considered important for the analysis regarding the influence that the student researcher (a male Ethiopian who had no previous experience of imprisonment) may have had during his interactions with prisoner and service provider participants, and while analysing and interpreting the interview data. The student researcher belonged to the same ethnic background and shared many of the same cultural practices from which most of the prisoner participants originated, which might have given him to some extent an insider role to access the culture and ask participants more meaningful questions [350, 356]. While the potential difference in socioeconomic and educational status between the student researcher and prisoner participants might have impacted the trustworthiness of data, the student researcher's previous research experiences in the same settings [26] offered him an opportunity to understand the research context [350, 356]. The student researcher constantly maintained a journal of the research process encompassing experiences, emotions and change in attitudes towards participants and how this could impact data [357]. Interpretation of data by triangulating the perspectives of the project supervisors (non-Ethiopian male and female academics) could potentially reduce possible bias due to the student researcher's view of prisoner participants in terms of accessing HIV care within the context of the study setting [350, 358].

4.7 Ethical considerations

Studies that involved direct participation of individuals (i.e. the cohort stage and qualitative interviewing) received ethical approvals from Flinders University, Social and Behavioural Research Ethics Committee (SBREC) (see Appendices 4.13 & 4.14) and Ethical Review Board of Southern Nations, Nationalities and People's Region (SNNPR) Health Bureau (see Appendix 4.15). A formal permission was obtained from the SNNPR State Prison Administration (see Appendices 4.16), and consent was obtained from each correctional and health care facility authority to allow the research team to contact participants.

Given the expected high level of illiteracy amongst participants, an information sheet was verbally explained in local languages that participants could understand. This was performed by the research assistants for the cohort participants and by the student researcher for prisoners participated in the qualitative interviewing. The information sheet described the purpose, importance, and associated risks of the studies as well as the type of information required from the participants (see Appendices 4.17 & 4.18).

Coercive participation was minimised by utilising various strategies. All potential participants were informed during recruitment that the student researcher and research assistants were neutral individuals who had no service provision role in any of the study prisons and health care facilities. They were made aware that participation was entirely voluntary and whether they participated or not, or withdraw after participating, would have no effect on any treatment, service that was being provided for them, sentencing (if a prisoner) or work position or benefits (if a service provider participant). They could ask that the interviewing be stopped at any time, and that they could withdraw at any time from the session or the research without disadvantage. Health care providers at the prisons and respective public health care facilities (ART sites) facilitated contacting potential participants during their regular clinic visits, however, these staff played no role in the consent and interviewing processes. Potential participants were invited to participate after having finished their routine medication activities.

Participants were provided with the information that they might not directly benefit from taking part in the research, however, sharing of their experiences may contribute to improving quality of HIV care at correctional facilities, which would ultimately lead to prevention of HIV in the larger community. They were informed that involvement of service providers in the project might allow consideration of the HCC in prison population as one of the primary public health

issues in the community so that contextual strategies would be designed to ensure standard care.

Participants engaged in the studies after details of procedures and any risks including the amount of time they would spend had been explained to their satisfaction and written consent was confirmed by signature (see Appendices 4.17 & 4.18). Information was provided for cohort participants about the situation that their blood test results of CD4 count and viral load would be extracted from laboratory registers, and qualitative interview participants were provided with information about audio recording of their interview. Participants were offered a compensatory payment for their time commitment taking into account the amount of time they devoted and their daily earning background. Although the student researcher anticipated minimal risk from their involvement in the studies, some participants might have experienced emotional discomfort given the nature of the project. Advice was given during recruitment about how to access free counselling and support services at each study health care facility if any emotional discomfort was experienced. Participants were assured that any information they provided would be treated with the strictest confidence by the student researcher. However, they were also advised that any illegal activities and mistreatments that might be disclosed during the research process would be reported to relevant authorities, although this did not happen in the current studies.

Self-disclosure of HIV status might be reduced amongst participants as HIV is often associated with stigma and discrimination by the community, prison staff and other inmates. For this reason, maintaining strict confidentiality was an important issue in the current studies. The research assistants who conducted the questionnaire interviews (in the cohort study) were trained HIV counsellors who already had good knowledge about handling HIV-related information. Questionnaires and qualitative interviews were completed in privacy secured places. The questionnaire interviews were conducted at public health care facilities in a room near to an ART clinic, whereas the qualitative interviews were undertaken in a prison clinic or in a room near to it. No names were recorded as data were collected using a unique ART number for cohort participants and study specific codes were used for qualitative interview participants. After collection, the student researcher transported forms containing data in a locked bag to a storage location where they were kept secured in a locker until entered into a password protected personal computer and later transferred to Flinders University personal password protected network. The unique ART number was replaced with a unique study

number after data entry. Participants were assured that while all the efforts would be made to remove any information that might reveal their identity in the resulting thesis, report or other publications, complete anonymity could not be guaranteed as the sample size was relatively small.

4.8 Methods: summary

With the stance of critical realism, this project employed a mixed methods approach to answer an overarching research question "What circumstances influence the HCC in incarcerated people compared to their non-incarcerated counterparts in South Ethiopia?" which seems to have both exploratory and comparative components. The exploratory components were investigated using a qualitative approach (qualitative interviewing), whereas the comparative components were addressed using quantitative approaches including meta-analysis and prospective cohort designs. The meta-analysis assessed factors affecting the HCC in incarcerated people worldwide, whilst the prospective cohort study compared the risk factors between incarcerated and non-incarcerated people in the South Ethiopian context. Findings of the cohort study were further explained by using meaning generated by in-depth interviewing of prisoners' lived experience regarding HIV care use across incarceration trajectories and relevant service providers' experiential account of HIV care provision for people with criminal justice involvement.

CHAPTER FIVE
RESULTS

Introduction

This chapter presents results of the quantitative and qualitative approaches discussed in the preceding chapter. Findings of the meta-analysis, prospective cohort study and qualitative interviewing are presented consecutively. In each section, the characteristics of participants (and individual studies in the case of the meta-analysis) are described, followed by specific study outcomes. The results are structured based on the stages of the HIV care continuum (HCC) assessed in this thesis: antiretroviral therapy (ART) initiation, adherence, viral suppression and immunologic progression.

5.1 Results of the meta-analysis

This section presents findings of meta-analyses of global studies on factors influencing the HCC in incarcerated people, which also formed part of a systematic review published in *PLOS ONE*[229] (see Appendix 3.4). Results of the systematic narrative review are presented in the literature review (Chapter 3, section 3.3). The review findings informed the prospective cohort and qualitative studies presented in the latter sections.

5.1.1 Study characteristics

The search strategies identified a total of 2,348 articles: 2,345 articles through database searches and three through bibliography searches. Of these, 2,274 articles were eliminated due to duplication and irrelevance based on title and abstract review. Twenty-nine of the remaining 71 studies were removed after full text review due to the study not analysing HIV care during incarceration or not reporting at least one of the HCC elements. The remaining 42 articles were included in the narrative review (presented in Chapter 3, section 3.3). Of these, seventeen studies were included in the meta-analysis; 25 articles were excluded due to being qualitative studies (8) or lacking other studies measuring the outcome/exposure (17). Figure 5.1-1 shows the overall screening process and number of studies excluded and retrieved at each stage.

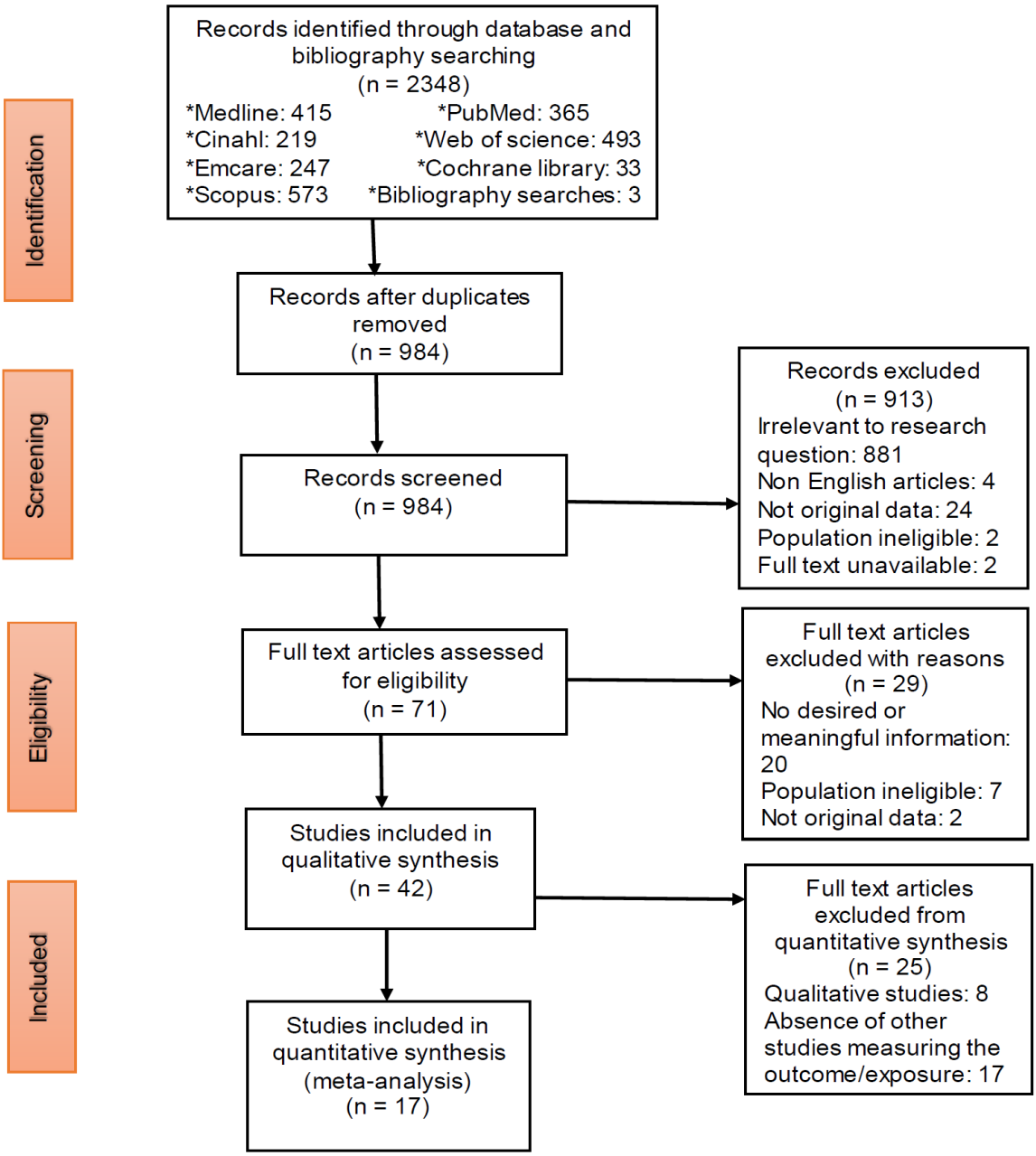


Figure 5.1-1: Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) flow diagram showing numbers of studies screened, included in and excluded from the review at each stage

The main characteristics of studies included in the meta-analysis are described in Chapter 3 (Tables 3.3-1, 3.3-2 & 3.3-3 with authors' name marked with ** or ***). The majority (16) of the studies were from high-income countries with most (11) of these being USA based while the rest five were from Canada (3) and Spain (2). The remaining one study was from Indonesia. Eight of the studies were retrospective cohort[97, 149, 244, 246, 247, 253, 254, 359] and other eight cross-sectional[20, 138, 139, 232, 233, 242, 248, 256] and one prospective cohort in design.[249] Three studies reported more than one elements of the HCC (one on ART initiation and adherence[138] and two on viral suppression and change in CD4 count[149, 254]) and hence were included in more than one category. The other fourteen studies reported on a single element of the continuum: four on ART initiation,[20, 232, 233, 242] two on adherence[139, 256] and eight on viral suppression.[97, 244, 246-249, 253, 359] Of the seventeen studies, fourteen were related to incarceration and the HCC,[20, 97, 138, 139, 149, 242, 244, 246-249, 253, 254, 256] and the remaining three were specific to jail incarceration.[232, 233, 359] Seven studies investigated outcomes of the HCC during incarceration[20, 138, 139, 232, 233, 242, 256] and five investigated the impact of history of incarceration and/or the number of incarcerations.[246-249, 359] Five studies compared the outcomes between incarceration trajectories: three before and after incarceration[97, 149, 244] and two between incarcerated and re-incarcerated people.[253, 254] Overall, studies included in the meta-analysis involved 22,292 people.

5.1.2 Methodological quality and measurements

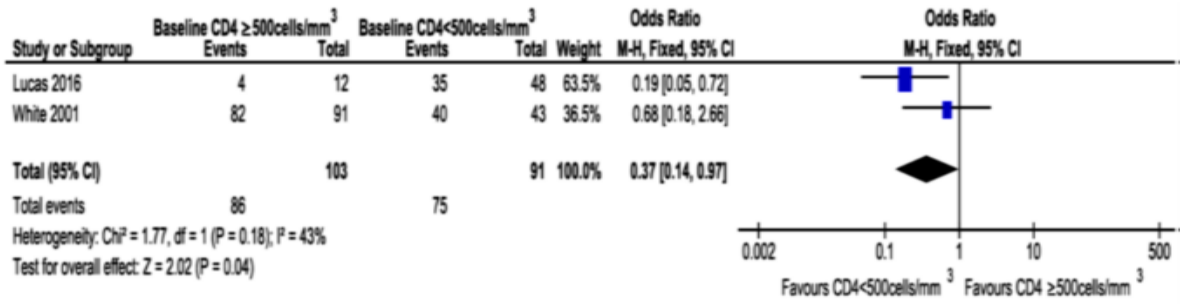
More than three-quarters of the studies (76%) were scored as moderate or above performance on the Effective Public Health Practice Project (EPHPP) tool with regard to minimising selection bias, while 41% scored moderate performance in terms of the appropriateness of the study design. More than half of the studies (70%) accounted for confounding variables during analysis and almost half (47%) scored moderate or above in terms of validity of data collection methods. Risk of bias due to drop-out and withdrawal was inapplicable in the majority of studies (94%) mainly due to analyses of cross-sectional and retrospective data. While two studies had a strong performance in the measurement of the overall methodological quality, seven other studies scored as having moderate methodological quality (see Appendix 5.1).

As discussed in Chapter 3 (section 3.1), various approaches have been used by the individual studies to define poor outcomes of the HCC. Of five studies that reported on ART initiation, one study measured a rate of ART initiation since diagnosis[20] and the other four estimated the prevalence of ART initiation or acceptance at a particular period of time.[138, 232, 233, 242] All ART adherence studies measured adherence to dose over a varying period of time (days, weeks and months) using self-report.[138, 139, 256] One study considered adherence to medication schedule as an alternative measure to dose adherence.[256] One study set optimal adherence at ≥80%[246] and two other studies defined non-adherence as missing ≥2 doses or schedules in the last five days or a week or more than two days without medication in the last three months.[139, 256]

The cut-off for viral suppression also varied greatly amongst studies, ranging from <40 copies/mL[149] to <500 copies/mL.[246, 247] Five studies used <400 copies/mL[97, 244, 249, 253, 254] and three used <200 copies/mL.[20, 248, 359] In this meta-analysis, the outcomes were dichotomised based on the highest cut-off values used in the included studies; adherence <100% as a threshold for non-adherence and viral load <500 copies/mL for viral suppression. Immunologic progression was measured as a change in CD4 count between entry and release from prison.[149, 254] A full description of the definitions is presented in Chapter 3 (Tables 3.3-1, 3.3-2 & 3.3-3).

5.1.3 Factors associated with delays in ART initiation

Lower odds of ART initiation were noticed amongst prisoners with higher baseline CD4 count (≥500 cells/mm^3) (Fig 5.1-2a; OR = 0.37, 95%CI: 0.14-0.97, I^2 = 43%) and those who were newly diagnosed for HIV (Fig 5.1-2b; OR = 0.07, 95%CI: 0.05-0.10, I^2 = 68%). Prisoners who lacked belief in ART safety and efficacy were 68% (Fig 5.1-2c; OR = 0.32, 95%CI: 0.18-0.56, I^2 = 0%) and 69% (Fig 5.1-2d; OR = 0.31, 95%CI: 0.17-0.57, I^2 = 0%) less likely to initiate ART respectively compared to their comparators.



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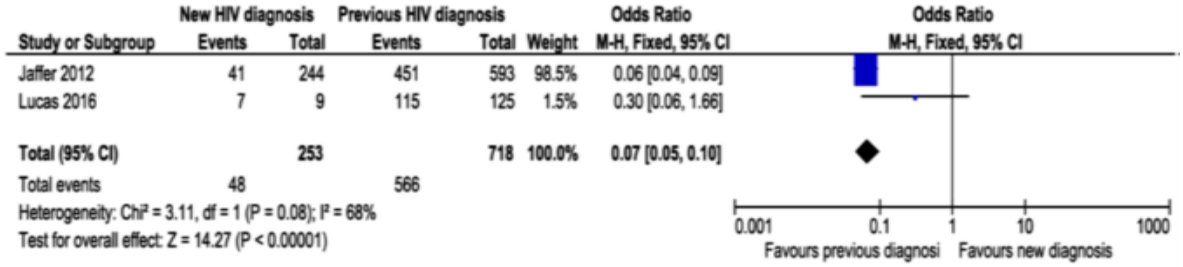

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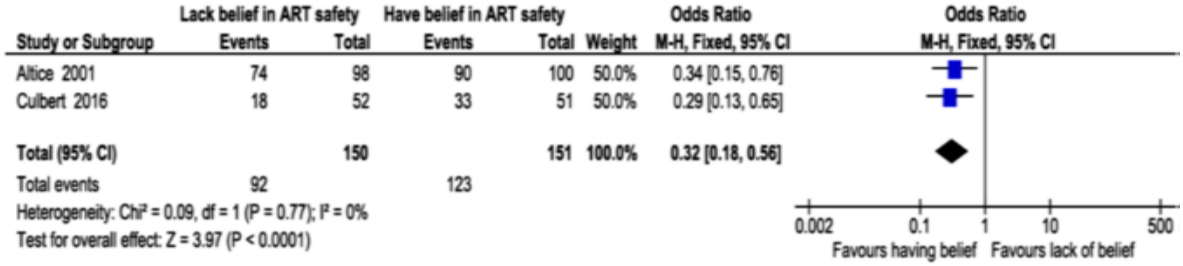

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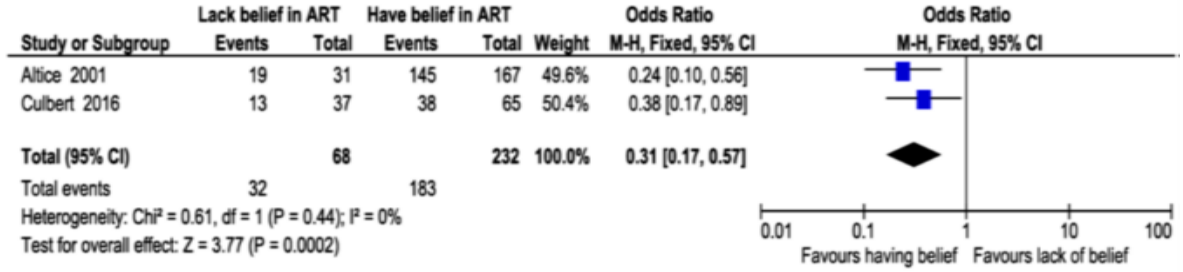


d)

Figure 5.1-2: Forest plot of associations between antiretroviral therapy (ART) initiation and baseline CD4 count (a), time of HIV diagnosis (b), belief in ART safety (c) and efficacy (d)

5.1.4 Factors associated with ART non-adherence

Non-adherence was higher amongst prisoners who lacked social support (Fig 5.1-3a; OR = 3.36, 95%CI: 2.03-5.56, I^2 = 35%) and those who had low self-efficiency to consistently use ART (Fig 5.1-3b; OR = 2.50, 95%CI: 1.64-3.80, I^2 = 22%). Prisoners with an experience of depression were more than twice less likely to be adherent to ART compared to their normal counterparts (Fig 5.1-3c; OR = 2.02, 95%CI: 1.34-3.02, I^2 = 0%).

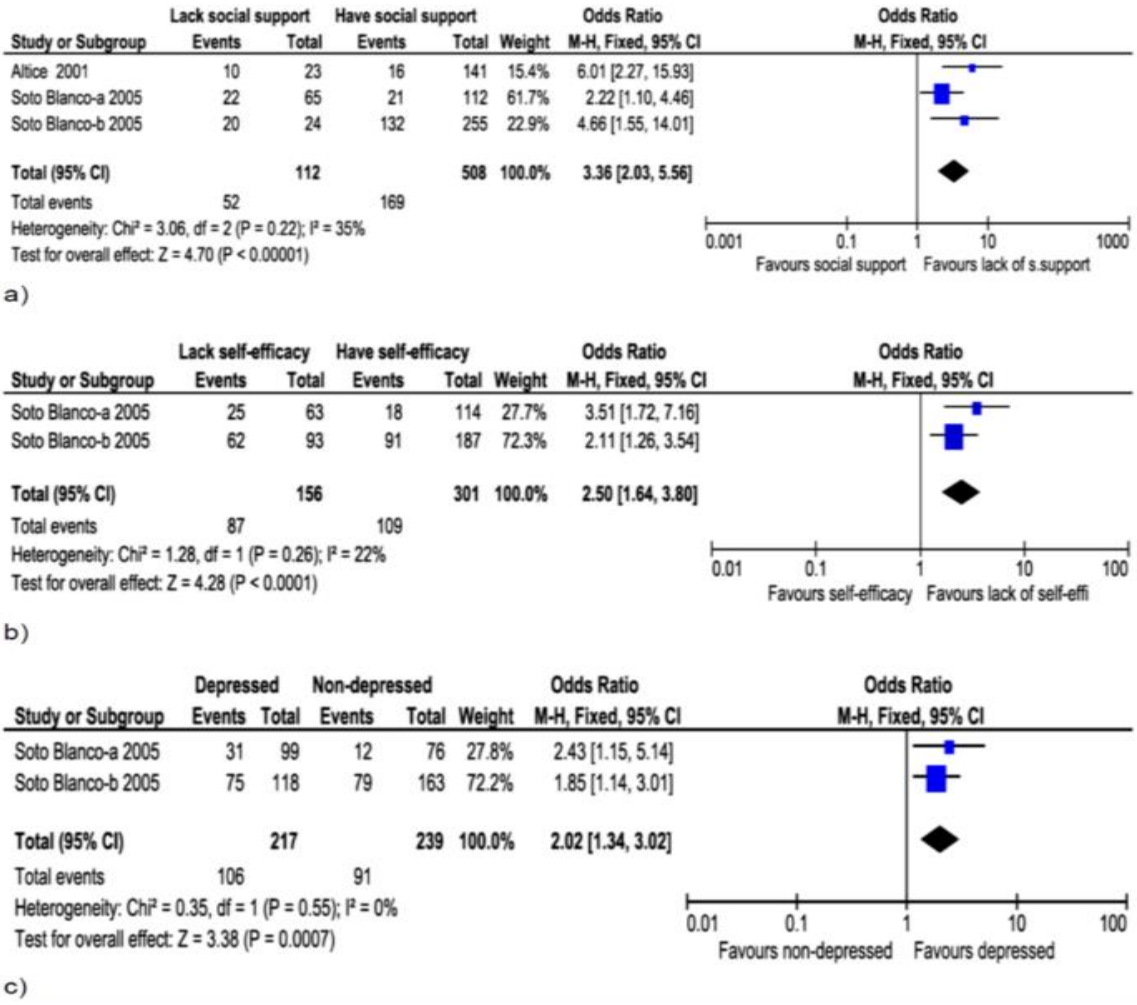
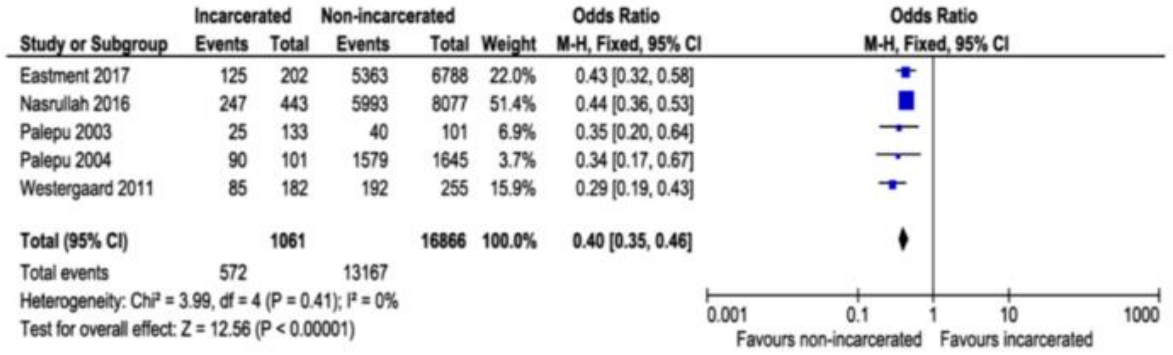


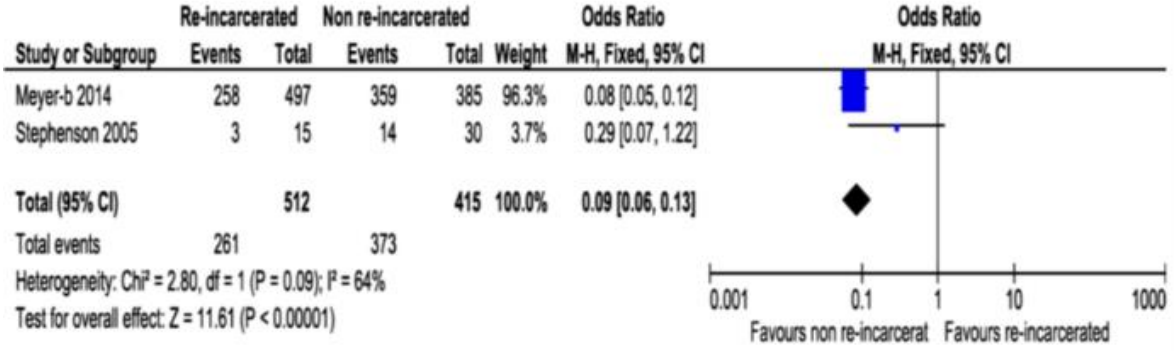
Figure 5.1-3: Forest plot of associations between antiretroviral therapy non-adherence and social support (a), self-efficacy (b) and depression (c)

5.1.5 Factors associated with viral non-suppression and immunologic decline

People with a history of incarceration were at higher risk of viral non-suppression compared to non-incarcerated people (Fig 5.1-4a; OR = 0.40, 95%CI: 0.35-0.46, I^2 = 0%), but at lower risk than re-incarcerated people (Fig 5.1-4b; OR = 0.09, 95%CI: 0.06-0.13, I^2 = 64%). Male prisoners had lower odds of viral suppression compared to female prisoners at exit from prison (Fig 5.1-4c; OR = 0.55, 95%CI: 0.42-0.72, I^2 = 0%).



a)



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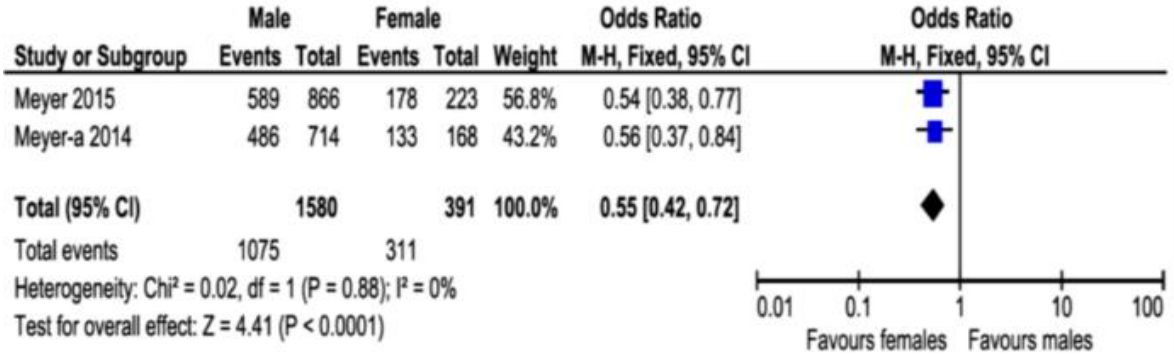

c)

Figure 5.1-4: Forest plot of associations between viral suppression and incarceration (a), re-incarceration (b) and gender (c)

Higher odds of CD4 count <200 cells/mm^3 (Fig 5.1-5a; OR = 2.01, 95%CI: 1.62, 2.50, I^2 = 44%) and lower odds of viral suppression (Fig 5.1-5b; OR = 0.20, 95%CI: 0.17-0.22, I^2 = 0%) were observed during prison entry compared to those noticed during release. A study by Lucas et al [20] was removed from the analysis of viral suppression during prison entry and exit to avoid severe heterogeneity (Fig 5.1-4b).

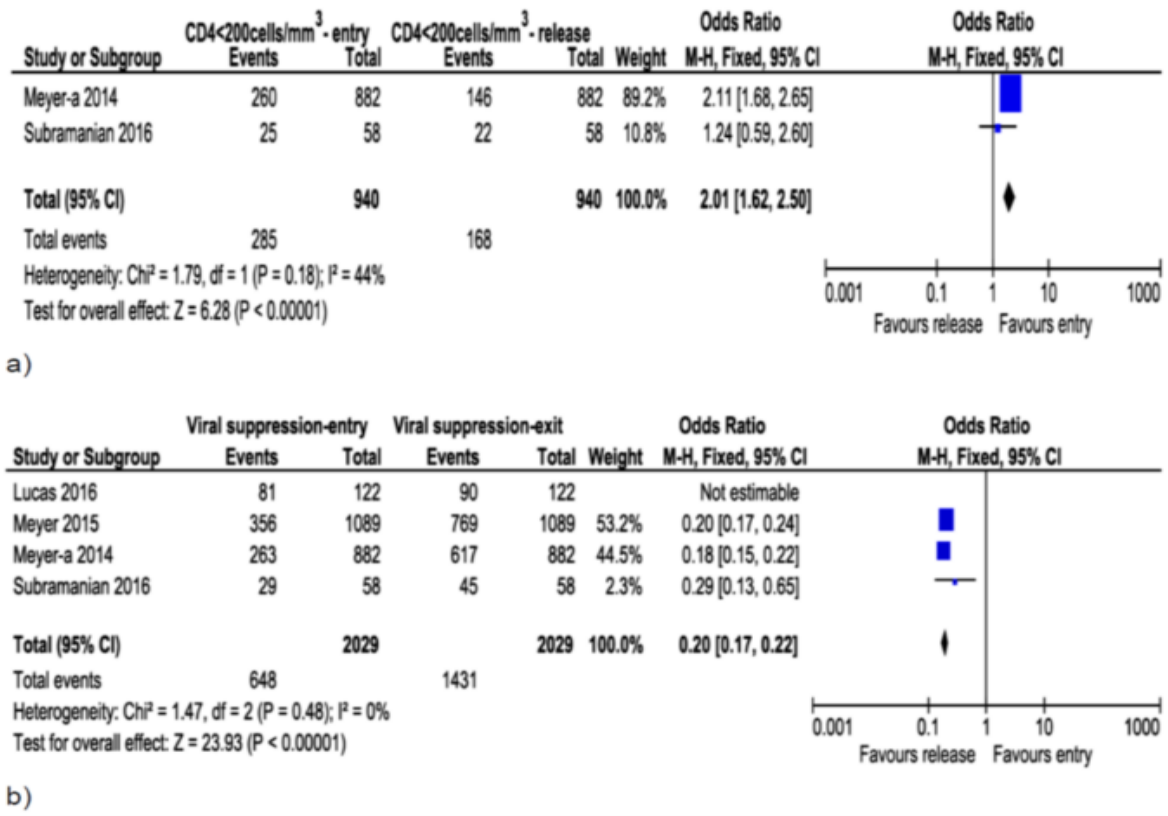

Figure 5.1-5: Forest plot of differences in CD4 count (a) and viral suppression (b) at prison entry and exit.

5.2 Results of the cohort study

Findings of the prospective cohort study, part of which also formed a paper submitted to *AIDS Research and Therapy* for publication (see Appendix 5.2), are presented in this section. The first three sub-sections present the sociodemographic (including incarceration-related characteristics of prisoners), psychosocial and clinical characteristics of participants. Results of univariate and multivariate analyses of factors influencing the HCC components amongst inmates living with HIV (ILWH) are described in the subsequent sub-sections in comparison with non-incarcerated people living with HIV (PLWH). The final sub-section describes findings on HIV transmission risk factors in the prisons and outside community.

5.2.1 Participant characteristics

5.2.1.1 Sociodemographic and incarceration-related characteristics

In the six participating correctional facilities, 122 ILWH had been identified from the respective prison clinics by the end of the study: 31 from Hossana prison, 29 from Sodo, 25 from Durame, 18 from Wolkite, 10 from Alaba and 9 from Worabe prison. Of these, 24 (19.7%) ILWH did not participate due to their release from prison ahead of their clinic appointment at which the consenting process would have been conducted. Eight ILWH (6.6%) failed to meet the study eligibility criteria (see Chapter 4, section 4.4.2). Of the remaining 90 ILWH, 76 agreed to participate in the study, which gives a response rate of 84.4%. During the study period, there was a total of 3,806 non-incarcerated adult PLWH who were receiving either pre-ART or ART service at the six selected public health care facilities; of whom, 319 were randomly selected for participation in this cohort as comparators (see Chapter 4, section 4.5.1).

Sociodemographic and incarceration-related characteristics of participants are described in Table 5.2-1. The majority (90%) of ILWH participants were male, as were only 48% of non-incarcerated PLWH participants. Both groups were of comparable age; the median age of ILWH was 34 years whereas that of non-incarcerated PLWH was 35 years ($P = 0.071$). Having a partner was less common in ILWH (46%) relative to non-incarcerated PLWH (58%). Significantly more non-incarcerated PLWH participants reported having completed high school and college education compared to ILWH participants ($P = 0.015$).

As measured according to the World Bank Wealth Index,[360] 30% of ILWH and 36% of non-incarcerated PLWH were classified below the poverty line (having a monthly income of ≤13.5USD). As shown in Table 5.2-1, half of the ILWH reported urban areas as their last residence before incarceration whereas 69% of non-incarcerated PLWH were urban residents (P = 0.013). While ILWH were significantly more likely to be farmers or daily labourers prior to incarceration relative to their comparators, rural residence and being a daily labourer was significantly associated with low educational and income status. A history of homelessness was significantly more common in ILWH compared to non-incarcerated PLWH.

The median length of incarceration for ILWH participants was 20 months and more than two-thirds (67%) were incarcerated for 12 or more months. Fifteen (20%) reported experiencing two or more episodes of incarceration (recidivism). In convicted ILWH, the median length of sentence was 68.5 months. The sentence period ranged from 12 months to 59 months in 37% of the cases and 120 months or more including a life sentence in 35% of the cases (see Table 5.2-1).

Table 5.2-1: Sociodemographic and incarceration-related characteristics of HIV-infected individuals in South Ethiopia (N=395)

Characteristic		Incarcerated (N=76), n (%)	Non-incarcerated (N= 319), n (%)	*P*-value (Ch^2)
Gender	Male	68 (89.5)	150 (47.0)	0.000
	Female	8 (10.5)	169 (53.0)	
Age in years	18-25	14 (18.4)	33 (10.4)	0.157
	26-30	19 (25)	69 (21.6)	
	31-35	14 (18.4)	61 (19.1)	
	>35	29 (38.2)	156 (48.9)	
Current marital status	Have partner	35 (46.1)	184 (57.7)	0.067
	Have no partner	41 (53.9)	135 (42.3)	
Highest level of education completed	No school	25 (32.9)	85 (26.7)	0.015
	Elementary school	38 (50.0)	121 (37.9)	
	High school	11 (14.5)	76 (23.8)	
	College graduate	2 (2.6)	37 (11.6)	
Employment status	Unemployed	4 (5.3)	19 (6.0)	0.000
	Government employee	7 (9.2)	64 (20.0)	
	Home duties	2 (2.6)	72 (22.6)	
	Farmer	19 (25.0)	50 (15.7)	
	Daily labourer	20 (26.3)	59 (18.5)	
	*Other	24 (31.6)	55 (17.2)	
†Monthly income in USD	≤13.5	22 (30.1)	114 (35.9)	0.480
	13.6-22.8	8 (11.0)	24 (7.6)	
	>22.8	43 (58.9)	179 (56.5)	
‡Residence	Urban	38 (50.0)	221 (69.3)	0.013
	Rural	28 (36.8)	74 (23.2)	
	Both	10 (13.2)	23 (7.2)	
	Unknown	0 (0.0)	1 (0.3)	
History of homelessness	No	63 (82.9)	307 (96.2)	0.000
	Yes	13 (17.1)	12 (3.8)	
Length of current incarceration in months	<12	25 (32.9)	–	–
	≥12	51 (67.1)	–	
†Length of current sentence in months	<12	3 (4.4)	–	–
	12-59	25 (36.8)	–	–
	60-119	16 (23.5)	–	–
	≥120	24 (35.3)	–	–
Number of incarcerations	1	61 (80.3)	–	–
	>1	15 (19.7)	–	

USD: United States dollars

*'Other' category for employment status represents individuals who were engaged in private jobs (including various business works) and students.

†Sum of 'monthly income' and 'length of current sentence' categories may not give the total sample due to missing data (1.3% and 10.5% respectively).

‡Residence, employment status and monthly income for incarcerated people refer to the last circumstances before incarceration.

5.2.1.2 Psychosocial characteristics and perceptions of HIV and ART

As shown in Table 5.2-2, psychosocial factors such as non-specific psychiatric distress, perceptions of stigma and social support (including support of health care providers) were assessed along with individual knowledge and perceptions of HIV and ART. The self-efficacy to seek social support was also assessed.

For parameters that were measured using the Likert's scale or similar methods (depression, social stigma, level of satisfaction, knowledge, attitude and self-efficacy), the 75th percentile was used to set the minimum cut-off point as the total scores are skewed and item correlations are less than 0.75 in all cases.[361] More than 38% of ILWH participants reported experiencing depression in the previous 30 days, which was significantly more frequent than for non-incarcerated PLWH (20%). The prevalence of the overall social stigma (perceived, enacted and internalised stigma) was higher in ILWH (28%) than non-incarcerated PLWH (23%). The overall level of satisfaction with ART services was only 20%, with significantly more ILWH (88%) reporting low satisfaction relative to PLWH (78%) (P = 0.024). The majority (86%) of ILWH participants also reported poor satisfaction with services provided by the prison system, including health care services and rations. Importantly, 63% of ILWH reported never receiving visits from people outside prison during their incarceration.

Table 5.2-2-: Psychosocial characteristics and perceptions of HIV and ART amongst incarcerated and non-incarcerated people living with HIV in South Ethiopia (N=395)

Variable	Incarcerated (N=76), n (%)	Non-incarcerated (N= 319), n (%)	*P*-value (Ch^2)
Depression	29 (38.2)	64 (20.1)	0.001
Social stigma	21 (27.6)	72 (22.6)	0.350
Dissatisfaction with ART services	67 (88.2)	234 (77.5)	0.024
Poor knowledge about HIV and ART	64 (84.2)	274 (85.9)	0.708
Negative attitude towards ART	65 (85.5)	258 (80.9)	0.346
Low self-efficacy to seek support	62 (81.6)	239 (74.9)	0.221
Dissatisfaction with prison services	65 (85.5)	–	–
Monthly visits from people outside prison: None One Two or more	 48 (63.2) 20 (26.3) 8 (10.5)	 – – –	–

ART: antiretroviral therapy

The levels of knowledge about HIV and ART and perceptions of ART were similar but considerably poor in both populations. While self-efficacy to seek social support was generally low overall (24%), it was lower in ILWH (18%) than non-incarcerated PLWH (25%) (see Table 5.2-2).

5.2.1.3 Outcomes of HCC

Outcomes of the HCC including ART initiation, treatment adherence, viral suppression and immunologic progression were investigated. In Table 5.2-3 are presented the outcomes in incarcerated and non-incarcerated PLWH. Overall, 130 PLWH (26 incarcerated and 104 non-incarcerated) participated in the ART initiation arm. Delay in ART initiation was measured using baseline CD4 count and WHO clinical stages as previously described in Chapter 4 (section 4.5.3.2). Commencement of ART on the date of diagnosis ('same day treatment') was assessed to evaluate the effectiveness of the 'Test and Treat' approach.

The overall prevalence of delayed ART initiation was 20% based on baseline CD4 count and 24% according to WHO clinical stages. ILWH had a median CD4 count of 381 cells/mm^3 during ART initiation which was higher than non-incarcerated PLWH (297 cells/mm^3), but this difference was not statistically significant (P = 0.115). More than half (56%) of participants were initiated to ART on the test date. While both cohorts had comparable prevalences of delayed ART initiation, a significantly lower proportion of ILWH (19%) were able to initiate ART on the test date relative to their non-incarcerated counterparts (50%) (see Table 5.2-3).

Table 5.2-3: Outcomes of the HIV care continuum in incarcerated and non-incarcerated people living with HIV in South Ethiopia*

Clinical characteristic		Incarcerated, n (%)	Non-incarcerated, n (%)	*P*-value (Chi2)
ART initiation	Failure to initiate ART on test date (N=130)	21 (80.8)	52 (50.0)	0.005
	Delay based on CD4 count (N=116)	5 (20.0)	18 (19.8)	0.981
	Delay based on WHO clinical stage (N=119)	4 (16.7)	24 (25.3)	0.375
ART adherence	SR-NA (N=370)	14 (18.9)	50 (16.9)	0.680
	MPR-NA (N=370)	8 (10.8)	74 (25.0)	0.009
ART outcomes	VF (N=359)	4 (6.0)	13 (4.4)	0.598
	IF (283)	0 (0)	4 (1.7)	–

ART: antiretroviral therapy; MPR-NA: non-adherence based on medication possession ratio (pharmacy refill); SR-NA: self-reported non-adherence; IF: immunologic failure; VF: virological failure; WHO: World Health Organization

*The total sample within a group categories varies due to missingness.

Seventy-four incarcerated and two hundred ninety-six (296) non-incarcerated PLWH participated in the ART adherence investigation. The median duration of ART use was 44 months for incarcerated PLWH and 48 months for non-incarcerated PLWH. Adherence was measured using self-report and MPR (Medication Possession Ratio) methods as discussed in Chapter 4 (section 4.5.3.2). The overall prevalence of non-adherence was 17% by self-report and 22% using MPR. While prisoners had a significantly higher MPR adherence compared to non-incarcerated individuals (89% vs 75%), they had a slightly lower dose adherence (see Table 5.2-3 above).

The same individuals who participated in the adherence analysis are represented in the assessment of ART outcomes. ART outcomes were determined based on the level of plasma viral load and CD4 count after six or more months of ART commencement as discussed in Chapter 4 (section 4.5.3.2). Both populations had comparable median values of plasma viral load (0 copies/mL) and a follow-up CD4 count (561cells/mm^3 vs 543 cells/mm^3) (P>0.05). The total prevalence of virological failure (VF) was 4.7% whereas that of immunologic failure (IF) was 1.4%. VF was higher in prisoners and IF was higher in non-incarcerated individuals but these differences were not statistically significant (see Table 5.2-3). Of note, no significant differences were observed between correctional facilities in terms of any of the above HCC outcomes.

Of fifty prisoners who were taking ART prior to their incarceration, more than half (52%) reported being unable to continue their medication during their stay in jail due to: no access to drugs, fear of social stigma, lack of support from jail staff or a combination of two or all of these reasons. A small number of inmates reported other reasons such as a ‘lack of interest’ in the medication. Of those who were able to continue their medication in jail, 9% experienced a delay of a week or more. Figure 5.2-1 depicts reasons for discontinuation of ART during stay in jail (immediately after their arrest) and after prison entry. After prison entry, 16% of prisoners continued ART following four or more weeks of interruption, again due to: lack of access to ART services, unsupportive security staff, fear of social stigma or a combination of the above reasons. Others reported experiencing ART interruptions during their transition from jail to prison.

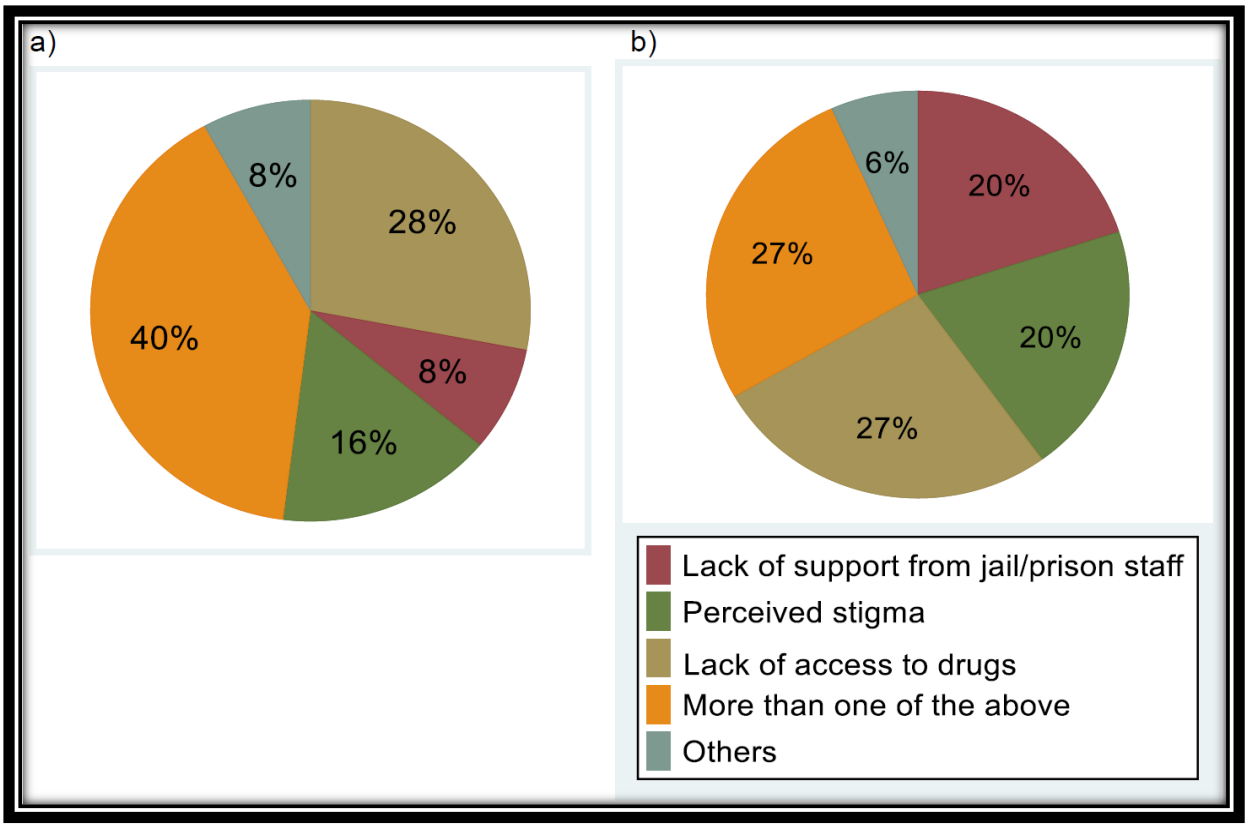

Figure 5.2-1: Reasons for discontinuation of antiretroviral therapy amongst HIV-infected prisoners during stay in jail (a) and after prison entry (b) in South Ethiopia

*Jails are temporary detention centres for arrested people who are not convicted and those whose cases are not yet on trial.

*Prisons serve convicted persons and those whose cases are brought to trial.

5.2.2 Factors associated with delay in ART initiation

From undertaking a bivariate analysis, the overall delay in ART initiation (estimated using a baseline CD4 count) was significantly higher in individuals who sought HIV testing due to being sick ($P = 0.002$). Based on the WHO clinical stage criteria, higher delay was detected in non-incarcerated individuals who waited more than an hour to see a health care provider compared to those who waited an hour or less ($P = 0.042$), but no significant association was identified in this regard amongst prisoners. Table 5.2-4 presents the bivariate analysis results of factors associated with delayed ART initiation in HIV-infected incarcerated and non-incarcerated individuals.

Table 5.2-4: Factors associated with delay in ART initiation amongst HIV-infected incarcerated and non-incarcerated people in South Ethiopia (incarcerated=26; non-incarcerated=104)

Variable		ART initiation		*P*-value (Chi^2)
		Early, n (%)	Delayed, n (%)	
Triggering factors for having HIV test[β]	Partner's death/illness	21 (87.5)	3 (12.5)	0.002
	Being sick	18 (62.1)	11 (37.9)	
	Advice from a health care provider	38 (90.5)	4 (9.5)	
	More than one of the above	6 (54.6)	5 (45.5)	
	*Other	10 (100)	0 (0)	
Length of time waited to see ART service provider[¥ɤ]	≤1hr	54 (80.6)	13 (19.4)	0.042
	>1hr	17 (74.7)	11 (39.3)	

ART: antiretroviral therapy; hr: hour; [¥]non-incarcerated people; [β]delay in ART initiation determined based on baseline CD4 count; [ɤ]delay in ART initiation determined based on baseline World Health organization (WHO) clinical stage

*'Other' category for triggering factors for having HIV test represents characteristics such as motivation to be aware of HIV status and marriage.

A multivariate cox regression analysis identified covariates that were associated with the survival time of ART initiation since the date of the first HIV-positive test. There was no statistically significant difference between HIV-infected incarcerated and non-incarcerated people in terms of hazards of ART initiation. Other factors showing a significant association with survival time (regardless of incarceration status) are indicated in Table 5.2-5. Overall, HIV-infected individuals who were from rural areas were 74% less likely to timely initiate ART compared to urban residents (AHR (adjusted hazards ratio): 0.26; 95%CI: 0.08-0.86). Likewise, daily labouring, the single most frequently reported occupation type by prisoners (see Table 5.2-1 above), increased the hazards of not commencing ART by 93% relative to government jobs (AHR: 0.07; 95%CI: 0.01-0.38). Disclosure of one's HIV status only to a spouse rather than to more than one person increased the risk of ART delay by 89% (AHR: 0.11; 95%CI: 0.04-0.35) and to an offspring(s) by 95% (AHR: 0.05; 95%CI: 0.004-0.66).

Table 5.2-5: Cox proportional hazards model of factors associated with ART initiation amongst HIV-infected incarcerated and non-incarcerated people in South Ethiopia (N=130)

Variable		CHR (95% CI)	AHR (95% CI)
Residence	Urban	1	1
	Rural	0.86 (0.53-1.39)	0.26 (0.08-0.86)*
Employment status	Home duties	0.64 (0.26-1.58)	0.43 (0.09-2.03)
	Farmer	0.98 (0.39-2.44)	0.22 (0.0.04-1.28)
	Daily labourers	0.48 (0.19-1.20)	0.07 (0.01-0.38)*
	Government employee	1	1
	†Other	0.90 (0.36-2.21)	0.29 (0.07-1.15)
Monthly income in USD[m]	–	1.01(1.002-1.01)*	1.002 (0.99-1.01)
Relationship with a person to whom HIV status disclosed	Spouse	0.60 (0.31-1.16)	0.11 (0.04-0.35)*
	Offspring	0.64 (0.86-4.76)	0.05 (0.004-0.66)*
	Parent	0.82 (0.25-2.71)	0.95 (0.19-4.64)
	Relatives	0.48 (0.16-1.40)	0.34 (0.07-1.60)
	Friends	1.46 (0.44-4.88)	1.49 (0.38-5.85)
	More than one of the above	1	1
Number of pre-ART appointment missed	None	1	1
	1	0.60 (0.35-1.02)	0.30 (0.13-0.71)*
	≥2	0.35 (0.14-0.84)*	0.04 (0.01-0.23)*
Baseline WHO clinical stage	I/II	1	1
	III/IV	1.54 (0.89-2.66)	1.56 (0.63-3.83)

CHR: crude hazards ratio; AHR: adjusted hazards ratio; CI: confidence interval; USD: United States dollars; ART: antiretroviral therapy; WHO: World Health Organization; [m] variable with missing values; * statistically significant association at $P<0.05$

† 'Other' category for employment status represents individuals who were engaged in private jobs (including various business works) and students.

Notes:

- Residence, employment status and monthly income for incarcerated people refer to the last circumstances before incarceration.
- Sum of categories of 'residence', 'employment status' and 'relationship with a person to whom HIV status disclosed' may not give the total sample as some categories were not considered in the analysis due to an insufficient number of observations.
- The effect of missingness in this particular dataset is negligible as the complete case analysis and multiple imputation gave exactly the same AHRs (results not displayed).

A log-rank test revealed a significant difference in the probability of ART initiation between HIV-infected individuals who missed two or more pre-ART appointments and those who did not miss any ($P = 0.005$). Figure 5.2-2 portrays Kaplan-Meier survival estimates of a delay in ART initiation in terms of pre-ART attendance in incarcerated and non-incarcerated people. This was further confirmed by the cox regression analysis that the likelihood of ART initiation was 70% lower in those who missed a single appointment (AHR: 0.30; 95%CI: 0.13-0.71) and 96% lower in those who missed two or more (AHR: 0.04; 95%CI: 0.01-0.23) (see Table 5.2-5).

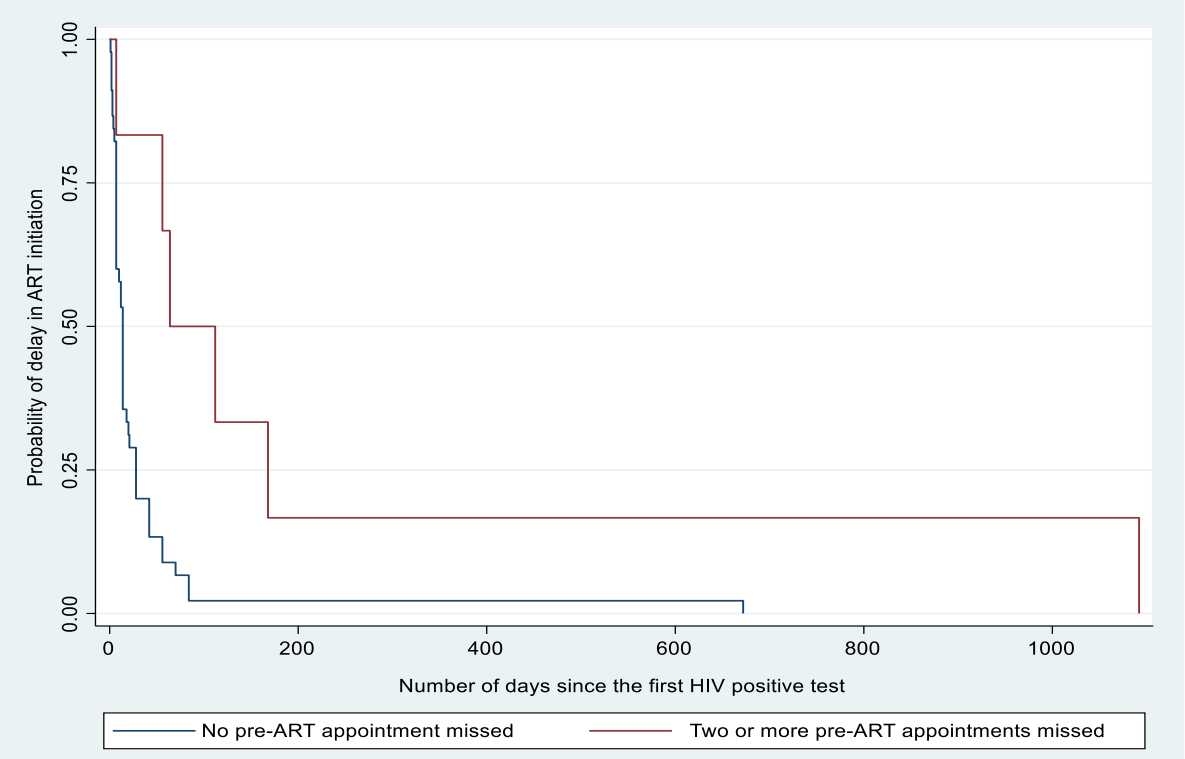

Figure 5.2-2: Kaplan-Meier survival estimates of delay in antiretroviral therapy (ART) initiation since the date of the first HIV-positive test with regard to pre-ART appointment attendance in incarcerated and non-incarcerated people

ART: antiretroviral therapy

Among participants who reported missing a pre-ART clinic appointment, the main reasons for missing were a lack of support from prison staff in inmates, forgetting in non-incarcerated people and fear of social stigma in both populations. Other reasons included a lack of transport, being busy in other activities and a need for repeat testing in the case of non-incarcerated individuals and stay in jail for inmates (see Fig 5.2-3).

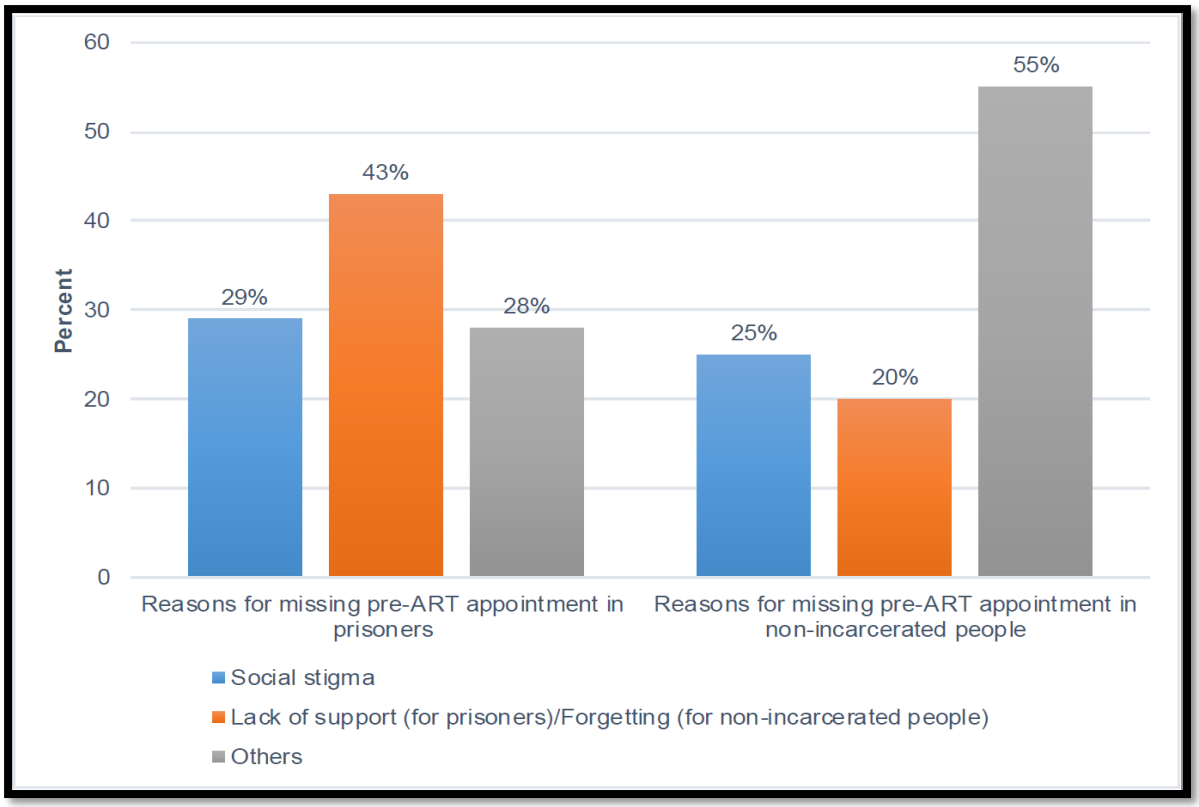

Figure 5.2-3: Reasons for missing clinic appointments during pre-antiretroviral therapy period amongst HIV-infected incarcerated and non-incarcerated individuals in South Ethiopia

ART: antiretroviral therapy

A multivariate logistic regression analysis showed that prisoners were 92% less likely to initiate ART on the test date compared to their non-incarcerated counterparts (AOR (adjusted odds ratio): 0.08; 95%CI: 0.02-0.28). Female PLWH in general were more than threefold more at risk of not commencing ART on the test date relative to males (AOR: 0.29; 95%CI: 0.11-0.78). The odds of same day ART was also significantly lower in individuals who perceived social stigma (AOR: 0.32; 95%CI: 0.11-0.90), and in those who were diagnosed due to sickness (through an 'Opt-in' approach) compared to a voluntary counselling and testing (VCT) approach (AOR: 0.26; 95%CI: 0.09-0.76) (see Table 5.2-6).

Table 5.2-6: Logistic regression model of factors affecting initiation of ART on test date amongst HIV-infected incarcerated and non-incarcerated people in South Ethiopia (N=130)

Variable		ART initiation on test date (TT)		COR (95% CI)	AOR (95% CI)
		Yes, n (%)	No, n (%)		
Incarceration	Non-incarcerated	52 (50.0)	52 (50.0)	1	1
	Incarcerated	5 (19.2)	21 (80.8)	0.24 (0.08-0.68)*	0.08 (0.02-0.28)*
Gender	Male	33 (47.1)	37 (52.9)	1	1
	Female	24 (40.0)	36 (60.0)	0.77 (0.38-1.55)	0.29 (0.11-0.78)*
Testing approach	VCT	18 (46.1)	21(53.9)	1	1
	Opt-out/PICT	26 (54.8)	22 (45.8)	1.38 (0.59-3.22)	1.34 (0.48-3.74)
	Opt-in	13 (30.2)	30 (69.8)	0.47 (0.19-1.17)	0.26 (0.09-0.76)*
Social stigma	Non-stigmatised	49 (48.0)	53 (52.0)	1	1
	Stigmatised	8 (28.6)	20 (71.4)	0.43 (0.18-1.07)	0.32 (0.11-0.90)*

COR: crude odds ratio; AOR: adjusted odds ratio; CI: confidence interval; ART: antiretroviral therapy; VCT: voluntary counselling and testing; PICT: provider initiated counselling and testing; TT: test and treat; * statistically significant association at $P<0.05$

5.2.3 Factors associated with ART non-adherence

As well as incarceration, factors related to an individual's literacy, and behavioural and clinical characteristics were linked with MPR (pharmacy refill) non-adherence in a bivariate analysis. Table 5.2-7 shows the bivariate analysis findings of factors associated with MPR non-adherence. Interestingly, MPR adherence was significantly higher in ILWH (89%) than non-incarcerated PLWH (75%) ($P = 0.009$).

The overall prevalence of non-adherence (of MPR) was significantly higher in PLWH who attended no school (26%) and in those who completed just elementary school (26%) relative to high school graduates (9%) ($P = 0.017$). It was almost twice (24%) as high in clients who had poor satisfaction with ART services as those who had good satisfaction (13%) ($P = 0.032$). Among non-incarcerated PLWH, those who reported drug use had a relatively lower MPR adherence compared to non-users (57% vs 76%) ($P = 0.047$). Moreover, non-incarcerated PLWH who were able to always follow their medication schedule were also able to be more adherent to MPR ($P = 0.004$), however, they became less adherent if they had any special medication instructions ($P = 0.004$) (see Table 5.2-7).

Table 5.2-7: Factors associated with pharmacy refill non-adherence amongst incarcerated and non-incarcerated people living with HIV in South Ethiopia (incarcerated=74; non-incarcerated=296)

Variable		Adherence		*P*-value (Chi^2)
		Adherent, n (%)	Non-adherent, n (%)	
Incarceration	Non-incarcerated	222 (75.0)	74 (25.0)	0.009
	Incarcerated	66 (89.2)	8 (10.8)	
Highest level of education completed	No school	78 (73.6)	28 (26.4)	0.017
	Elementary school	113 (73.9)	40 (26.1)	
	High school	70 (90.9)	7 (9.1)	
	College graduate	27(79.4)	7 (20.6)	
Drug use*	No	219 (75.8)	70 (24.2)	0.047
	Yes	4 (57.1)	3 (42.9)	
Adherence to medication schedule in the last four days*	Never	3 (60.0)	2 (40.0)	0.004
	Some	4 (40.0)	6 (60.0)	
	Half	18 (60.0)	12 (40.0)	
	Most	97 (74.1)	34 (25.9)	
	All of the time	100 (83.3)	20 (16.7)	
Having special medication instructions*	No	204 (77.6)	59 (22.4)	0.004
	Yes	18 (54.6)	15 (45.5)	
Satisfaction with ART services	Poor	226 (75.6)	73 (24.4)	0.032
	Good	62 (87.3)	9 (12.7)	

ART: antiretroviral therapy; *non-incarcerated people

Different factors were identified as determinants of overall dose non-adherence in a multivariate logistic regression analysis (see Table 5.2-8). The analysis indicated that missing a clinic appointment increases the risk of dose non-adherence. For instance, missing a single ART appointment increased the risk by 94% (AOR: 0.06; 95%CI: 0.02-0.22). As shown below in Figure 5.2-4, ART clients missed their clinic appointments for various reasons. Prisoners often missed appointments due to a lack of cooperativeness by prison staff and/or forgetting. Being away from usual residence, being occupied by daily routines, forgetting ART appointments, a lack of transport or a combination of two or more of these factors played a role in the case of non-incarcerated PLWH. Some prisoners reported missing their ART appointment due to a fear of being socially stigmatised, having a sense of hopelessness and lacking interest in the medication. A small number of non-incarcerated PLWH missed appointments being too ill to attend a health care facility.

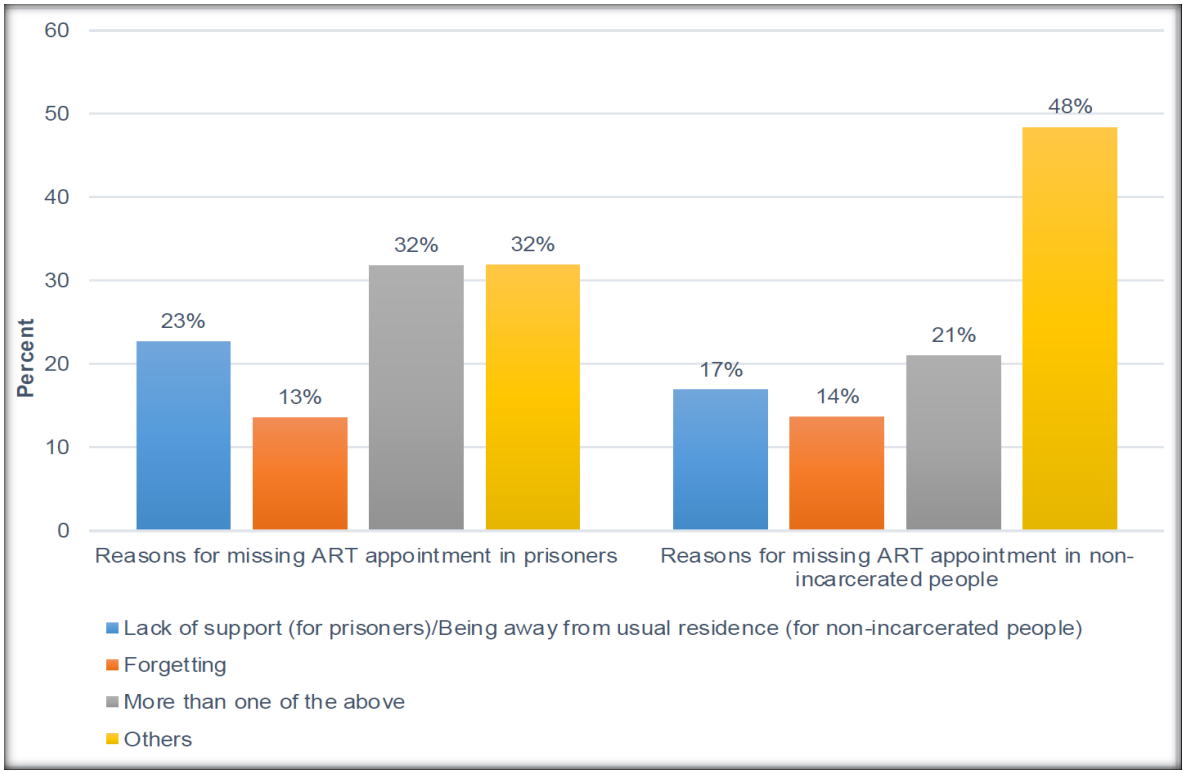

Figure 5.2-4: Reasons for missing clinic appointments amongst incarcerated and non-incarcerated antiretroviral therapy clients in South Ethiopia

ART: antiretroviral therapy

* Reasons reported by non-incarcerated ART clients such as 'being busy in daily routines' and 'a lack of transport' are included under 'Others' category.

Similar to MPR adherence in non-incarcerated PLWH (see Table 5.2-7 above), the ability to strictly adhere to a specific medication schedule was a determinant of dose adherence in both incarcerated and non-incarcerated PLWH. Accordingly, the odds of dose adherence were 99% lower in those who were able to keep their medication schedule most of the time rather than all of the time (AOR: 0.01; 95%CI: 0.002-0.13) and 99.8% lower in those who never followed their medication schedule (AOR: 0.002; 95%CI: 0.0001-0.05).

Methods that participants used to manage their medication schedule also appeared to affect dose adherence. PLWH who used news time on radio/TV or other social cues, such as sunlight or departure time to school/church/mosque were less likely to comply with doses relative to those who were able to use one or more time monitoring devices such as mobile phones, wristwatches, etc. (AOR: 0.08; 95%CI: 0.01-0.53 vs AOR: 0.07; 95%CI: 0.01-0.67). In addition, the risk of dose non-adherence was more than seven times higher in PLWH who had poor satisfaction with ART services (AOR: 0.14; 95%CI: 0.03-0.63), which was higher in incarcerated PLWH than their non-incarcerated counterparts (see Table 5.2-8).

Table 5.2-8: Logistic regression model of factors associated with self-reported ART non-adherence amongst incarcerated and non-incarcerated people living with HIV in South Ethiopia (incarcerated=74; non-incarcerated=296)

Variable		Adherence		COR (95% CI)	AOR (95% CI)
		Adherent, n (%)	Non-adherent, n (%)		
Relationship with a person to whom HIV status disclosed	Spouse	48 (92.3)	4 (7.7)	3.07 (1.03-9.12)*	1.71 (0.38-7.71)
	Offspring	11(64.7)	6 (35.3)	0.47 (0.16-1.36)	0.58 (0.11-3.02)
	Parent	10 (71.4)	4 (28.6)	0.64 (0.19-2.17)	0.98 (0.13-7.23)
	More than one of the above	129 (79.6)	33 (20.4)	1	1
Adherence to specific medication schedule in the last four days	Never	6 (75.0)	2 (25.0)	0.08 (0.01-0.51)*	0.002 (0.0001-0.05)*
	Some	6 (54.5)	5 (45.5)	0.03 (0.01-0.15)*	0.03 (0.002-0.52)*
	Half	20 (57.1)	15 (42.9)	0.04 (0.01-0.12)*	0.002 (0.0001-0.02)*
	Most	120 (75.9)	38 (24.1)	0.08 (0.03-0.24)*	0.01 (0.002-0.13)*
	All of the time	154 (97.5)	4 (2.5)	1	1
Aids used to manage medication schedule	Mobile phone	33 (80.5)	8 (19.5)	0.67 (0.28-1.61)	0.35 (0.07-1.72)
	Watch	24 (72.7)	9 (27.3)	0.43 (0.18-1.03)	0.23 (0.04-1.26)
	Radio/TV	19 (63.3)	11(36.7)	0.28 (0.12-0.66)*	0.08 (0.01-0.53)*
	†Other	26 (74.3)	9 (25.7)	0.47 (0.20-1.11)	0.07 (0.01-0.67)*
	More than one aid	166 (86.0)	27 (14.0)	1	1
Number of clinic appointments missed in the last 12-months	None	210 (93.8)	14 (6.3)	1	1
	1	83 (65.3)	44 (34.7)	0.13 (0.07-0.24)*	0.06 (0.02-0.22)*
	≥2	13 (68.4)	6 (31.6)	0.14 (0.05-0.44)*	0.16 (0.03-0.97)*
Satisfaction with ART services	Poor	242 (80.9)	57 (19.1)	0.46 (0.20-1.06)	0.14 (0.03-0.63)*
	Good	64 (90.1)	7 (9.9)	1	1

COR: crude odds ratio; AOR: adjusted odds ratio; CI: confidence interval; ART: antiretroviral therapy; TV: television; * statistically significant association at $P<0.05$

† 'Other' category for aids used to manage medication schedule represents meal or prayer time.

- Sum of categories of 'relationship with a person to whom HIV status disclosed' and 'aids used to manage medication schedule' may not give the total sample as some categories were not considered in the analysis due to an insufficient number of observations.

Predictors of non-adherence to doses and pharmacy refill were assessed specifically for prisoners using a multivariate fractional regression analysis. Table 5.2-9 and Table 5.2-10 respectively show the fractional regression analyses results of factors associated with non-adherence to doses and pharmacy refill in prisoners. Prisoners who were accessing ART services from a hospital were 75% less likely to comply with scheduled doses (AOR: 0.25; 95%CI: 0.07-0.90) compared to prisoners who were accessing the services from a health centre. The risk of dose non-adherence increased by 93% when prisoners missed a single ART appointment (AOR: 0.07; 95%CI: 0.01-0.67) and by 99% when they missed two or more appointments (AOR: 0.01; 95%CI: 0.002-0.08). Depressed inmates had a 74% lower likelihood of dose adherence than non-depressed inmates (AOR: 0.26; 95%CI: 0.07-0.88) (see Table 5.2-9).

Table 5.2-9: Fractional regression model of factors associated with self-reported dose adherence amongst inmates living with HIV in South Ethiopia (N=74)

Variable		**COR (95% CI)**	**AOR (95% CI)**
‡Employment status	Unemployed	1.20 (0.07-20.00)	0.09 (0.004-2.03)
	Government employee	1	1
	Farmer	3.40 (0.37-31.12)	2.46 (0.81-7.44)
	Daily labourer	0.867 (0.13-5.89)	0.69 (0.28-1.72)
	†Other	2.67 (0.34-20.79)	0.70 (0.34-1.44)
Depression	Non-depressed	1	1
	Depressed	0.28 (0.08-0.95)*	0.26 (0.07-0.88)*
Type of health facility	Health centre	1	1
	Hospital	0.89 (0.26-3.02)	0.25 (0.07-0.90)*
Number of clinic appointments missed in the last 12-months	None	1	1
	1	0.04 (0.01-0.19)*	0.07 (0.01-0.67)*
	≥2	0.02 (0.001-0.33)*	0.01(0.002-0.08)*

COR: crude odds ratio; AOR: adjusted odds ratio; CI: confidence interval; ART: antiretroviral therapy; * statistically significant association at $P<0.05$

‡Employment status refers to the last occupation before incarceration

† 'Other' category for employment status represents individuals who were engaged in private jobs (including various business works) and students.

- Sum of categories of 'employment status' may not give the total sample as some categories were not considered in the analysis due to an insufficient number of observations.

Similar to dose adherence, accessing ART services from a hospital decreased the inmates' pharmacy refill adherence by 95% compared to accessing the services from a health centre (AOR: 0.05; 95%CI: 0.02-0.13). Prisoners who developed a viral failure were more than two times less likely to comply with pharmacy refill (AOR: 0.38; 95%CI: 0.20-0.73). Moreover, the likelihood of pharmacy refill adherence was 86% lower in inmates who reported lacking ILWH-roommates (AOR: 0.14; 95%CI: 0.05-0.40) (see Table 5.2-10 below).

Table 5.2-10: Fractional regression model of factors associated with pharmacy refill adherence amongst inmates living with HIV in South Ethiopia (N=74)

Variable		COR (95% CI)	AOR (95% CI)
Length of time on ART in months	–	1.01(1.001-1.02)*	1.01 (0.99-1.03)
ART use before incarceration	No	2.54 (0.88-7.35)	2.78 (0.99-7.79)
	Yes	1	1
Presence of anyone living with HIV in a cell	No	0.26 (0.08-0.79)*	0.14 (0.05-0.40)*
	Yes	1	1
Type of health facility	Health centre	1	1
	Hospital	0.28 (0.10-0.82)*	0.05 (0.02-0.13)*
Viral failure[m]	No	1	1
	Yes	0.12 (0.02-0.64)*	0.38 (0.20-0.73)*

COR: crude odds ratio; AOR: adjusted odds ratio; CI: confidence interval; ART: antiretroviral therapy; MPR: medication possession ratio (pharmacy refill); [m] variable with missing value; [*] statistically significant association at $P<0.05$

- The effect of missingness in this particular dataset is negligible as the complete case analysis and multiple imputation gave exactly the same AORs (results not displayed).

5.2.4 Factors associated with virological and immunologic failures

A multivariate logistic regression analysis identified predictors of overall virological failure (VF) in incarcerated and non-incarcerated PLWH. The estimation was made based on a complete case analysis and multiple imputation of variables with missing values. Table 5.2-11 describes the complete case analysis and multiple imputation findings of factors influencing VF amongst incarcerated and non-incarcerated PLWH. Sociodemographic factors such as gender, age and social stigma appeared to be determinants of VF in both analyses. In the complete case analysis, the risk of VF was 97% higher in males than females (AOR: 0.03; 95%CI: 0.003-0.41) whereas 96% higher in multiple imputation (AOR: 0.04; 95%CI: 0.003-0.41).

PLWH in the age group of 31 to 35 years had more than fourteen times the risk of developing VF relative to those who were above 35 years old in the complete case analysis (AOR: 14.10; 95%CI: 2.35-84.57) and about thirteen times higher risk in the multiple imputation (AOR: 13.05; 95%CI: 2.10-81.16). Experiencing social stigma increased the risk of VF more than tenfold both in the complete case analysis and multiple imputation (AOR: 10.59; 95%CI: 1.81-62.03 vs AOR: 10.19; 95%CI: 1.77-58.57) (see Table 5.2-11).

Table 5.2-11: Logistic regression model of factors associated with virological failure amongst incarcerated and non-incarcerated people living with HIV in South Ethiopia

Variable		Virological failure		COR (95% CI)	AOR (95% CI), Complete case analysis (N=279)	AOR (95% CI), Multiple imputation (N=370)
		Yes, n (%)	No, n (%)			
Gender	Male	16 (8.0)	183 (92.0)	1	1	1
	Female	1(0.4)	156 (99.4)	0.07 (0.01-0.55)*	0.03 (0.003-0.41)*	0.04 (0.003-0.41)*
Age in years	26-30	3 (3.9)	74 (96.1)	1.12 (0.27-4.61)	5.37 (0.62-46.34)	4.89 (0.54-44.32)
	31-35	8 (11.4)	62 (88.6)	3.57 (1.19-10.70)*	14.10 (2.35-84.57)*	13.05 (2.10-81.16)*
	>35	6 (3.5)	166 (96.5)	1	1	1
Social stigma	Non-stigmatised	9 (3.3)	262 (96.7)	1	1	1
	Stigmatised	8 (9.1)	80 (90.9)	2.91 (1.09-7.79)*	10.59 (1.81-62.03)*	10.19 (1.77-58.57)*
Follow-up CD4 count[m]	–	–	–	1.00 (0.99-1.00)	0.998 (0.995-1.000)	0.998 (0.995-1.00)

COR: crude odds ratio; AOR: adjusted odds ratio; CI: confidence interval; ART: antiretroviral therapy; [m] variable with missing value; [*] statistically significant association at $P<0.05$

- Sum of the age categories may not give the total sample as a category '18-25 years' was not considered in the analysis due to an insufficient number of observations.

5.2.5 HIV transmission risks in prison and outside community

Behavioural patterns that have been reported in the literature to increase the likely transmission of HIV infection in Ethiopia[24, 362] were assessed and the results are shown in Table 5.2-12. More than 13% of ILWH participants reported khat chewing which was slightly lower than non-incarcerated PLWH. Surprisingly, there was no significant difference in drug use between ILWH and non-incarcerated PLWH participants although it was higher in the ILWH group. The most commonly used drug in both populations was cannabis/hashish, but there were no reports of injection drug use (IDU). Only 57% of ILWH were able to disclose their HIV status to at least one person, which was significantly lower than the non-incarcerated PLWH participants (78%). Sharing of personal paraphernalia such as shaving and tattooing materials was more common in non-incarcerated PLWH (18%) than ILWH (5%).

Table 5.2-12: Behavioural characteristics related to HIV transmission amongst incarcerated and non-incarcerated people living with HIV in South Ethiopia (N=395)

Variable		Incarcerated (N=76), n (%)	Non-incarcerated (N= 319), n (%)	*P*-value (Ch^2)
Khat chewing	No	66 (86.8)	267 (83.7)	0.498
	Yes	10 (13.2)	52 (16.3)	
Drug use	No	71 (93.4)	311 (97.5)	0.074
	Yes	5 (6.6)	8 (2.5)	
HIV status disclosure	No	33 (43.4)	71 (22.3)	0.0001
	Yes	43 (56.6)	248 (77.7)	
Sharing personal paraphernalia with others	No	73 (96.1)	271 (84.9)	0.010
	Yes	3 (3.9)	48 (15.1)	
*Sharing tattooing material	No	3 (75.0)	14 (60.9)	0.589
	Yes	1 (25.0)	9 (39.1)	
†Number of sexual partners in the last 12-months	1	17 (89.4)	185 (83.7)	0.778
	2	1 (5.3)	22 (10.0)	
	≥2	1 (5.3)	14 (6.3)	
‡Condom use	Never	1 (20.0)	22 (24.2)	0.928
	Sometimes	2 (40.0)	40 (43.9)	
	Always	2 (40.0)	29 (31.9)	

*Sharing tattooing material denotes participants who had a tattoo (N=27).
†Number of sexual partners denotes participants who had sex in the last 12-months (N=240).
‡Condom use denotes participants who had sex in the last 12-months with individuals who had HIV-negative or unknown status (N=96).

Although the majority of incarcerated (89%) and non-incarcerated PLWH (84%) had a single sexual partner in the previous 12 months, more than half (60%) of PLWH who had sex with HIV-negative partner(s) or of unknown status never or only sometimes used condoms (see Table 5.2-12 above). As described in Table 5.2-13, a multivariate ordered logistic regression analysis identified several social and individual determinants of consistent use of condoms amongst incarcerated and non-incarcerated PLWH.

PLWH who were in the lower middle-income category (earning 13.6-22.8USD per month) were more than four times more likely to consistently use condoms during sex relative to those who were in the upper middle-income category (earning >22.8USD per month) (AOR: 4.12; 95%CI: 1.28-13.21). In addition, the likelihood of a regular use of condoms decreased by more than half when an individual's HIV status was disclosed to just one person rather than more than two people (AOR: 0.46; 95%CI: 0.22-0.94), but almost ten times high when had sex with individuals of unknown HIV status compared to known HIV-positive individuals (AOR: 9.53; 95%CI: 3.42-26.54). On the other hand, self-efficacy to seek social support was related to a consistent use of condoms that those who were unable to seek social support were 68% less likely to always use condoms during sex (AOR: 0.32; 95%CI: 0.16-0.65).

Table 5.2-13: Ordered logistic regression model of factors associated with non-use of condoms among incarcerated and non-incarcerated people living with HIV who had sex in the last 12-months in South Ethiopia (N=240)

Variable		Condom use			COR (95%CI)	AOR (95%CI)
		Never, n (%)	Sometimes, n (%)	Always, n (%)		
Highest level of education completed	No school	32 (60.4)	12 (22.6)	9 (17.0)	0.20 (0.08-0.50)*	0.36 (0.10-1.26)
	Elementary school	44 (43.2)	39 (38.2)	19 (18.6)	0.35 (0.16-0.79)*	0.48 (0.17-1.39)
	High school	15 (25.0)	24 (40.0)	21(35.0)	0.79 (0.34-1.87)	0.88 (0.31-2.47)
	College graduate	5 (20.0)	10 (40.0)	10 (40.0)	1	1
‡Monthly income in USD[m]	≤13.5	44 (58.7)	25 (33.3)	6 (8.0)	0.28 (0.16-0.48)*	0.80 (0.35-1.84)
	13.6-22.8	9 (47.4)	4 (21.0)	6 (31.6)	0.61 (0.24-1.57)	4.12 (1.28-13.21)*
	>22.8	43 (29.9)	54 (37.5)	47 (32.6)	1	1
Sexual partner's(s') HIV status	Positive	73 (50.7)	43 (29.9)	28 (19.4)	1	1
	Negative	7 (17.9)	17 (43.6)	15 (38.5)	3.46 (1.78-6.70)*	5.38 (2.44-11.88)*
	Positive & negative	4 (26.7)	9 (60.0)	2 (13.3)	1.66 (0.66-4.18)	5.55 (1.05-29.41)*
	Unknown	12 (28.6)	16 (38.1)	14 (33.3)	2.44 (1.28-4.64)*	9.53 (3.42-26.54)*
†Number of people to whom HIV status disclosed	One	33 (48.5)	26 (38.3)	9 (13.2)	0.35 (0.19-0.64)*	0.46 (0.22-0.94)*
	Two	25 (49.0)	16 (31.4)	10 (19.6)	0.38 (0.20-0.75)*	0.30 (0.14-0.65)*
	More than two	24 (30.0)	23 (28.7)	33 (41.3)	1	1
Self-efficacy	Have self-efficacy	15 (25.0)	24 (40.0)	21(35.0)	1	1
	Have no self-efficacy	81(45.0)	61(33.9)	38 (21.1)	0.45 (0.26-0.78)*	0.32 (0.16-0.65)*

COR: crude odds ratio; AOR: adjusted odds ratio; CI: confidence interval; ART: antiretroviral therapy; USD: United States dollars; [m] variables with missing values; * statistically significant association at $P<0.05$

†Number of people to whom HIV status disclosed denotes participants who had disclosed their HIV status (N=199).

‡Monthly income for incarcerated people refers to the last income before incarceration; sum of monthly income categories may not give the total sample due to missingness; the effect of missingness in this particular dataset is negligible as the complete case analysis and multiple imputation gave exactly the same AORs (results not displayed).

5.3 Qualitative findings

This section presents findings of the qualitative interviewing. The characteristics of participants are described, followed by themes that emerged as barriers to, and facilitators of early ART initiation and adherence amongst ILWH in South Ethiopia. Participants' views on strategies to improve HIV care in the prison system, potential factors influencing post-release care, as well as HIV transmission risk factors in the prisons are also presented. Within the context of contrasting and comparing concepts within and between transcripts, selected quotes that are representative of reflections for the majority of participants are included under each theme for which a unique participant identification is provided by acronym and number. However, there are also specific individual accounts regarding particularly important lived experiences. Pseudonyms are used instead of real names of individuals mentioned in the interviews and letters to represent the prisons, health care facilities as well as health departments in order to prevent potential identification of persons providing the information.

5.3.1 Participant characteristics

The characteristics of prisoner participants are detailed in Table 5.3-1. Of eleven prisoner participants, eight were male and the rest three were female, with median age of 35 years (range: 25-55 years). Most (64%) of the prisoners reported elementary school (1-8th grade) as their highest educational attainment.

Table 5.3-114: Sociodemographic, incarceration and HIV care-related characteristics of prisoner participants

Participant	Site	Sex	Age	Education (Nth grade)	Length of time in prison (years)	Time since HIV diagnosis (years)	Time on ART (years)
P#1	A	M	35	5	1	7	6
P#2	B	M	38	9	5	4	4
P#3	B	M	30	10	9	9	8
P#4	B	M	25	8	3	7	7
P#5	C	M	45	3	4	5	4
P#6	C	M	32	10	5	12	12
P#7	C	M	38	7	0.7	0.7	0.7
P#8	D	M	32	8	0.5	0.5	0.5
P#9	B	F	55	3	4.5	4	4
P#10	A	F	45	4	9.5	11	10
P#11	B	F	35	NE	3.5	1.5	1

P: prisoner; M: Male; F: Female; ART: Antiretroviral therapy; Site: indicates a prison; NE: No formal education

Eight inmates had been incarcerated for more than one year (range: 0.5-9.5 years), six were diagnosed with HIV after prison entry and seven initiated on ART through the prison system. Of prisoners reporting their likely mode of HIV infection, the majority reported engaging in unprotected sexual intercourse prior to their imprisonment. Six prisoners reported five or more years' experience of living with HIV (with an overall median experience of five years), but only four had used ART for five or more years (range: 0.5-12 years). Table 5.3-2 provides relevant summary statistics of these prisoners.

Table 5.3-2: Summary statistics of prisoner participant characteristics

Variable	Range		Median
Age (years)	25-55		35
Highest level of education (Grade)	0-10		6
Length of time in prison (years)	0.5-9.5		3.8
Time since HIV diagnosis (years)	0.5-12		5
Time on ART (years)	0.5-12		6
		N	**%**
Time of HIV diagnosis			
	Before incarceration	5	45.5
	After incarceration	6	54.5
Time of ART initiation			
	Before incarceration	4	36.4
	After incarceration	7	63.6

ART: Antiretroviral therapy

Table 5.3-3 summarises characteristics of service providers who participated in the qualitative interviews. All participating prison health care staff and ART service providers had a tertiary qualification in health-related disciplines. The prison health care staff had nine and more years' of experience working within the prison health care system (range: 9-10 years), whereas the ART service providers had over six months' experience of providing ART services (range: 0.6-5 years). The prison health care staff primarily delivered basic diagnostic procedures, including Voluntary Counselling and Testing (VCT) services, and managed uncomplicated medical cases. They also made referrals to external health care facilities for those inmates who were found to be HIV-infected and/or had complicated medical conditions. The ART service providers' main duties included the provision of HIV and related (supplementary) medications, adherence support, assessment of drug side-effects and treatment effectiveness via laboratory investigations, such as viral load and CD4 measurements.

Table 5.3-3: Sociodemographic characteristics and HIV care delivery experience of service provider participants

Participant	Site	Sex	Age	Education/ Military rank	Role in prison HIV care	Experience on HIV care (years)
PN#1	B	F	35	BSc(Nurse)	Testing and linkage to care	10
PN#2	C	F	29	BSc(Nurse)	Testing and linkage to care	9
AP#1	A	F	32	BSc(Health Officer)	ART initiation /Adherence support	4
AP#2	B	M	41	BSc(Health Education)	ART initiation /Adherence support	5
AP#3	C	F	25	BSc(Health Officer)	ART initiation /Adherence support	0.6
PO#1	B	M	37	12+3 (Sergeant)	Guarding during clinic visit	2
PO#2	C	M	39	11th grade (Deputy Inspector)	Guarding during clinic visit	10
PA#1	B	M	32	BA(Economics/Assistant Inspector)	Prison Head	14
PA#2	C	M	45	Commander (12+3)	Prison Head	11
HA#1	A	M	47	BSc (Health Officer)	Zonal HIV Coordinator	4
HA#2	C	M	53	BSc (Nurse)	Zonal HIV Coordinator	5

M: Male; F: Female; BSc: Bachelor of Sciences; PN: Prison Nurse; AP: ART service provider: PO: Prison Officer; PA: Prison Administrator; HA: Health Agent; ART: Antiretroviral therapy; Site: indicates a prison or a health department or a health care facility offering ART services

Prison officers had two and more years' experience of managing inmate visits to external health care facilities to access HIV care (range: 2-10 years). They were frequently involved in supervising prisoner movements from their cells, accompanying their transit to the health care facilities and, at times, facilitating administrative issues related to prisoner medical affairs. Prison and health administrators were also experienced officials who had been managing, and providing technical and material support for the prison healthcare system for four or more years (range: 4-14 years).

5.3.2 Factors influencing early ART initiation

The following sub-sections present barriers to, and facilitators of early ART initiation amongst HIV-infected prisoners in South Ethiopia. A paper based on these findings have been published in *BMC Public Health*[363] (see Appendix 5.3). Figure 5.3-1 shows interrelationships between themes and sub-themes that were identified in relation to ART initiation in prisoners.

5.3.2.1 Barriers to early ART initiation

After analysing the in-depth interview data, four main themes were identified as barriers to early ART initiation. These include a lack of access to HIV testing, inability of health staff to make timely care linkage, uncooperative security and loss of privacy regarding HIV status.

5.3.2.1.1 Lack of access to HIV testing

There existed a limited access to HIV testing services in the South Ethiopia prison system. The prisons lacked testing facilities which would support early identification of HIV-infected prisoners and linkage to care. New cases were detected when inmates requested testing due to severe sickness (suggesting an advancement of the infection), and passively through ad hoc campaigns undertaken by external agencies. A prisoner who had tested positive after prison entry reported:

> *"My weight had been reduced severely but unfortunately I hadn't realised that. I hadn't known but something started to appear on my thigh [Showing his thigh]; um----something like weight loss, and it had just started making me dizzy when I had walked for a while, and tingling on the endings, then I was told I had the virus after being tested. They called me to the clinic, there is a clinic if you have seen it, and they called me there and gave me a piece of advice and took me to the hospital." (P#2).*

He elaborated on the importance of prisoner concern in the face of potential signs of the infection in order to access testing, in the absence of encouragement in the prison system:

> *"I haven't seen anything like that [offering of voluntary HIV testing and counselling] unless the person himself discloses or wants to have the test. For instance, they didn't ask me when I entered. I had the test on my own, after being hurt and got an opportunity during the campaign [performed by an external health agency]. There is no any motivational work being done by the prison health staff." (P#2).*

Other prisoners also reported having waited until an external agency came to the prison and performed testing, although they had noticed some possible signs of the infection and so wanted to have the diagnosis:

> *"I got tested when [external] health professionals undertook a testing campaign. I was so sick long before I was aware of my status. There were times when testing campaigns were undertaken. A lot of inmates still want to have the test but they [prison health staff] often say 'We don't have test kits'." (P#9).*

Service provider participants supported the reports of inmates that there were inconsistencies in HIV testing services. This meant that inmates often undertook delayed testing at external health care facilities despite exhibiting symptoms suggestive of infection. Alternatively, they could incidentally be diagnosed through ad hoc testing campaigns undertaken by external agencies. A prison officer acting as a treatment facilitator described:

> *"-------at least when they [prisoners] repeatedly come to our clinic with the same case, we take them straight to the hospital when their condition remains unimproved. No one has been dispatched from here to begin treatment there. But once, people from the Region [a health agency from the Regional State] took their blood for HIV testing and sent back the result via the Post Office." (PO#1).*

Health agencies lacked faith in prison health care staff to undertake HIV testing despite the fact that they had been trained, and so denied test kits. Thus, diagnostic services were external to the prison health care system and provided exclusively by public health care facilities. This represented a missed opportunity for prison health care staff to offer testing services and utilise the trust they had built with inmates through regular contacts, to perform the task. A prison nurse reported the following:

> *"---- we had a training on the new kits because you have to have training whenever a new kit is launched, but they [health agents] were not happy to provide us the new kits assuming that we hadn't had the training. They said, 'We will do it ourselves.' I don't mean they shouldn't perform testing but it would be better if it was performed by the prison itself because it is us whom the prisoners make contact with, every day; it is us whom they trust more. It's better when a person gets served by the professional whom he trusts more." (PN#2).*

Another prison nurse regretted that she was not able to undertake entry HIV testing for incoming prisoners due to an insufficiency of test kits, despite the fact that the majority of prisoners were eager to have the test:

> *"-------It should have been [regarding offering prisoners voluntary HIV testing at entry], but we didn't do that. By the way, all prisoners are voluntary to have HIV test, I can say. Many of them ask for testing when they come to the OPD (Outpatient Department). Seventy-five percent of them are very willing but I don't have test kits, I am short of test kits. I just tell them, 'Remind me when kits are available!'" (PN#1).*

Prison officials confirmed a poor level of diagnostic services available in prisons and explained the process of testing prisoners for HIV. According to these participants, HIV testing occurred only rarely and usually in conjunction with international events such as on "World's AIDS Day" or when external agencies carried out testing campaigns. A prison administrator elaborated on what he observed at his prison regarding HIV testing activities:

> *"Mostly--- is it on the 22nd of November? [referring to World's AIDS Day]; it occurs on the 22nd of November, and when there is a request by the Regional [Prison] Commission for an overall testing [program] including the staff, and umm-----in collaboration with the Zonal Health Department; they support us test kits." (PA#2).*

Another prison administrator described a rare occurrence of HIV diagnosis that was primarily carried out by external agencies:

> *"Once, the federal agency came to undertake examinations on HIV, TB and Hepatitis, paying a lot of expenses; they paid per diem for inmates and prepared a tea-coffee ceremony to provide a brief lesson and they directly went to testing activity. Prisoners got tested and be aware of themselves [regarding their HIV status]. Examinations are being carried out every year." (PA#1).*

ART service providers and health agents also described that HIV diagnoses were made external to the prison health care system. They reported that the majority were conducted through incidental campaigns organised by outside agencies in the general community which gave no guarantee that inmates who were about to be released could access. Prison health care staff played little or no role on this, apart from referring prisoners to outside health care facilities when their health worsened. One ART service provider stated:

> *"It is not actually the health professionals there [at the prison] who undertake testing and link positive cases, rather it is often through campaigns carried out by the City Health Unit, the Hospital or partners." (AP#1).*

Another ART service provider observed prisoners having HIV test through referral to public health care facilities once their health was severely affected (possibly due to the HIV infection):

> *"----although there has been HIV testing activities carried out at the prison, they [prisoners] often have tested positive when they come here [to the hospital] for other treatment." (AP#2).*

Health agents felt a responsibility for making sure that every prisoner who volunteered for HIV testing received an opportunity ahead of his/her release. However, they were uncertain how effective they were in relation to the prison health care staff's performance:

> *"We do nothing! [regarding pre-release HIV testing]; We don't know when he gets out. We never know; we never know [Laughs]! We have no any plan to test people who get out of prison, to be honest. We can't work being there as a routine work. Umm-----they [prison health care staff] don't ask us for help regarding educating people who come out of the prison." (HA#1).*

In prison settings where on-site HIV testing rarely occurred, it was found to be only secondary to other health care activities. This impacted on the identification of HIV-infected prisoners especially amongst new arrivals as the prison health care staff often gave a priority to other medical duties. A prison nurse described the situation and recommended the presence of a separate office equipped with its own trained professionals to provide an effective diagnostic service:

> *"-----they [new prison entrants] often come after 5pm from police stations; there is a high work load even if you want to perform [HIV]testing. It requires its own separate office and a professional who would undertake this work only. Many people may arrive at a time, more than a dozen of people! On one hand, it is not suitable to host them as there are [other] people being served here [at the clinic]. I think it would be nice if there was a separate room and HIV trained professional who would perform this job; would be effective in identifying people who enter here every day." (PN#1).*

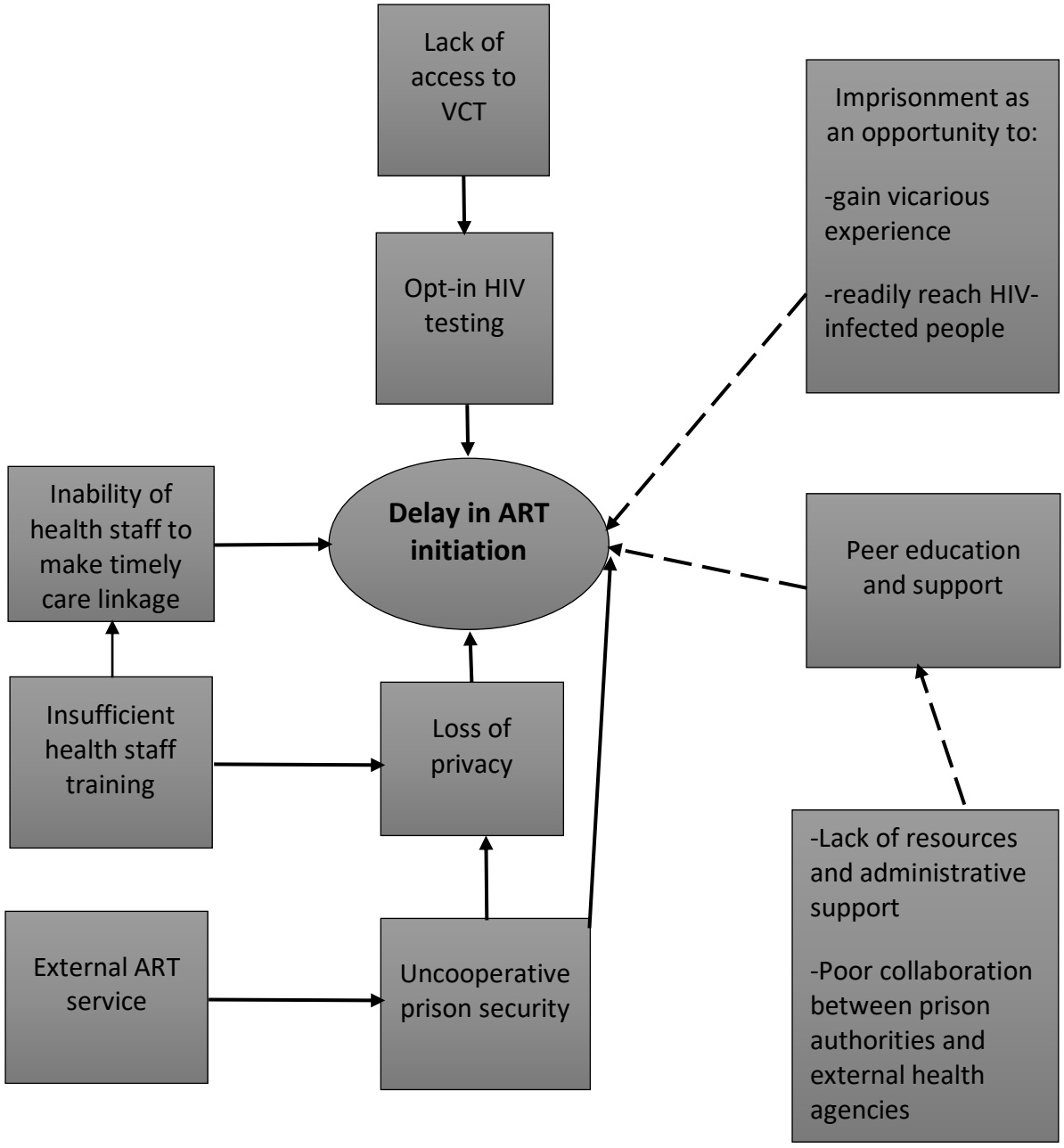

Figure 5.3-1: Factors influencing antiretroviral therapy initiation amongst HIV-infected prisoners in South Ethiopia

ART: antiretroviral therapy; VCT: voluntary counselling and testing

→ Predisposing relationship - - - → Protective relationship

5.3.2.1.2 Inability of health staff to make timely care linkage

Prisoners who were able to be detected as HIV-infected, either through testing campaigns or an opt-in diagnosis at a prison clinic, were not always provided their test results at the testing sites. They were often kept waiting for long periods of time. Prisoners described the circumstance that they were referred to a nearby public health care facility to learn about their HIV status, despite having the test in the prison:

> *"The prison nurse made some part of the examination and told me that they had no kits to undertake a complete diagnosis so that he referred me to the nearby health centre. I had been told there that I was infected with HIV." (P#8).*

Another prisoner who tested positive in a campaign by external agencies said:

> *"---------Then they [prison health care staff] called me to the clinic as it was a secret, they didn't tell me anything except offering me an enveloped paper. Then they sent me there [to a hospital] and they [ART service providers at the hospital] had counselled me a lot and asked some questions." (P#3).*

ART service providers at external health care facilities described similar situations and found prisoners who were referred through such a system were confused about their test results after they realised that they were HIV-infected. The service providers related the prison health staff's inability to declare test results with an insufficiency of skills related to provision of appropriate counselling and referral services:

> *"I have experienced something like this: He [a prisoner] was diagnosed there [at prison clinic] and we found him positive here and he said, 'I was diagnosed there but I have not been told this!' We just thought that it might be due to a counselling problem by the health staff and we counselled him and let him start the treatment."*

> *"There is a sector at the Zonal Health Department which works on HIV. So, they should direct them [prison health care staff] how to perform testing, make a referral and linkage and how the system should be. The prison is under the Zonal Health Department not under this Hospital!" (AP#2).*

Another ART service provider gave an account of a prison health care staff member's failure to offer proper post-test counselling adding their pejorative description of inmates' being infected with HIV:

> *"Umm---there was a prisoner who had newly been identified as HIV-infected; I think there is some problem with the prison health staff; I don't know whether it is due to a knowledge gap or being frightened; they don't clearly let them know about their HIV status. Umm---they don't tell them they have HIV virus rather they say like, 'Your blood is turbid!' We found the guy when he came to the Eye Clinic." (AP#3).*

A prison nurse acknowledged the problems associated with not letting inmates know their test results, and the fact that she never declared HIV test results to HIV-positive prisoners; rather she referred them to nearby public health care facilities:

> *"I mean, we don't even let him [a prisoner] know his test result, although not recommended. We advise him, 'I have tested you here but better you go to the health centre because they have more advanced testing equipment so that you can be more certain about your result!' Then they test him again and offer him ART." (PN#2).*

ART service providers noticed significant delays even when such referrals were made that were not in accordance with standards of effectiveness and timing adhered to by other non-ART community health care facilities:

> *"Among individuals who had been tested there [in prison], there are people who came after a month, two months, and even after four months. It is very difficult and requires a strong referral system. We have inter-ward and inter-facility linkage systems; other district health facilities do it in that way and we would have done the counselling here if they had told us the results even if they wouldn't let the client know his result; if they let us know even using a piece of paper, or just sent it to us through the Post Office." (AP#2).*

Another ART service provider compared care linkage efforts made by the prison healthcare system and community non-ART sites, identifying a high likelihood of delays amongst incarcerated people even if the diagnosis was performed by similar health agencies:

> *"The issue of care linkage is the usual complaint. Prison campaigns have been undertaken and positive cases were identified; but if it was in the community, there would have been a high chance of being immediately linked to care. For instance, if a positive case is found in a community campaign, one can easily bring him here, and health professionals can also easily bring them if found here in this hospital. However, the situation at the prison is really hard." (AP#1).*

A prison nurse also described the presence of considerable delays in care linkage while attempting to assemble patient inmates to send them to external health care facilities en masse:

> *"If they [prisoners] are found to be [HIV] positive today, I will call them today. However, the number of people matters when we send them to the hospital. If not urgent, I will suspend patients who have an appointment today for tomorrow to include them. If so, I'll look at the appointment and say, 'I'll send you on this day!' I say, 'Stay ready!' it won't be longer than a maximum of a week." (PN#1).*

5.3.2.1.3 Uncooperative prison security system

Prison security's denial of inmate requests for external health care facility visits played a role in causing delays in care linkage. It tended to discourage newly identified HIV-infected prisoners from pursuing ART initiation and even to deny that they were infected. One prisoner described how he noticed his friend dissuading himself from ART initiation because of the emotional trauma he experienced as a result of prison security's procrastination about his health care facility visit:

> *"One day, they [prison security] gave him [newly identified HIV-infected inmate] an appointment and let him be back. He became very offended since then. 'You didn't take me out at my appointed time so I don't want to go again!' he refused. They had declined to take him to the health centre a couple of times due to a cloudy weather. He got frustrated because of this and he was even saying, 'I don't have the virus!' [Laughs]." (P#5).*

A health agent also reported a prison officers' denial of external health care facility visits as a barrier to accessing care among HIV-infected prisoners:

> *"Sometimes these people [HIV-infected prisoners] may not come [to an external health care facility] by themselves because they have low access to outside environment. At times the prison officers refuse to bring them to the health facilities." (HA#2).*

5.3.2.1.4 Loss of privacy regarding HIV status

Prisoners sometimes refused to be initiated on ART due to concerns about loss of privacy during procedures at external health care facility visits, as well as negative attitudes displayed by prison officers during the process. One prison nurse shared her experience in relation to this while assisting newly identified HIV-infected inmates to start ART, proposing on-site ART services as an ideal approach to avoid such difficulties:

> *"---------This was the main reason why the guy we talked about earlier refused to start treatment. He had been tested here and the prison officers tried to take him to the health centre. He replied, 'I don't want to go there!' It is a very bureaucratic procedure. They should be tested and start their treatment here at the OPD (Outpatient Department). It reduces mistreatment for the prisoners." (PN#2).*

Another prison nurse described the occurrence of privacy loss during call-backs of HIV-positive inmates to let the inmates know their test results, because of the involvement of a third party (prison officers and other prisoners):

> *"------If so [referring to being tested positive], we'll call [back] and let them [prisoners] know. But when they are called out alone, other inmates become suspicious. If you say to someone [a police officer], 'Get a person with this number!' he himself will be suspicious. There is something like, 'He was called because he has the virus!'" (PN#1).*

On some occasions, HIV-positive prisoners were not directly informed about their test results, but prison officers were informed about the results prior to taking them to public health care facilities. On these occasions, prisoners were unaware of why they had been escorted to the external health care facility until informed by the ART service provider. One ART service provider described:

> *"It was one of the guarding police who told me, 'He [a prisoner] has tested positive [Whispering]!': 'He came here after being diagnosed there [at prison clinic]!' The man didn't know, but the guarding police knew. The prisoner says nothing. It's just the person pulling him in and out." (AP#2).*

5.3.2.2 Facilitators of early ART initiation

Two main themes emerged as facilitators of early ART initiation including peer education and support, and an imprisonment as an opportunity to gain vicarious experiences, and to easily access HIV-infected individuals (see Figure 5.3-1).

5.3.2.2.1 Peer education and support

Participants discussed the importance of peer education and support for having an early diagnosis and status disclosure to access care in the prison environment. Peer support of ILWH was identified as an essential source of information and a means through which the more experienced ILWH convince newly diagnosed inmates to start ART. As a prisoner who had been using ART in prison for about four years said:

> *"We are the ones to help them [HIV-infected prisoners who refused to be initiated on ART]. If we seniors advise them, they will take it easy and start their medication. Otherwise, they fear to ask and may get worst." (P#5).*

Although ILWH highlighted the significance of sharing their experience of living with HIV and indicated their intention to perform the course of action, it appeared to be challenging for them to participate in peer education activities that were seldom held in the correctional facilities. They encountered an interference by people without HIV experience in the educational programs that was apparently unnoticed by prison officials. A prisoner who tested positive and initiated ART after he entered into a prison discusses:

> *"Yes, it [referring to World's AIDS Day] is celebrated here once in a year, but when that occurs, it is mainly city gangsters who engage in the ceremonial activities. They just interfere in every activity, they know how to dance, how to talk, and then they will be paid! They are the ones who dance and teach, no one who lives with HIV has ever come in. There is no one to coordinate us. They [prison officials] still remain unresponsive."*

> *"I am willing personally [to share his life experience with others]. I don't even teach at a ceremony, why not they print my name out in newspapers! I will teach them "Why and how it occurs!" But it was not given to me, it was given to the gangsters. They don't know the extent that I know about the situation, it is just an intrusion." (P#3).*

Another prisoner who had been on ART for 12 years (five years in prison) recalled ILWHs' motivation to teach fellow inmates in such events, describing how it was discouraged by a lack of institutional support:

> *"We saw it last time [on World's AIDS Day]. We even tried to announce the program on media, but there were no arrangements at all. I don't know why they quit it now if there was any [previously]. I have never come across such things in this institution. These are the things that should have been present here. I can say that the institution lacks a coordinating committee or there is a dysfunctional committee." (P#6).*

A prison nurse who had previously run an HIV prevention office described the cessation of HIV education programs at her institution despite the commitment of ILWH to educate fellow inmates. She attributed blame for the interruption to a disregard for the program by prison administration and health agencies:

> *"There had been tea-coffee programs. We used to be provided with two-percent of the total institutional budget for a monthly tea-coffee program; an exciting program! Umm----the Zonal Mainstreaming Officer used to attend the program [I don't know who is in charge of the Office currently; might have been changed], and provide us with brochures, music CDs, and teaching leaflets. The prisoners [living with HIV] also used to write a poem, and it was really a vibrant ceremony. It has been interrupted now, otherwise it was an exciting activity." (PN#2).*

Prison health care staff did not always feel it was their responsibility to undertake HIV education programs:

> *"It's just like you sit in the clinic and do the work you are supposed to do, but there is nothing else you can feel as a responsibility [regarding HIV education]. We didn't have love and unity. There was no thought to each other within the team rather fault finding. Then you would go out having done your work to which you are accountable for. That has created the gap." (PN#1).*

Both prison and health administrators blamed supporting agencies and the government for a reduction in allocation of resources related to HIV prevention and control activities. It was assumed that the infection had meaningfully declined in the community, which eventually evoked restriction of funds by donor agencies. Having announced the decline of the infection in the community, the government did not appear to have the capacity to implement the programs on its own, which had previously been operated by donor agencies in the main. However, the infection continued to spread at an epidemic level, particularly among the most at risk populations. A health agent described the active HIV prevention and control programs that previously existed at the Zonal level, and the anticipated risks that health agencies would likely face in attempting to achieve the goal of ending the AIDS epidemic by 2030 if funds by donor agencies remained restricted:

> *"There is no one to be asked [for funds] like before. Everyone is short of funds. HIV has been assumed to decline but it has not actually; it has been disseminating like a wild fire [Laughs]! A lot had been done at schools, districts and neighbourhood level including prisons. Following these all efforts, the Ethiopian government declared that HIV had been reduced by 70%; [consequently] the budget has declined considerably since then. The Global Fund and supports of USAID have been shifted to other issues leaving the country to deal HIV issues on its own.*
>
> *While the national government announced HIV had been reduced, be it for political purpose or not, but it still remains at the epidemic stage. According to the international definition, the prevalence of more than 1% in the general population is considered as an epidemic. But there are cities in our country with a prevalence of more than 5%. Hosanna [the City where his office located] itself has documented over 2%, the land where HIV was assumed to be absent. In this sense, the government and the people got distracted. It has set to do that again but it is not going to be effective by the government's only capacity. Although the government is saying, 'HIV will be stopped by 2030' it's getting harder." (HA#1).*

A prison administrator added:

> *"Generally, as there has been a decline in HIV-related activities, particularly in relation to the recent slogan, 'Our achievements on decline'; there must be awareness creating work to enhance this through umm----drama, umm------conversations and other means to create knowledge amongst high risk groups such as drivers, soldiers, and others groups like prisoners; both men and women need to know that it [HIV infection] occurs due to lack of precautions to protect oneself." (PA#2).*

In addition to the decline in the emphasis on HIV-related issues at national level, prison administrations and health agencies failed to work collaboratively or demonstrate appropriate understanding that prisoners are among the most at risk populations for HIV transmission:

> *"Not that much in this regard [participation in the development and implementation of HIV-related plans at the Zonal level]; they don't invite us in what [HIV-related plans] they have developed" (PA#2).*

The same prison official discussed the apparent gap in HIV promotion activities existing between his institution and health agencies, and his perception that it was partly attributable to the prison administration's lack of mandate to make direct contact with health agencies. He proposed he was forced by the circumstance from involvement in the implementation of HIV-related programs at Zonal level:

> *"As I said it before, we have no a mandate to directly attract NGOs (non-governmental organisations) to our institution or contact Regional Health Bureau because we are responsible to the Regional Prison Commission. It should be decentralised but still they are the ones who contact NGOs to give us holistic trainings wherever they come from. For instance, you came here after having reported to the Regional Prison Commission! So?" (PA#2).*

5.3.2.2.2 Imprisonment as an opportunity for early ART initiation

Service provider participants discussed the prospects that incarceration could offer for early treatment of HIV infection. A health agent viewed incarceration as an opportunity to identify and initiate ART for HIV-infected individuals who otherwise might have been difficult to reach:

> *"For instance, sometimes you may not find HIV-infected people at health facilities but you may find them at prisons. They may refuse to start ART as they might have tested [positive] at private clinics. Thus, prisons provide a good opportunity to capture such cases which would benefit the patient as well as the community at large." (HA#2).*

One prison nurse appreciated the importance of vicarious experiences of the valuable outcomes of ART that a prison environment offered ILWH. She provided more weight to positive and negative outcomes in fellow ILWH in changing their behaviour than education provided by health care providers. In her perception, it helped ILWH understand the health benefits of ART and decide to initiate:

> *"It is not because we have educated them [prisoners] correctly or advised them, 'the medication does this in your body, it reduces viral load, it boosts your immunity', but they learn from the people inside. For example, I've experienced this: many had just been so drained and their body got back to normal after they had started the medication. Many others have learned from this. They believe that 'Mr 'X' was like this so nothing happens to me!'" (PN#1).*

One female prisoner reported having HIV diagnosis after prison entry, which she was incapable of performing before imprisonment even if she was suspicious about being infected due to her partner's death related to HIV:

> *"I was not diagnosed even after his [her husband's] death, when I was outside prison. Then this crime was committed, came into prison; it was after my prison entry that I got diagnosed." (P#9).*

5.3.3 Factors influencing ART adherence

Factors affecting ART adherence amongst ILWH in South Ethiopia are described in this sub-section. These findings also formed a paper submitted to *PLOS ONE* for publication (see Appendix 5.4). Themes that were identified as barriers to, and facilitators of ART adherence and their interrelationships between each other and with sub-themes are portrayed in Figure 5.3-2.

5.3.3.1 Barriers to ART adherence

Several themes emerged as barriers to ART adherence including: a limited access to standard HIV care, insufficient health staff support, uncooperative security system, loss of patient privacy, a lack of status disclosure due to social stigma, depression related to imprisonment and food supply insufficiency.

5.3.3.1.1 Limited access to HIV care

The prison system in South Ethiopia was marked by a lack of standard HIV care which imposed additional 'suffering' on ILWH and represented a 'double burden'; the imprisonment itself and inappropriately treated HIV infection. The perception of many of the inmates' was that both HIV infection and incarceration occurred incidentally but were highly likely to produce

psychological as well as physical trauma. One prisoner who used ART in prison for four years explained how difficult it was for ILWH to cope with both conditions in a context where there was sub-optimal HIV care:

> *"Most [HIV-infected] people suffer here because of lack of support, they are embarrassed by imprisonment on one hand and by the disease on the other hand. People here also cause embarrassment to us; better be hurt physically rather than having a psychological trauma. ------there are people who are severely hurt both physically and mentally." (P#2).*

Another inmate being treated with ART in prison for approximately eight months proposed that incarceration alone represents a burden to all prisoners, but a lack of HIV care in a prison system exacerbates the burden to ILWH:

> *"-----No human being is free from incidents; I came here incidentally. Both a crime and disease are incidents. Everyone comes here whenever he commits a crime but he should not suffer from a double burden." (P#7).*

Although ILWH who had been using ART before incarceration indicated an intention to adhere to the therapy after being arrested, absence of HIV care in the prison system caused substantial delays in treatment continuation:

> *"I thought I had enough in my bag [during arrest] but it was empty. Then I let them [prison health staff] know about the issue but there is no HIV treatment service here. Thus, the only chance I had was calling my family to bring me some if there was any…But I ignored that because they [prison security] didn't allow me to do so." (P#6).*

Being incapable of grabbing their medication due to a panic related to a sudden arrest by police, ILWH who had been on ART before imprisonment had little chance of accessing drugs during their earlier time of incarceration:

> *"When the police brought me from my home, I went to the police station empty-handed because I was in a real shock at that moment. We didn't even have any cloth when we left our home." (P#10).*

In all prison settings, ILWH were accessing ART service from external health care facilities which presented a series of intra-institutional and inter-institutional barriers to adherence. At some settings, access to care was adversely influenced by the long distance between a prison and an ART site, as there was no facilitation of transport by the prison system. ILWH at such settings were therefore required to take their own actions to obtain finances for transport:

"Since it [referring to an external ART site] is too far to go on foot, I should borrow some money from someone convincing them that I will pay them back sometime later by doing weaving; but there is nothing, no support at all." (P#5).

"It [an external ART site] is too far to go on foot. Sometimes it feels demotivating because of the exhausting journey." (P#10).

Prison administrations placed the onus on ILWH of paying for their own transport, as well as for the accompanying prison officers. A prisoner who had been using ART through the system for four years reported:

"*What I would suggest is that there are people who cannot afford paying for taxi to go to the health centre. We pay it ourselves. Whenever we arrive at the gate, the first question to be asked is, 'Don't you have money for taxi?' Two prison officers guard us at a time so we pay for their transport as well." (P#5).*

A shortage of prison officers caused delays in ILWH's health care facility visits as they were forced to go *en masse* even if their appointment fell on different dates:

"There are times that they [prison health care staff] jump our appointment. ...sometimes there could be even a shortage of guarding police. They just trick us saying, 'They went to court; guarded private permissions; got a duty'." (P#3).

In addition to limited human resources, the preference for group clinic visits partly resulted from the prison officers' lack of awareness of the specific clinical requirements on which ILWH's appointment times were arranged. At times, ILWH had little chance to see ART service providers when they arrived at the health care facilities during off times (e.g., at lunch time):

"'Why you come on one by one?' They [prison security] do not know that we go according to our treatment initiation and based on a doctor's appointment. It is problematic if you hurry up to get there before lunch time. 'Let's get there before lunch!' If in case it occurs in the afternoon, they just throw us back here. Then this one [a treatment facilitator] says, 'Haven't you gone before?' You may not be able to find someone who takes you back." (P#1).

Among inter-institutional factors, poor organisational relationships between prisons, health care facilities as well as courts presented a substantial barrier to ART adherence. A lack of collaboration between health care facilities and the correctional system resulted in interruptions of ART during prison entry and transfer of ILWH between correctional facilities. A prisoner who had been using ART before incarceration discussed his experience of the challenges of pursuing ART during prison entry:

"----------Then the hospital on its turn said, 'We don't treat him unless we receive a referral!' I just remained without medication in the middle and had no one to borrow some. The doctor from this hospital had contacted the one there [the hospital where he had been taking the medication before imprisonment] and handed me a referral to receive treatment at 'Hosanna' Hospital." (P#1).

ART service providers described the difficulties in tracing back records of newly arriving ILWH who had been using ART elsewhere, compared to non-incarcerated PLWH who had been transferred in from other public health care facilities. As prisoners were often transferred abruptly, ILWH often had limited opportunity to arrange consultations with ART service providers and complete their pre-transfer medication requirements:

"--------Because he [newly arriving ILWH] often comes suddenly. For example, they [prison staff] are not going to ask him when he will be leaving so that he can collect his medical information from the Hospital. They just pick him up and transport to somewhere. When other [non-incarcerated] clients want to change their residence, they just report to us -----so, they will be given with the letter and go with their referral." (AP#1).

Health care facility and court appointment times sometimes overlapped, leaving ILWH oscillating between the two, with no power to influence a change for either appointment:

"------Then I got troubled when the hospital appointment overlaps with the court appointment. When I ask the court, 'I have a clinic appointment, could you please change the appointment for me?' He says, 'Are you the judge? It doesn't concern you! Shut up!' I just say 'OK!' Then when I come here [to the prison clinic] and inform them [prison health care staff], they say, 'Why didn't you go there [to the hospital] yesterday? Wasn't your appointment yesterday? I say, 'I went to the court!'" (P#1).

This situation led ILWH to perform medically discouraged acts such as using unprescribed medications borrowing from fellow inmates. The aforementioned inmate went on to describe the negative impact of the circumstance on his medication use:

"-------we also used to borrow [meds] from each other here with 'Usman' and 'Feleke Girma'. Sometimes the health facility appointment overlaps with court appointment." (P#1).
**Individuals' names used in this quote are pseudonyms.*

Moreover, restrictions on movement associated with imprisonment itself presented a barrier to accessing required medical support. ART service providers noticed considerable difficulty in reporting drug side-effects in incarcerated clients compared to non-incarcerated clients:

"Some clients complain about [drug] side-effect such as headache, nausea, dizziness and itching. So, when people in the community experienced this or any other problem while taking the meds, they come quickly within two days, three days or four days. But they [prisoners] don't have this opportunity." (AP#2).

ART service providers found it more challenging to review ILWH when required, compared to ART clients from the outside community. One ART service provider described instances when ILWH failed to receive appropriate laboratory investigations for assessing the effectiveness of ART:

> *"----------There are such individuals [that are unable to attend health care facility] in the prison who use ART and they are really pressured, and it is difficult for them to give blood for viral load test at any time required. We sometimes call ART patients back when we encounter electric interruptions but you can't find prisoners again at that moment; they may be left out of the viral load test." (AP#3).*

A scarcity of supplementary medications at the public health care facilities imposed an additional burden on ILWH. The problem was more intense in the case of incarcerated PLWH than non-incarcerated ones because the former were financially incapable of obtaining the medication from private drug venders. This occurred partly as a result of a self-insufficient collaborative agreement that was made between the prison system and health agencies, in ensuring consistent access to free medications for ILWH:

> *"They [HIV-infected prisoners] can always find [HIV] medication. But there is a problem when there is a need for OI (opportunistic infection) medications like fluconazole. There is a scarcity of OI drugs at the ART clinic. But they don't miss ART drugs. They don't afford buying OI drugs from outside pharmacy, we all know that. They have free medication from the government but OI drugs are rarely available at the hospital." (AP#2).*

The health administrators tended to accept that ILWH accessed ART services from external health care facilities as normal practice, on the basis of perceived difficulty of introducing ART services within the prison system:

> *"---------So, going to the hospital is the only option they [ILWH] have and it doesn't matter if they go there every month; no other option!" (HA#1).*

Although some ILWH tended to prefer external ART visits, despite its being physically demanding, others perceived it unrewarding. In the first case, ILWH saw external visits as an opportunity to get some refreshments while being out of the very restricted prison environment:

> *"Let it be, that is not what matters most [travelling to the external health facility on foot]. We stay here locked, it can be a means to get fresh air and stretching feet. When you get out of here, you enjoy the air outside. I don't think I have difficulties with that." (P#1).*

In a prison nurse's understanding, ILWH's high motivation to go to public health care facilities might have been related to their intent to use the opportunity to access other services available outside, rather than seeking care:

> *"They [ILWH] don't only consider taking the meds, they also take it [an external ART visit] as a refreshment and there could be something that they can get when they go out. I don't think they care about taking meds but they need that one. Many are willing to go." (PN#1).*

One ART service provider, on the other hand, considered ILWH's desire for frequent external ART visits as a barrier to arranging longer appointments which was thought to be an important means to reduce institutional and personal barriers to medication pickups and adherence support:

> *"The guarding police often say, 'We don't take you ten times, you should all come together!' We can put them [ILWH] on [treatment] spacing, however, some of them want to take it every month and say, 'I want it monthly!' You don't put a person complaining like this on spacing." (AP#2).*

Other ILWH, however, were reported by prison health staff to be reluctant to undertake external ART visits, giving greater priority to their work within the prison than their medication:

> *"There are some [ILWH] who are very busy doing different business activities within the [prison] compound. They work very hard, they remain busy all day. They beg me, 'Please Sister, let someone bring me the meds! My business gets interrupted; I have shoes to bring in, I have clothes to bring in!' or they may bring in food stuff [to sell]." (PN#1).*

An ART service provider, who was caring for the same ILWH as the above-mentioned prison nurse, explained the difficulties in providing adherence support for such ILWH:

> *"There are prisoners who do private work in the prison. It is hard for them to receive feedback on CD4 count and adherence because they send others to bring the meds for them." (AP#2).*

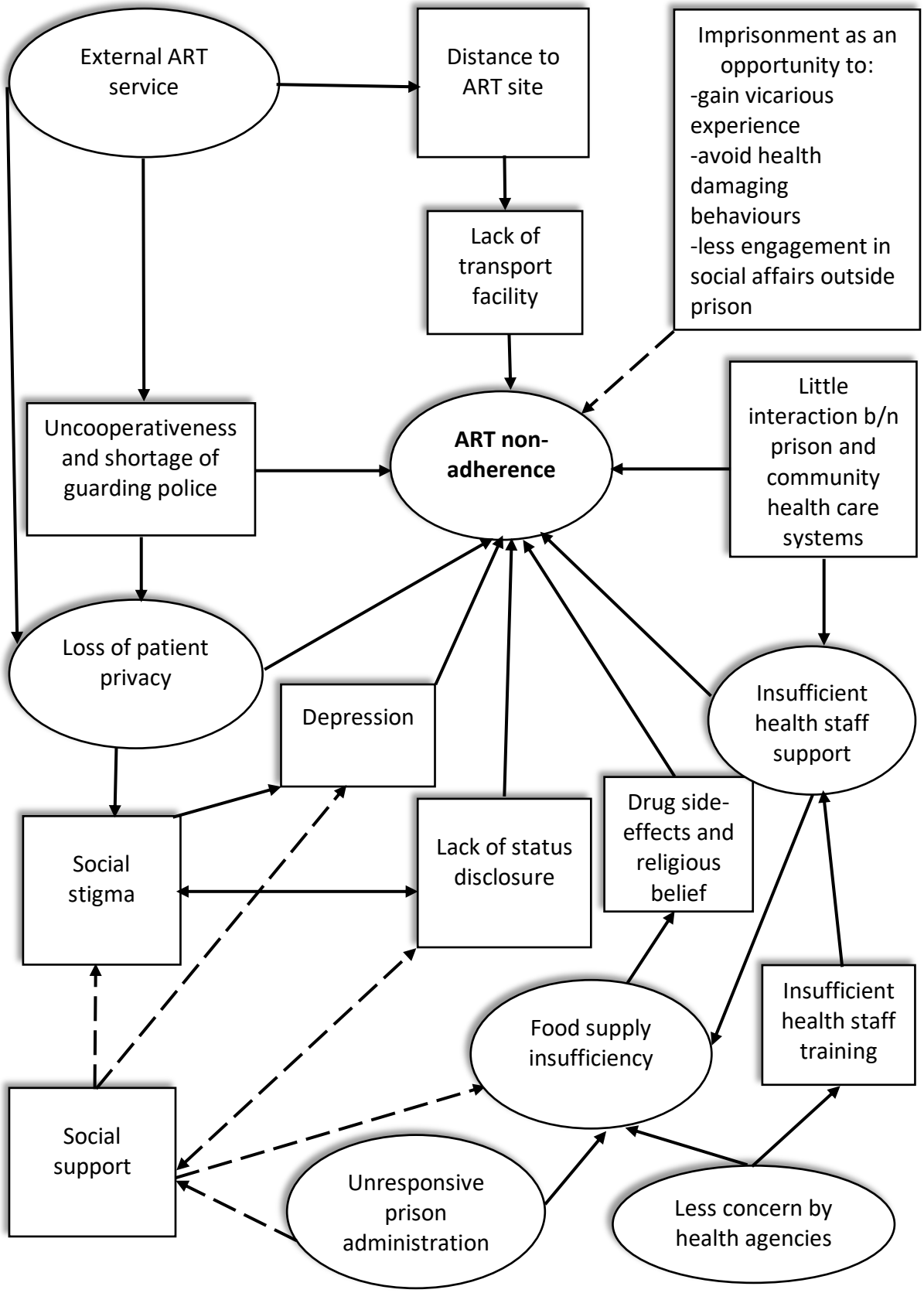

Figure 5.3-2: Factors influencing antiretroviral therapy adherence amongst prisoners living with HIV in South Ethiopia

ART: antiretroviral therapy

→ Predisposing relationship - - - → Protective relationship

5.3.3.1.2 Insufficient health staff support

Prison health care staff appeared to feel little responsibility towards ILWH given HIV treatment services operated entirely external to the prison healthcare system. Both prisoner and service provider participants discussed the deficiency of HIV care provided to ILWH via the prison healthcare system. As one prisoner stated, prison health care staff were not considered central to HIV care in the prison system:

> *"There is nothing we obtain from them [prison health care staff]; we should take our medication properly. They just send us to the hospital based on our appointment. We may get treatment from the clinic for other diseases just like any other prisoners. Our contact is with the hospital staff not with them." (P#2).*

Perhaps due to the reduced sense of connection they had with prison health care staff, ILWH reported lacking confidence in the prison healthcare system to offer them appropriate care. This made them totally reliant on external ART services, which were only provided on an appointment basis:

> *"Because I can explain my personal problems there [at an external health facility]. If it [HIV medication] comes here, it will require a long process to go there. I use the opportunity to get other benefits in terms of medication use. I eagerly await for the date to explain it to my doctor when I feel any discomfort. If you tell this to the staff here, to be honest, they may not respond well." (P#2).*

Some ILWH considered the external ART visit as an opportunity to evade institutional bureaucracies involved in patient referral processes for supplementary diseases, because they perceived that the prison healthcare system is not in a position to provide this:

> *"Better [HIV medication] be given there [at an external health facility]; I will get diagnosed there if I get sick, and if in case get TB (tuberculosis) infection. It is easier to go abroad than to go to the hospital! I'm serious! It is really bad here. It doesn't matter if we take it from here but the hustle to go to the hospital when I get sick something else." (P#1).*

Prison officials discussed the challenges that they faced in making referrals because of ILWH's lack of confidence in the prison healthcare system. They suggested an imbalance between the community and prison healthcare systems in terms of resource allocations:

> *"---------Secondly what I would add is that we are now having trouble making a referral. So a work position which encompasses doctors should be designed. There is one at a hospital, there is one at a health centre, why is it limited for correctional facilities? It would be nice if a position which includes doctors was designed jut to avoid unnecessary complaints like, 'There is no a doctor; this is a nurse!'" (PA#1).*

Lack of regular health care staff support was identified as a driver of self-harming in ILWH and even suicide attempts. The lack of support was underscored by the stated comfort derived from their discussion with the researcher:

> *"I have tried this thing [a suicide attempt] over and over again. But thanks to God I have forgotten it at least for now as I see you. I'm so excited now to be honest! It would be a great freedom for me if there was a person who regularly talks with us just like this; it doesn't matter whether he gives me nothing; I would be so happy! We are just thrown in here just like an object." (P#1).*

ILWH at times tended to excuse prison healthcare staff, attributing their inappropriate care provision to a failure of the higher health agencies to offer them professional training:

> *"The Clinic? ---- They [prison health care staff] care for us at the level that they have been trained for, but I often use paracetamol and diclofenac from the clinic when I have something like a fever, and nothing else. I often go there [to a hospital]. It is known that a person does what he has learned as a profession and shouldn't be expected to do more and they are serving us as much as they can." (P#3).*

Possibly due to limited HIV-related training, prison health care staff appeared to encourage or perform repeat testing for ILWH who were on ART. This increased the risk of discontinuing medication as a result of false negative results attributed to inhibition of viral replication by their medication:

> *"They [ART service providers] could have even reinitiated him [HIV-infected prisoner who had been using ART before incarceration] on treatment after having tested as a new client and measured his CD4 count at the hospital." (PN#2).*

The desire for repeat testing also arose amongst ILWH, who assumed that their HIV infection had resolved as a result of their medication. A prison nurse described this situation and the misunderstandings among ILWH:

> *"'My weight rises steadily and I don't feel any discomfort even if I do a lot of heavy works all day!'[as a prisoner on ART said to her]. 'Is HIV a painless disease?' Last time, they came mixed with others and had the test. Many of them say, 'Am I cured?'" (PN#1).*

Prison officials stated their belief that their health care staff had an acceptable range of educational background, but there was an urgent need for updating professional training in order for them to align with rapid changes in HIV management. They described the scarcity of professional training again as being associated with a generally low interest of health agencies in the prison healthcare system:

"---------It is due to inattention by organisations that offer training. If you take the Zonal Health Department, it just ignored our institution assuming it as a regional institution while giving the opportunity to the districts and even to the provinces including the [community] health extension workers. They don't give training for our staff. We complained about this in a forum held last year and the year before, 'These professionals need to have capacity building training, they need to update themselves to undertake their professional work appropriately, although they have their own professional scale!' but they don't hear us." (PA#1).

In acknowledging complaints made by the prison officials about inadequate health care staff training, health administrators tended to blame higher health agencies, such as the Regional Health Bureau, for their inequitable delivery of professional training between the community and prison healthcare systems. Ultimately, prison health care staff were not receiving HIV-related training because ART services were delivered entirely external to the prison healthcare system:

"They [prison administrators] often complain about their health staff being neglected [in terms of professional training]. … even the Regional Health Bureau gives more focus to public health care facilities. We have recently implored them a lot to train the health professionals there [at prison]. Nonetheless, their training level is insufficient because prisons are not ART sites." (HA#2).

When asked, health administrators appeared unable to consider what circumstances might lead to the introduction of ART service in the prison settings:

"Right now it is impossible to open an ART site at the prison. It has its own requirements to open an ART site; how many people are using it? How many positive cases identified at a time? Umm-----is there an expert to manage the service? It is not suitable jut to prescribe the drugs there. It needs more staff and they [prisons] may not facilitate that. In that sense, I don't know if the government or other agencies assign someone there particularly at correctional facilities where a large number of HIV-infected inmates are found." (HA#1).

Because of limited communications from ART service providers at public health care facilities, prison health care staff lacked knowledge about how effectively ILWH were using their medication:

"They [ART service providers] never give us feedback. I don't actually know whether the prisoners' CD4 count is declining or viral load rising…; I think it's every six-month that viral load is measured, I'm not sure whether they perform it or not." (PN#2).

ART service providers also described an almost complete lack of communication between themselves and prison health care staff; one even indicating that their knowledge of prison health staff was solely derived from their participation in the current study:

"Never. It was your study that made me know that girl [a prison nurse], her phone and even about the correctional institution itself; I have never thought of it. We never had a communication with the health care staff there rather with the prison officers who bring inmates here, just to get the inmates." (AP#1).

The ART service providers' limited understanding of the context of HIV care for ILWH may have contributed to the low HIV care uptake among ILWH at some external health care facilities. ILWH commonly discussed the need for self-motivation in managing their treatment as they were only rarely receiving adherence support from ART service providers:

"-------I was provided with the counselling service the first day. I have been striving by myself since then. -----once the doctor has prescribed it for me, 'You have this disease!' It's a doctor next to God. He gave me this saying, 'Just use this if you want to live tomorrow!' I'm using it just to see tomorrow. But [Clapping his hands] I haven't received any advice since then." (P#7).

Another prisoner shared his lived experience of potentially avoidable drug side-effects during his first encounter with ARVs, due to insufficient pre-ART initiation counselling by ART service providers:

"Yes, it [HIV medication] makes you feel dizzy if you take it before a meal [Laughs]! I once took it at the wrong time; it happened when I first started it. I mistakenly took it at 5pm; we get in at 5:30pm; they [ART service providers] hadn't told me whether I should take it after a meal, they had just said, 'Take it at a similar time!' I just took it, I didn't drink much water, and I just drank a little and remained seated for about thirty minutes. You know a drunk person, I'm not sure whether you have ever been drunk [Laughs]! I just felt giddy." (P#2).

Additionally, some ILWH were found to be unaware of the possible adverse consequences of interrupting medication use:

"How do I know that? I don't know about the consequences of missing the medication because I have never missed my medication. As I said, there might be a lapse of few minutes." (P#7).

ART service providers appeared to vindicate their incapability of providing optimal care because of the high volume of patients they were managing. They were therefore unable to guarantee whether ILWH were properly using the medication that they had been collecting:

"Because we have a lot of patients to deal with----------there are gaps in our side too. When you ask him like, 'Are you taking the medication?' If he says 'Yes!' Then you will let him go just providing him with the prescription and taking his weight. But we don't know whether he takes it or not." (AP#1).

5.3.3.1.3 Uncooperative security system

Interruptions to medication use occurred at different stages of the incarceration process due to uncooperative security systems. One prisoner who had started ART before imprisonment discussed being prevented from accessing his medication during arrest and the delays that subsequently occurred in his medication continuation because of the absence of ART services in the prison system:

> *"I told this to Tewabech [an ART service provider], the police denied having my medication with me during arrest. I was arrested suddenly by the police on my way to home. 'Don't move back!' they said. I implored them, 'I'm a patient, let me just have my meds with me!' 'You'll take medicine from Hosanna Hospital!' they replied. 'I did not take the meds for three days." (P#1).*

ILWH's treatment adherence after prison entry was also considerably constrained by protracted security processes. Incoming ILWH were obliged to remain without treatment until the police investigations were completed about any medications they may have had with them on arrest:

> *"I was troubled the first day [during entry]. It was because the security had taken away my drugs for a check by the health staff, and this took a while. I eventually got it after a lot of hustle." (P#6).*

In addition to the sense of a diminished responsibility towards ILWH exhibited by prison staff, prison security presented an additional barrier to accessing supplementary medications available in the prison system:

> *"He is a treatment facilitator. He is the one who lets us see her [a prison nurse]. It is really hard even to come here! Oh, I can't come here if I have some stomach-ache, and she knows this. I gently explain to him this because he should not be offended. Then he says, 'Wait!' He takes me here [to the prison clinic] if he is happy to do so. Sometimes I prefer to get hurt on the day they are annoyed by other people." (P#1).*

Prison security-related factors also impacted the quality of care delivered by ART service providers. Prison officers often allowed insufficient time for ILWH-ART service provider discussion and laboratory investigations, which influenced ILWH's care use:

> *"----------Even after they [prisoners] have arrived at here [an ART site], they cannot receive appropriate adherence support and laboratory results like other clients do. The guarding police are unwilling to go out for us to talk privately with the clients. … They tend to insult us if we are to take some time to discuss with them." (AP#1).*

The same participant discussed the emotional trauma of ILWH caused by the presence of prison officers during their consultation, and how this affected the ILWH's intention to speak freely with their clinician:

> *"Oh! They [ILWH] don't even say a word! When you ask them about something, they just become restless and lack confidence because those persons [the prison officers] are unwilling to stay out. They just feel restless and almost we don't talk anything except something like saying, 'How are you? Are you taking your meds? Is there any problem?' 'No problem!' they reply; they don't talk anything more." (AP#1).*

One of her ILWH clients witnessed a prison officer's intrusion in a client-health care provider discussion and the argument that resulting in ILWH being taken away from the health care facility before their consultations were completed:

> *"They [prison officers] don't allow us to stay there. She [an ART service provider] insulted them sometime and told them, 'Don't do this, you may also be arrested tomorrow!' She said this because she saw what they were doing to us. If in case treatment delays, they just rush us off saying, 'Let's go! We've brought you to the hospital, we have been told just to do that!'" (P#1).*

In comparing incarcerated and non-incarcerated PLWH, ART service providers reported that ILWH were generally less likely to express their concerns because of prison officers' uncooperativeness:

> *"--------- I mean their [ILWH's] communication; as the guarding police urge to take them back quickly. First, the police officers are suspicious of an escape and fear that they will be accountable if prisoners get escaped; they don't freely say what they want to like their non-incarcerated counterparts. When you see others, they talk or ask what they want but for prisoners their big deal is just collecting their medication and going back." (AP#3).*

5.3.3.1.4 Loss of patient privacy

Both prisoner and service provider participants discussed challenges in relation to keeping patient privacy and confidentiality within the context of the prison system. Congregated living conditions and regular external ART visits (often guarded en masse) contributed greatly to loss of privacy. A prisoner who had been taking ART in prison for six years explained circumstances when patient privacy was affected for ILWH in relation to their HIV status:

> *"-----you know what happens in this [prison] compound, he [HIV-infected prisoner] may attempt to hide for some time, but people will make it overt soon. Since we live in the same compound, every prisoner is aware of who has the virus and who doesn't." (P#2).*

This same participant continues to explain how making visits to both the prison clinic as well as external ART sites made privacy of ILWH divulged, illustrating this with his inability even to come to the prison clinic unnoticeably for the current interview:

> *"Everyone knows. There are people who know why I came here. They were just watching me being in the visitors' hut because I never come here without a reason. They know it from the beginning, when you start going to the hospital, they know why you go there, I don't know who tells them that!" (P#2).*

One prisoner who had not previously disclosed his HIV status described his experience of having his medication divulged during external ART visits, and his struggle to keep his diagnosis confidential. Prison staff and fellow inmates became suspicious of his being HIV-infected because of his regular external ART visits and security checks at the gate:

> *"I prefer the medication itself would be dispensed here with my nurse offering it inconspicuously. You know what, when you go to the health centre regularly, people become suspicious [of being HIV-infected]. And in your check-in, prison security fumble into your pocket and may bring the meds out." (P#8).*

He was therefore obliged to take his medication at a time when all his roommates were out, which in his perception was inconvenient as it prohibited him from resting appropriately as medically recommended:

> *"-----when I say untimely [referring to medication use], the instruction says you have to have some rest after having the drugs, but in my case, since people don't go to bed until 11pm or 12am, I take it at 4pm; there will be no one in the living room at that time [as they go to the Mosque]. (P#8).*

The issue of medication privacy was found to be even more critical for ILWH who encountered a different social environment in the prison settings, leading them to medication interruption. For example, ILWH who were from localities remote to the prison settings were less likely to disclose their HIV status, and so more likely to discontinue their medication. A prison nurse said:

> *"----However, there are others who don't want to disclose their [HIV] status particularly prisoners who came here [to the prison] from other localities; they entered this prison because they committed a crime here in the surrounding community, although their residence is different; you can't oblige them! It's his right not to disclose if he doesn't want to. There are also others who quit [their medication] when they were transferred to another prison. Because transferred cases often perceive that there could be stigma and discrimination in the destination prison, they often pass without letting the security know about their status at the gate." (PN#2).*

Privacy issues were reported differently with respect to ILWH's social interactions with the outside community in relation to external ART visits. ILWH who had strong social networks in the immediate communities of the prison settings were reported to be less comfortable in their interactions with health staff than those who were from remote areas. One ART service provider described what he noticed of the situation:

> *"They [HIV-infected prisoners] came from different areas so there are some who know the local community and there are others who don't know. They come en masse. We notice that those who know the local community often get embarrassed. Those who came from somewhere else don't care." (AP#2).*

Patient privacy was also impacted by casual communications between prison health care staff and ILWH. Prison health care staff were unable to maintain patient privacy, which was challenged by the highly exposed prison environment. An undisclosed HIV-infected prisoner shared his lived experience of loss of privacy during contact with a prison nurse:

> *"Rather patient privacy is severely divulged here in the prison. One day he [a prison nurse] called me and asked 'Where are those who got diagnosed with you?' There were a lot of prisoners around me when he was saying this. I was so embarrassed. It should be me and him who should know about this, isn't it?" (P#8).*

As correction staff responsible for accompanying ILWH to ART visits were frequently changed, inmates' HIV status was constantly disclosed to different people at different times without consent. One ART service provider argued for specified prison officers to escort ILWH to alleviate the problem of privacy loss at least to some extent, recalling similar situations from his previous experience to support the claim:

> *"It is not just one person who knows them. What I heard in ART training was that clients complain about frequent changing of cleaners; …Why not only one person? You see the case of the guarding police? They are different prison officers who bring them at different times." (AP#2).*

5.3.3.1.5 Social stigma and lack of status disclosure

Some ILWH who had been using ART before incarceration felt unable to disclose their HIV status and/or their previous use of ART to prison staff and were therefore more likely to discontinue their medication. A prison officer who often took ILWH to external ART sites came across such a situation:

> *"…There are people who are aware of their HIV status prior to prison entry and got into without disclosing their status. However, it will eventually be revealed when his health condition gets worse. (PO#2).*

ILWH were discouraged from disclosing their HIV status because they had observed that it resulted in adverse consequences such as enacted stigma to those who had performed the course of action. One prisoner said that he preferred to keep his HIV status secret to avoid potential maltreatment by his fellow inmates:

> *"Yes, I haven't disclosed to anyone. I was imprisoned in this prison before, and there was a guy from another town, because he has HIV in his blood, no one wished to have a meal with him, they let him eat alone. They prohibited him from using water and tea utensils together. This is why I preferred to hide my status. Doesn't matter if it was outside, nobody does anything to you, and you would live your own life yeah, but here……" (P#8).*

Perceived stigma dissuaded ILWH from disclosure due to its possible adverse consequences such as emotional suffering, which might prevent them from participating in prison social life:

> *"Nothing but a psychological trauma [if disclosed]. You know, these are uncontrolled people. When they call you, 'You ill!' you may feel embarrassed, tortured and get annoyed all day." (P#8).*

Other prisoner participants asserted occurrence of avoidance, insult and infuriation (i.e. enacted stigma) by fellow inmates and prison officers on the basis of their HIV status. They paradoxically condoned the culpable act demonstrated by members of the prison communities making the organisational structures responsible for the low awareness they possessed about HIV, which in their perception made them behave reprehensibly against ILWH:

> *"-------- there are people who avoid eating with me particularly when I was fresh; sometimes this happens and you may feel lonely. I hope this will improve over time. But if you teach them [HIV non-infected prisoners] about the risky behaviours, ways of HIV transmission and the likes, they may socialise with you." (P#6).*

> *"There are some [HIV non-infected female inmates] in the living room who insult me. I will be so traumatised when they say that. Those who infuriate me are just mad people----------." (P#11).*

The effect of stigma on ILWH appeared to be even more intense when it was enacted by prison officers, often leading to despondency:

> *"You know they [prison officers] consider me as dead: they perceive me as if I carry death like a laptop. I'd love to see if they are provided with a sort of training and I wouldn't be tortured mentally." (P#1).*

One ART service provider reported about one of her ILWH clients, who had recently been released from prison that he experienced enacted stigma by prison officers, which made him feel 'desperate' and suicidal:

"He [recently released HIV-infected prisoner] said he wanted to hang himself to death because they [prison officers] said to him something like that [mocked him that he would die before he was released]; [He told me this] because he was very close to me. He said he was so desperate and wanted to die particularly immediately when he received his verdict." (AP#1).

Nonetheless, prison health care staff and health agents reported that incoming ILWH should have announced their HIV status to prison staff to ensure continuation of their medication. They appeared to possess diffused responsibility for offering ILWH appropriate professional support. A prison nurse explained that she was not able to help incoming ILWH if they were unable to inform her about their HIV status:

"------However, if there is someone who is arrested and doesn't speak to us, we can't help. We haven't yet examined them while entering." (PN#1).

According to one health administrator, ART service providers were only responsible to help ILWH receive medication if they could disclose their status to prison staff and make an external ART visit:

"If there is a prisoner who takes HIV medication or has been using it before prison entry, we give him the medication at the health centre [an external health facility], I mean only when he comes [to the health centre]; otherwise he remains there." (HA#2).

Incoming ILWH who felt able to disclose their HIV status and/or their previous use of ART to prison staff were less likely to experience medication interruptions that often occurred during prison entry. One female inmate who had been on ART before imprisonment reported her lived experience regarding this:

"After I told the security at the police station that I had a prescription, my family brought me my medication card, and then I went to the hospital with the police to continue my medication. And I told the prison officers myself and then they informed the prison health staff." (P#10).

Some inmates believed that their capability to disclose their HIV status dispelled possible embarrassment (perceived stigma) and enabled them to confidently use their medication, as well as to interact with members of the prison communities. It helped them obtain peer support essential to manage their medication use within the context of custodial settings. An inmate discussed how disclosure helped him confidently withstand enacted stigma impinged on him by one of his fellow inmates, and gain peer support:

"The time a guy died of HIV; while I was playing with one of my friends, two guys came to us, and I heard one of them saying to my friend like, 'Take care not to be pricked by that guy's nails!' Even I myself got embarrassed at that moment [Laughs]! And I just went away laughingly; I never get embarrassed because everyone knows about it. I just talk to everyone; I don't hide it! Why would I? I even ask them to tell me the time to take my medication as my watch is not working now." (P#5).

Another inmate mentioned that disclosure enabled him to obtain basic necessities for his medication use from his roommates as he was unable to access on his own because of uncooperative prison security:

"--------But I took some [water for medication] from my roommates to whom I shared my situation as there wouldn't be a human being who doesn't care about a human being." (P#7).

One other prisoner elaborated how being disclosed allowed him to create sources of social supports through forming a friendship with colleagues, which crucially helped him manage his medication use in a prison environment, and served as an encouragement to keep up his good health:

"There is no way to hide; he hurts himself. You get a good friend when you share your issues with them. I have two very dear friends here. When one of them unwraps the meds, the other brings it to me, and the other says, 'It is your med time!' 'Oh! You don't look sick!" (P#1).

For some ILWH, disclosure avoided possible punitive measures by prison security due to their physiological incapability of performing routine tasks given to prisoners as a whole:

"I let from the home committee to the institutional committee beware of the situation [that I live with HIV] otherwise they would order me a task. If you don't perform the task, you will be punished, umm---locked. Because I did those things, thanks to God, nothing!" (P#7).

Disclosure was also perceived by some ILWH as a means to promote positive living standards that are important for supporting themselves and others in similar situations (i.e. PLWH) to shape their life prospects through sharing their lived experiences with each other:

"----Thus, it means nothing to me if I disclose my status. Because the point here is to enable everyone who is in a similar situation to lead his life as myself. You will only be able to have a clear conscience when you disclose yourself to others rather than hiding or covering it. It has a big impact in your life; you will obtain what you need to obtain, and live normal life just like this." (P#6).

ILWH who were able to accept their HIV status were capable of coping with privacy affecting prison environments and demonstrated a high level of confidence to pursue normal life while using the medication. Their self-confidence enabled them to also cope with negative responses from others in regard to their HIV status:

"I can't do anything even if it [stigmatisation by fellow inmates] exists, I just ignore it. They can say whatever they want to say, I don't care about that."(P#11)

"They [HIV non-infected prisoners] don't talk to you face to face. They say it to others. You know what folks do, they say it to someone when they want to attack you. If you say, 'Are you talking about me?' then he replies, 'Did I call you? [Laughs]'. Then what would you say? They are just a few; I don't even listen to them. I'm not a person who gets offended easily. Anger is a work of devil." (P#2).

5.3.3.1.6 Depression related to imprisonment

Being overwhelmed by issues related to imprisonment, some ILWH became less concerned about HIV infection, which in turn influenced their care seeking behaviour. As ART service providers reported, due to despondency that was perhaps caused by imprisonment, some ILWH felt hopeless and became careless about their health, which induced impression of indifference to ART use:

"There are some [HIV-infected prisoners] who got frustrated. Last time I came across a guy who felt hopeless and said, 'Doesn't matter, if I take it or not!' He got frustrated. This is in association with their behaviour; they just want to live today and die tomorrow. When I asked him like, 'Have you disclosed?' and he was a convict of a murder case and said, 'Doesn't matter whether I live or die, better it [HIV] kills me than I stayed here [at prison]!'" (AP#2).

Another ART service provider observed more despondency in ILWH compared to other ART clients, as expressed by their lack of motivation to talk their medical concerns:

"Nothing other than being kept silent [HIV-infected prisoners' behaviour compared to other clients]. However, sometimes silence may have meaning, isn't it? They don't want to say anything more apart from just replying, "Yes, it is." They never talk to us freely; I think they feel depressed." (AP#3).

5.3.3.1.7 Food supply insufficiency

Almost all prisoner participants reported insufficiency and poor quality of food in the prison system. Most of them perceived that the poor quality of food caused more suffering to those who were using ART. Anticipating its possible negative effects on the health benefits of the medication, an inmate favoured taking the medication before a meal, which was against instructions:

"-----The drugs and the food we eat are totally irrelevant, particularly the bread…it looks like something made of mud! And the sauce…I'm not sure whether they cook it well. It is really unappetising with the medication. I take my medication on empty stomach fearing that it may provoke nausea. Although unpleasant, it is better to eat it after taking the drugs unless it may affect the effectiveness of the drugs." (P#2).

This inmate perceived that the adverse side-effects of the medication were completely dependent on an appropriateness of the food that he was consuming, and would cause no harm if proper food was taken:

> *"It is a good medication once you have an appropriate diet; it is a nice medication. I had never had any bad feeling due to this medication [when I was outside prison]. What matters most is what you eat and the way you eat." (P#2).*

ILWH reported being challenged to maintain their medication use, often ascribing their vulnerability to drug side-effects to their impaired physical states produced by insufficiency of food. They felt uncertain about being capable of pursuing the use of medication in the face of combined adverse-effects of poor quality food and the medication itself:

> *"Sometimes I skip the meds when I feel empty stomach after having eaten this dry loaf of bread ... It makes me like fatigued. ... I can't even laugh loud, my heart feels dry, and my throat feels dry -------" (P#1).*

> *"The drugs burn my heart, the food also burns. I'm not comfortable with the flat bread and sauce provided by the prison. It just burns me when the medicine is added. It burns my whole body, and sometimes there are days when I fast and just take the drugs." (P#9).*

Insufficiency of food sometimes led ILWH to relying on religious beliefs to retain health in place of their medication:

> *"I'm suffering a lot because of the food. To tell you the truth, I came here because I was a convicted criminal; I wait with prayers and with God until I will be released once I served my sentence." (P#7).*

At some prison settings, inmates reported insufficient access to other basic necessities, including to drinking water:

> *".... I often get troubled to get some water to take my meds; I get so hurt when they [prison security] say, 'Just queue with others to have water!' It is with hustle and bustle you could get some water and only the gangs take it." (P#1).*

Because of their direct experience of its punishing effects on their health, ILWH dissuaded themselves from performing income generating activities that other (HIV non-infected) inmates undertook to earn money to afford additional food:

> *"'Bacha' is a kind of weaving, it needs a great deal of energy. My colleagues do that but when we [ILWH] do it we can't even walk, umm------because we do it while sitting, I feel pain in my kidney. I've tried this twice or thrice but I couldn't cope with it. So, I have been doing nothing since I came here." (P#4).*

ART service providers experienced a challenge while verbally persuading their prisoner clients to adhere to the medication instructions, as ILWH held poor self-efficacy to pursue the course of action because of the food:

> *"There are individuals [ILWH] who complain about the food provided by the prison and say, 'We're almost burned, the meds are burning us! We're taking this medicine with that food!' They have too much complaint about the food." (AP#2).*

However, prison officials failed to respond to this, although they often did recognise ILWH had greater dietary requirements than ordinary inmates because of their medication use. They often blamed funding agencies for their limited budget allocation for necessary additional food rations for ILWH:

> *"You know what? Considering that [rations] we see them [ILWH] as prisoners. It is 0.7USD [United States Dollar] a day, 20USD a month. There is no exception to him, he is fed in the same manner as other inmates are. Of course, it's not enough. First, HIV patients should get balanced diet…It is problematic that there is no any additional support other than the normal budget allotted for other inmates." (PA#2).*

In contrast, prisoner participants at some of the prison settings reported that prison officials often exercised their power to deny additional food support for ILWH:

> *"We complained to the correctional office, 'We are being severely hurt due to lack of food; the drugs are hurting us, please do something; there are sheep for us; what do you think about this?' They responded, 'The former prisoners have destroyed it a lot; we don't want you to destroy it again, and you will receive what we are going to provide you!' And we still live in that situation." (P#7).*

At the community level, while there had been a substantial number of supporting agencies outside prison working on nutritional issues with PLWH, the prison system seemed to be in isolation from such programs as it lacked due attention from these agencies:

> *"Yes, NGOs (non-governmental organisations) such as What-sup, Nastad and others too, they are about three but I don't exactly remember their names, and they carry out supporting works in the community. They give them [PLWH] money and grain. Catholics also help them. Our main duty is just giving treatment, but if the [prison] clinic had some social linkage, they would have supported them as well." (AP#2).*

5.3.3.2 Facilitators of ART adherence

The analysis of in-depth interview data identified two main themes as facilitators of ART adherence amongst ILWH. The presence of social support and a unique environment created by imprisonment (to refrain from health damaging behaviours, learn punishing effects of undesirable behaviours from others and to less engage in social affairs outside prison) appeared to facilitate ART adherence (see Figure 5.3-2).

5.3.3.2.1 Social support

Prisoners described the importance of social networks for enhancing ART adherence in prison. In their view, social networks serve as a means for ILWH to offer each other information, material and emotional as well as affectionate support. Through social networks, senior ILWH would encourage incoming ILWH to disclose their HIV status in order to access health care and support. An inmate who had been using ART in prison for four years reported the benefits that ILWH used to gain from such a network:

> *"We used to get together every month; we used to help each other when there was anyone who is seriously sick; we used to give him money from our common account. If it was in the past, they [incoming ILWH] would report to the club, and then we would let the concerned body know that there are new arrivals. We would receive them kindly." (P#5).*

He continues to reconstruct his lived experience how peer networks helped him access ART services during prison entry:

> *"When I asked him [a peer coordinator], 'I am like this, what should I do?' and showed him the card, he said, 'You should go [to an external ART site]!' I just started the treatment after I had received the referral from the prison nurses." (P#5).*

His claim was asserted by situations in prison settings where there were no establishments of such social networks; incoming ILWH in such settings faced difficulty in finding the existing ILWH in order for them to obtain information necessary to pursue their life in prison as PLWH. Consequently, they were highly likely to make contact with inappropriate social groups while looking for senior ILWH:

> *"The newcomers [newly arriving ILWH] who come here committing various crimes just gather information from other people; people in the casino, smoking area and at different places. They hear people saying, 'There are people in this compound who live with HIV' and then they come to me. Then I explain the situation to them." (P#3).*

The later loss of such social networks meant that ILWH also lost the medical attention they used to have as patients on a continuous therapy:

> *"Previously, we had our own leader thus, we were given the priority when we got sick; we didn't register to wait for turns. We came here [to the prison clinic] first. We came here instantly and received the care. There are no such things now! No one is even concerned about you. It is horrific! If our turn is not up today, we should wait overnight, and this is hard for us as we continuously take medications and we may not get treatment on time." (P#5).*

The social networks also used to function as a means to earn income for accessing supplementary food and transport to external ART sites. It fostered cooperation amongst ILWH to run various business activities otherwise might be difficult to carry out individually in a prison environment:

> *"We had our own barbershops, table tennis and other stuff; we made monthly meetings. These were things that we rely on to have some coffee and tea. They would have allowed us to run our club so that we could have covered our transport costs." (P#5).*

ILWH also believed that social networks have the capacity to dispel dejections, and avoid alienations by HIV non-infected prisoners:

> *"At the time we had the club, we used to get together and talk to each other about our daily problems. When we did that, we got a sense of relief. But now, everyone particularly the healthy ones point their finger at you, 'He's like---------medication!'" (P#5).*

ILWH considered socialising with their peers as a means to share their lived experiences of how to effectively adhere to the medication, and gain some sort of comfort while living in such congregated settings being ART users:

> *"It would be difficult for me if I lived alone being a [ART] user with a thousand of inmates. But now as they [other ILWH] are with me, I learn many things from them. There is a guy who has been using for eleven years and we discuss a lot with him. He teaches me about the medicine and other stuff; I learned a lot from them, they help me. I'm glad to have them." (P#4).*

One prisoner discussed how he felt after losing his friends due to a transfer out to other prisons, recalling the value of their affections and companionships in making things easier for him in a prison context:

> *"I felt some sort of imprisonment afresh after they [his ILWH friends] had been transferred to another prison! We use to chat being there [at a hut], we laugh and play together, and talk with each other. It was really nice when we were three or four. Now I'm alone." (P#1).*

Close living circumstances amongst ILWH was also found to determine an appropriate use of ART as it appeared to be essential for them to support each other to stick to their medication schedule:

> *"A person next to me also uses the medication. We live in the same room. My bed is just here and his bed is over there [Showing the position]. We sometimes help each other not to forget our medication time." (P#2).*

Notwithstanding the value of the social networks for ILWH, some prisoner participants reported a denial of the resources that used to be offered in their prison, which were essential for the existence of the associations. Participants related this to unresponsive prison officials who undermined the seriousness of HIV infection:

> *"We asked them [prison administrators] to allow us to run the club by ourselves; to help anyone in a serious health condition. They denied it although we have the capacity to work. We have appealed a couple of times to the office. Someone in the office once ironically responded, 'You call this [HIV] a disease? This is a kind of an ordinary illness!' He added, 'Why you speak like this?'" (P#5).*

The prisoners suggested a reduction in number of ILWH as a reason for the prison officials' rejection of their claim. However, they argued that the social network could attract a substantial number of ILWH who might otherwise choose to remain undisclosed:

> *"...they [prison administrators] say, 'You are only few!' You are only few! People come together when they find their likes. There could be many people who would join us." (P#5).*

Prisoners perceived being short of power to influence the officials to permit them running the association as they were least fitted to judge on their own possessions:

> *"When they [prison administrators] asked us about the issue, we argued, 'We can manage it [referring to a club] ourselves; anti-HIV club belongs to us not you!' We were told that it couldn't be in our hands. We can't do anything, we just kept silent; they auctioned it off." (P#7).*

The prison officials' inattention to HIV issues was further expressed by their possession of little knowledge about the actual number of ILWH in their institutions. For instance, a prison administrator said:

> *"----------For instance, HIV-infected prisoners are eligible for parole and I think there are only two currently [they were actually seven]. I thought they were all released in last September; I think there are two." (PA#2).*

Health agents also reported that prison officials paid little attention to issues related to HIV. The prison officials tended to give more focus to other duties while undermining the importance of HIV in their institutions:

> *"The other thing is it [HIV issues] needs emphasis by the [prison] administration. The focus of the administrators is only minimal; due to being busy with other jobs, with the politics, with other internal stuff. Sometimes they don't even think that there is HIV [Laughs]!" (HA#1).*

Furthermore, prisoners tended to blame health agencies for the decline in care and support at the prison system including social networks. As they perceived, health agencies' ignorance of HIV issues at prion settings inflicted suffering on ILWH:

> *"The anti-HIV club should have been closely monitored with governmental and non-governmental organisations taking part. I don't think the club is recognised by the government; it rather seems that people voluntarily support us. I don't think the government recognises that there are people living with HIV in prison; whether we are alive or dead." (P#7).*

There was an inequitable distribution of resources important for the establishment of such social networks between incarcerated and non-incarcerated PLWH; the former being devoid of health agencies' due attention. One ART service provider described the alienation of PLWH at prison settings from various social activities that were undertaken in the community, which served as an important point for dissemination of information for affected people:

> *"They [prisoners] are very isolated in this perspective. Because there are training sessions that I often go and offer them [PLWH in the outside community]. HIV-positive people will be called and get organised, and provided with [life skills] training. There are associations called 'Tesfa' meaning 'Hope', "Iitinne' to mean 'With Love'…OSA [Orphan Support Africa], -------. So, they have a very slight chance of getting training compared to people in the outside community. No one even remembers at first place to invite people from prion [Laughs]! I mean there is no one who thinks there are patients at prion [Laughs]!" (AP#1).*

Health agents acknowledged that the benefits of social networks had been clearly demonstrated in the community settings for PLWH. They were operating as a means to gain government agencies' attention and build self-confidence among PLWH to share each other their lived experiences, and run various income generating activities. However, the health agents recognised the scarcity of such social networks at the prison system, ascribing this to the instability of prison populations and restrictions inherent to prison settings:

"There are associations related to HIV in the Town. There is an association called "Iitinne", meaning "With Love" which works closely with us. They have an association so that they have nothing to fear; they stand in front and teach; they trade like a normal person. There are also members from the prison staff who disclosed their status and use the opportunity. The situation of prisons is quite different; they are a little strict [Laughs]. It's not a house you knock to get in; it has its own time to get in and out; it is quite tight." (HA#1).

5.3.3.2.2 Prison environment as a facilitator of ART adherence

Imprisonment encouraged some PLWH to refrain from behaviour which adversely affected their ability to appropriately use ART. One prisoner reported:

"I started taking the meds properly after I became imprisoned. When I was out there, I used to smoke forty cigarettes per day, I also used to chew "khat". I was so desperate! Since I came here, I just started to think about and wondering what was going on, where I'm going to; then I entered Church, quit my addictions, refrained myself from being with addicted friends, my reduced CD4 [count] shown some gains as I have got checked for it last time." (P#1).

ART service providers observed some behavioural changes amongst their clients during incarceration with significant improvements in treatment outcomes. They tended to relate this to less accessibility of undesirable social networks that existed outside prison:

"Sometimes I see incarceration as an opportunity. There were clients who had behavioural problems, and addicted to substances like cigarette and had an adherence problem. However, after they had got into there [prison], they don't think of other things, they only think of their medicine: they don't smoke, they don't use "khat", so it's just their medicine; there are people whose adherence has improved. Yes, their viral load and CD4 count are better; even better than those in the outside community." (AP#1).

The ART service providers also indicated other favourable environments that an incarceration could create in terms of ART use that inmates' disengagement from social affairs in the outside community could enable them to achieve optimum ART adherence and outcomes:

"Their [prisoners'] adherence is good compared to others. They follow their medication and as I said before, people from the community are a bit ignorant and miss their appointment due to being away from the residence for mourning, weddings, being busy in their daily routines. However, they don't bother in social activities and it is a good opportunity for them. They are even better compared to others." (AP#2).

Imprisonment was found to offer conducive social environments for ILWH to learn about the adverse consequences of medication interruption from peers who had experienced these consequences:

> *"There were persons whose feet got paralysed and had some inflammation on their body [due to medication interruption]. Then they went to the hospital, continued their medication and then the signs disappeared. Then I say, 'What's the matter if I take this little thing [the medication]! Isn't this easier than what I have every time?'" (P#3).*

5.3.4 Strategies to improve HIV care in the South Ethiopian prison system

Almost all service provider participants discussed the likely positive health outcomes to be produced if ART service was provided at the prison settings. As a prison nurse argued, provision of on-site ART service at the prison system would promote implementation of the "Test and Treat" approach recommended by the national guidelines to increase identification of infected individuals and subsequent initiation of treatment for all:

> *"As the [national] guidelines recommend a test and treat strategy, they [HIV-infected prisoners] should get treatment here [at the prison clinic] where they have been tested. It's nothing more than extending the procedure when you refer a person, 'Just go there as you are tested positive!' after having been tested here. It just increases a hustle when everyone says, 'Go there, and come here!'" (PN#2).*

She recalled her experiences of failure and success regarding TB treatment before and after it had become available at the institutional level, to anticipate possible benefits of on-site ART service at the prison setting. She perceived that it would significantly reduce difficulty in making frequent external health care facility referrals, and enable her to successfully accomplish her responsibility of properly monitoring ILWH's health:

> *"I'm so happy if he [HIV-infected prisoner] takes his medication from the OPD (outpatient department) in a similar manner as other patients; this will ease service provision. This was the case for TB (tuberculosis) treatment. We used to instruct prisoners, 'You have to go to the health centre or hospital every morning to take your medication!' But now they receive their treatment here in a swift way; they come here with their water every morning and take their medication in front of us. We monitor their progress measuring their weight, with every responsibility; it increases your responsibility when you do it on your own; I do it as my own duty. It is not good to leave them to someone after just offering them the test.." (PN#2).*

Provision of on-site ART service at the prison system was assumed to avoid transport problems associated with external ART visits and encourage ILWH to perform assented disclosure of their status to prison health care staff, as it would likely reduce loss of privacy:

"Oh! That is sacred [referring to on-site ART]; it is very sacred. For example, they [prisoners] could get it here on daily basis. Secondly, they wouldn't bother about transport, although the drugs are always available at the health centre as well. They would just come here, contact their nurse and disclose their status to them; oh! What a blessing! This would be really nice!" (PO#2).

It was also believed to increase an inmate's capability to adhere to his/her medication schedule as it could avoid potential delays in ART visits associated with their long distance from the prison settings. A prison administrator said:

"What I would suggest is that these people should have access to HIV medication in their vicinity like other medications, if it is possible. Most of them obtain their medication from the hospital, which is a bit far from the prison and umm------others may obtain from different places. Thus, better they would be provided with the medication at the prison clinic by our health staff in order to keep their medication schedule." (PA#2).

This same participant conceptualised that HIV care at the prison system at its current form was only secondary to other routine health care services, lacking specially trained health care staff. However, he perceived that HIV infection likely involves a series of medical and social issues including strict treatment monitoring and maintenance of patient privacy:

"What should be focused at the national level is that there should be specifically trained health professionals for HIV care at prisons just like psychiatrists are for people with mental [health] problems instead of making it supplementary to other health care services. These people may require privacy, confidentiality of their profiles and strict treatment follow-up which might be quite different from other cases." (PA#2).

ART service providers described their expectations of the benefits of the approach. Accordingly, in addition to its capacity to protect patient privacy, on-site ART would facilitate offering of more intense health care staff support particularly for those who might have adherence problems, which essentially require frequent contacts with health care providers:

"It would be preferable if they [prisoners] had their own ART clinic right there in the prison compound. This would be very important first to secure their medication privacy and secondly, it would enable them to get EAS (Enhanced Adherence Support) there at their vicinity." (AP#2).

5.3.5 Treatment discontinuation after prison release

Poor coordination between public health institutions and the prison healthcare system produced uncertainties amongst ILWH about continuation of their treatment after prison release. In an effort to ensure post-release medication continuation, some ILWH were persuaded to follow their treatment at health care facilities in their original residence despite the fact that in most cases the original residence was considerably faraway from the correctional facilities:

> *"----------Because I had started the treatment there [a hospital at his original residence], I mean in 2007. I think I have the treatment card [Trying to show the card], it was since then if I am not mistaken. Yes, I have got it! I started there, here it is [Showing the card]. I have every stuff there; my file and others. If I continued my treatment here at the health centre [near to the prion], they would definitely say, "He is lost!" And I will have to start the treatment again as a new patient when I go back to the hospital. I just want to continue my medication there when I get released hopefully. I don't want to be back here for this." (P#6).*

ILWH expressed concern about the possible discontinuation of treatment after release as they were devoid of information about how they would prevent this:

> *"My main concern is if there are arrangements facilitating continuation of my medication in my original residence when I'm back home after release. I have no idea about how previously released prisoners continued their medication in the outside community." (P#10).*

After release from prison, some PLWH either completely disengaged from care or re-engaged after long delays. This was because in some cases they tended to give more weight to the social affairs in the community than their medication:

> *"There were three inmates [living with HIV] recently released on parole and one of them never came back after he had been released, we don't know where he has gone. He told us that he would continue his meds here. The other one came back after a long delay. I asked him why he didn't [immediately] continue his treatment and he said that he was bothered with social stuff and ignored his treatment." (AP#2).*

Prison health care providers' failure to have a pre-release plan and their inability to be involved in ILWH's community transfer process contributed its part to discontinuation of care after prison release. A prison nurse, for instance, found herself in a poor position to take part in the inmates' community transfer process to make sure that they had continued their medication at their destination. She felt estranged from the responsibility placing it on ART service providers at external health care facilities:

"There is nothing they [prisoners living with HIV] can get form us, it is the hospital that gives them everything [during release]. We don't do that [communicating ART service providers at destination health care facilities]." (PN#1).

Unfortunately, ART service providers at external health care facilities displayed a complete lack of understanding about what ILWH would likely encounter after prison release regarding their treatment. It appeared to be the inmate's responsibility rather than the prison healthcare system to let the ART service providers know about completion of his/her prison sentence otherwise he/she would have a high chance of being counted as a "lost case":

"Yes! I don't know what will happen to them [inmates living with HIV] after they left the prion. Who would tell you? Telling you like, there is HIV-infected prisoner going to be released? I have already told you about this, it is all sudden. They get released like any other inmate; there is nothing like asking the hospital for a referral letter. We don't know their release if they [inmates] don't inform us. He is going to be a lost case, maybe when he is found to be a prisoner during the search; we go straight to the prison and ask, 'Where has this prisoner gone?' then we do nothing apart from hearing them saying, 'He is released!'" (AP#1).

Prison officials distanced themselves from their institutions' failure to ensure continuation of treatment after release by inmates' indeterminate post-release residence. It seemed to be evident that the prison settings lost their connection with ILWH once they returned to the community, at least in the perspective of their HIV care use if not completely:

"What we focus is on the person's release because he may not stay in a single place. He may move to provinces or to the cities in search for jobs; they are not only from this town, they come from various places. As a crime is incidental by its nature, his residence might be different from the locality where he has committed the crime." (PA#2).

5.3.6 HIV transmission risks in prison

It was evident that there were risks for HIV transmission in the South Ethiopian prison system. Inmates engaged in risky behaviours including sharing sharp objects for shaving, cutting nails, removing insects and tattooing. This was largely due to inability to afford their own personal equipment and despondency related to imprisonment:

> *"How many people use a single razor here? This is due to a lack. But they stand around and shave their beard using a single razor. They can't afford to buy a razor with 0.1USD. As a result, no one knows whether they have HIV, Ebola or any other infectious disease. It is so sad that they use it desperately saying, 'Why not it kills us!'" (P#1).*

One female prisoner reported the possibility of her having been infected with HIV in prison due to sharing sharp objects with her HIV-infected friend for cutting nails and removing insects:

> *"I didn't have HIV infection in my entire married life. I had been infected after I entered this prison. My husband is still HIV-negative. I'm the only one from my family who is living with HIV [Crying]! I lived with an HIV-infected woman for about eight months in the police station. We were often sharing a razor and needle. Then I had tested positive when I came to this prison, I didn't have it before. We were even removing insects from our feet using the same needle. I cut my nails with the razor she used and she cuts with the one I used." (P#11).*

Tattooing was often practiced in the prisons discreetly and inmates were unaware of the potential risk of HIV transmission through sharing tattooing material:

> *"There is a practice of tattooing in this compound, but hidden. They do it secretly. I just tell them [inmates], 'Tattooing can transmit HIV!' They don't listen when I tell them to stop it." (P#3).*

Given prisoners' little knowledge regarding HIV transmission means, unsafe disposal of used sharp materials in the prisons presented a risk for infection:

> *"If I dispose something like a used razor in a toilet, people will reuse it. No one educates [them] about this. What I fear most is the toilets are always open. If you go there now, you may observe some cues; so many razors, so many things!" (P#8).*

5.4 Summary of results

Results of the three methodological approached (meta-analysis, cohort study and qualitative interviewing) are summarised as follows in the order of their appearance in the previous sections.

5.4.1 Meta-analysis

2,348 articles were identified through a systematic search of relevant studies across seven databases, and bibliography searches, regarding factors affecting HIV care continuum in incarcerated people. Of 42 studies included in the narrative review (after removing duplicate, irrelevant and ineligible articles), 17 studies were found to be eligible for meta-analysis. The majority (94%) of studies included in the meta-analysis were from high-income countries and used retrospective or cross-sectional designs.

The meta-analysis identified a lower likelihood of antiretroviral therapy (ART) initiation in HIV-infected prisoners who had a higher baseline CD4 count, and in those who were recently diagnosed. Inmates living with HIV (ILWH) who had belief that ART improves their health and causes no harm (in terms of drug adverse side-effects and social stigma) were more likely to accept ART. The odds of adherence were lower in ILWH who experienced depression, lacked self-efficacy to consistently use their medication and in those who lacked social support. The meta-analysis signified the influence of gender on viral suppression in ILWH that males were significantly less likely to have viral suppression compared to females. Viral non-suppression was also higher in people living with HIV (PLWH) with a history of incarceration than PLWH without a history of incarceration, but lower than PLWH with a history of re-incarceration. Analysis of studies that compared viral suppression and CD4 count during entry and exit from prison showed a significant progression in both treatment outcomes during incarceration.

5.4.2 Cohort study

Seventy-six incarcerated and 319 non-incarcerated PLWH participated in the prospective cohort study. While both groups had a comparable age (median age: 34 vs 35 years), the majority (90%) of prisoner participants were male. The median length of incarceration and sentence for prisoners was 1.7 years and 5.7 years respectively.

Among psychosocial factors assessed in the cohort study, depression was found to be significantly higher in ILWH (38%) than non-incarcerated PLWH (20%), but both groups bore comparable burden of HIV-related social stigma. In addition to their higher dissatisfaction (86%) with the overall prison services (including health care services), ILWH had a significantly lower (12%) satisfaction with external ART services compared to non-incarcerated PLWH (26%). While the majority of incarcerated (84%) and non-incarcerated PLWH (86%) had poor knowledge about HIV and ART, prisoners were less likely to seek social support when a need arose.

The overall prevalences of delay in ART initiation was 20% based on baseline CD4 count and 24% when measured using World Health Organization (WHO) clinical criteria. Although incarcerated and non-incarcerated PLWH had a comparable prevalence when determined using both methods, a significantly low number of ILWH (19%) were able to initiate ART on the test date relative to their non-incarcerated counterparts (50%). The overall prevalence of non-adherence was 17% by self-report and 22% using medication possession ratio (MPR). Self-reported dose adherence was approximately similar between the two populations, but ILWH had a significantly higher MPR adherence (89% vs 75%). The total prevalence of virological failure (VF) was 4.7% whereas that of immunologic failure (IF) was 1.4% with ILWH having a slightly higher VF but lower IF, which was not statistically significant. Medication interruptions were common (during stay in jail and after prison entry) amongst ILWH who had been using ART before incarceration, primarily due to: a lack of access to ART services, fear of social stigma and uncooperative security staff.

Multivariate analyses identified a number of factors influencing ART initiation in incarcerated and non-incarcerated PLWH. A rural residence, being a daily labourer, failure to disclose HIV status to more than two people and missing a pre-ART appointment were significantly associated with lower odds of ART initiation independent of imprisonment. Most ILWH participants reported missing pre-ART appointments due to a lack of support by prison staff and in fear of social stigma, the latter also being important in non-incarcerated PLWH. Furthermore, female gender, perceived social stigma and diagnosis due to ill-health independently predicted failure to commence ART on the test date regardless of an incarceration status.

The overall dose non-adherence was significantly associated with missing ART appointments, patient's ability to comply with a medication schedule and types of methods used to monitor the schedule. The level of satisfaction with ART services (which was significantly lower in ILWH) independently predicted the overall dose non-adherence. Viral failure was significantly higher in males, people of age 31 to 35 years and in those who experienced social stigma, regardless of their incarceration status. In specific multivariate analyses of factors influencing ART adherence in ILWH, accessing ART services from a hospital negatively affected dose adherence compared to accessing care from a health centre. In addition, ILWH's ability to always attend clinic appointments also predicted dose non-adherence. ILWH were less likely to conform to dose instructions when they experienced depression and lacked social support.

Risk behaviours related to HIV transmission were observed in incarcerated and non-incarcerated PLWH. Substance use was fairly common in both populations; the most commonly used substances were khat and cannabis. Failure to disclose HIV status was significantly higher in ILWH (43%) than non-incarcerated PLWH (22%). Sharing sharp objects was more commonly practiced amongst non-incarcerated PLWH. Although the majority of cohort participants reported having a single sexual partner in the previous 12 months, more than half (60%) of them never or only sometimes used condoms during their sexual encounter(s) with HIV-negative or a partner(s) of unknown status. A higher socioeconomic status, failure to disclose HIV status to more than two people and a lack of self-efficacy to seek social support were identified as risk factors for an inconsistent use of condoms in incarcerated and non-incarcerated PLWH.

5.4.3 Qualitative findings

Eight male and three female ILWH who were a subset of those taking part in the prospective cohort study participated in the qualitative interview. The prisoners had a median age of 35 years. More than half of the ILWH had been incarcerated for more than a year and four used ART for five or more years. In addition, eleven service providers (seven male and four female) including prison health staff, ART service providers, prison officers and administrators, and health agents participated in the qualitative interview.

After analysing the in-depth interview data, four main themes were identified as barriers to early ART initiation in prisoners: a lack of access to HIV testing, inability of prison health staff to make timely care linkage, uncooperative security and loss of privacy regarding HIV status. A limited access to HIV testing services in the prison system substantially contributed to delays in ART initiation, as new cases were detected only when inmates requested testing due to severe sickness (through a 'risk-based' or 'opt-in' approach). Poor prison staff support on the other hand led to loss of patient privacy and perceived social stigma, which in turn caused treatment refusal. Late linkage of HIV-infected prisoners to external HIV care negatively affected same day treatment. Nonetheless, peer education and support, and an opportunity created by the prison environment to gain vicarious experiences, and to easily access HIV-infected individuals appeared to facilitate early initiation of ART in prisoners.

Several themes emerged in relation to barriers to ART adherence in ILWH including: a limited access to standard HIV care, insufficient health care provider support, uncooperative security system, loss of patient privacy, a lack of status disclosure due to social stigma, depression related to imprisonment and food supply insufficiency. External ART services presented various intra-institutional and inter-institutional barriers to adherence amongst ILWH; a lack of transport facilities, shortage and/or uncooperativeness of escorting prison officers and poor communications between prisons, health care facilities and courts were the most important barriers. Most ILWH participants reported that care provided by the external ART clinics was sub-optimal as demonstrated by a lack of continuous counselling and support during and after initiating ART. Almost all service provider participants suggested that on-site ART services would substantially mitigate these barriers.

In addition to depression imposed by an imprisonment, stigma by fellow inmates and prison officers affected ILWH's ability to disclose their HIV status and led to further despondency and a diminished commitment to use ART. Moreover, insufficient supply of food in the prison system combined with a limited access to community nutritional programs aggravated antiretroviral side-effects, which in turn increased the likelihood of medication discontinuation. However, adherence was facilitated by ILWH's self-efficacy to disclose their HIV status and cope with the influences of social stigma, the presence of peer support as well as a unique environment created by imprisonment which enabled them to: refrain from health damaging behaviours, learn punishing effects of these behaviours from others (such as interrupting medication), and to less engage in social affairs outside prison.

CHAPTER SIX
DISCUSSION

Introduction

This thesis sought to investigate factors influencing HIV care continuum (HCC) in incarcerated people relative to non-incarcerated people living with HIV (PLWH) in South Ethiopia. As discussed earlier in Chapter 1 (section 1.4), antiretroviral therapy (ART) has both therapeutic and preventative benefits[6-8] when PLWH commence the treatment as timely as possible and are capable of achieving optimal adherence after initiating.[9] Prisoners bear a disproportionate burden of HIV infection accounting for the highest proportion of all new infections worldwide.[2] Consequently, they have a higher potential of transmitting to others during and after incarceration.[2, 54] Despite this, few studies have so far been undertaken globally, and fewer in low-income countries, regarding the level of HCC outcomes in incarcerated people. Little is known about circumstances that could influence the main outcomes of the HCC including: early initiation of ART, adherence and viral suppression/immunologic progression. Therefore, this thesis employed a mixed methods approach to explore various structural, sociocultural and individual level factors that positively or negatively affect each of the HCC elements in the South Ethiopian prison system relative to the local community-based settings and prison systems at an international level.

In this chapter, results of the meta-analysis, prospective cohort study and quantitative interviewing are discussed in an integrated manner. The first three sections sequentially discuss the prevalence of delay in ART initiation, non-adherence and virological and immunologic failures, as well as the predictors of each of the sub-optimal HCC outcomes. The last three sections respectively discuss strategies suggested to improve HIV care in the South Ethiopian prison system, post-release care and HIV transmission risks in prison and outside community.

6.1 Prevalence of delay in ART initiation

Twenty percent of HIV-infected prisoners in South Ethiopia commenced ART late. This is comparable to the prevalence observed in the local non-incarcerated population (see Chapter 5, section 5.2.3), and lower than the prevalence previously reported in prisoners in other low- and middle-income countries.[12, 110] The majority (96%) of prisoners initiated ART within three months of diagnosis, which was also slightly higher than the rate observed in the non-incarcerated population and that reported in other prison settings internationally.[20, 96, 116] The recent rapid expansion of ART services in Ethiopia through a 'Test and Treat' approach allowed commencement of ART for all HIV-infected individuals regardless of the level of CD4 count or WHO clinical stage,[9, 70] which might have also contributed to the lower prevalence of delayed ART initiation in prison population in this thesis. Nonetheless, a substantial number of HIV-infected prisoners (81%) in South Ethiopia were unable to initiate ART on the test date, which was significantly higher than non-incarcerated people (50%). This thesis is the first study to report findings regarding the impact of the new 'Test and Treat' strategy in prisoners. Prior community-based studies in sub-Saharan Africa (SSA) reported a higher prevalence of non-initiation of ART on the test date than the present study.[117, 118]

6.1.1 Factors influencing early ART initiation

Several structural, social and personal factors were identified to influence early initiation of ART in HIV-infected prisoners compared to their non-incarcerated counterparts, and these factors are discussed in the following sub-sections.

6.1.1.1 Structural factors

The cohort study did not show a statistically significant difference in the hazards of not initiating ART between incarcerated and non-incarcerated individuals, however, prisoners were significantly (92%) less likely to commence treatment on the test date. This may lead to sub-optimal treatment outcomes [364, 365] and further transmission of infection for others during and after incarceration,[56, 57] given the high prevalence of HIV and late diagnosis amongst prisoners in Ethiopia.[2, 14] The qualitative interviews helped explain the reason behind these results by identifying several institutional barriers to early ART initiation in the South Ethiopian prison system. For example, insufficient training for prison health care staff on pre- and post-test counselling resulted in delay in the feedback of test results and linkage of HIV-infected prisoners to external ART sites. There were greater delays in care linkage for prisoners relative to people who were tested at non-ART sites in the community. Many studies previously reported an insufficiency of specially trained health staff for HIV care in prison

settings in low- and middle-income countries, primarily due to a limited resource allocation relative to the community settings.[11, 74, 96, 110]

Training of prison health staff is an essential step in enhancing access to HIV testing, care and treatment for prisoners.[366] It is part of the recommendations of international guidelines for training and reassigning tasks to lower level health care workers to enhance testing coverage in HIV key populations.[150, 367] Such approaches are also found to be efficient and effective in increasing testing rates in prisons in low-income countries, particularly when coupled with peer education programs.[91]

Given the congregated living conditions in the prisons - up to 150 inmates accommodated together in a cell measuring 100m^2, patient privacy was lost on various occasions. This increased prisoner reluctance to accept ART due to anticipations of social stigma, which was one of the identified predictors for not initiating ART on the test date in the current cohort. Such breeches of privacy included public announcements of test results and overt transportation of prisoners to external ART sites to access care. Insufficient health care staff skills in HIV care combined with prison officers' negative perceptions of inmates living with HIV (ILWH) substantially contributed to losses of privacy and delays in care linkage. Prison officers' uncooperativeness in relation to ILWH's accessing of care from external ART sites has been noted in other prisons in low- and middle-income countries, causing loss of privacy and missing clinic appointments,[10, 75] and this formed the main predictor of late ART initiation in the present cohort. Conversely, higher rates of linkage to care and ART initiation were achieved through on-site ART approaches (i.e. HIV care provided by specially trained prison health care staff) in many prisons.[20-22] Other international studies also found more likelihood of ART acceptance amongst prisoners who were satisfied with prison-based healthcare systems and had trust in their health care providers,[137, 138] but acceptance decreased when there was a loss of privacy while navigating care.[239]

There are no legal grounds to ensure medical privacy for prisoners in Ethiopia, and it seems to be a difficult task given the circumstances related to accessing care in groups and a congregated living environment. However, provision of appropriate counselling for prisoners during diagnosis and reducing social stigma by creating awareness about HIV amongst members of the prison community may encourage consented discloser. Training in patient privacy and confidentiality for prison staff who are involved in the provision of HIV care could improve undisclosed inmates trust and, consequently, uptake of ART.[366]

The qualitative study revealed that HIV testing in the South Ethiopian prison system was usually only available upon the prisoners' request (through an 'opt-in' or 'risk-based' approach). A number of factors could hamper the prisoners' ability to request testing. As noted in this and several other studies,[11, 74, 75, 239-241] prisoners were often faced with procrastination, or frank refusal, from health care providers and prison officers when they tried to seek care. In addition, due to the widespread social stigmatisation and discrimination associated with HIV both in the community and prison settings, individuals who suspect that they may be infected with HIV are generally less likely to request testing.[366, 368-371] It has been reported that an opt-in approach generally provides a little opportunity to reach prisoners before they return to the community.[372-374] Such an approach could be even more challenging to implement in settings such as South Ethiopia where the majority (86%) of prisoners return to the community within less than two years of imprisonment.[26]

6.1.1.2 Disclosure and social support

Findings of the cohort study indicated that disclosing one's HIV status exclusively to a family member (e.g., spouse or offspring) decreased the likelihood of ART initiation by more than 88% compared to disclosing to more people. As discussed in Chapter 3 (section 3.2.1.2), HIV status disclosure can facilitate access to social support, which can minimise the negative influence of perceived social stigma on ART initiation.[114, 375] The current findings therefore provided evidence that disclosing HIV status beyond immediate family members creates a greater chance of accessing social support from various sources, increasing the probability of initiating ART early. This was further detailed in the qualitative interviews, in which the majority of participants described the importance of peer support programs for early diagnosis and treatment of HIV infection in prisoners. Such programs not only offered ILWH an opportunity to share each other's experiences of living with HIV in a prison environment, but also served as a route of encouragement to commence ART. The positive impact of social networks on the outcomes of the HCC is well acknowledged in the community-based populations,[376, 377] but little is previously known about its effect in correctional settings.

6.1.1.3 Individual's perception

The cohort study and meta-analysis showed that HIV-infected individuals generally require motivational factors to seek care. For example, in the cohort, the prevalence of delay in ART initiation was significantly higher in incarcerated and non-incarcerated individuals who presented for care due to experiencing severe symptoms. Conversely, the meta-analysis identified a lower likelihood of ART initiation in prisoners with a high CD4 count and more recent HIV diagnosis. HIV-infected individuals often feel healthy during the earlier phases of the infection (i.e. at asymptomatic stages

and/or high CD4 count), which can deter them from initiating treatment.[63, 114, 120, 164, 165, 167, 189-192, 232] However, the present study and others[137] also demonstrated that symptoms alone may not always be sufficient to prompt ART initiation, but there should also be confidence that the treatment is safe and efficient. This implies the importance of ensuring patient acceptance of immediate ART to attain the clinical and public health benefits of the 'Test and Treat' strategy, in addition to maintaining access to treatment particularly for population groups which are at highest risk of HIV transmission, such as prisoners.[378, 379]

6.1.1.4 Socioeconomic and sociodemographic factors

The cohort study identified socioeconomic and sociodemographic factors such as residence, occupation and gender as predictors of late ART initiation in incarcerated and non-incarcerated people. Significantly higher hazards of not initiating ART were observed in rural residents and daily labourers compared to urban residents and governments employees respectively. As discussed in Chapter 3 (section 3.2.1.2), ART sites in SSA countries are frequently located in the urban areas, creating transport and expense issues for people from rural provinces.[63, 113, 124, 166] Rural residence in the Ethiopian context is also associated with low economic and educational status, which could further impact timely treatment initiation.[170] This might also explain the decreased probability of ART initiation in this study in prisoners originated from such areas. The lower likelihood of ART initiation in daily labourers might also be linked with their relatively limited understanding of the health benefits of ART and low-income; potentially due to relatively low educational levels that are associated with this group and/or incompatible clinic open hours.[166, 170] The latter case was supported by the higher delay in ART initiation in non-incarcerated people who waited more than an hour to see a health care provider, which was not the case in prisoners. Given the predominance of daily labourers and people from rural areas in the prisons of South Ethiopia,[26] these findings have a crucial individual and public health importance in the management and prevention of HIV.

Females generally were more than 70% less likely to initiate ART on their test date compared to males. While there has not been much evidence concerning the influence of gender on same day treatment in both populations, this finding is in contrast with the available evidence[117] and many other SSA studies that reported higher rates of linkage to care and ART initiation in females[62, 64, 108, 114, 170, 176, 177, 190] (see Chapter 3, section 3.2.1.2). One possible explanation for the lower acceptance of same day treatment in females in this study could be the fact that females in Ethiopia bear greater responsibility of taking care of children and other family members relative to males, and may need more time to weigh up competing priorities before commencing treatment.

6.2 Prevalence of ART non-adherence

Incarcerated PLWH in the current cohort study had a slightly higher prevalence of dose non-adherence compared to non-incarcerated PLWH (19% vs 17%), but significantly lower non-adherence in terms of medication possession ratio (MPR) (11% vs 25%). The higher MPR (pharmacy refill) adherence was due to prisoners tend to be more likely to pick up their medication in a timely manner,[133, 321] whereas the lower self-reported dose adherence indicates their lower likelihood of consistent use[321, 323] (see Chapter 4, section 4.5.3.2). Although both dose- and MPR-adherences are required for attaining optimal treatment outcomes, the extent of the patient's compliance with specified doses directly correlates with their prospect of achieving viral suppression and immunologic progression,[218, 219] which essentially predicts HIV-related morbidities and mortality, as well as further transmission.[6-8] The prevalence of non-adherence identified by this study in the prison population was higher than the prevalence reported by some studies in the general population in Ethiopia,[128, 129] but lower than the prevalence reported by others[144, 145] and that reported in the SSA general populations,[134, 203] as well as in prison populations internationally.[139-141, 149, 231]

6.2.1 Factors influencing optimal ART adherence

The three methodological approaches used in this thesis revealed various structural, psychosocial, individual and clinical factors affecting ART adherence in ILWH relative to non-incarcerated PLWH. While their mechanism of influence differs, some of the factors are essentially akin to those influencing ART initiation as discussed earlier in this chapter.

6.2.1.1 Structural factors

While missing ART appointments was an important factor in both incarcerated and non-incarcerated populations, it appeared to be more critical in prisoners. Regular clinic visits are essential for PLWH to receive ongoing adherence counselling and support services, as well as clinical assessment and further prescription of ART.[150] Omission of such appointments, therefore, subsequently leads to sub-optimal adherence.[380-384] As identified by the qualitative study, external ART services in the South Ethiopian prison system presented several institutional and inter-institutional barriers to care. A lack of transport facilities combined with shortage of escorting prison officers led to group clinic presentations, which in turn caused frequent missing of clinic appointments and use of unprescribed medications. This is commensurate with findings of other prison studies in low-income countries.[11, 75] The issue of transport was also found to be the main reason for missing ART appointments in non-incarcerated PLWH in this study. ART clients in SSA, particularly those with lower socioeconomic status, often struggle with transport costs related to distant ART sites.[63, 166, 382] In addition,

incompatibility of clinic operating hours with PLWH's work schedules might have contributed to missing clinic appointments.[170, 385]

Regular group visits to external health care facilities, involving frequent rotations of escorting prison officers, severely affected medication privacy of ILWH, which (as discussed earlier) was already challenged by congregated living conditions of the prisons.[10, 261] Loss of privacy during visits to external ART sites appeared to be more critical for ILWH who had strong social connections with the surrounding community, and might be due to their reluctance to disclose their HIV status to members of the community to which they would ultimately be released. The privacy issue also appeared to be important in ILWH who originated from areas remote to the prisons. This might be related to ILWH's lack of familiarity with the prison environment enhancing fear of stigma and discrimination in relation to disclosure of their HIV status.[386]

Another health services-related factor that influenced ART adherence in this study was the level of satisfaction with ART services. The cohort study identified a significantly lower level of satisfaction in ILWH than non-incarcerated PLWH. This is important because the results revealed an 86% lower likelihood of dose adherence in PLWH who had low satisfaction. The qualitative study also suggested that sub-optimal HIV care was being provided by external ART clinics for prisoners, which was demonstrated by a lack of continuous counselling and support during pre-ART and ART periods. Inadequate health care staff support was also reported in the prison healthcare system, which appeared to be predominantly driven by a lack of HIV-related training and poor communication with ART service providers. This in turn tended to reduce prisoners' trust in the health care staff who then tended to completely rely on external health care services, despite them being barely accessible. Good health care provider-patient relationships are essential for enhancing adherence.[137, 260, 261, 380, 387] It has been reported that patients who believe that health care providers are uncaring and unsympathetic are less likely to conform to medication instructions.[262, 388]

The influence of limited prison health staff's skills (related to HIV care) on prisoners' adherence observed in this thesis is consistent with other prison studies that also reported a relationship between poor adherence and inappropriate care and support by health staff, due to their insufficient special skills regarding ART services.[239, 259, 261] The prison health care staff's lack of HIV care skills in this study was demonstrated by their repeated HIV testing in ILWH who were already on ART and ILWH's dissatisfaction with their services. Retesting individuals who are on ART usually produces false negative results as a result of viral suppression by the medication, and increases the likelihood of medication discontinuation.[150]

From the cohort study, the odds of dose adherence were 75% lower in ILWH who had received ART services from a hospital compared to those receiving services from a health centre. This might result from the fact that hospitals in SSA often serve a large volume of patients, which leads to long waiting time, overcrowding and, ultimately, loss of patient privacy.[389] It may also explain ILWH's dissatisfaction with ART services provided by external health care facilities (as mentioned above). Health care provider- and health facility-related factors are amongst the most frequently reported barriers to ART adherence in SSA.[389] The findings suggest a need for decentralisation of ART services to primary health care facilities, including prison clinics. Training of health care providers in HIV care provision is pivotal to achieve this, in addition to reinforcing collaboration between prison and community healthcare systems [366].

The qualitative study revealed occurrence of medication interruptions at different stages of the incarceration process in relation to uncooperative security system. Denial of medication possession during arrest, coupled with protracted security processes during prison entry, forced incoming ILWH to interrupt their medication. After prison entry, prison officers' obstruction of ILWH-ART service provider consultation influenced prisoners' care utilisation and caused emotional trauma and demotivation of reporting their medical concerns. Similar findings were reported by Shalihu et al [10] (page 971) in a Namibian prison that prison officers' discriminatory threatening of ILWH caused "frustration, humiliation and discouragement" to use ART. Other studies also described frequent medication interruptions amongst ILWH due to uncooperative prison security even in prison systems where on-site ART services were implemented.[239, 260, 261] It is impossible to consider protecting the health of people who are involved in the criminal justice system without contemplating the role of security staff. The current findings implicate the necessity for security staff to be aware of whether the arrested/detained/imprisoned individuals are on ART and their specific health care support requirements. This is essential to ensure continuation of medication throughout the incarceration process.

Another structural barrier to ART adherence in ILWH, as revealed by the qualitative study, was food supply insufficiency. ILWH suggested that imprisonment appeared to be more burdensome to them than other prisoners due to inadequate nutrition. This is because individuals on ART require a higher quality diet to prevent exacerbation of antiretroviral (ARV) adverse-effects,[225] one of the most frequently reported predictors of poor adherence in prisoners.[138, 139, 230, 260, 262] Reduced food access and the associated exacerbated treatment side-effects sometimes resulted in ILWH preferring to rely on religious belief rather than ART for their health. The use of spiritual or alternative medicine to

ART is one of the main behavioural causes of ART discontinuation in the general population in Ethiopia[128] and elsewhere in SSA.[147, 210]

The food supply insufficiency in this study was partly attributable to structural factors related to prison officials' denial of additional food support for ILWH, as well as unfair distribution of nutritional support by health agents that favoured PLWH in the outside community. The influence of food insufficiency on ART adherence in this study is in line with findings of studies in SSA[10, 11] and low- and middle-income countries elsewhere[141, 262] that reported frequent missing of doses and treatment interruptions amongst ILWH due to hunger. It is clear that prisoners have limited capacity to create alternative sources of food compared to people in the outside community. Consequently, their dietary requirements are almost entirely dependent on rations provided by the prison system. This suggests a need for modification of prisons' food supply policy for ILWH who are on ART, in addition to integrating HIV-related nutritional programs in the community into the prison system.

6.2.1.2 Psychosocial factors

In this study, four interrelated psychosocial characteristics: depression, social stigma, disclosure and social support were found to determine optimal ART adherence in prisoners. Both the cohort study and meta-analysis showed a significant decrease in the odds of dose adherence in depressed prisoners compared to their non-depressed counterparts. Although depression strongly predicts poor adherence in the community-based populations as well,[135, 221, 388] ILWH often report feeling depressed due to imprisonment-related concerns[78] in addition to their HIV infection.[265] The qualitative findings also showed that depression was common in ILWH, primarily resulting from issues related to being imprisoned that often demotivated their compliance with medication instructions. International and local studies identified depression as one of the main predictors of poor adherence in prison populations.[255, 257, 260]

The qualitative study revealed that ILWH were required to disclose their HIV status and/or previous use of ART to prison staff if they were to continue their medication. However, this study and others[239] found that many ILWH lack the confidence to disclose their HIV status to prison staff, often disclosing only when their health worsened due to the progression of infection. Vicarious and direct experiences of social stigma by fellow inmates and prison officers played a role in hindering ILWH's motivation to disclose their status, and so lessened their commitment to use ART. The impact of discriminatory attitudes of prison security was most intense, which prisoners reported often led to despondency, the main predictor of non-adherence in incarcerated people.[139, 255-257, 260] This supports the well-documented negative influence of marginalisation and discriminatory treatment on adherence in a custodial environment on the basis of HIV status.[10, 259-261]

Despite the absence of organisational structures supporting disclosure and ensuring patient privacy in the prison system, ILWH who felt able to disclose their HIV status were able to reduce potential medication interruptions[239] and to create sources of social support. Disclosure also served as a means to gain self-confidence that was important to cope with social stigma, and internal satisfaction and motivation to support oneself and others in similar situations – as Sprague et al [241] describes, "generating a type of solidarity" (page 1437). As noted by other authors,[239] ILWH in this study were encouraged to disclose their HIV status with the hope that they might receive special considerations from prison officers, such as an exemption from mandatory work.

All three studies indicated the importance of social support for optimal ART adherence in prisoners. In the cohort study, the odds of adherence to pharmacy refill (MPR) decreased by 86% in ILWH who did not have other HIV-infected prisoners living in the same cell. The meta-analysis showed more than threefold higher risk of dose non-adherence in ILWH who lacked social support, either from people in prison or outside, compared to those who received social support. The qualitative study also revealed networks of ILWH operating as an essential source of social support including material, emotional and information support, as well as creating a sense of comradeship. With the help of the social networks, ILWH were able to generate income in order to afford necessities such as additional diet and transport to ART sites, and they helped each other emotionally to overcome depression. The social networks also acted as a means to learn from peer experiences related to medication adherence, avoid social stigma and encourage each other to disclose and evade structural barriers to access care. As discussed in Chapter 3 (section 3.3.2), several other prison studies reported the positive impact of social support on prisoners' ART adherence[140, 239, 241] and the likely increase in the risk of poor adherence when ILWH suffer from social isolation.[137, 138, 255]

Despite the difficulty of ensuring patient privacy within the context of the Ethiopian prison system in particular, and of low-income countries in general (discussed above), the protective effects of disclosure and social support on social stigma and depression, and the bidirectional positive relationship between each other indicate the importance of the concepts for enhancing ART adherence amongst prisoners. Moreover, the impact of social stigma on disclosure and depression signifies that reducing social stigma in a prison environment could increase the likely consented disclosure amongst HIV-infected inmates and alleviate depression.

6.2.1.3 Individual level factors

Among the individual level factors assessed in the cohort study, the ability to comply with specified medication schedules determined dose adherence in incarcerated and non-incarcerated PLWH. Similarly, the meta-analysis identified higher odds of dose adherence in ILWH who possessed the self-efficacy to consistently use their medication. The cohort study also identified that the type of methods clients used to manage their medication schedule affected dose adherence. For example, dose adherence significantly decreased in clients who used news time on radio/TV or other social cues compared to those who used more direct methods such as mobile phones and/or wristwatches. Research shows that PLWH's ability to comply with medication instructions generally increases when they perceive good efficacy and safety of ART.[140, 257, 387] In addition, the use of reminder devices such as telephone reminders, clocks and alarms has been associated with a significant increase in ART adherence.[390-392] However, a difficulty of integrating pill-taking into dose time, a lack of access to clock time and subjective perceptions of duration are the main challenges in maintaining dose schedule adherence in ART clients in low-income countries such as Ethiopia.[393]

Due to security reasons, possession of a mobile phone is prohibited for prisoners in Ethiopia, but they are allowed to have other time monitoring devices such as wristwatches. In addition, as observed, most living cells in the South Ethiopian prions had a wall-clock. This provides a good opportunity to adapt interventions that have been known to be effective in community settings to the existing resources in the prison system. For example, wristwatches and/or wall-clocks supplemented with reminders could be introduced to the prisons. The use of wristwatch alarms seems to have a particular importance for improving adherence in prisoners who are unable to disclose their HIV status, as this minimises loss of privacy during medication use.

6.2.1.4 Clinical factors

In the current cohort, ILWH who experienced viral failure had a significantly lower MPR adherence. Prior studies have shown that having poor adherence lessens the likelihood of viral suppression in both prison-[140] and community-based populations.[143, 151, 216, 217] However, the current study provided no evidence regarding such a relationship, which might be due to the small number of participants who had developed the clinical outcomes. Nonetheless, as seen in Chapter 3 (section 3.2.2.2), people with a higher plasma viral load[209, 214, 215] and other disease symptoms[140, 260] often find it challenging to consistently use their medication. This could be related to a high pill burden and potential drug interactions that are likely to occur during the advanced stages of HIV infection due to opportunistic infections.[129, 147, 203] The finding underscores the importance of early HIV treatment for achieving optimal adherence in prisoners.

6.3 Prevalence of virological and immunologic failures

Six percent of prisoners participating in the cohort study experienced virological failure (VF). This estimate is slightly higher than the prevalence observed in the non-incarcerated population, but lower than that reported by several international prison studies,[13, 20, 97, 139, 140, 243, 244] and comparable with that observed in the SSA prisons offering on-site ART services.[21, 76] The lower prevalence of VF amongst prisoners in this thesis might be attributed to the relatively higher adherence, however, it might also be partly attributed to differences in the cut-off value used for defining VF across the different international studies (see Chapter 3, section 3.1.2).

The prevalence of VF observed in the non-incarcerated population in this study was also relatively lower than that previously reported in Ethiopia[151] and elsewhere in the low- and middle-income countries.[154, 227, 394] None of the prisoner participants developed an immunologic failure (IF), whilst 1.7% of the non-incarcerated PLWH had this clinical outcome. This thesis is the first study to investigate the prevalence of IF in a prison population. However, several prior studies also demonstrated positive changes in CD4 count after prison entry.[13, 20, 97, 243, 244] Similar to the VF, this thesis identified a lower prevalence of IF in the non-incarcerated population as well, compared to the most recently reported prevalence in Ethiopia.[156, 395-398] As mentioned, the recently implemented 'treat all' strategy in Ethiopia might have contributed to the better treatment outcomes in incarcerated and non-incarcerated people in this study.

6.3.1 Factors influencing viral suppression

The cohort study identified a significantly higher likelihood of VF in males, people in the age group of 31 to 35 years and in those who encountered or perceived social stigma, irrespective of their incarceration status. The meta-analysis also showed higher odds of viral suppression in female prisoners than male prisoners. With limited evidence available regarding the mechanism of how gender influences viral suppression, as discussed in Chapter 3 (section 3.2.1.2), females often adhere better to ART in the community settings,[145, 203, 209] which might have also facilitated their adherence during incarceration.

Younger age (below 35 years) has been frequently reported to be associated with a higher risk of poor adherence and VF in both incarcerated[141, 255] and non-incarcerated populations.[134, 145, 151, 203, 227] People in this age group are generally more likely to adopt substance misuse behaviours and often encounter social stigma and discrimination.[202] They are also more likely to initiate ART late,[64, 65, 114, 176] which may lead to subsequent non-adherence and VF.[66, 151, 209, 214, 215] Young adult males predominate prison populations in South Ethiopia[26] and around the world[244, 399] and they have a high prevalence of HIV

infection compared to other age groups.[400, 401] This clearly shows the risk of spreading infection in prison and beyond when HIV is poorly managed in this sub-population and the potential public health benefits of targeted interventions.

The significant positive association between social stigma and VF in this study may reflect the adverse-effect of alienation on a patient's appropriate use of medication,[147, 210, 222] which is particularly profound in prison populations.[10, 259-261] Nonetheless, there existed no statistically significant association between social stigma and self-reported or pharmacy refill adherence in this study, which may represent a lower specificity of these methods for identifying adherence relative to plasma viral load measurement.[159, 321-323] The contradiction between the good adherence amongst ILWH in the cohort study and an array of barriers identified by the qualitative study further suggests the limitations of the methods in detecting the true use of medication.

6.4 Strategies to improve HIV care in the South Ethiopian prison system

Service providers participating in the qualitative interviews described the potential benefits of incorporating HIV care in the prison healthcare system. They suggested that providing ART services within prisons, rather than externally, would make the existing prison healthcare system compliant with the national treatment guidelines that recommend universal access to HIV care.[14] In the service providers' view, on-site ART may provide the capacity to foster prison health care staff responsibility for the identification of new cases and offering uninterrupted care and support for ILWH. It was suggested that this would reduce delays in care linkage by avoiding protracted structural procedures and loss of privacy in relation to external ART visits.

While there has been a lack of data with which to compare on-site and off-site ART services in prison settings, there have been reports of positive HCC outcomes because of on-site ART, both in resource-limited[21, 76, 238] and resource-rich countries.[20, 97, 244] In line with the service providers' recommendations in this study, on-site ART has been found to enhance early detection and treatment of HIV infection in high risk populations which often face challenges in accessing care in the community settings,[20, 22, 137, 230] and prompt identification of PLWH who had been using ART before incarceration.[21] This study added a preliminary evidence on how offering standard HIV care at prison settings could facilitate the HCC in prison populations of resource-limited settings.

6.5 Treatment discontinuation after release

The qualitative study revealed the presence of a high chance of treatment discontinuation after ILWH leave prisons in South Ethiopia. As ART service providers described, there were substantial delays in the re-engagement of released ILWH into care if they were not completely defaulted from ART. Poor communications between the prison and community healthcare systems mainly contributed to the post-release care interruption. HIV care being completely external to the prison healthcare system, prison health care staff had little opportunity to play a role in the ILWH's community transfer process. ART service providers at external health care facilities were not necessarily informed when their prisoner clients were going to be released and where their destination would be in the community.

Disengagement from care after prison release may reverse treatment benefits gained during incarceration.[20-22, 245, 253, 402, 403] This was further evidenced by the current meta-analysis findings that; while the likelihood of viral suppression was lower in PLWH with a history of incarceration than those without a history of incarceration, it was much lower in re-incarcerated PLWH. There have been no published studies on post-release care in low- and middle-income countries. Studies in high-income countries, however, showed that former prisoners often face various socioeconomic and behavioural challenges such as homelessness, social stigma and engagement in substance misuse, which may adversely affect their ability to access care in the community.[404, 405] In addition to worsening their health, poorer treatment outcomes in released prisoners may lead to viral rebounds and drug-resistance,[66-68] and increased transmission to the community should they engage in high risk sexual and drug use behaviours.[404, 406-409]

6.6 HIV transmission risks in prison and outside community

This thesis identified important risk factors for HIV transmission amongst incarcerated and non-incarcerated PLWH in South Ethiopia. Although the risk of having multiple sexual partners was found to be low in both populations and there were no reports of homosexual relationships, inconsistent use of condoms during sexual encounters with individuals of HIV-negative or unknown status was high. Prior findings also showed unprotected heterosexual intercourse as a major risk factor for HIV transmission in Ethiopia.[2, 24, 36] Other studies in SSA reported the persistence of high risk sexual behaviours after ART initiation in PLWH.[410-415]

None of the prisoner participants in this study reported having sex with inmates in the previous twelve months. This possibly means that their sexual risk behaviours had occurred before incarceration or alternatively when they made family visits (on permission). Other studies in SSA also reported pre-incarceration unprotected heterosexual intercourse as a risk factor for HIV infection in prisoners,[40, 41, 419, 420] which contrasts with research findings in high-income countries that identified occurrence of homosexual unprotected sex during incarceration.[2, 38, 39] Nonetheless, while there have been reports of unprotected homosexual practices, including rape and sex bartering in the SSA prisons,[41, 42, 420-422] the patterns of sexual transmission of HIV in prisons is generally poorly investigated.

A more consistent use of condoms was observed when PLWH had sex with partners of unknown HIV status than HIV-positive partners. Although this may reduce transmissions to non-infected individuals, it may facilitate re-infection of treated individuals with drug resistant strains.[416, 417] Regular use of condoms was more common in PLWH who disclosed their HIV status to more than two people (including their sexual partners) and in those who were able to seek social support. While disclosure of HIV status to sexual partners creates an opportunity for discussing the use of condoms, PLWH who do not disclose have been known to have unprotected sexual encounters.[411, 412, 423-425] Social support encourages PLWH to disclose their status by reducing the perceived negative impacts of social stigma, and thus to consistently use condoms.[426] Several prior investigations demonstrated reductions in high risk sexual behaviours in PLWH as a result of social support although the effect size differed amongst sub-populations and according to different contexts.[427-429] The interrelationship between disclosure, social support and stigma in influencing the practice of safe sex amongst HIV-infected individuals shows the potential role of the concepts in the prevention of transmission in addition to their role in enhancing the HCC outcomes (as discussed earlier).

The consistent use of condoms was also associated with the level of income. The likelihood of condom use was significantly lower in HIV-infected individuals who had a relatively better income level. The relationship between economic status and HIV transmission within the context of SSA has been reported to be inconsistent.[430, 431] Nonetheless, in Ethiopia[432, 433] and in many other SSA countries,[432, 434] high risk sexual behaviours such as unprotected sex and the consequent higher transmission rates have been reported amongst individuals who are in the highest wealth index category. It is unclear how better socioeconomic status predisposes people to HIV infection, however it has been suggested that wealthier people often reside in urban areas where HIV prevalence is high and paid sex is more frequently practiced.[432, 434, 435]

Other risk behaviours, such as sharing personal paraphernalia (e.g., shaving and tattooing instruments), substance misuse including khat chewing and cannabis smoking were fairly common in both incarcerated and non-incarcerated PLWH. Although the risk of HIV transmission through sharps injuries is lower compared to unprotected sexual intercourse,[436] sharing of sharp objects is commonly practiced in Ethiopia.[437, 438] This study being the first to comprehensively assess HIV transmission risks in Ethiopian prisons,[419] studies in other SSA countries also showed that prisoners often share sharp objects for shaving, tattooing and rituals.[41, 42, 420] In the current qualitative study, prisoners reported frequent sharing of sharp instruments due to their financial incapability of affording their own personal paraphernalia, which sometimes forced them to reuse discarded equipment. This necessitates implementation of harm reduction strategies in prisons such as provision of personal paraphernalia on top of other risk prevention methods that are known to reduce HIV transmission, including promotion of universal testing and status disclosure, as well as behavioural change interventions.[44, 47]

Substance misuse can severely affect judgement in relation to practicing safe sex[439] and even lead to trading sex, particularly when coupled with poverty.[440-442] Substance use during sex may also reduce the chance of status disclosure, which can also negatively affect consistent use of protective methods.[443] Khat, a plant that is predominantly consumed by chewing and has a stimulant effect, is the most commonly used substance in Ethiopia. Khat users have a much higher prevalence of HIV compared to non-users.[435, 442, 444] Moreover, PLWH who use khat are more likely to practice risky sexual behaviours, such as unprotected sex, having multiple sexual partners and casual sex.[445] Khat use is often accompanied by the use of other substances such as alcoholic drinks, which may further impair judgement in relation to practicing safe sex.[446, 447]

Although research shows that a history of substance use is high in SSA prison populations, possibly due to the strong association between substance use and criminal behaviours,[85, 448-450] there has not been evidence demonstrating the relationship between substance use behaviours and HIV transmission during incarceration. Similar to the current findings, previous studies have also identified khat and cannabis as the most commonly used substances by Ethiopian prisoners before imprisonment,[450] reflecting the circumstance in the general population.[435] Cannabis has also been amongst the most frequently reported substances used in other East African prisons.[42, 85]

There were no reports of injecting drug use (IDU) in this study by prisoners or by community-based individuals. IDU is known to be amongst the main modes of HIV transmission in incarcerated and non-incarcerated people in high-income countries.[2, 39, 451-453] However, it is also becoming a growing risk factor for HIV transmission in Africa particularly in young adults, contributing substantially to the already established epidemic in the region.[454]

There is sparse literature regarding IDU in African prisons. The available data indicate that the number of people who inject drugs (PWIDs) in the correctional facilities is on the rise in many countries.[41, 454] While there have not been published studies on IDU amongst prisoners in Ethiopia, one study conducted in Addis Ababa City[455] reported a high number of PWIDs (mostly young adults) in the outside community, most of them sharing syringes and needles. The absence of IDU behaviour in the current study might therefore partly represent: the rural nature of the study area, relatively older age of the participants (see Chapter 5, section 5.2.1), and/or non-reporting of the behaviour in fear of criminalisation, stigma and discrimination.[455] A reluctance to report IDU was also noted amongst prisoners in other SSA nations.[42, 420]

Although ART is proven to be effective in reducing HIV transmission,[54, 416] its effectiveness is highly dependent on the extent to which the infected individual is adherent to medication and, thus, on the level of plasma viral concentration.[417] Therefore, other biomedical and behavioural prevention methods remain an integral part of the combination prevention programs.[418] It has also been shown that the preventative benefits of ART in the community decrease when there are widespread HIV risk behaviours.[412] Given the high prevalence of risk behaviours in HIV-infected persons with criminal justice involvement, ART is unlikely to succeed as a single strategy in such populations even where high quality HIV care can be implemented.

6.7 Limitations of this thesis

6.7.1 Limitations of the meta-analysis

The majority of studies included in the meta-analysis were based in high-income countries which made international extrapolation of the findings difficult. Almost all studies identified in low-and middle-income countries were simple descriptive studies without explicit analyses of the potential factors which limited ascertaining specific determinants of the HCC in prison settings. Causality between variables could not be claimed as the analyses were mostly made based on retrospective data. The definitions of the HCC outcomes (i.e. early ART initiation, adherence and viral suppression) differed among studies, which might have led to over- or under-estimation of the effects. The certainty of the evidence could only be established with low-level of quality as all of the included studies were non-randomised observational studies; only 53% of the studies had a score of 'moderately high' or above in the overall quality assessment; there was inconsistency of effects between the studies (for some of the outcomes) and imprecision of the results as most of the studies were small studies with few events [456]. Studies published in languages other than English were not included in the review due to resource and time constraints and this might have increased the potential for reporting bias. Also, there could be missed studies as screening was performed by a single reviewer.[457] A funnel plot for the detection of publication bias was not reported due to the small number of studies (n<10) [458] included in the meta-analysis of each exposure variable.

6.7.2 Limitations of the cohort study

Approximately a quarter of correctional facilities present in South Ethiopia were included in the study based on the size of their prison populations. While there was no significant variation in the HCC outcomes based on the type of correctional facility, it is still possible that ILWH who were in other prisons may have had different outcomes. Given the high turnover amongst prisoners and the high prevalence of sub-optimal HCC outcomes in recidivists,[253, 254] the prevalence of delay in ART initiation, non-adherence and viral/immunologic failure might have been underestimated in incarcerated people.

When the study commenced, the Ethiopian government had introduced a new criminal law granting parole to ILWH who had served some part of their prison sentence. This might have caused under-representation of prisoners who had been incarcerated for relatively longer periods of time, although most prisoners participating in the study had been incarcerated for extended periods (median incarceration time, 1.7 years). Attributed to this and long clinic appointments (six months for most PLWH on ART) practiced by the study public health care facilities, 18% of the study eligible ILWH

were released before their appointment due date. Nonetheless, prisoners who had been lost to follow-up due to release during the study enrolment period were replaced by those who entered into the prisons and all enrolled prisoners contributed to person-time at risk.

Lack of regular counselling and testing services in the prison system limited the prospective analysis of the relationship between each component of the HCC as only a few inmates were diagnosed for HIV after prison entry. It is also assumed that the likelihood of undiagnosed cases could be high amongst prisoners who were available during the study period, which could have resulted in a higher prevalence of delay in ART initiation than estimated. A higher prevalence of delay in ART initiation could have also been obtained if the interval of time between the date of infection and date of treatment commencement had been measured instead of time since diagnosis,[176] although this was partly estimated using baseline WHO clinical stage and CD4 count.

The participants' true compliance to medication might have been over- or under-estimated as adherence in this study was measured using self-report and pharmacy refill methods.[159, 321] Self-reported adherence is likely to be threatened by recall and social desirability bias as seen in Chapter 4 (section 4.5.3.2). To minimise the effect of recall bias, short term (the previous four days) adherence was measured so that the participants' memories about doses would be clearer. Strategies that could reduce participants' perceptions of the possible consequences of reporting adherence or non-adherence (such as reinforcing the importance of reporting both conditions for the research project, and reassurance that the information provided would not affect their care) were used to minimise social desirability bias.

The pharmacy refill method of adherence measurement does not guarantee that clients could not obtain drugs from sources other than the reporting pharmacy, or provide information about when and how they take the medication.[321] Nonetheless, public health care facilities in the study area were almost exclusively providing ART services, which might have minimised an oversupply of drugs as only such institutions were involved in this study. In addition, when self-report and pharmacy refill methods are used in conjunction, the weakness of one approach could be offset by the strength of the other.[321]

6.7.3 Limitations of the qualitative study

Although taking field notes on tacit knowledge could help analyse unclear ideas, there might have been matters that were unobservable to the interviewer.[346, 459] The use of qualitative interviewing enabled exploration of inmates' lived experiences in relation to the socially sensitive HIV-related issues that they might not want to talk about in a group environment,[347] but it is still possible that there could be a difference between the reported and real behavioural acts.[346]

Most prisoner participants had been using ART for many years and this might have affected their recall in relation to their experiences when initiating ART, and challenges of adherence may vary depending on level of ART-related experience. While a number of crucial concepts emerged through consultation with service providers regarding the effectiveness of the existing HIV care provision strategy, incorporating higher level health agencies (e.g., representatives from the Regional Health Bureau and Ministry of Health) might have deepened understandings of the policy perspectives of HIV care in the prison settings. Analysis of post-release care was made based on the experiences of service providers and prisoners' forethoughts as exploration of the real experience of recently released prisoners is beyond the scope of this thesis.

CHAPTER SEVEN
CONCLUSION

Introduction

This chapter concludes the main findings that are discussed in the previous chapter and provides respective recommendations that are made based on the findings. The findings have important public health, health policy and research implications that help address barriers to each stage of the HIV care continuum (early treatment initiation, adherence and viral suppression), as well as to ensure the preventative benefits of antiretroviral therapy (ART), as will be discussed sequentially in the following sections. The chapter ends by conceptualising the circumstances influencing HIV care continuum (HCC) in the South Ethiopian prison system and suggesting further research priorities to improve the care continuum in people involved in the criminal justice system.

Early ART initiation

Although both incarcerated and non-incarcerated people in South Ethiopia had a similarly high prevalence (20%) of delay in ART initiation, prisoners had a much lower probability of commencing ART on their test date. This represents a large discrepancy with the second goal of the Joint United Nations Programme on HIV/AIDS (UNAIDS), which aims to treat 95% of infected individuals by 2030.[60] Several factors were identified as barriers to early ART initiation in prisoners, including: a lack of access to voluntary counselling and testing (VCT) services, poor linkage to care due to insufficient health staff training, uncooperative prison security systems and loss of privacy regarding HIV status. Insufficient health staff training and uncooperative prison security both contributed to loss of patient privacy, which resulted in treatment refusal.

Ensuring access to voluntary and confidential HIV testing for prisoners is an essential component of reaching universal access to HIV prevention, treatment and care.[366] This enables this HIV key population to undergo early diagnosis, which is an important prerequisite of timely ART initiation,[150] improved treatment outcomes[364, 365] and reduced risk of infection for others.[56, 57] The prison environment represents an important arena for early treatment of HIV as it creates an opportunity to access people who are at high risk of infection and are difficult to reach in the outside community.

Several intervention studies have reported the effectiveness and feasibility of implementing VCT in prison settings in high- and low-income countries. For example, an opt-out based provider initiated counselling and testing (PICT) approach has been associated with higher testing rates in many prisons when integrated into routine prison healthcare systems.[4, 20, 91, 374] This approach is also known to increase rates of linkage to care and ART initiation especially in HIV-infected prison entrants[20] and an opportunity to reach prisoners before they return to the community.[372-374] Adaptation of the Seek, Test, and Treat (STT) strategy,[460] which involves identification and offering of ART to all HIV-infected individuals, may further help ensure universal access to testing and treatment services for all infected prisoners. The implementation of these interventions would be facilitated through training of prison health staff in HIV care provision as this aligns with recommendations in international guidelines and is proven to be effective in enhancing HIV testing in prison. Training in patient privacy and confidentiality is also required for other prison staff who take part in HIV care provision for prisoners.

Consented disclosure of HIV status to more people appeared to facilitate early ART initiation regardless of incarceration status as this created more chances of accessing social support. The positive impact of social support for prisoners on early ART initiation often came from peer education and support programs, which enhanced HIV testing and treatment in the prison system. At the time of the study, however, there had been a decline in HIV education and social support initiatives in the prisons due to a lack of resources and administrative support, and poor collaboration between prison authorities and external health agencies. Social support and education initiatives involving peers are highly recommended in correctional settings to enhance HIV testing and to access care.[40, 90] Prisons represent important organisational contexts to identify and treat HIV-infected individuals by implementing peer education programs.[461] Therefore, prison HIV-related health promotion programs should be an integral part of community information, education and communication programs, and prison authorities should establish strong linkages with these community-based health agencies, in addition to developing plans to assure appropriate resource for supporting well organised peer support and education programs.[90]

The inmates' perceptions of the severity of HIV infection as well as effectiveness of ART in treating existing health issues strongly influenced whether timely ART commencement occurred. This influence was similar for non-incarcerated people. Novel information dissemination strategies including peer education and engagement of socially concordant navigators,[462, 463] are highly required in prison settings to enhance the inmates' awareness of the health benefits of early ART initiation. Robust patient counselling approaches are required to increase an uptake of same day treatment

amongst individuals who feel healthy during diagnosis and in those who do not perceive the immediate health benefits of early ART.

The risk of not initiating ART was higher in incarcerated and non-incarcerated people living with HIV (PLWH) who were rural residents and daily labourers. This could be related to an inability to afford transport costs associated with the distant ART sites in the rural communities of Ethiopia and untailored clinic operating hours to patient's routines in non-incarcerated PLWH, and a low knowledge about HIV and ART. Decentralisation of ART services to primary health care facilities may help halt this problem in non-incarcerated PLWH, targeted educational interventions are required for both groups. Patient-centred service delivery approaches should be applied to maintain the best fit between clinic hours and patient work schedules.

ART adherence and outcomes

The prevalence of viral suppression (94%) in prisoners in this thesis was close to the third goal of UNAIDS i.e. achieving viral suppression in 95% of treated individuals.[60] Nonetheless, prisoners had a lower likelihood of using the medication and a relatively higher prevalence of viral failure compared to non-incarcerated PLWH. External ART services in the South Ethiopian prison system presented several institutional and inter-institutional barriers to care and support including: a lack of transport facilities, uncooperative as well as an insufficient number of security staff, and poor communication between prison health care staff and ART service providers. This may lead to poor treatment outcomes and facilitation of community transmission.[54, 127, 150] Implementation of standard HIV care package in prison is recommended by international guidelines[78, 88, 90] and proven to be feasible and effective in both high- and low-income countries.[21, 76, 95] It is imperative that security staff are aware of the necessity of ART for all inmates living with HIV (ILWH) in every step of the incarceration process and the importance of health care provider counselling and support for maintaining adherence.[464]

Dose non-adherence was higher in PLWH who had a lower satisfaction with ART services – and satisfaction was much lower in prisoners. This was further explained by the qualitative findings that there was sub-optimal care and support by both ART service providers and prison health care staff for ILWH, the latter likely to have been driven by insufficient training related to HIV care. Optimal and continuous health care provider support is crucial for maintaining ART adherence in ILWH.[137, 260, 261] Thus, provision of HIV-related training for prison health care staff is highly recommended in addition to strengthening the connection between prison and community healthcare systems.[366]

Insufficient supply of food in the prison system combined with a limited access to community nutritional programs exacerbated antiretroviral (ARV) side-effects for prisoners, which in turn increased the likelihood of medication discontinuation. Inability of the prison administrations to consider ILWH's requirement for a high quality diet (due to their medication use) and unfair distribution of nutritional support by health agencies contributed to the food insufficiency. Efforts should be made to enhance food support programs in prison settings and give special focus to prisoners in the nutritional programs designed to support PLWH at public health care facilities.[465]

Disclosure, social support, stigma and depression were found to interdependently affect adherence in prisoners. While those who were able to disclose their HIV status avoided potential medication interruptions at different stages of the incarceration process and created an opportunity to obtain social support, stigma expressed by fellow inmates and prison officers decreased ILWH's ability to disclose and led to despondency, which was already common due to issues related to imprisonment itself. Nonetheless, disclosure itself appeared to enhance ILWH's capacity of coping with the detrimental effects of social alienation. A lack of social support and depression were found to be significantly associated with sub-optimal ART adherence. This implies a need for interventions that enhance consented disclosure amongst ILWH, while preserving patient privacy and confidentiality; increasing access to HIV counsellors and reducing social stigma through improving a general understanding of HIV amongst prison staff and prisoners may facilitate disclosure.[466] In addition to enhancing peer support programs in prison settings,[137, 138, 140, 255] integration of HIV care and treatment of medically diagnosed depression is likely to be essential for maintaining ART adherence in prisoners.

Greater adherence to an appropriate dosage was observed amongst incarcerated and non-incarcerated PLWH who were compliant with their medication schedule, and in those who used different devices to monitor their medication time rather than social cues. As research supports the use of reminder devices for enhancing adherence in HIV-infected individuals (as discussed in the previous chapter), adapting such interventions to the prison context and the specific needs of prisoners is required. Males and people in the age group 31 to 35 years had a higher risk of developing viral failure compared to females and older age groups respectively, regardless of their incarceration status. Given the predominance of these population groups in correctional facilities and their association with substance use behaviours, group specific HIV care intervention strategies including provision of adequate educational information about HIV and the importance of a consistent use of ART, are highly recommended.

HIV transmission risks

This thesis revealed important HIV transmission risk factors in incarcerated and non-incarcerated PLWH, including: unprotected heterosexual intercourse, sharing paraphernalia and substance use behaviours. The practice of such risky behaviours may reduce the preventative benefits of ART particularly when coupled with poor medication adherence. Unprotected sex amongst prisoners in South Ethiopia was reported to occur before imprisonment. However, given the criminalisation and condemnation of sexual activity in African prisons,[41] the existence of unreported sexual practices in the prisons could not be ruled out. In addition, there have been reports of such behaviours in many other sub-Saharan African (SSA) prisons, as discussed in the previous chapter. Nonetheless, most SSA countries prohibit condom provision for prisoners and this may further increase the risk of infection in combination with relatively low prisoner awareness about HIV prevention methods generally.[4, 41-43] Efforts should be made to ensure universal HIV testing in prisons along with the creation of a culture that promotes consented status disclosure, as this has a potential to reduce the practice of unsafe sex. Other harm reduction strategies such as provision of personal paraphernalia (such as shaving and tattooing equipment) should be implemented in prisons in addition to behavioural change interventions that might mitigate the practice of risk behaviours including substance misuse.

Conceptualisation of factors influencing the HCC in prisoners

A multitude of interrelated factors influenced the HCC in the South Ethiopian prison system, which require multilevel interventional approaches to alleviate the barriers at each stage of the care cascade. These multifaceted influences can be conceptualised best using the Ecological Model of Health Behaviour (EMHB) as discussed in Chapter 3 (section 3.6). The EMHB posits that an individual's health behaviour can be influenced by a combination of factors at structural, community, organisational, interpersonal and intrapersonal levels.

Lack of a comprehensive policy structure supporting the implementation of standard HIV care programs in the prison system substantially contributed to an inaccessibility of care and represented an uneven distribution of healthcare resources between the prison and community healthcare systems. Ethiopia has recently adopted the international standards for the treatment of prisoners (also known as The Nelson Mandela Rules), which provides prisoners the right to standard health care at least equivalent to that available in the surrounding community.[467] The national HIV prevention, care and treatment guidelines also recognised prisoners as one of the HIV key populations.[14] Nonetheless, there is a lack of a set of principles that ensure appropriate distribution of healthcare resources between incarcerated and non-incarcerated people. This appears to be against the concept of social

justice which does not support arbitrary distribution of advantages between persons or population groups based on social circumstances such as incarceration. Just social schemes always possess principles that define relevant similarities and differences between individuals, to determine which distribution of advantages is appropriate to attain the broader goals of the society as whole.[277, 278] In addition to being at high risk of infections and other debilitating health issues, prisoners are an inseparable part of the society as they are connected to people in the outside community in many ways – which means that ensuring standard health care in prison is part of achieving public health goals.[88]

Poor inter-institutional relationships between the criminal justice system and healthcare system (e.g., between prisons, courts and public health care facilities) presented a barrier to accessing care at different stages of the incarceration process. On the other hand, loss of patient privacy, insufficient health staff support, and uncooperative security systems and prison administration characterised the discouraging institutional contexts in the prisons for enhancing the HCC.

At an interpersonal level, while the presence of social support either from inside prison (e.g., social networks of ILWH) or outside (e.g., family members and/or relatives) encouraged prisoners to use ART effectively, social stigmatisation of ILWH by members of the prison community discouraged disclosure of HIV status and so limited care access. Intrapersonally, perceptions of the severity of HIV infection, particularly during earlier stages, and of the effectiveness of ART in treating an illness associated with the infection played a role in determining ILWH's self-efficacy to accept and adhere to ART. The conceptualisation of circumstances influencing the HCC in the South Ethiopian prison system therefore suggests contextual application of the EMHB in the implementation of the aforementioned intervention strategies.

Further research recommendations

This thesis has shed light on various areas that require further investigation. Despite the high burden of HIV infection, there has been limited evidence regarding the HCC in the prison populations in low-income countries in general and in SSA in particular compared to high-income countries. This calls for contextually tailored research in the prison systems. Most factors identified and explored in this thesis have been interpreted as strongly influencing ILWH and have been found to be consistent across the included correctional facilities. This suggests the pervasiveness of the circumstances in Ethiopian prisons. However, a nationally representative study is required to draw conclusions that are illustrative of the prison populations in the country. Factors that affect the HCC throughout the incarceration trajectories (during arrest, stay in jail, stay in prison and after release) should be longitudinally investigated involving individuals at each stage of the process.

Patient and health care provider acceptance of the newly implemented 'Test and Treat' strategy and its effect on the subsequent stages of the HCC should be explored further in both incarcerated and non-incarcerated populations, with due focus given to females, as they had a significantly lower acceptance rate in this thesis in contrast to their higher care linkage and ART initiation rates in the existing literature. It also remains unclear how gender influenced viral suppression in both incarcerated and non-incarcerated PLWH. Interventional studies are suggested to compare on-site and off-site ART services in terms of producing optimal HCC outcomes amongst prisoners with a focus on the patient perspective.

Further research is required to contextualise and translate social networking programs which were found to be effective in enhancing the HCC in community settings (as discussed in the previous chapter) for correctional facilities. Research is needed to more closely investigate the interconnections between patient privacy, disclosure and social stigma and their effect on the HCC in the prison environment.

The issue of sexual transmission of HIV in Ethiopian prisons is complex, as it is in other SSA prisons, and requires follow-up studies to assess seroconversion rates in association with risky sexual behaviours during incarceration. Similarly, more rigorous investigation is required to understand the extent of injecting drug use (IDU) and other substance use behaviours during incarceration in Ethiopia and other SSA countries and their association with HIV transmission.

Concluding comments

In conclusion, using a combination of methods and prospectively examining the outcomes of the HCC in incarcerated people relative to their non-incarcerated counterparts, this thesis generated novel information regarding factors of various levels influencing the care continuum in the South Ethiopia prison system, which can potentially be extended to other resource-limited settings. The findings provided information that could inform the development of targeted intervention strategies and policy amendments that are important for ensuring equitable access to standard HIV care between community- and correctional facility-based populations. The findings from this thesis also indicated further research priorities that would help enhance both preventative and treatment benefits of ART in prisoners – one of the HIV key populations globally and the principal target of the '*end the AIDS epidemic by 2030*' goal.

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