HOUSING PRECARITY, CORRELATES, AND UNMET HEALTH CARE AND HIV CARE NEEDS AMONG WOMEN LIVING WITH HIV IN METRO VANCOUVER, CANADA

by

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Abstract

Background: Cisgender (cis) and trans women living with HIV experience numerous barriers to stable housing and health services. With most research focusing on HIV care continuum outcomes and homelessness, there remain substantial gaps in research on more nuanced forms of housing precarity and broader health services access outcomes. This study is the first to apply the Canadian Definition of Homelessness (CDOH), a national, inclusive guideline, to the housing status reported by women living with HIV with the objective to investigate the prevalence and correlates of housing status and examine the associations between housing status and health services access.

Methods: This study utilized data (2010-2019) from a longitudinal community-based open cohort of cis and trans women living with HIV aged 14+. Housing status derived from CDOH included four categories: unsheltered, unstable, supportive housing, and stable housing (reference). Health services access outcomes included: unmet primary, dental, and mental health care needs, HIV viral load, CD4, currently taking antiretroviral (ART), and self-reported ART adherence. Bivariate and multivariable analyses using generalized linear mixed models (GLMM) or generalized estimating equations (GEE) examined associations between social-structural correlates and housing status and associations between housing status and health services access over time.

Results: Among 336 participants (1930 observations), the study sample had disproportionately high representations of Indigenous women (57%) and women with sexual (33%) and gender (10%) minority identities, relative to the Canadian population. Multivariable GLMM analyses identified that: Downtown Eastside (DTES) residence, hospitalization, physical/sexual violence, and stimulant use were associated with being unsheltered, compared to stable housing. DTES

residence, hospitalization, and physical/sexual violence were associated with unstable housing, compared to stable housing. In multivariable GEE analyses, being unsheltered was independently associated with unmet primary and dental care needs, not taking ART, and detectable viral load.

Conclusion: Prevention of housing precarity with women living with HIV should address affordability, systems and institutional barriers, gendered violence, and reformation of landlord and tenant laws. To ensure equitable access to new and existing housing and health services, trauma- and violence-informed principles, cultural safety, cultural humility, gender-responsiveness, and harm reduction practices are critical.

Lay Summary

The housing situations of cisgender and trans women living with HIV was not well-known because current studies did not include women's housing experiences. Women living with HIV face many barriers to stable housing. Unstable housing can limit health care access and lead to worse health. This is the first study to apply the Canadian Definition of Homelessness to examine the housing situations of women living with HIV in Metro Vancouver, Canada. Less stable housing was related to hospitalization, physical/sexual violence, and stimulant drug use. Being unsheltered was associated with unmet primary, dental care needs, not taking HIV medication, and detectable viral load. Lack of stable housing should be addressed through laws and policies designed with women living with HIV. Housing and health services need to practice trauma- and violence-informed principles, cultural safety, cultural humility, gender-responsiveness and harm reduction to make sure women get the needed resources.

Preface

This study is an analysis of data from a longitudinal, community-based open cohort study with women living with HIV in Metro Vancouver, Canada (Sexual Health and HIV/AIDS: Longitudinal Women's Needs Assessment [SHAWNA], 2010-present). All data collection, entry, coding, and cleaning were performed by the SHAWNA research team and the statistician at the Centre for Gender and Sexual Health Equity (CGSHE). SHAWNA is funded by Canadian Institutes of Health Research (FDN-143349, MOP-133617 and CBR-151184) and approved by the Providence Health Care/University of British Columbia (UBC) Research Ethics Boards and BC Women's Hospital (H14-01073). This thesis holds ethical approval by UBC's Behavioural Research Ethics Board (H20-00500; PI: Kathleen Deering).

I devised and conceptualized the research designs (Chapters 2 and 3) with support and guidance from my supervisory committee (Drs. Kathleen Deering, Jane Buxton, and Lianping Ti). In collaboration with the statistician at CGSHE, I developed the plans for data analysis in each chapter. The statistician then performed the analysis using SAS. I created all the figures and tables in this thesis.

A version of Chapter 2 has been submitted for publication at a peer-reviewed journal; I have taken the lead role in this manuscript as the first author. A manuscript based on Chapter 3 is also being produced with co-authors, on which I will also submit to a peer-reviewed journal as first author.

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List of Abbreviations

AOR	Adjusted odds ratio
ART	Antiretroviral treatment
BC	British Columbia
CI	Confidence interval
CDOH	Canadian Definition of Homelessness
DTES	Downtown Eastside in Vancouver
GBV	Gender-based violence
GED	General Educational Development
GEE	Generalized estimating equations
GLMM	Generalized linear mixed models
IPV	Intimate partner violence
OR	Odds ratio
PWUD	People who use drugs
Q1-Q3	First to third quartile
RTA	Residential Tenancy Act, British Columbia
SHAWNA	Sexual Health and HIV/AIDS: Longitudinal Women's Needs Assessment
TVI	Trauma- and violence-informed
US	The United States

Glossary

Antiretroviral therapy adherence (or ART adherence) refers to taking ART medications in quantities and frequencies as prescribed by a medical provider.

Gender-based violence is defined as any harmful act towards an individual based on their gender, including verbal, physical, sexual, mental, and economic harms.

Gender minorities include transgender, transsexual, transfeminine, transmasculine, gender diverse (non-binary, Two-Spirit), and other non-cis gender identities. Depending on the person and context, Two-Spirit can be a gender identity.

HIV care continuum (aka HIV cascade of care) includes stages of care for people living with HIV, which is HIV diagnosis, linkage to HIV care, antiretroviral treatment, and viral load suppression (<200 copies/mL).

HIV viral load suppression (or viral suppression) is defined as having an HIV RNA test result of < 200 copies/mL.

HIV viral load, undetectable (or undetectable viral load) is defined as having an HIV RNA test result too low to be detected, usually < 50 copies/mL. While the 40 copies/mL cutoff is also being used, in this thesis the 50 copies/mL is preferred considering the historical context of data collection.

Homelessness refers to living without a proper shelter for human habitation, such as tent, car, abandoned building (squatting), and public spaces.

Housing precarity includes homelessness and precarious/unstable housing in this work.

Marginalization is defined as peripheralizing individuals based on their 'identities, associations, experiences, and environments'. This thesis uses marginalization and marginalized population due to the perception that this term is neutral in nature relative to previous terms that have tried to address similar concepts (e.g., vulnerable populations).

Precarious/unstable housing refers to living in temporary shelter or short-term housing, couch surfing, and living in substandard or overcrowded housing without security of tenure.
Sexual minorities include lesbian, gay, bisexual, asexual, Two-Spirit, queer, and other non-heterosexual identities. Depending on the person and context, Two-Spirit can be a sexual orientation.

Renoviction refers to eviction on the basis of repairing or renovating the housing unit, resulting in increased rent for the next tenant.

Trans women refers to transgender, transsexual and/or any other transfeminine identities.

Two-Spirit is a North American Indigenous Peoples' way to identify diverse or non-normative sexualities, genders, and gender expressions. Two-Spirit roots in traditional languages and

cultures, and it differs from Western terms of gender and sexual orientations (e.g., man, women, heterosexual, and gay). Whether Two-Spirit is considered a sexual orientation or gender identity depends on the person and context.

Acknowledgements

The work in this thesis cannot be done without the generous support and collaboration from many. I most sincerely appreciate my outstanding Thesis Committee, including Drs. Jane Buxton, Kathleen Deering, and Lianping Ti, who saw the potential in me and provided the necessary pushes and guidance. My thanks also go to my co-authors of diverse expertise who always provided great feedback and inspired me to produce better work.

My study is supported by the graduate research assistant fellowship from the Centre for Gender and Sexual Health Equity (CGSHE). I offer my sincere gratitude to the researchers, staff, and trainees at CGSHE who have laid the groundwork of the SHAWNA project and inspired me to continue my work in this field.

Special thanks are owed to my parents for their unconditional supported throughout my years of education. Lastly, I would like to thank my partner for his patience and belief in me producing this work.

Chapter 1: Introduction

1.1 Background and Objectives

Housing is a basic human right and has been identified globally and in Canada as a critical social determinant of health on a population level (1–5). Housing can provide shelter and support and has a fundamental impact on achieving 'a state of complete physical, mental, and social well-being' (5). Housing precarity (referring to homelessness and precarious/unstable housing) is found to be associated with negative health outcomes, including infectious diseases, mental illnesses, substance use, chronic illnesses, and mortality (3,4,6). Supported by overwhelming evidence, housing precarity has been shown to limit access to consistent and appropriate medical care and negatively affects adherence to medication and treatment, which subsequently leads to disease progression and poor health outcomes (2,4,7). Housing is particularly crucial to people living with HIV, who have complex health care needs and a strict medication regimen (2). Limited access to health services while being homeless can exacerbate HIV-related outcomes and comorbidities, resulting in a cycle of worsening health and homelessness (2,8,9).

Globally and in Canada, housing access is far from equal across the population. A strong body of evidence has demonstrated that housing precarity often results from a complex accumulation of structural, systemic, and individual factors, rather than a single cause (6,10,11). On a structural level, the economic and social environment can exacerbate high rent or mortgage, poverty, income gaps, discrimination, and other factors that restrict access to affordable, appropriate housing (12,13). When individuals leave hospital, correctional facility, child welfare, and other systems, the constrained or absent resources or supports in place (combined with barriers of limited availability of different housing options) to help find suitable housing for people after discharge can lead to housing precarity (10,13). At the individual level, traumatic

events, intimate partner violence (IPV), family break-up, sex work, poor health, mental health conditions, substance use/addiction, and job loss have all been shown to lead to loss of housing, especially in the absence of societal and social supports (10,12,14). The effects of discrimination and stigma according to race, sexual orientation, gender identity, and many other lived/living experiences including disability, mental health, drug use, incarceration, sex work, and living with HIV, operate on individual and structural levels, and have been shown to be associated with housing precarity (6,15–17).

Homelessness affects 150,000-300,000 Canadians in a given year (10), with women representing 30-36% of people experiencing housing precarity in a given night (18,19). However, women's homelessness is likely severely underestimated, since current surveillance methodologies fail to consider the 'hidden homelessness' more commonly experienced by women (6,20). Hidden homelessness means that an individual intentionally avoids street living or homeless shelters and instead chooses to either live with family, friend, or abusive partner, or stay in overcrowded housing (6). Hidden homelessness accounted for 28-76% of men and women experiencing homelessness in Denmark, Finland, and Germany (20). Population-level, shelter-based and point-in-time count methodologies overlook individuals experiencing hidden homelessness who use social support network rather than accessing homeless services. Additionally, shelters for women fleeing violence are not always included in studies of homelessness (19,21), since IPV is not always recognized as a housing problem, despite its role in causing homelessness in women (22). The knowledge gap in understanding women's housing experiences demands an inclusive definition of homelessness with considerations of women's experiences and is critical to understanding women's homelessness.

Many women living with HIV are at higher risk of experiencing housing precarity due to social-structural inequities and marginalization (23,24). In British Columbia (BC), Ontario, and Quebec, a cohort study estimated that 52% (723 individuals) of women living with HIV experienced housing insecurity, meaning living in homeless, precarious situations and having difficulty paying for housing costs (25). Across Canada, cisgender (cis) and trans women living with HIV represent a population with diversity of race, gender identity, sexual orientation, socioeconomic status, experiences with gender-based violence (GBV), mental health, and substance use (25–28). However, Indigenous, otherwise racialized, trans[1], and lesbian and bisexual[2] women are over-represented among women living with HIV (29–33), and women living with HIV experience disproportionate levels of social and structural barriers including poverty, violence, mental health conditions and substance use (25,28,29,34,35). Limited housing studies with women living with HIV exist, and more are urgently needed to study the specific housing needs and challenges experienced by women living with HIV using modern and inclusive definitions of housing status. The SHAWNA (Sexual Health and HIV/AIDS: Longitudinal Women's Needs Assessment) study is a longitudinal, community-based, open cohort with a decade of collaboration with cis and trans women living with HIV in Metro Vancouver. SHAWNA's wealth of data, particularly in broad social determinants including housing and health and health services access, is well-suited for studying the housing status among women living with HIV.

[1] The percentage of transgender population or trans women is not available in Canada. In the United States, it is estimated by literature review and extrapolation that 0.4% of the adult population identify as transgender in 2016 (32).

[2] In Canada, 3.5% of female population identifies as lesbian or bisexual (33). If stratified by gender, the percentage may be different. However, gender identity data is not available from Statistics Canada.

Another novelty of this thesis is the use of the Canadian Definition of Homelessness (CDOH) (36) created by the Canadian Observatory on Homelessness with academic and policy experts in homelessness and adopted by the Government of Canada. The CDOH qualitatively defines many forms of homelessness, including the 'hidden homelessness' commonly experienced by women, and considers the dynamic and complex nature of housing precarity (more details in Section 1.2). In using the CDOH, the study findings with the SHAWNA cohort can be translatable to housing experts, policy makers, and other knowledge users nationally.

The main objectives of this thesis are:

1. Characterize the housing status reported by women living with HIV according to the CDOH;
2. Describe the prevalence and correlates of housing status among women living with HIV;
3. Investigate the association between housing status and outcomes along the HIV care continuum, and the association between housing status and access to key health services.

1.2 Conceptual framework

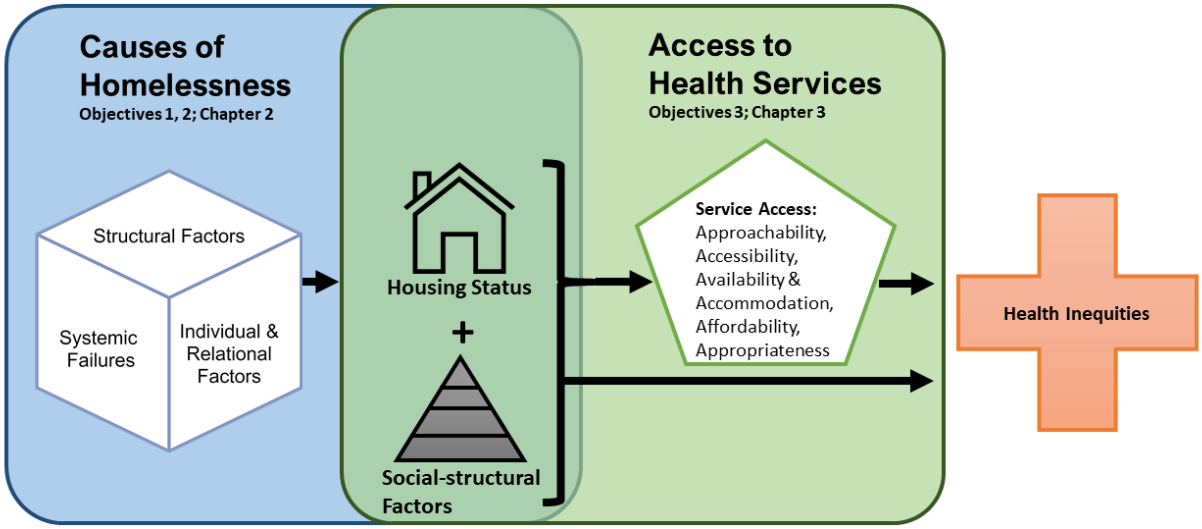

Figure 1.1 Theoretical and Conceptual framework.

The theoretical and conceptual framework of this thesis was built upon housing status according to and adapted from the CDOH (36), Gaetz et al.'s model (2013) on the causes of homelessness (10), Levesque et al.'s concept (2013) on the access to health services (37), and health inequities in HIV care continuum, and the access to primary, dental, and mental health care (Figure 1.1). For Objectives 1 and 2, Chapter 2 examined the prevalence of housing status among the SHAWNA cohort and systemic, structural, and individual/relational correlates. For Objective 3, Chapter 3 used housing status, as well as social-structural confounding factors, as an explanatory variable to study its associations with various HIV outcomes and access to health services.

This thesis referenced the CDOH in deriving the housing status variable, which was a critical aspect of this study, and was incorporated as an outcome (Chapter 2) and as an explanatory variable (Chapter 3). The CDOH (36) identifies homelessness across a spectrum, between having no shelter to lacking housing security, and describes four categories of homelessness (Table 1.1): (1) unsheltered, (2) emergency sheltered, (3) provisionally accommodated, and (4) at risk of homelessness. The first three categories were referenced in defining housing status because they were categorized based on location, which is routinely collected in the SHAWNA questionnaire. In contrast, identifying someone as at risk of homelessness would be challenging using the available data since it requires the incorporation of additional demographic information, but there is little guidance or consensus in the literature for how to do this in a way that would be consistent across studies among different populations and settings.

Table 1.1 Four categories of homelessness according to the Canadian Definition of Homelessness (CDOH).

Types of Homelessness	Definitions
Unsheltered	Living in public or private spaces without consent or contract, squatting in abandoned buildings, and living in places not intended for human habitation. Examples: living on the street, in parks, in cars, and in tents (36).
Emergency Sheltered	Living in emergency shelters for people who are homeless, fleeing family violence, and victims of natural disasters (36).
Provisionally Accommodated	Hidden homelessness or living in temporary accommodations without security of tenure. Examples: interim housing for people who are homeless, accommodation centers for migrants and refugees, couch surfing, short term rentals, being in institutional care without permanent housing (36).
At risk of Homelessness	An individual is currently housed but may lose housing due to one or co-occurring factors, for example, lack of affordable/well-maintained housing, precarious employment, sudden unemployment, eviction, severe mental illness/behavioral issues, substance use, division of household, and violence (36).

As detailed in Chapter 2 (Objectives 1,2), in examining the correlates of housing status/homelessness, Gaetz et al. (2013) was referenced to help recognize the complex underlying factors that work together and independently to result in housing precarity (10). Gaetz et al. suggested three interacting types of causes for homelessness: structural factors, systems failures, and individual and relational factors (Figure 1.1 and Table 1.2) (10). The structural level consists of economic and societal factors that are shaped by legislation and policy and may contribute to homelessness (10). As leading barriers to housing, lack of affordable housing and inadequate income generation are hallmarks of structural inequities (12). Additionally, structural inequities can determine who can access private housing due to racism, discrimination, and stereotyping (36). Gendered and racialized income inequity can also subsequently affect the affordability of housing (38,39). On the system level (Table 1.2), defects in public programs can undermine individual's access to adequate benefits and housing (13). Systems also refer to public

institutions or systems, such as hospital, correctional facility, and child welfare. When at-risk individuals leave a facility or system, lack of planning and support may result in homelessness that is otherwise preventable by a more proactive system design (10). Lastly, individual and relational factors (Table 1.2) pertain to personal circumstances contributing to loss of housing or being unable to find housing. Such factors often marginalize individuals within the existing systemic and structural inequities, resulting in homelessness (8,10). A traumatic event, such as job loss, may not necessarily lead to loss of housing. However, in the absence of governmental benefits and support from other sources, unemployed individuals may be evicted or dislocate due to unaffordable rent or mortgage. Another example can be woman-led family fleeing IPV. If the current housing market does not offer affordable family housing for the income generated by the single parent, then the family will have difficulty relocating to a new residence. Guided by this theory, this work examines the correlates of the housing status reported by women living with HIV through a lens of systemic and structural inequities. On a broader scale, the three major causes of homelessness can also impact health services access and lead to health inequities (Figure 1.1).

Table 1.2 Three causes of homelessness and examples according to Gaetz et al. (2013).

Causes of Homelessness	Examples
Structural Factors	Poverty, gendered and/or racialized pay gap, rent prices, and availability of affordable housing.
Systemic Failures	Young adult leaving child welfare system without adequate support in securing housing; lack of considerations of housing planning in hospital discharge results in homelessness (10).
Individual and Relational Factors	Traumatic events (e.g., job loss, house fire), interpersonal violence, poor physical health, disabilities, mental illnesses, and substance use (10).

The concept of intersectionality was incorporated in interpreting the complex reasons for housing precarity (Chapter 2, Objectives 1,2) as well as for how housing status may influence access to health services among women living with HIV (Chapter 3, Objective 3). Intersectionality as a concept and term originated from African-American feminist lawyer Kimberly Crenshaw's observation that Black women experienced violence based on both race and gender (40). Intersectionality has since evolved into a theoretical framework that explains the oppression on an individual level as a result of interlocking effects of structural factors (e.g., race, gender, income, and HIV status) (40,41). The concept of intersectionality is of particular relevance to this thesis, because some groups of people having historically experienced high levels of social and structural marginalization particularly suffer from housing precarity, among other social and health inequities, and are overrepresented among people living with HIV. This includes Indigenous people, Two-Spirit Indigenous people, racialized individuals, sexual minorities, and gender minorities, (6,10,12,18,42,43). The mechanisms to explain why people with these social identities experience greater social and health inequities are rooted in discrimination and stigma, both on an individual and structural level. Many factors that are implicated in housing precarity, including poverty and precarious employment, are found at higher prevalence among people with intersecting social identities as a result. An intersectionality approach can help understand how the effects of discrimination and stigma related to behaviors that are often shaped by social and structural marginalization experiences; drug use, living with HIV, or other medical conditions may also intersect with the experiences of racism or discrimination and stigma experienced by sexual and gender minorities. Thus, the pathway to housing precarity for a person with multiple social identities will be shaped by their unique experiences and cannot be explained by the sum of the effects experienced by those with

single social identities alone: the experience of a racialized trans woman who uses drugs does not equate the experiences of a person who uses drugs, trans woman, and racialized person, summed together. The interpretation of complex reasons for housing precarity will be guided by intersectionality rather than rely on single social categories (e.g., race, sexual orientation, gender identity). This is critical to incorporate into this thesis, given the multiple experiences of oppression and marginalization by participants in this study, even in the absence of intersectional statistical analysis in this work (see Section 4.4 Strengths and Limitations).

From the perspective of people who seek care , Levesque's five dimensions in a stepwise manner motivating access to health services included (Table 1.3), (1) approachability, (2) acceptability, (3) availability and accommodation, (4) affordability, and (5) appropriateness (37). An individual's housing, socioeconomic, and health status interacts with systemic and structural factors of the health system and broader society in determining how an individual experiences the five dimensions and utilize health services.

Table 1.3 Five dimensions of health services access according to Levesque et al. (2013).

Dimensions in Health Services Access	Definitions
Approachability	Individuals who seek care are able to identify the services.
Acceptability	Individuals who seek care consider the services as culturally and socially appropriate without discrimination or judgement.
Availability and Accommodation	Individuals who seek care are able to access the physical location of services in a timely manner.
Affordability	Individuals who seek care can afford the price of services, travel time, and opportunity cost.
Appropriateness	Individuals who seek care consider services suitable and effective for their needs.

For approachability, living in a familiar neighborhood with abundant clinics and/or hospitals makes it easy to identify the available services. In comparison, moving constantly between emergency shelters can prevent identifying health resources or limit someone to utilizing only outreach services within shelters. The acceptability of health services depends on social and cultural factors. Discrimination and stigmatization related to homelessness, race, gender, HIV, substance use can prevent marginalized populations from seeking care due to negative experiences in the past and/or anxiety and fear towards health professionals (44–46). Next, the availability and accommodation of services are often limited by institutional factors (e.g., hours of operation, wait time, walk-in availability, appointment policy, transportation) that interacts with one's housing, socioeconomic, and health status. Access to services is compromised for individuals who are located far from services, travel or move frequently, and have inflexible work schedule, limited transportation options, and restricted mobility due to illness or disability (37). As for affordability, health services carry monetary, time, and opportunistic costs, which may not be affordable to individuals experiencing homelessness and/or generating limited income. Available governmental benefits can offset the direct cost, but inadequate benefits often limits services access (45,46). Travel time and cost can be a barrier for individuals who need to travel far and/or have limited transportation. Additionally, opportunistic cost may be high for shift workers who do not have sick leave or when finding food and housing take priority over attending medical appointments (44). Lastly, appropriate services need to meet the patient's needs, provide correct assessment and treatment to the health problem, and communicate effectively to the patient. For individuals with limited health literacy, health communication and education are key to involve them in the decision-making process and encourage self-efficacy and self-management in adhering to medications and/or self-care

instructions (37). Appropriateness as the last element is built upon the success of previous dimensions, particularly social and cultural awareness (acceptability) and cost consideration (affordability).

To assess the association between housing status and health services access inequities, Chapter 3 mainly focused on access along the HIV care continuum and access to health services of key relevance to the health and well-being of women living with HIV. As a key measure of treatment progress, the HIV care continuum (47–49) includes four stages of care, (1) HIV-diagnosed, (2) linked to HIV care, (3) taking antiretroviral treatment (ART), (4) achieving viral load suppression (<200 copies/mL). Representing access along the HIV care continuum, the associations were investigated between housing status and the following outcomes, taking ART, ART adherence, viral load, and CD4 count. Successful control of the viral load not only reduces HIV-related death and illnesses, but also prevents HIV transmission (50–52). Since HIV is a systemic disease that can affect the whole body, it is crucial to examine access to broader health services, and the outcomes used in this thesis included access to primary, dental, and mental health care services.

1.3 The SHAWNA Cohort

The data used in this thesis were drawn from SHAWNA, an open community-based study of women living with HIV over nine years of follow-up (January 2010-February 2019) with the overall objective to understand the interpersonal, social, and structural factors shaping women's HIV outcomes and experiences in navigating HIV treatment and care as well as other health services through their lifetime. Founded on extensive consultation with community, clinical, and policy experts, SHAWNA is committed to the GIPA/MIPA (Greater/Meaningful Involvement of

People living with HIV) principle since conception. Women with lived/living experience have been involved in crucial aspects of the project as community interviewers, Community Engagement Associates (CEAs), Peer Research Associates (PRA), and co-authors. SHAWNA is guided by a Community Advisory Board of clinical and community collaborators and a Positive Women's Advisory Board of 15 women living with HIV.

Eligibility for SHAWNA includes cis and trans women living with HIV aged 14+ who live and/or access HIV care in Metro Vancouver. The participants have been recruited by PRAs, self-referrals, and referrals from HIV care providers, peer navigators, HIV/AIDS organizations, and clinical outreach, including BC's primary referral center for women living with HIV (Oak Tree Clinic, based at BC Women's Hospital). At baseline and every 6 months, the participants who have provided informed consent attended a questionnaire interview administered by community or peer interviewers and a clinical HIV and sexual health visit. The questionnaire administered collects socio-demographics and information regarding structural vulnerability (e.g., food insecurity, experiences of violence, and substance use) as well as aspects of sexual and reproductive health access and HIV-related questions.

Participants voluntarily undergo laboratory tests for HIV viral load, CD4, hepatitis C antibody, and sexually transmitted infections (STIs). Treatment and referral for active STIs are made accordingly by a sexual health nurse. Each participant receives a $50 CAD compensation for their time, travel, and expertise. SHAWNA holds ethical approval through Providence Health Care/University of British Columbia Research Ethics Board and BC Women's Hospital. Data are securely collected and managed using Research Electronic Data Capture (REDCap) hosted at UBC (53,54).

1.4 Housing Precarity and Gendered Social-Structural Correlates

In North America, women make up a significant and growing proportion of people experiencing housing precarity. In Canada between 2005 and 2016, women represented 30% of people who stay in emergency shelters (excluding shelters whose mandates are to address violence against women) (19). A 2018 Canada-wide point-in-time count found that women accounted for 36% of people who experience housing precarity on a given night (18). In the United States (US), the percentage of women increased from 35% to 38% in 2007-2017 among people living in homeless shelters, despite an absolute decrease of 20,000 in the number of women (55). Due to methodology issues that overlooked hidden homelessness commonly experienced women, and limited data collection on gender identity, the prevalence of housing precarity among cis and trans women remains unclear.

Systemic and structural inequities greatly impact cis and trans women's housing through racial, gender, and sexual identities, and intersections between these social groupings. Among Indigenous peoples of Canada, the ongoing effects of settler colonialism and intergenerational effects of residential schools are the primary driver for social inequities including lack of safe, stable, and affordable housing. In Canada, Indigenous women and children are at high risk of homelessness due to disproportionately high level of poverty and violence compared with the general population (6,56,57). Among all racialized persons in Canada, ongoing structural racism and discrimination have shaped the inequitable housing experiences by limiting their opportunities to education, employment, economic advancement, healthcare, and housing options (6,16,56).

Structural discrimination related to gender identity and expression and sexuality can minimize opportunities to stable housing for women who identify as gender or sexual minorities.

Trans, lesbian, and bisexual women tend to become homeless and live in poverty at a young age due to discrimination, abuse, and exclusion at home, school, homeless shelter, and workplace (15,58). Further, the marginalization on systemic, structural, and individual levels makes it difficult to exit poverty and homelessness. Studies suggested that exclusion, discrimination, and abuse based on trans gender identities prevented trans women from the same access to housing services and safe housing as cis individuals (59).

The marginalization of housing experiences among women living with HIV is supported by limited evidence. When housing was available, substandard housing situations, such as Single-Room Occupancy (SRO) hotels, could be discriminatory and dehumanizing (60,61). Vancouver-based qualitative studies revealed substandard living conditions, undermined tenancy rights, social violence, and gender-based violence towards women tenants taking place in SRO hotels where many people living with HIV and people who use drugs (PWUD) resided in Downtown Eastside (DTES), a Vancouver neighborhood characterized by high levels of poverty and open drug scene (60,61). There remains a knowledge gap in the prevalence of housing precarity among women living with HIV, and limited evidence is available to guide the development of safe housing programs for this population.

1.5 Disparities in the HIV Care Continuum

Gender disparities in HIV care negatively affected engagement in the HIV treatment and care continuum among cis and trans women, globally and in Canada (48,62–65). In population level studies that assessed access to HIV treatment and care (48,63,65), binary sex and gender were typically used, leaving trans women unrepresented. In BC's context of HIV treatment at no cost to individuals, lower quality of HIV care, associated with increase in mortality, has been more

commonly experienced by cis women living with HIV than cis men living with HIV (65). Compared to men living with HIV in BC, lower percentages of cis women living with HIV were retained in HIV care, initiated ART and achieved viral suppression (48). Another Canadian study suggested that once a connection to HIV treatment and care is made, women living with HIV were found to spend one year longer in suboptimal HIV care without achieving ART adherence and viral suppression, compared with their man counterparts (63). Similarly, Canadian women living with HIV also spent less time (1.4 years) than men living with HIV in optimal ART adherence and successful viral suppression (63). The gender disparity in HIV care is likely not unique to Canada, as the average life expectancy of women living with HIV in North America was 47.3 years in 2000-2007, 6 years shorter than that of man counterparts (62).

While limited evidence is available for women living with HIV, housing has been identified as a critical determinant of HIV care continuum outcomes for people living with HIV (2). People experiencing housing precarity are likely affected by several structural inequities, such as inadequate income, food insecurity, the lack of access to affordable housing and health supports, and discrimination based on race, gender, homelessness, and drug use (10,66,67). In the context of people living with HIV also living with homelessness, such structural inequities can undermine HIV care, ART adherence, and viral suppression (2). A study of women living with HIV in San Francisco identified a dose-response relationship between more nights in unstable housing and homelessness and unsuppressed viral load (68). Among people living with HIV who also use drugs in BC, homelessness (69) and eviction (70) were associated with unsuppressed viral load. Furthermore, homelessness was associated with elevated viral load of >1500 copies/mL in people living with HIV who also use drugs (71). For people living with HIV taking ART, a dose-response relationship was found between longer homeless duration and the

lower likelihood of HIV viral load <500 copies/mL (72). A modelling study showed doubling in viral suppression among people living with HIV who also use drugs, if homeless individuals were hypothetically housed (69). These findings are not surprising, since homelessness and unstable housing among people living with HIV were found to be associated with delayed entry, poor access to HIV medical care, and poor quality and adherence to ART (2,9), which can subsequently result in failure in HIV viral suppression and mortality (2,3,9). The common lack of inclusive definition of homelessness in current literature precludes a full view of housing precarity and its connection to disparities in HIV care continuum among women living with HIV. Therefore, gender-inclusive approach to investigating these relationships, employing the CDOH, is much needed.

1.6 Disparities in Health Services Access

HIV is a chronic, systemic disease and has major implications for an individual's general health, highlighting the need for access to other health services in addition to HIV treatment and care. People living with HIV may have acute and chronic comorbidities, such as pneumonia, cardiovascular diseases, fractures, diabetes mellitus, hepatitis B and/or C, and HIV-associated nephropathy (73,74). Oral cancers, dental carries, periodontal disease, and oral infections are associated with an HIV diagnosis (75,76). In fact, oral symptoms can be a marker for an underlying HIV diagnosis and disease progression (76). People living with HIV experience higher prevalence of mental illnesses than the general population (77,78). Mental health conditions (e.g., cognitive impairments, mood disorders, substance use) can impair outcomes along the HIV care continuum (78,79). In particular, depression was found to be independently associated with ART non-adherence (80). Therefore, adequate comprehensive primary, dental,

and mental health management is highly important and necessary to support the health and well-being of people living with HIV. However, in Canada's context of universal health care, cost and lack of public funding prevent accessing affordable dental care (including teeth and gums) due to the exclusion from Canada Health Act (81). Similarly, dental care (other than dental surgery requiring hospitalization) is not covered by BC's provincial health insurance; therefore, individuals seeking dental care need to reply on limited public funding or private insurance or shoulder the cost on their own (82).

As with HIV care, basic health services (primary, dental, and mental health care) are not easily accessible to all, especially to populations experiencing structural marginalization, including people living with HIV. In BC, people living with HIV reported fear and anxiety of stigmatization and negative reactions when disclosing their HIV status to primary care providers (83). In the US, women living with HIV had 51% higher rates of hospitalization than men living with HIV, a marker of sub-optimal management of chronic conditions (2,84). Indigenous people in BC face heightened racism and discrimination through decades of settler colonialism in Canada. According to a recent investigation by Turpel-Lafond on Indigenous-specific racism and discrimination in health care, 7-30% of Indigenous Peoples living in BC reported experiencing different forms of stereotyping and discrimination by healthcare workers, which undermined the quality of services and their trust in the health system (85). Gender inequities affect access to health services at a population level as well as for people living with HIV. Among the general population of BC, evidence suggested that women were more likely than men to not receive needed primary care services (86). Further, unmet health care needs were experienced by 36% trans women in Ontario, Canada, which is 28% higher than cis men and 24% higher than cis women (87). Limited studies with individuals who identify as gender or sexual minorities

revealed that health service access could be challenging due to the lack gender inclusion and understanding of their health care needs (27,88,89).

While women living with HIV likely experience housing precarity as discussed above, the link between their housing and health services access is not well-documented. Limited studies showed that among people living with HIV, housing precarity was associated with limited health services access and utilization and frequent emergency department (ED) visit and hospitalization (2,90,91). Among general population experiencing homelessness, longer duration of homelessness was associated with limited primary care access (i.e., not having a family physician) (44). Precarious housing created structural barriers to primary care access, including limited transportation, lack of time, financial strain, recent and frequent moving, lack of health card, previous negative experiences with providers, and competing needs for daily living (such as finding food and shelter) (44,66,67,92). As for oral health, barriers experienced by people living in homelessness included cost, fear, dental anxiety, discrimination, administrative procedures, and long wait time (45,93). People living with HIV also experienced high level of HIV stigma and face rejection or discrimination by dental clinics after HIV disclosure (94–97). Even though people living in homelessness required more dental treatment and experience more severe pain and functional limitation than the general population, barriers to dental care often left them to self-treatment and emergency dental care or hospital care (45,98). Mental health conditions (e.g., mood disorders, alcohol use, substance use/addiction, personality disorders, and psychosis) are many times more prevalent among people experiencing homelessness and people living with HIV than the general population (4,78). Mental health conditions (including substance use/addiction) may lead to housing precarity and acquiring HIV, meanwhile the latter can become stressors in leading to and exacerbating poor mental health (8,34,78,99). Among

people living with housing precarity, problematic drug use was found to be associated with unmet mental health care needs, highlighting the need to improve access for individuals experiencing concurrent homelessness and addiction challenges (100). For trans women living with HIV, existing literature in health service access often failed to include women living with HIV who also experience housing precarity, but rather focus on either people living with HIV or people living in homelessness.

There are limited studies conducted with women living with HIV, and none on the association between housing precarity and health services access. In fact, people living with HIV and people experiencing homelessness were mostly studied as separate populations. Studies often focused on single areas of health care (e.g., primary care and dental care). However, the combined experiences of living with HIV and housing precarity could lead to increased needs in health care and heightened disparities in health services access as a result of structural barriers, discrimination, and other factors. Additionally, as mentioned in the previous section, a lack of inclusive definitions of homelessness was a common limitation across current studies, and hence the importance of applying the CDOH in this work. Therefore, there remains a knowledge gap in evidence focusing on women living with HIV who face housing precarity and unique health care needs and challenges. The SHAWNA cohort represent a diverse group of women living with HIV, with over half (57%) of participants identifying as Indigenous, approximately 10% identifying as otherwise racialized, and over one-third (35%) identifying as sexual and/or gender minority. Drawing on data from SHAWNA and applying the CDOH to define housing status will contribute to more visibility of women living with HIV in the literature and paint a clearer picture in the relationship between housing precarity and health services access.

Chapter 2: Prevalence and Correlates of Housing Status

2.1 Introduction

Housing is a human right and social determinant of health for women living with HIV (2,4). For people living with HIV, housing not only provides a safe shelter but also impacts their HIV care continuum, access to health services, medication adherence, and subsequently health outcomes (2,4). Without housing, women living with HIV in Ontario, Canada had a 10-fold premature mortality when compared with counterparts who had stable housing (3). This chapter will present the characterization of the housing situations reported by a cohort of cis and trans women living with HIV (SHAWNA) in Metro Vancouver, Canada (Objective 1) and the prevalence and correlates of different housing categories (Objective 2).

In Canada on a given night, women accounted for 30-36% of people experiencing housing precarity, including homelessness and unstable housing situations (18,19). However, women's housing precarity is likely dramatically underestimated; even less evidence is available for women living with HIV. Due to the exclusion of hidden homelessness in popular methodologies (e.g., shelter-based study, point-in-time count), housing study results often excluded women who avoided homeless shelters or living on the street and chose couch surfing or live in overcrowded settings as temporary solutions (6,20). A comprehensive study of women's homelessness demands a more encompassing methodology. The Canadian Definition of Homelessness (CDOH) (Chapter 1.1 and 1.2) is an inclusive definition capturing a spectrum of homelessness experiences, including hidden homelessness. Its first application to the SHAWNA cohort attempts to bridge the gap in current housing literature of women living with HIV.

Women living with HIV face multiple and intersecting structural inequities that limit their opportunities to stable housing. Limited studies with women living with HIV documented substandard conditions, discriminatory eviction, and lack of tenant protection in limited low-income housing (60,61). Women living with HIV might be at higher risk of homelessness due to more exposure to intimate partner violence (IPV), a common cause of homelessness among women (10,101). Prevalent physical and mental health conditions among people living with HIV might also contribute to housing precarity due to disability, hospitalization, limited income, and lack of suitable housing options (8,77,99). In addition, discrimination based on race, gender identity and expression, and sexuality might become barriers to stable housing for women living with HIV (15,17,102). Following the characterization of housing status aligned with the CDOH, the remainder of this chapter will explore the individual (demographic) and social-structural (e.g., institutional, interpersonal, and behavioral) correlates of the housing status reported by the SHAWNA cohort.

2.2 Methods

2.2.1 Primary outcome variable

Housing status as the primary outcome was defined according to the CDOH (36,103). The CDOH viewed homelessness as a dynamic state and recognizes various unsheltered and sheltered homeless situations (36). Housing status was time updated at each semi-annual study visit, and was determined for each participant based on the answer to a housing question in the questionnaire interview, 'In which of the following types of places have you slept overnight in the last 6 months?' As detailed in Table 2.1, the responses were then classified into six initial housing categories: 'no shelter'; 'emergency shelter'; 'provisional housing'; 'precarious

housing'; 'supportive housing'; and 'own apartment or house'. Due to the overlap among different groups, housing status was finalized as four mutually exclusive categories (Figure 2.1): (1) 'unsheltered at any point' (shortened as 'unsheltered'); (2) 'unstable'; (3) 'supportive housing only' (shortened as 'supportive housing'); and (4) 'stable housing' (reference). The 'unsheltered' and 'unstable' categories intentionally captured individuals who have stayed in a mixture of accommodations to reflect the complexity and instability of the cohort's housing situations. For example, a combination of living in a car (no shelter), staying with a friend (provisional housing), and supportive housing would be defined as 'unsheltered', using the least stable categorization. Similarly, staying with a friend and supportive housing would be defined as 'unstable housing'.

Table 2.1 Step one of two: characterizing housings status. Descriptions and examples of six initial housing categories.

Initial Housing Categories	Descriptions and Examples	Possible Final Housing Status
No shelter	Living on the street, in vehicles, in abandoned buildings, and anywhere that is not designed or fit for habitation.	Unsheltered
Emergency Shelter	Staying at an emergency shelter due to extreme weather, violence, natural disaster, and so on.	Unstable
Provisional Housing	Staying with family and friends, staying at interim housing for the homeless, being in institutional care and lacking permanent housing arrangements. The key feature is lacking the security of tenure of housing.	
Precarious Housing	Single-Room Occupancy (SRO) hotels.	
Supportive Housing	Staying at any supportive housing recognized by the provincial government, HIV supportive housing, and non-profit housing for those with special needs.	Supportive Housing
Own Apartment or House	Staying at one's own apartment or house alone or with family, intimate partner, and roommates.	Stable

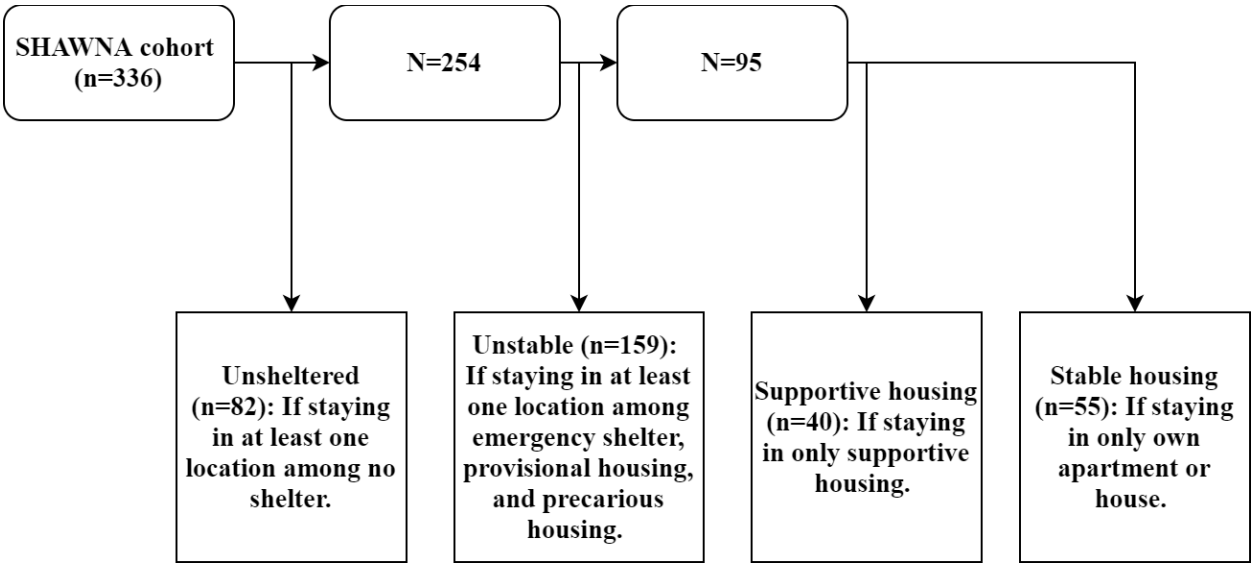

Figure 2.1 Step two of two: characterizing housing status. Criteria of four major housing status according to the participants' all recent housing experience at baseline.

2.2.2 Sociodemographic and explanatory variables

All social-structural and systemic (institutionalization) variables are indirectly measured through individual exposure. Time-fixed social-structural variables included: race (Indigenous [First Nations, Metis, Inuit], other racialized persons [African, Caribbean, Black, Latin American, Asian, other], vs. only reporting White); highest level of education completed ('high school graduate, any college/university, trade, General Educational Development (GED) certification' vs. 'none, elementary/grade school, high school not completed'); sexual orientation (sexual minority at any study visit [inclusive of lesbian, gay, bisexual, asexual, Two Spirit, queer, other] vs. heterosexual at all study visits); and gender identity (gender minority at any study visit [inclusive of trans [transgender, transsexual, other transfeminine identity], gender diverse [non-binary, Two Spirit] vs cisgender at all visits).

All other variables were time-updated at each semi-annual study visit. Time-updated demographic and social-structural variables that were measured in a 'current' timeframe included: age (measured continuously, in years); location of residence (answer to 'where do you live?'; dichotomized as 'City of Vancouver' vs. 'not City of Vancouver', and 'DTES' vs. 'not DTES'). Time-updated social-structural variables capturing events in the last six months included: employment (answer to 'what was your main source of income?'; categorized as 'formal, legal employment', 'sex work' vs. 'none or nonlegal employment'); average monthly income (including government allowances, measured in $CAD); food insecurity (measured by a version of the Radimer/Cornell Hunger Scale; dichotomized as 'often true' or 'sometimes true' to at least one item vs. 'never true' or 'not applicable' to all items) (104,105). Institutionalization variables included: lifetime incarceration (answer to 'in your lifetime, have you been in detention, prison, or jail overnight or longer for any reason at all?' and time updated at each semi-annual study visit); hospitalization in the last six months (answer to 'have you been admitted to the hospital/stayed overnight?'). All behavioral variables captured events in the last six months and included: stimulant drug use (e.g., cocaine, crack, crystal methamphetamine, and including any non-injection or injection use); opioid drug use (e.g., heroin, morphine, fentanyl, and including any non-injection or injection use); drug overdose from any substance (answer to 'have you overdosed by accident (i.e., where you've had a negative reaction by using too many drugs)?'). Interpersonal variables included: feeling in danger where currently sleeping (answer to 'do you ever feel in danger in the place where you currently sleep?'); experience of physical/sexual violence in the last six months (by any perpetrator); ever being outed as HIV positive (answer to 'has anyone ever 'outed' you for knowing or suspecting you were HIV positive?' and time updated at each semi-annual study visit); ever being abused due to HIV

status (answer to ‘have you ever been verbally or physically abused by someone because they knew or suspected you were HIV positive?’ and time updated at each semi-annual study visit).

2.2.3 Statistical Analysis

Descriptive sample characteristics were calculated to examine sociodemographic variables stratified by housing categories at baseline. Categorical variables were summarized as frequencies and proportions, and continuous variables as medians and first to third quartile (Q1-Q3). P-values were calculated using Pearson’s chi-square test for categorical variables (or Fisher’s exact test for small cell counts) and analysis of variance (ANOVA) for continuous variables. Using longitudinal data, bivariate and multivariable generalized linear mixed models (GLMM) were used to examine associations with the multinomial outcome using a generalized logit link; random intercepts were incorporated to account for repeated measures among participants. Variables that had strong bivariate associations ($p<0.10$) with any housing category were considered for inclusion in the multivariable explanatory model. Backward stepwise model selection was used to determine the model with the best fit, as indicated by the lowest Akaike Information Criterion (AIC). Odds ratios (OR), adjusted odds ratios (AOR) and 95% confidence intervals (CI) were presented, and all p-values were two-sided. All analyses were performed in SAS version 9.4 (SAS Institute Inc., Cary, North Carolina, USA).

2.3 Results

Table 2.2 describes the baseline demographics, including relevant socioeconomic and structural factors of participants in SHAWNA. The study sample included 336 participants with 1930 observations from baseline and follow-up interviews in 2010-2019. The median age of participants was 43 years (first to third quartile [Q1-Q3]: 36-50 years); 32.7% (n=110) of

participants were sexual minority women, and 9.8% (n=33) were gender minority women. Of the sample, 7.1% (n=24) were trans women, and 1.5% (n=5) were gender diverse women. Overall, 56.9% (n=191) were Indigenous women; 8.9% (n=30) were otherwise racialized; 34.2% (n=115) were White. Of Indigenous participants, 12.6% (n=24) were Two-Spirit women. At baseline, 71.7% (n=241) of participants reported living in unsheltered (24.4%, n=82) and unstable (47.3%, n=159) housing situations in the last six months; 28.3% (n=95) lived in either supportive housing (11.9%, n=40) or their own apartment or house (16.4%, n=55). Eleven participants lived in HIV supportive housings; they did not form a subgroup due to the small number.

Bivariate analysis identified the following variables associated with at least one of the outcome housing categories at a $p<0.10$ level: age, sexual minority, living in DTES, food insecurity, employment, incarceration, hospitalization, stimulant use, opioid use, and physical/sexual violence. Multivariable analysis identified the following variables as positively associated with unsheltered, unstable, or supportive housing versus stably housed (Table 2.3): for being unsheltered, living in DTES (AOR=5.07, 95%CI (2.98-8.65)), sex work (AOR=2.58, 95%CI (1.11-6.00)), hospitalization (AOR=4.89, 95%CI (2.64-9.04)), stimulant use (AOR=2.73, 95%CI (1.59-4.69)), and physical/sexual violence (AOR=4.67, 95%CI (2.54-8.60)) were significant factors; for unstable housing, living in DTES (AOR=2.21, 95%CI (1.42-3.43)), hospitalization (AOR=7.83, 95%CI (4.63-13.25)), and physical/sexual violence (AOR=3.00, 95%CI (1.75-5.12)) were significant; for supportive housing, age (AOR=1.04 per year older, 95%CI (1.01-1.07)), living in DTES (AOR=3.30, 95%CI (1.94-5.60)), incarceration (AOR=2.20, 95%CI (1.12-4.31)), and stimulant use (AOR=2.32, 95%CI (1.42-3.76)) had significant associations. Negative associations from the multivariable analysis included age (AOR=0.96 per year older, 95%CI (0.93-0.99)) for being unsheltered compared to stable housing, and no formal,

legal employment (AOR=0.56, 95%CI (0.36-0.89)) for unstable housing compared to stable housing.

Table 2.2 Baseline demographics and characteristics of 336 WLWH from SHAWNA cohort stratified by the four-category housing status.

			Housing status				
	Total N=336 (100)	Missing data (%)	Unsheltered N=82 (24.4)	Unstable N=159 (47.3)	Supportive housing N= 40 (11.9)	Stable housing N=55 (16.4)	P-value
Age (median, Q1-Q3)	43 (36-50)	0 (0)	40 (34-46)	44 (37-52)	48 (43-53)	44 (36-50)	<0.001
Sexual minority	110 (32.7)	1 (0.3)	26 (31.7)	56 (35.2)	12 (30.0)	16 (29.1)	0.836
Gender minority	33 (9.8)	2 (0.6)	15 (18.3)	10 (6.3)	1 (2.5)	7 (12.7)	0.008
Race		0 (0)					0.384
White	115 (34.2)		24 (29.3)	56 (35.2)	15 (37.5)	20 (36.4)	
Indigenous	191 (56.9)		53 (64.6)	86 (54.1)	24 (60.0)	28 (50.9)	
Otherwise racialized	30 (8.9)		5 (6.1)	17 (10.7)	1 (2.5)	7 (12.7)	
Currently live in City of Vancouver	246 (73.2)	1 (0.3)	72 (87.8)	102 (64.2)	39 (97.5)	33 (60.0)	<0.001
Currently live in DTES	103 (30.7)	1 (0.3)	43 (52.4)	36 (22.6)	18 (45.0)	6 (10.9)	<0.001
Education, high school level and above	161 (47.9)	0 (0)	29 (35.4)	87 (54.7)	16 (40.0)	29 (52.7)	0.022
Employment[a]		12 (3.6)					0.001
None	165 (49.1)		32 (39.0)	80 (50.3)	23 (57.5)	30 (54.6)	
Sex work	115 (34.2)		42 (51.2)	45 (28.3)	11 (27.5)	17 (30.9)	
Formal, legal	44 (13.1)		3 (3.7)	30 (18.9)	5 (12.5)	6 (10.9)	
Monthly income in $CAD[a] (median, Q1-Q3)	1,600 (1,110-2,660)	5 (1.5)	1,490 (1,000-3,150)	1,700 (1,140-2,820)	1,380 (1,110-1,930)	1,690 (1,180-2,400)	0.085
Food insecurity[a]	260 (77.4)	2 (0.6)	71 (86.6)	123 (77.4)	27 (67.5)	39 (70.9)	0.077
Incarceration[b]	246 (73.2)	1 (0.3)	66 (80.5)	113 (71.1)	32 (80.0)	35 (63.6)	0.081
Hospitalization[a]	79 (23.5)	1 (0.3)	24 (29.3)	47 (29.6)	5 (12.5)	3 (5.5)	<0.001
Stimulant use[a]	221 (65.8)	1 (0.3)	72 (87.8)	93 (58.5)	31 (77.5)	25 (45.5)	<0.001
Opioid use[a]	143 (42.6)	1 (0.3)	49 (59.8)	60 (37.7)	17 (42.5)	17 (30.9)	0.003
Overdose[a]	19 (5.7)	3 (0.9)	8 (9.8)	8 (5.0)	2 (5.0)	1 (1.8)	0.257
Feel in danger where currently sleeping	89 (26.5)	0 (0)	26 (31.7)	44 (27.7)	9 (22.5)	10 (18.2)	0.316
Physical/sexual violence[a]	62 (18.5)	15 (4.5)	29 (35.4)	24 (15.1)	4 (10.0)	5 (9.1)	<0.001

Outed as HIV+[b]	154 (45.8)	11 (3.3)	38 (46.3)	69 (43.4)	17 (42.5)	30 (54.6)	0.686
Abused due to HIV status[b]	108 (32.1)	21 (6.3)	32 (39.0)	50 (31.5)	11 (27.5)	15 (27.3)	0.383

All data refer to n (%) of participants unless otherwise specified.
Q1-Q3: first to third quartile.
[a] Last six months prior to the interview
[b] Lifetime

Table 2.3 Unadjusted and adjusted odds ratios and 95% confidence intervals (CI) from bivariate and multivariable GLMM for significant correlates of housing status.

	Unadjusted Odds Ratio (95% CI)			Adjusted Odds Ratio[c] (95% CI)		
	Unsheltered	Unstable	Supportive Housing	Unsheltered	Unstable	Supportive Housing
Age (per year older)	0.91 (0.88-0.95)	1.00 (0.98-1.02)	1.02 (0.99-1.06)	0.96 (0.93-0.99)	1.01 (0.99-1.04)	1.04 (1.01-1.07)
Sexual Minority	2.16 (1.21-3.87)	1.41 (0.95-2.10)	1.26 (0.69-2.28)	--	--	--
Currently live in DTES	7.72 (4.71-12.66)	2.58 (1.72-3.89)	3.61 (2.20-5.93)	5.07 (2.98-8.65)	2.21 (1.42-3.43)	3.30 (1.94-5.60)
Food insecurity[a]	1.58 (1.02-2.45)	1.14 (0.82-1.57)	1.04 (0.68-1.57)	--	--	--
Employment[a,b]						
None	2.02 (0.98-4.20)	0.71 (0.45-1.10)	1.23 (0.67-2.28)	1.18 (0.56-2.48)	0.56 (0.36-0.89)	1.20 (0.64-2.26)
Sex work	7.09 (3.22-15.62)	1.53 (0.91-2.56)	1.52 (0.75-3.06)	2.58 (1.11-6.00)	1.14 (0.64-2.04)	1.22 (0.57-2.62)
Incarceration, lifetime	3.00 (1.54-5.83)	1.91 (1.25-2.91)	3.15 (1.61-6.15)	1.30 (0.64-2.65)	1.29 (0.82-2.03)	2.20 (1.12-4.31)
Hospitalization[a]	4.32 (2.47-7.57)	7.20 (4.43-11.71)	1.00 (0.54-1.84)	4.89 (2.64-9.04)	7.83 (4.63-13.25)	1.07 (0.55-2.05)
Stimulant use[a]	5.77 (3.63-9.18)	1.78 (1.29-2.47)	3.01 (1.96-4.62)	2.73 (1.59-4.69)	1.06 (0.72-1.55)	2.32 (1.42-3.76)
Opioid use[a]	3.63 (2.35-5.62)	1.51 (1.08-2.11)	1.74 (1.15-2.64)	--	--	--
Physical/sexual violence[a]	6.67 (3.77-11.83)	3.12 (1.88-5.18)	1.74 (0.94-3.22)	4.67 (2.54-8.60)	3.00 (1.75-5.12)	1.62 (0.85-3.05)

The stable housing category is the reference for all odds ratios.

[a] Time-updated variable capturing events in the last six months at each semi-annual study visit.

[b] Formal, legal employment is the reference.

[c] All variables in the table were included in the full explanatory model, and the best fitting model did not retain sexual minority, food insecurity, and opioid use.

2.4 Discussion

Using the CDOH, the findings identified that the majority of SHAWNA participants had experienced unsheltered and unstable living situations in the last six months at baseline. Key social-structural factors were associated with unsheltered and unstable housing relative to stable housing, with important implications for housing developments to address and prevent homelessness among women living with HIV. According to multivariable analyses, these factors included living in the DTES, recent hospitalization, and recent experience of physical/sexual violence.

Living in the DTES was associated with over five times the odds of being unsheltered and over twice the odds of living in unstable situations. Vancouver's DTES has a systemic and structural housing crisis (106). The DTES offers inexpensive and often precarious rental options and an accepting culture for many marginalized and low-income populations (106,107). The DTES is also a resilient and vibrant community characterized with grassroot organizing and governmental support to combat poverty, housing, and health-related challenges faced by the residents (106). A hallmark example of population growth in this neighborhood was the influx of patients who were previously institutionalized for mental illnesses and later displaced by communities due to stigmatization, discrimination and perceptions that communities were unprepared for their healthcare needs (106). Widely available illicit drugs in the DTES neighborhood have also played a role in exacerbating poverty and displacing people from housing options intolerant of drug use (106).

The findings also showed that recent stimulant use was associated with almost three times the odds of being unsheltered compared to stable housing (Table 2.3). Stimulant use is a factor for homelessness (108). Stimulant and other substance use occurs for complex reasons. In

a cohort of women experiencing housing precarity in San Francisco, having no shelter or staying at a homeless shelter, recent sexual violence, and concurrent illicit opioid use were associated with increased stimulant use outcome (109). Alcohol and drugs can be a coping mechanism for some individuals to temporarily escape from trauma, marginalization, and other hardship (110). Substance use is a known contributor to the loss of housing due to financial instability and a societal lack of understanding and low-barrier approach to drug use (10,12,102,110). Meanwhile, being homeless could also exacerbate substance use as a response to a stressful environment, which makes it difficult to break the homeless and substance use cycle (109–111). Further, settler colonialism, residential schools, and historical trauma have impacted generations of Indigenous people, resulting in disproportionate prevalence of substance use and addiction (102). The stigmatization of substance use and addiction fuels discrimination against potential tenants perceived to use drugs, which limits access to rental housing (112). To realistically help PWUD gain access to stable long-term housing, housing programs need to be more tolerant towards substance use, such as following harm-reduction principles, as well as provide or link to adequate, culturally safe and gender-responsive treatment programs with trauma- and violence-informed (TVI) approaches, while the society continues its search for the root causes and preventions of future substance use.

Substance use is only one part of the housing crisis in the DTES. As higher-income urban developments increased in the DTES, recent decades have seen a systemic decrease in cheap rental units, such as aging SROs, which further limited the housing options of the residents (106). Precarious housing, such as SROs, were not considered ideal for residents seeking housing stability due to the lack of maintenance, overcrowding, lack of tenancy right, and coerced eviction (61). Despite the growing medical and social services and shelters to accommodate the

basic needs for survival, DTES residents still remain underserved and marginalized (106,107). The results showing an association between living in the DTES and living in unsheltered and unstable situations among women living with HIV make sense in the context of overlapping experiences with marginalization and poverty among women living with HIV. To address chronic housing issues in the DTES, intervention from provincial and municipal government is required, and all actions need meaningful consultation with and guidance from DTES residents. The availability of more affordable and livable housing options should be improved to support residents and break cycles of poverty and structural marginalization.

The study identified an association between hospitalization and homelessness. Current literature has conceptualized homelessness and unstable or precarious housing as a reason to explain frequent (113) and increased (90) utilization of the emergency department among people living with HIV in BC, whereas stable housing can encourage connection with primary care to avoid misuse (90). These studies can partially explain the association between hospitalization and homelessness among the SHAWNA cohort. Meanwhile, hospitalization could also lead to and explain homelessness or unstable housing (8). To better interpret the association between recent hospitalization and the unsheltered and unstable housing experience among women living with HIV, hospitalization can be broken into systemic, structural, and individual levels. Systemically, poor discharge planning could introduce someone to homelessness when they do not have the physical well-being and resources to obtain stable housing (10). Structurally, hospitalization could cause financial crisis by reducing income generation (especially for low-income shift workers), even leading to unemployment, poverty, unstable housing and homelessness (99). On the individual level, severe and debilitating illnesses requiring hospitalization could also prevent individuals from pursuing and maintaining employment and

secure housing. Individuals with mental and behavioral illnesses might also experience disruption of social connections from family, relatives, and others, including those that support stable housing (99). People living with HIV have higher likelihoods of hospitalization relative to the general population (91). Further, women living with HIV in the US had 51% higher rates of hospitalization than their male counterparts (84). For trans women living with HIV, the lack of gender inclusivity and understanding about trans people's healthcare needs makes it even more difficult to access healthcare (27,88). Limited healthcare access while being homeless can exacerbate HIV and other illnesses, resulting in a cycle of worsening health and perpetual homelessness (2,8,9). Essentially, poor health of women living with HIV as a result of structural marginalization can further lead to poverty, homelessness, and worse health. Housing developments and social welfare programs should recognize healthcare inequity, engage in health education and promotion, and provide adequate financial and personal support to women living with HIV to reduce preventable homelessness.

Violence is also a well-known pathway towards homelessness, especially for women, Indigenous People, and people who identify as members of gender minority communities (10). The study findings were consistent with existing literature that intimate partner violence (IPV) was a major cause of homelessness among women (10). Women and children are most likely to become homeless upon leaving violent relationships or households (99). In Canada, Indigenous women are twice more likely than indigenous men and three times more likely than non-Indigenous men and women to experience any violent incidents (57). Violence and inadequate resources often force Indigenous women to leave their communities on reserve, resulting in higher risk of homelessness (112). In an Ontario study of gender-diverse people, 73% ever experienced violence and 67% reported having to move due to their gender identity and

expression (88). Even at women-specific shelters, trans and two-spirit individuals were subject to structural violence, including discrimination, social exclusion, and gender policing (59). Furthermore, HIV-related stigma also exposes cis and trans women living with HIV to verbal, physical, and sexual violence by any perpetrator, ranging from intimate partners to strangers (101,114). Violent and traumatic experiences can lead to psychological stress, damaged self-esteem, suicidality, and substance use to cope with trauma (101,114). All the consequences will further marginalize women living with HIV and lead to perpetual housing instability. My findings add to the literature by highlighting the need to create safe, inclusive, and TVI housing solutions with considerations of the diverse racial and gender identities among women living with HIV.

Inequities in employment and income among women living with HIV structurally undermine housing opportunities. The majority of the cohort, 90% of unsheltered participants and 79% of unstably housed participants, experienced unemployment or worked nonlegal employments and sex work at baseline (Table 2.2). Extrapolating from participants' average monthly income at baseline, the median annual income in this sample was 19,200 $CAD (Table 2.2), which is 62% of the Canadian national median income of females and 45% of that of males (39). A Canadian study showed that 70.3% of women living with HIV reported an annual personal income <20,000 $CAD, whereas the prevalence was 28.1% for women who do not live with HIV of similar age and race (115). The lack of adequate income structurally increases an individual's vulnerability to homelessness (10,102). Additionally, 52% participants had less than high school level of education (Table 2.2). Lower education level not only limited the opportunities for employment and income generation, but also was linked to poor literacy and numeracy skills, which negatively affects securing housing (102). Further, race is a structural

determinant of employment and income, and subsequently housing status. In Canada, racialized women had higher unemployment rate (9.6%) than their non-racialized counterparts (6.4%); the pay gap between racialized and non-racialized women persisted over generations (38). Such economic differences have important implications on housing security. Experiences with structural and interpersonal racism and discrimination, which may intersect with other forms of discrimination (e.g., poverty) could increase the likelihood for racialized and Indigenous people to experience rental housing discrimination (6,116,117). Employment status, source of income, and receiving rent subsidy were perceived as the top reasons of discrimination by Indigenous people living with HIV in Ontario (116), while urban Albertan landlords reported welcoming tenants receiving government assistance as a reliable form of payment (117). Sufficient and timely income support is necessary to maintaining housing and bridge the long-standing income inequality for cis and trans women living with HIV and marginalized populations experiencing or at risk of homelessness. Meanwhile, additional programs should be designed with and for women living with HIV to introduce educational and recreational activities to build communities and encourage future engagement in the workforce.

The multivariable analysis revealed additional relationships between social-structural factors and living in supportive housing. Older age, living in DTES, having ever been in detention, prison, or jail, and recent stimulant use were associated with living in supportive housing when compared to the stably housed participants (Table 2.3). Women-centered, TVI supportive housing programs were advocated as a reasonable solution for women living with HIV who need safe and stable housing and have complex healthcare needs, since they often provide social and structural benefits by offering medical and social case management (118–122), peer support (118), culturally safe care (118,123), and harm reduction practices (120,123),

as well as supporting women to maintain relationship with children and family (112). Connection with culture and spirituality and involvement of cis and trans women living with HIV in program planning and implementation will also help tailor supportive programs (112). These approaches might also support better access to healthcare (including primary, HIV, substance use, and mental health), financial resources (through governmental benefits and employment), health benefits, organization and life skills, and positive social network (118,119,123). women living with HIV in supportive housing programs might have increased chance of achieving viral suppression and longer survival than those in conventional care (120,121). Lastly, not all supportive housing were created equal; some had limited competency and experience working with people living with HIV or providing HIV prevention (124). Thus, housing solutions must cater to the need of their residents to humanely fulfill the rights to housing and health of women living with HIV and other marginalized populations.

The study had several limitations as well as strengths. Self-reported data might introduce bias due to social desirability and inaccurate recalls. However, SHAWNA's trained community interviewers have been building rapport with the participants over the 10-year study period, which can reduce the chance of bias. The sample overrepresented women living with HIV living in the City of Vancouver relative to in other settings in Metro Vancouver, so is likely not generalizable to all women living with HIV in Metro Vancouver or those in other settings. Though the longitudinal nature of this study increased statistical power via repeated measures, the sample size of the SHAWNA open cohort might have precluded us from detecting some associations, as the study was exploratory in nature. For example, the variable 'currently live in City of Vancouver' could not be used in the multivariable model due to small cell counts. However, it is important to note that most participants living in unsheltered and unstable housing

conditions live in Vancouver; unstable housing is not a phenomenon exclusive to DTES. This problem can be resolved once the cohort accumulates more responses or through a qualitative study to identify correlates and patterns in housing instability among women living with HIV. A strength of this study was to be the first to reference the CDOH in defining the housing status among women living with HIV and categorizing 50+ types of accommodation into four groups. By using the national definition, the findings would be easily accessible on the national level and translatable to influence future housing policies for marginalized populations. In using the CDOH, the study was able to reflect the complexity and diversity of housing experiences among women living with HIV through the four-category housing status variable. The unsheltered homelessness and unstable housing were distinct categories in this study, while they were often grouped together in previous studies.

To conclude, this study highlighted the prevalent housing instability among cis and trans women living with HIV in Metro Vancouver, Canada. Homelessness among women living with HIV is a complex product of systemic, structural, and individual and relational factors. The findings echoed the need for interventions for women living with HIV and other marginalized populations to protect their basic right to housing. The experience, concerns, and needs of women living with HIV must be consulted to resolve the housing crisis. Structural inequity and marginalization experienced by a diverse group of women living with HIV need to be addressed in order to achieve stable housing, as well as financial security, physical wellbeing, freedom from violence and discrimination to prevent future homelessness. Women-centered and culturally safe supportive housing with TVI approaches and harm reduction practices for women living with HIV can serve as a model to provide stable shelter, promote access to health services, alleviate financial hardship, and cultivate positive social connections (118–122).

Chapter 3: Housing Status, HIV Care Continuum, and Health Services Access

3.1 Introduction

Housing precarity greatly affects access to the HIV care continuum (i.e., HIV diagnosis, linkage to care, being on ART, and viral suppression), a clinical framework for successful control of HIV progression, HIV-associated morbidity and mortality, and HIV transmission (2,48,50–52). In North America, gender inequity in HIV care was demonstrated by lower engagement in HIV care and life expectancy among women than men living with HIV (62,63). Across Canada, women living with HIV were found to have reduced odds of viral suppression and increased odds of viral load rebound than men (125). Moreover, limited evidence with women living with HIV showed that more nights spent in unstable housing and single-room occupancy hotels (SROs) were associated with higher odds of unsuppressed viral load (>200 copies/mL) (68). Similarly, homelessness and eviction were found to be associated with unsuppressed viral load among people living with HIV who also use drugs (69,70).

The impact of housing precarity on the access to general health care should not be overlooked, since HIV as a systemic disease affects the whole body system and as a result the overall physical, dental, and mental health (73,74,77,78,126). Current literature lacks representation of women living with HIV. In the US, unmet primary, dental, and mental health care needs were common among individuals experiencing homelessness (127). Longer duration of homelessness was associated with not having a family physician in Toronto, Canada (44). Cis and trans women living with HIV and housing precarity likely experience inadequate access to health services due to multiple and intersecting identities, including race, gender, HIV status, income, and other structural factors (84,86,87).

Housing precarity needs to be scrutinized as one of the contributing factors to inequity in

HIV care and general health services access experienced by women living with HIV. Inconsistent housing definitions in literature make it challenging to compare study results. Building upon the housing status characterized by the CDOH, this chapter aims to examine the association between housing status and HIV care continuum and health services access experienced by women living with HIV in the SHAWNA cohort (Objective 3).

3.2 Methods

3.2.1 Primary outcome variables

The time-updated outcome variables pertaining to HIV care continuum included, currently on ART, at the time of interview; ART adherence, last 3-4 weeks (dichotomized as 'suboptimal ('self-reported adherence<95%' vs. '≥95%' as reference); detectable viral load, last six month (dichotomized as 'detectable [plasma HIV-1 RNA≥50 copies/ml in any test]' vs. 'undetectable [<50 copies/ml in all tests]' as reference); median CD4 <200, last six months (dichotomized as 'median CD4 cell count<200' vs. '≥200' as reference). Analyses on adherence were restricted to participants on ART. Viral load and CD4 data were collected from the Drug Treatment Program in British Columbia, with the consent of the participant (128). These analyses were restricted to observations from 2010-2017, for which linked data were available.

The time-updated outcome variables pertaining to health services access were added to the questionnaire in September 2014, and analyses were restricted accordingly to interviews completed on or after this time. These outcomes measured in the last six months included: unmet primary care needs (i.e., unable to access primary care when care was needed); unmet dental care needs (i.e., unable to access dental care when care was needed); and unmet mental health care

needs (i.e., unable to access mental health medications, assessment, diagnosis, counselling, and/or other support when care was needed) (127).

3.2.2 Explanatory variables

As detailed in Chapter 2.2, the time-updated main explanatory variable was the four-category housing status in the last six months (unsheltered, unstable, supportive housing, and stable housing), derived according to the CDOH (36,103). The secondary analysis assessed another variable that measured living in HIV housing, defined as community housing, sometimes subsidized, intended for people living with HIV in Metro Vancouver (129). The HIV housing and housing status variables might overlap over the unsheltered, unstable, and supportive housing categories, which provides more information on the participant's housing history. HIV housing overlapping with unsheltered or unstable housing status indicates moving at least once and a lack of stability in the last six months, whereas HIV housing overlapping with supportive housing means living at the same location in the last six months.

3.2.3 Potential confounders

Time-fixed social-structural variables included: race (Indigenous [First Nations, Metis, Inuit], other racialized persons [African, Caribbean, Black, Latin American, Asian, other], vs. only reporting White); highest level of education completed ('high school graduate, any college/university, trade, GED' vs. 'none, elementary/grade school, high school not completed'); sexual orientation (sexual minority at any study visit [inclusive of lesbian, gay, bisexual, asexual, Two Spirit, queer, other] vs. heterosexual at all study visits); and gender identity (gender minority at any study visit [inclusive of trans [transgender, transsexual, other transfeminine identity], gender diverse [non-binary, Two Spirit] vs cisgender at all visits).

All other variables were time-updated at each semi-annual study visit. Time-updated demographic and social-structural variables that were measured in a 'current' timeframe included: age (measured continuously, per one-year increase); currently living in City of Vancouver (yes vs. no). Time-updated social-structural variables capturing events in the last six months included: employment, last six months (answer to 'what was your main source of income?'; categorized as 'formal/legal employment', 'sex work' vs. 'none or nonlegal employment'). All behavioral variables captured events in the last six months and included: alcohol use; stimulant drug use (e.g., cocaine, crack, crystal methamphetamine, and including any non-injection or injection use); opioid drug use (e.g., heroin, morphine, fentanyl, and including any non-injection or injection use); and accidental drug overdose.

3.2.4 Statistical Analysis

Baseline descriptive statistics were calculated and stratified by the housing status variable. Categorical variables were summarized as frequencies and proportions, and continuous variables as medians and first to third quartile (Q1-Q3). P-values were calculated using Pearson's chi-squared test (or Fisher's exact test for small cell counts) for categorical variables and analysis of variance (ANOVA) for continuous variables. Using longitudinal data, bivariate and multivariable logistic regression analyses with generalized estimating equations (GEE) and an exchangeable correlation matrix were used to examine associations between the housing status variable and secondary HIV housing variable, and each of the outcome variables (not on ART, sub-optimal ART adherence, detectable viral load, median CD4 <200, and unmet primary, dental, and mental health care needs). All multivariable models included the hypothesized confounders: age, sexual minority identity, gender minority identity, race, Canadian born, employment, alcohol use, stimulant use, and opioid use. For each outcome, the most parsimonious model was determined

using the process described by Maldonado and Greenland (130), in which potential confounders were removed in a stepwise manner, and variables that altered all of the associations of interest by <5% were systematically removed from the model. All p-values are two sided; odds ratios (ORs) and adjusted odds ratios (AORs) with 95% confidence intervals (95%CIs) are reported. SAS version 9.4 was used for statistical analyses (SAS Institute Inc., Cary, North Carolina, USA).

3.3 Results

Table 3.1 describes the baseline demographics, including relevant demographic and social-structural factors of the study sample. The median age of participants was 43 years (Q1-Q3: 36-50 years); 32.7% (n=110) of participants were sexual minority women, and 9.8% (n=33) were gender minority women. Of the sample, 7.1% (n=24) were trans women, and 1.5% (n=5) were gender diverse women. Overall, 56.9% (n=191) were Indigenous women; 8.9% (n=30) were otherwise racialized; 34.2% (n=115) were White. Of Indigenous participants, 12.6% (n=24) were Two Spirit women. At baseline, 71.7% (n=241) of participants reported living in unsheltered (24.4%, n=82) and unstable (47.3%, n=159) housing situations in the last six months; 28.3% (n=95) lived in either their own apartment or house (16.4%, n=55) or supportive housing (11.9%, n=40). Eleven (3.3%) participants reported living in any HIV housing in the last six months; living in HIV housing overlaps with the unstable (45.5%, n=5), supportive housing (36.4%, n=4), and unsheltered (18.2%, n=2) categories (Table 3.2). The secondary analysis also included baseline outcomes in HIV care continuum and unmet health care needs stratified by HIV housing (Table 3.2).

For outcomes at baseline (Table 3.1), 81.9% of participants self-reported currently taking ART. Among participants taking ART, 28.0% had <95% adherence to ART in the last 3-4

weeks. At baseline, 41.4% of participants had a detectable viral load, and 14.0% had a median CD4 cell count <200. Among a subsample of 318 participants who answered questions about health services access, 15.7% of participants reported unmet primary care needs, 26.1% unmet dental care needs, and 16.4% unmet mental health care needs at baseline.

Bivariate logistic regression using GEE identified that unsheltered housing status (compared to stable housing) was statistically significantly associated with the following outcome variables at a $p<0.05$-level (Table 3.3): not on ART, suboptimal adherence, detectable viral load, being unable to access primary care, and being unable to access dental care. After adjusting for confounders, multivariable confounder models further revealed positive associations between being unsheltered (relative to stable housing) and outcome variables, including not being on ART (AOR=2.11, 95%CI (1.33-3.36)), detectable viral load (AOR=1.86, 95%CI (1.29-2.67)), unmet primary care needs (AOR=2.06, 95%CI (1.20-3.55)), and unmet dental care needs (AOR=1.61, 95%CI (1.02-2.54)).

Secondary analysis with the HIV housing variable showed an inverse bivariate association between HIV housing (relative to non-HIV housing) and not being on ART (Table 3.4). In multivariable logistic regression using GEE, living in HIV housing was found to be negatively associated with not being on ART (AOR=0.24, 95%CI (0.07-0.90)), even after adjusting for confounders.

Table 3.1 Baseline demographics and characteristics among full study sample and subset from SHAWNA cohort stratified by the housing categories.

			Housing Categories[a]				
	Total N=336 (100)	Missing data (%)	Unsheltered N=82 (24.4)	Unstable N=159 (47.3)	Supportive housing N= 40 (11.9)	Stable housing N=55 (16.4)	P-value
Age (median, Q1-Q3)	43 (36-50)	0 (0)	40 (34-46)	44 (37-52)	48 (43-53)	44 (36-50)	<0.001
Sexual minority	110 (32.7)	1 (0.3)	26 (31.7)	56 (35.2)	12 (30.0)	16 (29.1)	0.836
Gender minority	33 (9.8)	2 (0.6)	15 (18.3)	10 (6.3)	1 (2.5)	7 (12.7)	0.008
Race		0 (0)					0.384
White	115 (34.2)		24 (29.3)	56 (35.2)	15 (37.5)	20 (36.4)	
Indigenous	191 (56.9)		53 (64.6)	86 (54.1)	24 (60.0)	28 (50.9)	
Otherwise racialized	30 (8.9)		5 (6.1)	17 (10.7)	1 (2.5)	7 (12.7)	
Born in Canada	305 (90.8)	0 (0)	78 (95.1)	142 (89.3)	38 (95.0)	47 (85.5)	0.174
Currently live in City of Vancouver	246 (73.2)	1 (0.3)	72 (87.8)	102 (64.2)	39 (97.5)	33 (60.0)	<0.001
Education, high school level and above	161 (47.9)	0 (0)	29 (35.4)	87 (54.7)	16 (40.0)	29 (52.7)	0.022
Employment[a]		12 (3.6)					0.001
None	165 (49.1)		32 (39.0)	80 (50.3)	23 (57.5)	30 (54.6)	
Sex work	115 (34.2)		42 (51.2)	45 (28.3)	11 (27.5)	17 (30.9)	
Formal, legal	44 (13.1)		3 (3.7)	30 (18.9)	5 (12.5)	6 (10.9)	
Alcohol use[a]	197 (58.6)	1 (0.3)	57 (69.5)	98 (61.6)	17 (42.5)	25 (45.5)	0.007
Stimulant use[a]	221 (65.8)	1 (0.3)	72 (87.8)	93 (58.5)	31 (77.5)	25 (45.5)	<0.001
Opioid use[a]	143 (42.6)	1 (0.3)	49 (59.8)	60 (37.7)	17 (42.5)	17 (30.9)	0.003
Overdose[a]	19 (5.7)	3 (0.9)	8 (9.8)	8 (5.0)	2 (5.0)	1 (1.8)	0.257
On ART	275 (81.9)	0 (0)	54 (65.9)	136 (85.5)	37 (92.5)	48 (87.3)	<0.001
ART adherence[b]		2 (0.6)					<0.001
≥95% adherence	196 (58.3)		32 (39.0)	101 (63.5)	30 (75.0)	33 (60.0)	
<95% adherence	77 (22.9)		21 (25.6)	34 (21.4)	7 (17.5)	15 (27.3)	
Not on ART	61 (18.2)		28 (34.2)	23 (14.5)	3 (7.5)	7 (12.7)	
Detectable viral load[a,c]	139 (41.4)	43 (12.8)	50 (61.0)	60 (37.7)	11 (27.5)	18 (32.7)	<0.001

Median CD4 <200[a,c]	47 (14.0)	43 (12.8)	12 (14.6)	20 (12.6)	5 (12.5)	10 (18.2)	0.789
	Total N=318 (100)	Missing data (%)	Unsheltered N=64 (20.1)	Unstable N=153 (48.1)	Supportive housing N= 50 (15.7)	Stable housing N=51 (16.0)	P-value
Unmet primary care needs[a,d]	50 (15.7)	1 (0.3)	14 (21.9)	20 (13.1)	9 (18.0)	7 (13.7)	0.404
Unmet dental care needs[a,d]	83 (26.1)	4 (1.3)	25 (39.1)	43 (28.1)	7 (14.0)	8 (15.7)	0.007
Unmet mental health care needs[a,d]	52 (16.4)	1 (0.3)	11 (17.2)	28 (18.3)	7 (14.0)	6 (11.8)	0.691

All data refer to n (%) of participants unless otherwise specified.
Q1-Q3: first to third quartile.
[a] Last six months prior to the interview.
[b] Last three to four weeks prior to the interview.
[c] Data collected in January 2010-December 2017 (N=316). Twenty participants are missing from sample and grouped with missing data.
[b] Data collected in September 2014-February 2019 (N=318).

Table 3.2 Baseline descriptive statistics of housing status and health-related outcomes among full study sample and subset stratified by HIV housing.

	Total N = 336 (100)	Missing data (%)	HIV housing[a] N=11 (3.3)	P-value
Housing Status[a]		0 (0)		0.066
Unsheltered	82 (24.4)		2 (18.2)	
Unstable	159 (47.3)		5 (45.5)	
Supportive Housing	40 (11.9)		4 (36.4)	
Stable Housing	55 (16.4)		0 (0)	
Not on ART	61 (18.2)	0 (0)	0 (0)	0.226
ART adherence[b]		2 (0.6)		0.321
≥95% adherence	196 (58.3)		8 (72.7)	
<95% adherence	77 (22.9)		3 (27.3)	
Not on ART	61 (18.2)		0 (0)	
Detectable viral load[a,c]	139 (41.4)	43 (12.8)	4 (36.4)	0.753
Median CD4 <200[a,c]	47 (14.0)	43 (12.8)	3 (27.3)	0.205
	Total N=318 (100)	Missing data (%)	HIV housing[a] N=19 (6.0)	P-value
Unmet primary care needs[a,d]	50 (15.7)	1 (0.3)	3 (15.8)	1.00
Unmet dental care needs[a,d]	83 (26.1)	4 (1.3)	5 (26.3)	1.00
Unmet mental health care needs[a,d]	52 (16.4)	1 (0.3)	2 (10.5)	0.749

All data refer to n (%) of participants.
[a] Last six months prior to the interview.
[b] Last three to four weeks prior to the interview.
[c] Data collected in January 2010-December 2017 (N=316). Twenty participants are missing from sample and grouped with missing data.
[d] Data collected in September 2014-February 2019 (N=318).

Table 3.3 Unadjusted and adjusted odds ratios and 95% confidence intervals (CI) from bivariate and multivariable logistic regression with GEE for the associations between housing status and HIV care continuum and unmet health care needs outcomes.

	Unadjusted Odds Ratio (95% CI)			Adjusted Odds Ratio (95% CI)		
Outcomes	Unsheltered	Unstable	Supportive housing	Unsheltered	Unstable	Supportive housing
Not on ART[a]	2.72 (1.75-4.25)***	1.18 (0.78-1.78)	0.66 (0.35-1.23)	2.11 (1.33-3.36)**	1.05 (0.68-1.62)	0.58 (0.31-1.11)
Sub-optimal ART adherence[b]	1.62 (1.07-2.44)*	1.32 (0.96-1.81)	1.15 (0.77-1.74)	1.29 (0.83-2.01)	1.26 (0.89-1.79)	1.02 (0.67-1.57)
Detectable viral load[c]	2.33 (1.66-3.27)***	1.35 (1.01-1.81)*	0.90 (0.62-1.32)	1.86 (1.29-2.67)***	1.27 (0.93-1.75)	0.89 (0.60-1.33)
Median CD4 <200	1.29 (0.89-1.88)	1.14 (0.86-1.52)	0.70 (0.43-1.16)	--	--	--
Unmet primary care needs[d]	1.79 (1.06-3.02)*	1.28 (0.87-1.88)	1.39 (0.89-2.18)	2.06 (1.20-3.55)**	1.26 (0.84-1.90)	1.50 (0.94-2.40)
Unmet dental care needs[e]	1.74 (1.13-2.68)*	1.27 (0.91-1.78)	0.89 (0.60-1.31)	1.61 (1.02-2.54)*	1.20 (0.85-1.70)	0.82 (0.54-1.24)
Unmet mental health care needs	1.21 (0.71-2.06)	1.35 (0.96-1.92)	0.94 (0.63-1.42)	--	--	--

Stable housing is the reference in all odds ratios.
All measures were time updated to capture events in the last six months at each semi-annual study visit, with the exception of ART use (current use at each study visit) and adherence (adherence in the last 3-4 weeks at each study visit)
*p<0.05; **p<0.01; ***p<0.001
[a] Adjusted odds ratios are adjusted for age, sexual minority, gender minority, race, Canadian born, employment, stimulant use, opioid use.
[b] Restricted to participants on ART. Adjusted odds ratios are adjusted for age, sexual minority, gender minority, race, Canadian born, employment, alcohol use, stimulant use, opioid use.
[c] Adjusted odds ratios are adjusted for age, Canada born, employment, stimulant use.
[d] Adjusted odds ratios are adjusted for age, gender minority, race, employment, alcohol use, stimulant use.
[e] Adjusted odds ratios are adjusted for age, sexual minority, employment, alcohol use, opioid use.

Table 3.4 Unadjusted and adjusted odds ratios and 95% confidence intervals (CI) from bivariate and multivariable logistic regression with GEE for the associations between HIV housing and HIV care continuum and unmet health care needs outcomes.

Outcomes	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Not on ART[a]	0.33 (0.15-0.74)**	0.24 (0.07-0.90)*
Sub-optimal ART adherence[b]	0.85 (0.45-1.59)	0.98 (0.50-1.93)
Detectable viral load[c]	0.55 (0.29-1.04)	0.72 (0.36-1.42)
Median CD4 <200	1.30 (0.74-2.27)	--
Unmet primary care needs[d]	1.00 (0.52-1.94)	1.01 (0.52-1.96)
Unmet dental care needs[d]	0.97 (0.56-1.66)	1.06 (0.58-1.94)
Unmet mental health care needs	0.97 (0.54-1.75)	--

Non-HIV housing is the reference in all odds ratios.
All measures were time updated to capture events in the last six months at each semi-annual study visit, with the exception of ART use (current use at each study visit) and adherence (adherence in the last 3-4 weeks at each study visit)
*p<0.05; **p<0.01; ***p<0.001
[a] Adjusted odds ratios are adjusted for age, sexual minority, gender minority, race, education, Canadian born, employment, alcohol use, stimulant use, opioid use; the most parsimonious model has no confounder (AOR=0.22, 95%CI (0.09-0.52)).
[b] Restricted to participants on ART. Adjusted odds ratios are adjusted for age, gender minority, race, education, Canadian born, employment, alcohol use, stimulant use, opioid use.
[c] Adjusted odds ratios are adjusted for age, race, stimulant use, opioid use.
[d] Adjusted odds ratios are adjusted for age, sexual minority, gender minority, race, education, Canadian born, employment, alcohol use, stimulant use, opioid use.

3.4 Discussion

This study examined the associations between housing status of women living with HIV and multiple outcomes measuring health services access, including along the HIV treatment and care continuum as well as unmet primary, dental, and mental health care needs. Chapter 2 identified a high prevalence of housing precarity and associated social-structural inequities among the SHAWNA cohort. This chapter further examined the associations between being unsheltered and lack of access to HIV, primary, and dental care. Therefore, there is an urgent need to create safe and stable housing arrangements for women living with HIV to support access to comprehensive health services. Housing options should adapt to the complex needs of women living with HIV to address current barriers and support equitable access to health services.

The fact that 81.9% of the SHAWNA study sample was currently on ART was consistent with a national Canadian study with women living with HIV (83% on ART (131)). At baseline, 41.4% of SHAWNA participants had undetectable viral load in the last six months, while the national Canadian study suggested that 80% had achieved viral load of <200 copies/mL in the latest test (131), a difference likely attributable to the different viral load cut-offs. In this study, 15.7% participants reported unmet primary care needs in the last six months at baseline, lower than the national age-standardized rate in 2013 of 18-22% Canadians who could not get primary care for routine exams or non-life-threatening illnesses and injuries in the last year (132,133). The slight difference may be due to the different timeframes of measurement. If unmet primary care needs of the participants were measured over one year, the prevalence might be higher. A quarter (26.1%) of the cohort reported unmet dental care needs in the last six months at their baseline survey, highlighting a substantial gap in dental care. In the US, nearly half (49%) of urban people living with HIV reported not getting their needed dental treatment in the last year

(126). Among them, 55% reported cost as a main barrier to dental care; 18% reported difficulties in finding a clinic or securing an appointment (126).

The analyses showed that being unsheltered was associated with not being on ART and having a detectable viral load, after adjustment for sociodemographic and behavioral confounders. These findings were consistent with a study conducted among cis people living with HIV across the US, where being unsheltered or living in homeless shelters were independently associated with lower odds of having viral load <500 copies/mL, as well as lower odds of taking ART and adherence (66). Further, a dose-response association was found between longer duration of being unsheltered and lower odds of having viral load <500 copies/mL among cis people living with HIV who also use drugs in Vancouver (72). Similarly, a study with cis women living with HIV in San Francisco found that more nights spent in unsheltered or unstable housing were associated with higher odds of having unsuppressed viral load (68). Studies with trans women in San Francisco also found that being homeless or marginally housed was negatively associated with current ART use (134), and that unstable housing was independently associated with higher risk of detectable viral load (135). The study findings were also consistent with evidence from a systemic review that a lack of stable or quality housing was associated with negative outcomes in the HIV care continuum, including delayed entry to HIV care, poor access to and quality of HIV care, and sub-optimal ART adherence among people living with HIV in North America (2).

This study also revealed the association between being unsheltered and unmet primary and dental care needs. Existing population studies with people living with HIV indirectly pointed to unmet primary care needs by demonstrating the link between homelessness and frequent (113) and increased (90) utilization of the ED in BC. The unmet needs for dental care among people

living in homelessness ranged between 41%, according to a nation-wide study among US adults (127), and 91%, from a smaller population in Brisbane, Australia (98), though less has been documented among women living with HIV specifically. In addition to cost (98) and limited public dental insurance coverage (45), according to a BC-based qualitative study, barriers to dental care among people living in homelessness include difficulty in contacting the clinic (no phone), difficulty in keeping appointments, discrimination from dentists, lack of trust in dentists (as a result of lack of transparency and communication for the procedures and expectations), and substandard dental care (45).

Understanding the dimensions of health services access can be crucial to successfully engaging and retaining women living with HIV in HIV care, delivering adequate primary and dental care to this population, and achieving the best possible health outcomes. The access can be broken into five dimensions from the perspective of people who seek care (Figure 1.1) (37). These dimensions can help delineate the ways in which housing precarity can function as a barrier to health services access. For approachability, frequent moving makes it challenging for women living with HIV who are unsheltered to identify health services, and individuals often rely on limited outreach to receive care (136). For acceptability, social and cultural barriers limit the options for women living with HIV who are unsheltered, since marginalized individuals may experience from health workers discrimination and stigmatization based on housing situation, race, gender, HIV status, substance use, and others (44–46). For availability and accommodation, institutional barriers are prevalent in preventing access, including wait time, hours of operation, appointment flexibility, transportation needs, providers of preferred gender, and language services (44,46,66,137). For affordability, monetary and opportunistic costs of care can be high, because of competing needs between health care and daily living (e.g., food, shelter, and

laundry) (46,138). Lastly, for appropriateness, medical terminologies and explanations can be overwhelming to individuals with limited medical knowledge; lack of patient-friendly communication and education could lead to treatment fatigue and ART non-adherence (83,139). As suggested by the five dimensions, improving health services access for women living with HIV requires not only providing stable housing but also challenging current health system to deliver more equitable services for marginalized populations.

This study had several limitations as well as strengths. Self-reported data and geographical limitation remained the same weaknesses in this analysis (Section 2.4). The relatively small sample sizes of the cohort and the HIV housing subgroup likely limited statistical power, though the longitudinal nature of this study increased power with repeated measures. Despite limited data, the secondary analysis attempted to uncover the associations between HIV housing and health care access and HIV outcomes, as literature on this topic is limited. These findings serve as a primer for qualitative and quantitative research that studies the underlying mechanism of how HIV housing affects service access and HIV outcomes.

To conclude, this study applied the Canadian Definition of Homelessness (CDOH) to the housing status reported by women living with HIV and identified associations between being unsheltered and not being on ART, detectable viral load, and unmet primary and dental care needs. The mechanisms of housing precarity's negative impact on health services access were discussed according to Levesque et al.'s framework. The discussions also revealed inadequacies in current health systems to accommodate women living with HIV and marginalized populations. Therefore, improving health services access will require concerted transformations in both housing and health systems. Evidence-based recommendations can be found in Section 4.3.

Chapter 4: Final Discussion and Conclusion

4.1 Summary of Findings

There is limited evidence to understand or document features of housing status among women living with HIV in Canada. Housing research methodologies often underestimated women experiencing housing precarity. This thesis filled an important gap in research by being the first study to apply an inclusive national definition, the Canadian Definition of Homelessness (CDOH) (36), to a community-based cohort of women living with HIV in Metro Vancouver, BC. Three objectives achieved by this study include: (1) characterizing the housing status reported by women living with HIV (Chapter 2), (2) identifying the prevalence and social-structural correlates of housing status (Chapter 2), and (3) examine the association between housing status and HIV care continuum and health services access (Chapter 3).

Chapter 2 revealed alarming prevalence of housing precarity (i.e., being unsheltered and unstable housing) among women living with HIV in Metro Vancouver. Living in Vancouver's Downtown Eastside (DTES), recent hospitalization, and recent physical/sexual violence were identified as significant correlates of housing precarity. Recent stimulant use was associated with being unsheltered and living in supportive housing. A reference to Gaetz et al.'s framework (10) guided the discussion of these correlates' contribution to housing precarity on systemic, structural, and individual levels.

Chapter 3 measured outcomes along the HIV care continuum and access to health services among women living with HIV. Being unsheltered was found to be independently associated with not taking ART, detectable viral load, and unmet primary and dental care needs. In the secondary analysis, living in HIV housing had an inverse association with not taking ART.

Applying Levesque et al.'s framework (37), the chapter analyzed how housing precarity created barriers to women's interaction with the health services.

This final chapter will discuss and summarize solutions towards achieving housing and health care equity with and for women living with HIV. The recommendations will range from national and provincial policies to community-based actions to address the social-structural inequities experienced by women living with HIV.

4.2 Prevention of Housing Precarity with and for Women Living with HIV

Prevention of housing precarity is crucial to the rights to housing and health among women living with HIV. This study showed that 72% of women living with HIV in Metro Vancouver experience housing precarity at least once in the last six months at their baseline interview (Chapter 2), as measured by the CDOH guidelines. This work further showed that being unsheltered is associated with increased odds of not taking ART and detectable HIV viral load and reduced access to primary and dental health care (Chapter 3). Housing precarity is a symptom of deeper social and structural inequities. This section will discuss strategies to prevent homelessness and precarious housing among WLWH and marginalized populations according to Gaetz and Dej's framework (2017) and drawing on the results in this thesis (13). The aim of prevention is to strategically address the root causes of housing precarity among women living with HIV by engaging inputs and resources on the national, provincial, and local levels (13).

4.2.1 Addressing the Ability to Afford Housing

To address housing precarity among women living with HIV, the study results highlighted the importance of supporting affordable housing environments. Affordable housing environments could be supported via universal poverty reduction, rent support, and affordable housing developments (13). The median monthly income of the SHAWNA study sample was 1,600 $CAD (Q1-Q3: 1,110-2,660), approximately half of the median monthly income in Canada (39). Women who experience racialized and gendered income inequity (32,33,38,39), including Indigenous women and women who identify as sexual and gender minorities (Table 2.2), were over-represented in the study. Living with HIV is associated with increased prevalence of chronic physical and mental health conditions and substance use, resulting in economic burden and limited income generation (35,77,99). Additionally, HIV-related stigma acts as an additional barrier to seeking and sustaining employment among women living with HIV (140). This study confirmed key relationships between factors linked to poverty, including living in the DTES, and drug use, to homelessness, among women living with HIV. Living in the DTES was associated with housing precarity, including being unsheltered and having unstable housing in the last six months; stimulant use was associated with being unsheltered in the last six months (Table 2.3). Among the study sample, 31% reported currently living in DTES at baseline (Table 2.2). Substance use was prevalent among the study sample, with 66% reporting using any stimulant and 43% reporting using any opioid in the last six months at their baseline interviews (Table 2.2). Further, the study setting, Vancouver, has been the most expensive Canadian city since 2013 according to housing costs, basic living costs, inflation, and other economic factors (141,142). This urban setting intensifies existing socio-economic disparities among marginalized populations including women living with HIV relative to the overall populations. Therefore,

improving the ability of women living with HIV to afford housing will help address social and structural marginalization with respect to employment and income generation that women living with HIV have experienced in comparison to the general population (Section 2.4) (15,58).

On a structural level, national and provincial poverty reduction initiatives can help support the ability of women living with HIV to afford housing. Increasing financial security through providing universal basic income (a flat rate paid to all Canadians) or negative income tax for individuals with limited income has been proposed as a key policy option to reduce poverty and promote gender equity (143,144). Increasing welfare, disability, and the shelter component of social assistance can ensure adequate disposable income for basic living in addition to rent payment, which should be less than 30% of total income (145). Additional emergency and long-term monetary support for rent, food, and childcare that goes beyond what currently exists is also important for individuals and families to exit poverty (145). Unit-based rather than tenant-based rent control can prevent renoviction and ensure the sustainability of the rent support measures above (145). As for affordable housing, provincial and municipal funds need to be dedicated to a steady growth of affordable housing units located close to community resources to counter the net loss due to gentrification and commercial developments in the most needed communities, such as the DTES (146). Family-sized affordable housing units should be prioritized for women and children fleeing violence as well as women who require housing to reunite with children in child welfare (145).

The DTES offers low-rent housing, medical and social services, supervised drug injection sites, meal programs, and other grassroot advocacy programs, which are essential to women living with HIV living on low income and/or using drugs (106). Despite these benefits, there remains a housing crisis in the DTES, rooted in decades of neglecting the housing rights to all,

that impacts many women living with HIV. The results in Chapter 2 pointed to the DTES as a key location to implement the solutions to the crisis, and these solutions are complex and require concerted efforts from municipal, provincial governments, and community advocacy. The DTES community urgently needs structural interventions to provide affordable housing designed for and with WLWH amid the rapid growth of new market housing[3] (106,145). In 2018, one in 18 people living in the DTES experienced homelessness (145). As for renters, DTES residents paid on average of 87% of their monthly income[4] to single-room occupancy hotels (SROs), which exceeds far beyond the affordable 30% upper limit of income (13,145). Reducing poverty on a structural level and controlling housing prices are essential to keeping women living with HIV stably housed in the DTES. Given that the low vacancy rate has driven up rent across Metro Vancouver, structural interventions mentioned above to increase the availability and affordability of housing units in the DTES is a critical part of housing low-income women living with HIV. Structural changes will take persistent efforts in research and advocacy to take place and result in affordable housing and related regulations in the DTES and Metro Vancouver.

4.2.2 Addressing Systems and Institutional Barriers

On the systems level, removing barriers to accessing benefits and services in public systems and improving transition out of institutions can prevent unnecessary homelessness among women living with HIV. Systemic barriers on a population level stem from unawareness of benefit or support programs, difficulties navigating systems, segregation of systems, language and cultural

[3] In 2018, the ratio was 721:119 between the increase in unaffordable housing (market housing, condos, and housing with rent above welfare and pension rate) and the increase in affordable, permanent housing units.
[4] In the DTES, the average rent payment is $663 out of $760 social assistance per month. Housing subsidy pays $375-480 per person for the entire rent per month.

barriers, and others (13). Some women living with HIV experience similar or more severe barriers due to health status and socioeconomic status (120,121). Further, the paperwork required to apply for housing is overwhelming and a substantial barrier to accessing housing. People living with HIV are asked to disclose their HIV status on housing applications, with little assurance of confidentiality and limited to no conversations regarding why this information is needed. Successful housing intervention programs with people living with HIV could overcome these barriers by offering case management and assistance in obtaining eligible governmental benefits and supports (118,120–122).

The association between recent hospitalization with housing precarity (Chapter 2) suggested hospitals as an important institutional point of intervention. Women living with HIV were 51% more likely to be hospitalized than men living with HIV (84). Hospitalization can indirectly lead to unnecessary loss of housing through more complex pathways. Case studies show that in Australia single-mothers and their children missed rent payments and experienced financial difficulties (e.g., additional childcare cost) during the parents' hospitalization; delay in rent payment resulted in threats of evictions into homelessness upon hospital discharge (147). Some women living with HIV may shoulder heavy financial impact from missing work, medical expenses, and childcare expenses following hospitalization (38,39). On the system level, accessible services and supports as part of discharge planning, including rent supplement and free legal consultation and representation, can help keep women and families in their current housing in the case of delayed rent payment and other financial difficulties related to hospitalization. Study showed that free legal services could prevent unnecessary evictions and save costs that would have incurred if evicted women and families turned to homeless shelter, welfare, and other public services (147). Additionally, hospitals need to ensure successful

transition into housing after discharge (13). Inadequate medical and social supports in the community have serious repercussions for securing housing post-discharge. In recent BC history, lack of housing planning for deinstitutionalized individuals living with mental health conditions resulted in their displacement and exclusion by communities that were unprepared for their presence due to lack of health services, social supports, and tolerance and understanding of mental illnesses and substance use (106). As a result, deinstitutionalized individuals moved to the DTES for the low-rent housing (SROs), the high concentration of low-barrier health services, and accepting culture of mental health conditions and substance use (106). To date, the resilient communities in DTES are still living in a housing crisis amid rampant gentrification surrounding the neighborhood (60,61,106). Hospital discharge planning for women living with HIV ideally should be individualized based on health and social needs and relocate women into a community with safe and stable housing and adequate health care and social resources.

4.2.3 Addressing Gender-Based Violence as a Barrier to Stable Housing

Homelessness is preventable with early intervention by identifying and allocating resources to individuals and families at risk of homelessness or have experienced homelessness (13). The study findings also showed that gender-based violence (GBV), which includes intimate partner violence (IPV) and other forms of violence, was associated with housing precarity among cis and trans women living with HIV (Section 2.3). Given the high prevalence of lifetime violence (93%) among the SHAWNA study sample (35), early intervention for cis and trans women (including women living with HIV) to help prevent violence could be an impact on preventing precarious housing, since in IPV and interpersonal violence were frequently cited as causes of

homelessness among women, youth, Indigenous people, people who identify as sexual and gender minorities, and people living with HIV (6,10,13,35,99,101,114).

Once women living with HIV lose current housing, structural factors may individually or collectively subject them to limited housing opportunities in the private housing market, including discrimination based on gender and/or sexual orientation, racism, and other forms of discrimination including related to poverty or drug use, as well as health status (e.g., HIV, addiction, and disability) (6,61,102,112,117). Transitional housing for women fleeing violence cannot adequately prevent homelessness, since the maximum length of stay can potentially discharge women and their families from temporary housing into homelessness when permanent affordable housing is limited (13). In Australia, the Women's Homelessness Prevention Project demonstrated that early intervention and free legal and social services could successfully prevent eviction into homelessness for single mothers and their children living in private rental and public housing (147). Early actions (e.g., clinic screening, community outreach, peer advocate, and case management) could prevent homelessness by identifying women who were experiencing IPV and abuse and/or at risk of losing current housing and connecting them to public and legal services (13). For cis and trans Indigenous women living with HIV (57% of our study sample), peer advocate and independent, free social and legal support are crucial and should be co-created with Indigenous women, given the historical and current structural violence against Indigenous women in the forms of residential schools, child welfare, policing, and social services (148). It is critical to prevent homelessness for women living with HIV who experience GBV through safe, supportive early interventions tailored to meet women's needs.

4.2.4 Reforming Landlord and Tenant Laws to Improve Housing Stability

Keeping women living with HIV in stable housing is the best prevention of housing precarity, since current social-structural inequities (e.g., health status, violence, and substance use) faced by women living with HIV limit the available, affordable housing options (Section 2.4). According to Gaetz and Dej, stable housing should be safe, adequate (in good repairs), appropriate (based on family size), and affordable (≤30% of family income) (13).

Landlord and tenant laws governing low-income housing, concentrated in the DTES, need to be re-examined and revised to ensure the health, safety, and tenancy rights of women living with HIV. Private and non-profit SROs, as the few affordable housing options, have been found to substantially lack maintenance, sanitation, and tenant protection (60,61). Recent news articles also revealed undrinkable water, pest infestation, crowding, non-functional washrooms, and unsanitary, disease-causing conditions in SRO buildings (146,149). Despite advocacy from the tenants, problems such as undrinkable water persisted (146). An update in landlord and tenant laws should also target the overlooked discrimination and unlawful evictions of SRO residents in DTES (13). The regulations of non-profit social housing (e.g., SROs and transitional housing) remain a grey area under BC's Residential Tenancy Act (RTA), and thus tenants of some SROs may not have full protection from the RTA (145,150). Studies revealed unlawful eviction practices targeting PWUD in private and non-profit SROs (including women-only buildings) in the DTES (60,61). One in seven (16%) PWUD experienced at least four evictions in the past five years; four in five (84%) were evicted into homelessness (60,61). Building policies on guest visit, curfew, and codes of conduct added extra structural vulnerability to the tenancy in SROs, since such policies could be applied discriminatorily as the ground for eviction (61).

Unlawful eviction practices by SROs also included verbal notice of eviction (written notice is required by the RTA), inadequate notice (10 days to two month depending on the reasons for eviction), not having security deposits returned, and losing personal belongings during the eviction (61). Such practices targeted tenants with limited social and legal supports, as they reported feeling not fully aware of tenancy rights or having no legal support to dispute (60,61). In addition, unregulated evictions thrived upon the lack mandatory eviction registration by the government (unless dispute resolution is filed) and inaccessible dispute resolution mechanisms as structural inequities, resulting in unnecessary loss of housing in a city with limited affordable housing options (61). Loss of security deposit will limit future housing opportunities after eviction, particularly for individuals with limited income. For women living with HIV, loss of HIV medication with other personal possessions prevents adhering to ART and controlling HIV viral load. Therefore, the RTA needs to expand its coverage to all SROs in order to end unlawful practices against marginalized tenants, including women living with HIV (145).

Substandard, chaotic living environments in SROs can cause additional psychological or physical stress, including increased substance use, and subject women living with HIV to discriminatory eviction (151). For women living with compromised immunity due to HIV, it is critical to examine the relationship between substandard housing conditions and infectious diseases, such as tuberculosis and dysentery, due to the lack of sanitation and crowding (152,153). Poor and chaotic housing conditions and lack of privacy have been found to cause women living with HIV to defer ART initiation, with implications for disease progression, compromised immunity, and other health risks (50,151).

4.3 Recommendations for Housing, Housing Support Programs, and Health Services with and for Women Living with HIV

Section 4.2 highlighted how the high prevalence of housing precarity among women living with HIV required immediate actions to protect basic rights to housing as part of comprehensive housing prevention planning. In particular, throughout the sub-sections of Section 4.2, strategies were proposed to address women's ability to afford housing, systems and institutional barriers, gendered violence, and unjust landlord and tenant laws. Section 4.3 will further delineate the qualities and characteristics of housing and housing support programs that could enhance the health and well-being of women living with HIV, including their access to health services.

Buying or renting market housing units may not be a financially accessible option for all women living with HIV to address housing precarity (145,154). For affordable and independent living situations, SROs as the hallmark low-rent housing currently do not meet the criteria of safety, stability, and affordability; substantial maintenance and renovation are needed to create habitable environment in SROs (Section 4.2.4). Supportive housing (e.g. HIV housing) emerges as a potential option for women living with HIV who prefer or require various degrees of medical and social management to achieve better health outcomes (118–122). In the SHAWNA cohort, secondary analyses suggested that living in HIV housing is associated with reduced odds of not taking ART (Section 3.3) and reduced odds of HIV disclosure without consent (155). Nevertheless, the characteristics and qualities of all supportive housing, including HIV housing, are critical to consider.

Housing support programs are needed to connect women living with HIV who are experiencing housing precarity to stable housing. Such programs have the aim to provide safe and stable housing, prevent unnecessary homelessness, and improve the physical and mental

wellbeing of clients through connection to health services. The programs will outreach to identify women in need of housing, direct them to financial resources, find suitable housing options, and facilitate access to health services. Since not all housing have the capacity to offer onsite health services, housing supports programs for WLWH should link tenants to high quality and integrated health services with a multidisciplinary care team preferably in one location (including primary, HIV, dental, mental health, and addiction care) as necessary through case management and community outreach (92,136,138). Individuals' wishes should also be respected among those who do not want to or are not ready to live in formal housing units.

While housing for women living with HIV should support access to comprehensive health services and supporting access and adherence to ART (2,37,156), health services also need to improve their accessibility and encourage the utilization by women living with HIV in precarious housing situations. Key principles will be discussed to address barriers to health services, particularly primary, dental, and HIV care, faced by women living with HIV who experience precarious housing, as demonstrated in the study findings. To ensure successful and sustainable practices of these principles, organizations providing services to women living with HIV need to create or adapt their organizational policies to reflect the values represented by these dimensions, including consulting experts with lived experiences, employee education, feedback mechanisms for employees and service users, evaluation, and public reporting of relevant practices (157).

This section draws on principles embedded within several key frameworks that have been used to delineate the qualities and characteristics of health services (primary care, emergency care, HIV care, addictions services) that can help address social and structural inequities among marginalized populations to improve access to these services (157–160). Housing, housing

support programs, and health services with and for women living with HIV should feature dimensions that include trauma- and violence-informed approaches, a grounding in cultural safety and humility, gender-responsiveness, and harm reduction.

4.3.1 Trauma- and Violence-Informed Principles

In a study drawing on data from SHAWNA, 93% participants reported experiencing gender-based violence during their lifetime (35). Individuals identifying as gender and sexual minorities and Indigenous experience higher rates of GBV (15,57). Living with HIV also subjects cis and trans women to stigma, violence, and psychological distress (34). Additionally, IPV is the leading cause of women's loss of housing (6,10). Therefore, trauma- and violence-informed (TVI) principles are recommended in housing and housing support programs because they acknowledge trauma and violence and aim to install a sense of safety and trust, prevent re-traumatization, and promote equitable access to resources and services among women living with HIV (158,161).

TVI principles prioritize safety, choice, and control in one's environment (158). TVI principles recognize the prevalent experiences of trauma and violence as well as responses to violence, including substance use and mental health conditions (34,78), among cis and trans women living with HIV (158,161). TVI principles can create a safe, welcoming environment with cis and trans women living with HIV through learning from individuals' and groups' experiences, respecting individuals' decision making, reducing discrimination and stigma, and minimizing involuntary disclosure of HIV status. TVI principles ultimately fosters empowerment, shared decision-making, building upon individuals' strengths, and gaining control in one's environment and decision (161).

In housing and housing support programs with women living with HIV, staff need to receive training in TVI principles and be able to respond appropriately when others show signs of trauma or disclose trauma, provide assistance or referral as needed (162,163), and promote strength building, resilience, and growth from trauma (163). Housing for women living with HIV, particularly supportive housing and community housing, should include features to enhance the residents' wellbeing and promote self-care and healing as a community, such as activity rooms for community gathering, peer support, self-care programs, skill building, and computer access (e.g., nutrition, cooking, traditional healing, meditation, computer skills), and a budget for organizing community activities (e.g., game night, cook out) (163).

Housing support programs practicing TVI principles need to be aware of and responsive to different responses to and presentations of trauma, such as substance use, pain, and mental health concerns (158). To foster safety and trust and avoid re-traumatization, the services need to ensure welcoming environments, privacy, confidentiality, informed consent, and communicating clear and accurate expectations (158). For example, peer workers or advocates can communicate effectively with women living with HIV and make them feel trustful in the services. Shared and strength-based decision-making and realistic goals setting involving women at all stages of service are also crucial (158). Lastly, the services need to be flexible, adaptive, and creative to accommodate and benefit women living with HIV from diverse backgrounds and life journeys (158).

4.3.2 Cultural Safety and Humility

Cultural safety aims to foster a balance of power and mutual respect between services providers and Indigenous women living with HIV. Incorporating a cultural safety approach to housing and housing support programs would focus on wholistic considerations of historical, cultural, and personal aspects in the lives of Indigenous women living with HIV, since current housing and health inequities are deeply rooted in settler colonialism and ongoing oppression (56,157,164,165). Indigenous women and children are at high risk of housing precarity resulting from historical and ongoing effects of residential schools, intergenerational trauma, and socioeconomic inequities (6,56). Due to lack of availability of housing with cultural safety practices, Indigenous women, including those living with HIV might need to live in in buildings that restrict cultural practices (e.g., smudging), which could negatively impact their wellbeing (151).

As part of addressing historical and current oppressions in housing inequities, the human rights of Indigenous peoples must be honored and protected. Meaningful consultations with Indigenous peoples are needed to evaluate the insufficiency of current housing. To shift the power balance towards Indigenous people, more resources should be directed towards Indigenous-led initiatives for safe and affordable housing to support independent decision-making that benefits Indigenous communities and empowers self-determination. Existing and new housing and housing support programs for Indigenous women living with HIV need to have Indigenous consultants and staff, involve Indigenous peer advocates, respect traditional definitions of home, accommodate Indigenous cultural and spiritual activities, and incorporate Indigenous designs around the establishment (85). A systemic, persistent commitment to cultural safety across housing and housing support programs need to continually involve Indigenous

women living with HIV in decision making to address anti-Indigenous racism and oppression on the terms of Indigenous peoples (85).

Cultural humility is an important tool for achieving cultural safety (157). It encourages life-long learning, self-awareness, and self-reflection when interacting with others with the aim to fix power imbalances and create positive change through partnership (157,166,167). Practicing cultural humility in housing and housing support services means that service providers need to identify and honor the unique cultural values, beliefs, and other individual factors of all women living with HIV (168–170). Housing and housing support programs should widely consult individuals from different cultures and backgrounds (e.g., age groups, religious beliefs, ethnicity, gender identity, sexual orientation) to ensure the services are adaptable and flexible. For example, interpretation services need to be readily available to women who are more comfortable using their own languages; conversely, staff should avoid making assumptions on an individual's language and cultural preferences based on stereotypes or what a person appears to be.

4.3.3 Gender-Responsiveness

A gender-responsive approach is based on understanding of gender roles and inequities and works towards equal participation and equal and fair distribution of benefits (171). To be gender-responsive, housing and housing support programs must be rooted in the needs of cis and trans women living with HIV and involve consultation with women. As mentioned in Section 4.2.1, financial support and family-sized housing located near community resources also require expansion to address gender inequities among women living with HIV. Expansion of housing for women living with HIV need to account for 'hidden homelessness' that disproportionately affect

women and ensure accommodations of this subgroup. Housing units and housing support programs need to consider the different needs and challenges among subgroups of women who are not represented by the majority. For example, removing application barriers (e.g., paperwork, reference, credit checks) can benefit individuals living in poverty and without stable shelter; zero-tolerance of discrimination and effective reporting mechanism can make trans women feel safe and welcome; policies respecting the choice of sex work can protect sex workers from bad dates and police harassment (14,172).

4.3.4 Harm Reduction

Harm reduction centers around the idea that substance use is a health issue and aims to reduce the negative consequences of substance use (159). Harm reduction practices non-judgmentally engage PWUD to identify their needs and provide or direct them to necessary health and social supports while respecting their choice of abstinence or drug use (159). Substance use among women living with HIV (Table 2.2) is often a coping mechanism for trauma, homelessness, and other difficulties (110), and has been linked to housing precarity, eviction, mediated by financial insecurity, discrimination, and misunderstanding of substance use (12,29,60,61). Loss of housing can exacerbate substance use and subsequently limit access to housing and recourses (173). To break the cycle of substance use and homelessness, harm reduction practices are necessary in housing and housing support programs.

Implementation of harm reduction in housing and housing support programs with women living with HIV requires the input from women living with HIV who use drugs. In housing and housing support programs, harm reduction supplies at no charge (e.g., syringes, smoking supplies, drug checking, naloxone kits, and condoms) and referral information to treatment

programs should be and available to women living with HIV (159). Harm reduction in housing with women living with HIV should prevent and minimize eviction to break the cycle of substance use and homelessness (60). Low-barrier housing options should be available for women living with HIV at different stages of substance use, including substance-free residence for women working towards sobriety as well as housing for women who use drugs. Supportive housing for women living with HIV who also use drugs should provide drug checking and supervised injection rooms to prevent overdose deaths indoors (159,174). At housing support programs, safe, non-judgmental approaches to screening for drug use and HIV can help support employees tailor housing options to women living with HIV to housing that can meet their needs.

4.3.5 Re-Imagining Health Services

Incorporating dimensions of TVI principles, cultural safety and humility, gender-responsiveness, and harm reduction into health services, particularly primary, dental, and HIV care, can help address barriers faced by women living with HIV and experiencing housing precarity. In synergy, these dimensions may overlap and not necessarily be mutually exclusive.

To build effective and long-lasting services, commitment and involvement of entire health organizations and staff body will be necessary to respond to feedback from people who seek care and staff of all levels. Having a multidisciplinary health center in one location can ensure the coverage of all essential characteristics are shared across all services, particularly primary, dental, and HIV care.

Under the TVI principles, all health services staff needs to behave with empathy, compassion, comfort with the unknown, and willingness to learn when interacting with women living with HIV (163). TVI outreach can help persuade and connect individuals to care,

particularly those who have avoided care due to stigma and discrimination related to HIV, housing precarity, drug use, and other social-structural inequities. Integration of multiple disciplines, importantly dental care, can prevent repeated disclosure of HIV status (re-traumatization) and ensure the continual care in a TVI setting. For each woman living with HIV, clinic should incorporate a strengths-based perspective in patient care, develop a safety plan for crisis situation, provide diverse strategies to cope with trauma, and promote self-care (161,163). To engage women in at different points along the HIV care continuum, maintaining the confidentiality and privacy of women living with HIV should be emphasized during all aspects of health services, including pharmacy and other allied health services. Cautions should always be exercised to prevent unnecessarily disclosure of HIV status (e.g., dispensing or delivering medications, reporting lab results) during all kinds of interactions with health services. These strategies can help support women living with HIV to engage in sustained HIV care and treatment, as well as support adherence to medications (e.g., filling prescriptions). Besides supportive and compassionate health services, stable housing remains an important part of TVI care, since women living with HIV need to be able to store and take ART without fearing involuntary disclosure of HIV status. These practices can support ART adherence.

Cultural safety in health services is urgently needed to ensure that Indigenous women living with HIV access high-quality, discrimination-free health care. Indigenous Elder and/or knowledge keepers and consultants in the local community should be involved in all aspects of health care delivery for quality assurance. Providers and staff need to receive standardized education on the impact of colonialism, residential schools, and intergenerational trauma on the health and socioeconomic disparities among Indigenous people (85). Health services should support cultural healing practices, traditional medicines, and adapt certain practices be more

culturally appropriate (e.g., group counseling involving extended family to discuss trauma) (85,162). For cultural safety and humility, a robust feedback and dispute mechanism should be available for clients and staff to report any inappropriate, discriminatory comments or behaviors and ensure continual improvement in the services (85).

Cultural humility is an important practice that supports cultural safety and strives to include all cultures in health services through self-reflection in individuals and organizations (157). Health services should widely consult women living with HIV from diverse backgrounds to remove systemic barriers to care due to a lack of knowledge of certain communities. Communities that have been marginalized can benefit from this practice, including racialized persons, non-English speakers, migrants/immigrants, individuals identifying as gender and sexual minority communities, and individuals facing other discriminations (27,28,115). Cultural humility can also take the form of addressing basic needs as a competing factor to accessing health care by providing food, shower, sleep room, and laundry according to the needs of clients experiencing housing precarity (44,92,138).

Gender-responsive care for women living with HIV to achieve health equality requires a whole-person approach with many aspects of health care (e.g., sexual health, family planning) to enhance women's physical, mental, and social wellbeing. Cost is a barrier to health services access in BC's context of universal health care, particularly for dental care, counseling, non-HIV medications, and medical equipment (82). Providing consultation, treatment, and medications at no charge can incentivize connection to health care (95,126) and encourage adherence (92) among women living with HIV and limited income. Integration of multidisciplinary services in one location, particularly HIV-friendly dental and sexual health care, is necessary to address the fragmentation of care commonly experienced women living with HIV (92). Outreach can

encourage connection to care among those with limited knowledge of services and/or transportation (37). In recognizing women's social responsibilities (e.g., employment, parenting, caregiving), reducing wait time, extending hours of operation, accommodating flexible appointments, and assistance in transportation can reduce the opportunistic costs of a clinic visit and encourage access to care (37,137,175).

Harm reduction in health services should expand safe supply in response to the overdose crisis that can affect women living with HIV who also use drugs. Safe supply[5] refers to prescription drugs (e.g., hydromorphone, methylphenidate) (176) made available to PWUD and aims to prevent or reduce the use of street drugs contaminated by illicit fentanyl to prevents overdose deaths among PWUD who are not ready to become abstinent (177). Many providers in BC have been reluctant to adopt and normalize the practice due to the stigma and criminalization surrounding substance use (178), while evidence supports the benefit of safe supply in reducing street drug use and overdose risk and improving health, well-being, and personal finance among PWUD (179,180). These positive changes can potentially improve ART adherence and subsequently HIV care outcomes. Safe supply can also help connect women living with HIV to health services at multidisciplinary clinics, since they might otherwise have avoided previously due to stigma, financial hardship, and other factors surrounding drug use (179).

[5] Safe supply does not include opioid substitution or opioid agonist treatments (e.g., methadone, buprenorphine/suboxone, slow-release oral morphine).

4.4 Strengths and Limitations

4.4.1 Strengths

The main strength of this study was rooted in SHAWNA's community-based research design involving lived experts and community partners. Grounded in gender-responsiveness, TVIC, cultural safety, cultural humility, and harm reduction principles, the study team has been dedicating efforts in outreach, recruitment and referral through clinical care and social support programs. Trained and experienced interviewers have been building relationships with participants. As a result, reporting bias due to social desirability in self-reported data could potentially be mitigated. The longitudinal design increased the sample size in statistical analysis through repeated measures.

The SHAWNA questionnaire captured detailed demographic, behavioral, social, and clinical data, with constant update in the questionnaire to stay relevant to the participants. For housing data, the study collected 50+ types of accommodation reported by women living with HIV. As a result, another strength of this study was to apply the CDOH to characterize diverse housing situations and construct the four-category housing status. The four-category variable of housing status captured the complex and dynamic housing situations experienced by women living with HIV, which is an improvement upon the dichotomized variable (e.g., homeless vs not homeless) commonly used in existing studies. The CDOH has addressed the lack of consensus in the definitions of housing status or homelessness in current studies. In using the CDOH, the study results can be more easily translatable to academic researchers, national housing experts, policy makers, and other stakeholders to impact housing policies for WLWH.

4.4.2 Limitations

The power of analysis was limited due to the exploratory nature of the study, which can be mitigated by repeated measures from longitudinal data collection and continuing recruitment. Missing data may have contributed to limited power in certain analyses. The majority of missing data was under 5%, with the exception of >10% missing in viral load and CD4 through DTP linkage. However, missing data likely had no substantial impact on detecting the association between housing status and viral load, since the AORs between housing status and health services access and HIV care outcomes were consistent with each other and other study findings (Table 3.3). This study could not infer causality. However, future qualitative studies with the SHAWNA cohort can further delineate the processes and mechanisms and fill in the knowledge gap of how social-structural factors affects housing status and how housing status impacts health inequalities. The study findings are likely not generalizable to all women living with HIV in Metro Vancouver or those in other settings, as the study design and setting may have led to overrepresentation of marginalized populations and thus overestimation of the prevalence of housing precarity. My results make sense in the context of other studies, however, providing evidence that the associations identified in this study should remain valid. The questionnaire did not capture time spent in each housing situation, which prevents identifying chronic homelessness among participants.

This study was unable to assess differences in variations in the outcomes according to different sexual or gender minority identities. The questionnaire allowed the participants to provide more than one response to questions on sexual orientation and gender identity. However, due to relatively small sample size in response categories (e.g., non-binary), it was necessary to combine all non-heterosexual participants into the category of ‘sexual minority identity’ and all

non-cisgender participants into the category of 'gender minority identity'. However, this was justified because of evidence suggesting prevalent minority stress processes affecting all members of sexual minority communities relative to heterosexual individuals (181) and all members of gender minority communities relative to cisgender individuals (182). To incorporate the diverse voices from these communities, qualitative research is needed to identify the barriers to housing and health services and the link between them.

Lastly, while this study was grounded in an intersectional approach and guided by an intersectional framework in terms of the study design and interpretation of results (41), an intersectional approach was not incorporated into the approach to data analysis. Standard logistic regressions were utilized for data analysis. Quantitatively, the intersectional within-group impact (e.g., race and sexual and/or gender minority identity) on housing status and health-related outcomes is not fully understood. A mixed methods approach (183) and/or analysis of intercategorical variable (e.g., cross-stratified variable by race and sexual and/or gender minority identity) with structural mediator (184) could help address this limitation. Future qualitative research with the SHAWNA cohort is needed to understand the complex intersecting factors that shape precarious housing and could help explain why precarious housing shapes access to health services. Results from the qualitative can then guide a quantitative intersectional approach (183).

4.5 Conclusion

This study made important contributions to the literature by characterizing the housing status and precarity with women living with HIV through the application of the CDOH, a gender-inclusive and modern definition of homelessness. Women living with HIV have diverse housing situations and experience a high level of housing precarity. The study highlighted several social-structural

factors associated with housing precarity. Further, this study also identified disparities affecting women living with HIV in the outcomes along the HIV care continuum and unmet needs in primary, dental, and mental health care. Being unsheltered was found to be independently associated with restricted access to HIV, primary, and dental care.

To reduce housing precarity experienced by women living with HIV, structural-level interventions need to address the root causes of unaffordability and unavailability of housing and lack of tenant protection in Metro Vancouver. At the systems level, comprehensive discharge planning and support are needed to prevent unnecessary loss of housing related to hospitalization. Early intervention programs should target women and families experiencing violence and at risk of homelessness to prevent gendered housing precarity. While stable housing is the apparent solution to improve health services access, social-structural inequities (e.g., gender, race, poverty, substance use) must be addressed in both housing and health care through organization- and staff-level commitment to promote equity. Gender-responsiveness, TVI principles, cultural safety, cultural humility, and harm reduction were recommended as guiding principles for existing and new housing developments, housing support programs, and health services with and for women living with HIV with diverse cultures and backgrounds.

Overall, more meaningful representation and involvement of cis and trans women living with HIV are needed in shaping and facilitating research, policy making, and health services to address social-structural inequities. To ensure the suitability, quality, and longevity of initiatives in housing and health services, women with lived experiences must be meaningfully engaged. It will take sustained research and efforts to address the barriers to stable housing and access to health services and fulfill the fundamental human rights of housing and health among women living with HIV.

Bibliography

1. Commission on Social Determinants of Health, World Health Organization. Closing the gap in a generation: health equity through action on the social determinants of health - Final report of the commission on social determinants of health. Geneva, Switzerland; 2008.
2. Aidala AA, Wilson MG, Shubert V, Gogolishvili D, Globerman J, Rueda S, et al. Housing status, medical care, and health outcomes among people living with HIV/AIDS: A systematic review. Am J Public Health. 2016;106(1):e1–23.
3. Cheung AM, Hwang SW. Risk of death among homeless women: A cohort study and review of the literature. Can Med Assoc J. 2004;170(8):1243–7.
4. Fazel S, Geddes JR, Kushel M. The health of homeless people in high-income countries: Descriptive epidemiology, health consequences, and clinical and policy recommendations. Vol. 384, The Lancet. Lancet Publishing Group; 2014. p. 1529–40.
5. WHO Secretariat, Howden-Chapman P. Introduction. In: World Health Organization, editor. WHO Housing and Health Guidelines. Geneva; 2018. p. 1–11.
6. Schwan K, Versteegh A, Perri M, Caplan R, Baig K, Dej E, et al. The State of Women's Housing Need & Homelessness in Canada: Literature Review. Toronto, Canada; 2020.
7. Sandel M, Sheward R, De Cuba SE, Coleman SM, Frank DA, Chilton M, et al. Unstable housing and caregiver and child health in renter families. Pediatrics. 2018 Feb 1;141(2).
8. Frankish CJ, Hwang SW, Quantz D. Homelessness and health in Canada. Can J Public Heal. 2005;96(April 2005):S23-9.
9. Wolitski RJ, Kidder DP, Fenton KA. HIV, homelessness, and public health: Critical issues

and a call for increased action. AIDS Behav. 2007;11(SUPPL. 2):167–71.

10. Gaetz S, Donaldson J, Richter T, Gulliver T. The State of Homelessness in Canada 2013 [Internet]. Toronto, Canada; 2013. Available from: https://www.homelesshub.ca/SOHC2013

11. Gaetz S, Dej E, Richter T, Redman M. The State of Homelessness in Canada 2016 [Internet]. Toronto, Canada; 2016. Available from: https://www.homelesshub.ca/SOHC2016

12. Homeless Services Association of BC, Urban Matters, BC Non-Profit Housing Association. 2018 Report on Homeless Counts in B.C. [Internet]. Burnaby, Canada; 2018. Available from: www.bchousing.org

13. Gaetz S, Dej E. A new direction: a framework for homelessness prevention [Internet]. Toronto; 2017. Available from: https://www.homelesshub.ca/ANewDirection

14. Lazarus L, Chettiar J, Deering K, Nabess R, Shannon K. Risky health environments: Women sex workers' struggles to find safe, secure and non-exploitative housing in Canada's poorest postal code. Soc Sci Med. 2011 Dec;73(11):1600–7.

15. Cochran BN, Stewart AJ, Ginzler JA, Cauce AM. Challenges faced by homeless sexual minorities: comparison of gay, lesbian, bisexual, and transgender homeless adolescents with their heterosexual counterparts. Am J Public Health. 2002 May;92(5):773–7.

16. National Alliance to End Homelessness. Homelessness and Racial Disparities [Internet]. 2020 [cited 2020 Nov 18]. Available from: https://endhomelessness.org/homelessness-in-america/what-causes-homelessness/inequality/

17. Beltran T, Allen AM, Lin J, Turner C, Ozer EJ, Wilson EC. Intersectional Discrimination Is Associated with Housing Instability among Trans Women Living in the San Francisco

Bay Area. Int J Environ Res Public Health. 2019 Nov 15;16(22):4521.

18. Hunter P. Everyone Counts 2018: Highlights – Preliminary Results from the Second Nationally Coordinated Point-in-Time Count of Homelessness in Canadian Communities [Internet]. Ottawa, Canada; 2019. Available from: Canada.ca/publicentre-ESDC
19. Duchesne A, Rivier JR, Hunter P, Cooper I. Highlights of the National Shelter Study 2005 to 2016 - Emergency Shelter Use in Canada [Internet]. Ottawa; 2019. Available from: https://www.canada.ca/en/employment-social-development/programs/homelessness/reports-shelter-2016.html#h9
20. Bretherton J. Reconsidering Gender in Homelessness. Eur J Homelessness. 2017 Jul 1;11(2):1–22.
21. Employment and Social Development Canada. Homelessness Partnering Strategy 2005-2014 Highlights of the National Shelter Study. Ottawa, Canada; 2016.
22. Paula Mayock, Joanne Bretherton, Isabel Baptista. Women's Homelessness and Domestic Violence: (In)visible Interactions. In: Mayock P, Bretherton J, editors. Women's Homelessness in Europe. London: Palgrave Macmillan; 2017. p. 127–54.
23. Hall JM, Stevens PE, Meleis AI. Marginalization: a guiding concept for valuing diversity in nursing knowledge development. Adv Nurs Sci. 1994;16(4):23–41.
24. National Collaborating Centre for Determinants of Health. Let's talk: populations and the power of language. 2013.
25. Logie CH, Wang Y, Marcus N, Kaida A, O'Brien N, Nicholson V, et al. Factors Associated with the Separate and Concurrent Experiences of Food and Housing Insecurity Among Women Living with HIV in Canada. AIDS Behav. 2018 Sep 1;22(9):3100–10.
26. Erickson M, Pick N, Ranville F, Braschel M, Kestler M, Kinvig K, et al. Recent

Incarceration as a Primary Barrier to Virologic Suppression Among Women Living with HIV: Results from a Longitudinal Community-Based Cohort in a Canadian Setting. AIDS Behav. 2019;(0123456789).

27. Logie CH, James LL, Tharao W, Loutfy MR. “We don’t exist”: A qualitative study of marginalization experienced by HIV-positive lesbian, bisexual, queer and transgender women in Toronto, Canada. J Int AIDS Soc. 2012;15(2):1–11.

28. Lacombe-Duncan A, Warren L, Kay ES, Persad Y, Soor J, Kia H, et al. Mental health among transgender women living with HIV in Canada: findings from a national community-based research study Mental health among transgender women living with HIV in Canada: findings from a national community-based research study. AIDS Care. 2020;33(2):192–200.

29. Loutfy M, de Pokomandy A, Kennedy VL, Carter A, O’Brien N, Proulx-Boucher K, et al. Cohort profile: The Canadian HIV Women’s Sexual and Reproductive Health Cohort Study (CHIWOS). Schanzer DL, editor. PLoS One. 2017 Sep 28;12(9):e0184708.

30. Statistics Canada. Canada [Country] and Canada [Country] (table) - Topic: Ethnic Origin. Census Profile. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001 [Internet]. Ottawa; 2017. Available from: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E

31. Herbst JH, Jacobs ED, Finlayson TJ, McKleroy VS, Neumann MS, Crepaz N. Estimating HIV prevalence and risk behaviors of transgender persons in the United States: A systematic review. Vol. 12, AIDS and Behavior. AIDS Behav; 2008. p. 1–17.

32. Meerwijk EL, Sevelius JM. Transgender population size in the United States: A meta-regression of population-based probability samples. Vol. 107, American Journal of Public

Health. American Public Health Association Inc.; 2017. p. e1–8.

33. Statistics Canada. Table 13-10-0817-01 Socioeconomic characteristics of the lesbian, gay and bisexual population, 2015-2018 [Internet]. 2018. Available from: https://doi.org/10.25318/1310081701-eng

34. Orza L, Bewley S, Logie CH, Crone ET, Moroz S, Strachan S, et al. How does living with HIV impact on women's mental health? Voices from a global survey. J Int AIDS Soc. 2015 Dec 1;18(Suppl 5).

35. Erickson M, Pick N, Ranville F, Martin RE, Braschel M, Kestler M, et al. Violence and other social structural factors linked to incarceration for women living with HIV in Metro Vancouver: need for trauma-informed HIV care in prisons and post-Release. AIDS Care - Psychol Socio-Medical Asp AIDS/HIV. 2020 Sep 1;32(9):1141–9.

36. Gaetz S, Barr C, Friesen A, Harris B, Hill C, Kovacs-Burns K, et al. Canadian Definition Of Homelessness. Toronto, Canada: Canadian Observatory on Homelessness Press; 2012.

37. Levesque J-F, Harris MF, Russell G. Patient-centred access to health care: conceptualising access at the interface of health systems and populations. Int J Equity Health [Internet]. 2013;12(1):18. Available from: https://doi.org/10.1186/1475-9276-12-18

38. Block S, Galabuzi G-E, Trajan R. Canada's Colour Coded Income Inequality. Ottawa, Canada; 2019.

39. Statistics Canada. Income of individuals by age group, sex and income source, Canada, provinces and selected census metropolitan areas, Table: 11-10-0239-01 [Internet]. 2020 [cited 2021 Feb 24]. Available from: https://doi.org/10.25318/1110023901-eng

40. Crenshaw K. Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color. Stanford Law Rev. 1991 May 23;43(6):1241–99.

41. Bowleg L. The problem with the phrase women and minorities: Intersectionality-an important theoretical framework for public health. Am J Public Health. 2012 Jul;102(7):1267–73.

42. Pruden H. Two-Spirit Conversations and Work: Subtle and at the Same Time Radically Different. In: Devor A, Haefele-Thomas A, editors. Transgender: a Reference Handbook. Greenwood: ABC-CLIO, LLC; 2019. p. 134–6.

43. Pruden H, Salway T. Meet the methods series: "What and who is Two-Spirit" in health research [Internet]. 2020. Available from: https://cihr-irsc.gc.ca/e/52214.html

44. Khandor E, Mason K, Chambers C, Rossiter K, Cowan L, Hwang SW. Access to primary health care among homeless adults in Toronto, Canada: Results from the street health survey. Open Med. 2011;5(2):94–103.

45. Mago A, MacEntee MI, Brondani M, Frankish J. Anxiety and anger of homeless people coping with dental care. Community Dent Oral Epidemiol. 2018 Jun 1;46(3):225–30.

46. Caton S, Greenhalgh F, Goodacre L. Evaluation of a community dental service for homeless and "hard to reach" people. Br Dent J. 2016 Jan 22;220(2):67–70.

47. BC Centre for Excellence in HIV/AIDS. HIV Pulse Vol 3 HIV Cascade of Care in British Columbia [Internet]. Vancouver; 2016. Available from: http://bccfe.ca/hiv-cascade-care-british-columbia

48. Lourenço L, Colley G, Nosyk B, Shopin D, Montaner JSG, Lima VD. High levels of heterogeneity in the hiv cascade of care across different population subgroups in British Columbia, Canada. PLoS One. 2014;9(12):1–18.

49. Nosyk B, Montaner JSG, Colley G, Lima VD, Chan K, Heath K, et al. The cascade of HIV care in British Columbia, Canada, 1996-2011: A population-based retrospective

cohort study. Lancet Infect Dis. 2014 Jan;14(1):40–9.

50. Rodger AJ, Lodwick R, Schechter M, Deeks S, Amin J, Gilson R, et al. Mortality in well controlled HIV in the continuous antiretroviral therapy arms of the SMART and ESPRIT trials compared with the general population. AIDS. 2013 Mar 27;27(6):973–9.

51. Wood E, Milloy MJ, Montaner JSG. HIV treatment as prevention among injection drug users. Curr Opin HIV AIDS. 2012 Mar;7(2):151–6.

52. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, et al. Antiretroviral Therapy for the Prevention of HIV-1 Transmission. N Engl J Med. 2016 Sep;375(9):830–9.

53. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)-A metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform. 2009 Apr;42(2):377–81.

54. Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, O'Neal L, et al. The REDCap consortium: Building an international community of software platform partners. Vol. 95, Journal of Biomedical Informatics. Academic Press Inc.; 2019.

55. Henry M, Bishop K, de Sousa T, Shivji A, Watt R. The 2017 Annual Homeless Assessment Report (AHAR) to Congress, Part 2: Esimtates of Homelessness in the U.S. Washington, United States; 2018.

56. Thistle J. Definition of Indigenous Homelessness in Canada. Toronto, Canada; 2017.

57. Boyce J. Victimization of Aboriginal people in Canada, 2014. Kanata, Canada; 2016.

58. Fletcher JB, Kisler KA, Reback CJ. Housing Status and HIV Risk Behaviors Among Transgender Women in Los Angeles. Arch Sex Behav. 2014;43(8):1651–61.

59. Lyons T, Krüsi A, Pierre L, Smith A, Small W, Shannon K. Experiences of Trans Women

and Two-Spirit Persons Accessing Women-Specific Health and Housing Services in a Downtown Neighborhood of Vancouver, Canada. LGBT Heal. 2016;3(5):373–8.

60. Collins AB, Boyd J, Damon W, Czechaczek S, Krüsi A, Cooper H, et al. Surviving the housing crisis: Social violence and the production of evictions among women who use drugs in Vancouver, Canada. Heal Place. 2018;51(April):174–81.

61. Fleming T, Damon W, Collins AB, Czechaczek S, Boyd J, McNeil R. Housing in crisis: A qualitative study of the socio-legal contexts of residential evictions in Vancouver's Downtown Eastside. Int J Drug Policy. 2019;71:169–77.

62. Samji H, Cescon A, Hogg RS, Modur SP, Althoff KN, Buchacz K, et al. Closing the gap: Increases in life expectancy among treated HIV-positive individuals in the United States and Canada. PLoS One. 2013;8(12):6–13.

63. Gillis J, Loutfy M, Bayoumi AM, Antoniou T, Burchell AN, Walmsley S, et al. A multi-state model examining patterns of transitioning among states of engagement in care in HIV-positive individuals initiating combination antiretroviral therapy. J Acquir Immune Defic Syndr. 2016;73(5):531–9.

64. Milloy MJ, Alexandra K, Thomas K, Evan A, Hasina S, Silvia G, et al. Improvements in HIV treatment outcomes among indigenous and non-indigenous people who use illicit drugs in a Canadian setting. J Int AIDS Soc. 2016;19(1):1–8.

65. Carter A, Eun Min J, Chau W, Lima VD, Kestler M, Pick N, et al. Gender Inequities in Quality of Care among HIV-Positive Individuals Initiating Antiretroviral Treatment in British Columbia, Canada (2000–2010). Sluis-Cremer N, editor. PLoS One. 2014 Mar 18;9(3):e92334.

66. Kidder DP, Wolitski RJ, Campsmith ML, Nakamura G V. Health status, health care use,

medication use, and medication adherence among homeless and housed people living with HIV/AIDS. Am J Public Health. 2007;97(12):2238–45.

67. Allen J, Vottero B. Experiences of homeless women in accessing health care in community-based settings: a qualitative systematic review. JBI Evid Synth. 2020;18(9).

68. Riley ED, Vittinghoff E, Koss CA, Christopoulos KA, Clemenzi-Allen A, Dilworth SE, et al. Housing First: Unsuppressed Viral Load Among Women Living with HIV in San Francisco. AIDS Behav. 2019;23(9):2326–36.

69. Marshall BDL, Elston B, Dobrer S, Parashar S, Hogg RS, Montaner JSG, et al. The population impact of eliminating homelessness on HIV viral suppression among people who use drugs. Aids. 2016;30(6):933–41.

70. Kennedy MC, Kerr T, McNeil R, Parashar S, Montaner J, Wood E, et al. Residential Eviction and Risk of Detectable Plasma HIV-1 RNA Viral Load Among HIV-Positive People Who Use Drugs. AIDS Behav. 2017;21(3):678–87.

71. Kennedy MC, Kerr TH, Wood E, Shoveller JA, Montaner JSG, Milloy MJS. Social and structural factors associated with greater time with a plasma HIV-1 RNA viral load above log10 (1500) copies/ml among illicit drug users. Aids. 2018;32(8):1059–67.

72. Loh J, Kennedy MC, Wood E, Kerr T, Marshall B, Parashar S, et al. Longer Duration of Homelessness is Associated with a Lower Likelihood of Non-Detectable Plasma Hiv-1 Rna Viral Load Among People Who Use Illicit Drugs in. AIDS Care. 2017;28(11):1448–54.

73. Wester CW, Koethe JR, Shepherd BE, Stinnette SE, Rebeiro PF, Kipp AM, et al. Non-AIDS-defining events among HIV-1-infected adults receiving combination antiretroviral therapy in resource-replete versus resource-limited urban setting. AIDS. 2011 Jul

31;25(12):1471–9.

74. Hasse B, Ledergerber B, Furrer H, Battegay M, Hirschel B, Cavassini M, et al. Morbidity and Aging in HIV-Infected Persons: The Swiss HIV Cohort Study. Clin Infect Dis. 2011 Dec 1;53(11):1130–9.

75. Leao JC, Ribeiro CMB, Carvalho AAT, Frezzini C, Porter S. Oral complications of HIV disease. Clinics (Sao Paulo). 2009 May;64(5):459–70.

76. Nokta M. Oral manifestations associated with HIV infection. Curr HIV/AIDS Rep. 2008;5(1):5–12.

77. Kendall CE, Wong J, Taljaard M, Glazier RH, Hogg W, Younger J, et al. A cross-sectional, population-based study measuring comorbidity among people living with HIV in Ontario. BMC Public Health. 2014 Feb 13;14(1):1–9.

78. Remien RH, Stirratt MJ, Nguyen N, Robbins RN, Pala AN, Mellins CA. Mental health and HIV/AIDS: The need for an integrated response. Vol. 33, AIDS. Lippincott Williams and Wilkins; 2019. p. 1411–20.

79. Freeman MC, Patel V, Collins PY, Bertolote JM. Integrating mental health in global initiatives for HIV/AIDS. Vol. 187, British Journal of Psychiatry. Br J Psychiatry; 2005. p. 1–3.

80. Gonzalez JS, Batchelder AW, Psaros C, Safren SA. Depression and HIV/AIDS treatment nonadherence: A review and meta-analysis. Vol. 58, Journal of Acquired Immune Deficiency Syndromes. Lippincott Williams and Wilkins; 2011. p. 181–7.

81. Yalnizyan A, Aslanyan G. Introduction and overview [Internet]. Putting Our Money Where Our Mouth is: the Future of Dental Care in Canada. Ottawa; 2011. Available from: https://www.policyalternatives.ca/publications/reports/putting-our-money-where-our-

mouth

82. BC Ministry of Health. Medical Services Plan (MSP) for British Columbia (B.C.) Residents - Province of British Columbia [Internet]. 2021 [cited 2021 Jun 25]. Available from: https://www2.gov.bc.ca/gov/content/health/health-drug-coverage/msp/bc-residents

83. Donnelly LR, Bailey L, Jessani A, Postnikoff J, Kerston P, Brondani M. Stigma Experiences in Marginalized People Living With HIV Seeking Health Services and Resources in Canada. J Assoc Nurses AIDS Care. 2016;27(6):768–83.

84. Bachhuber MA, Southern WN. Hospitalization Rates of People Living with HIV in the United States, 2009. Public Health Rep. 2014 Mar 1;129(2):178–86.

85. Turpel-Lafond ME. In Plain Sight: Addressing Indigenous-specific Racism and Discrimination in B.C. Health Care - Summary Report [Internet]. 2020. Available from: https://engage.gov.bc.ca/app/uploads/sites/613/2020/11/In-Plain-Sight-Summary-Report.pdf

86. Socías ME, Koehoorn M, Shoveller J. Gender Inequalities in Access to Health Care among Adults Living in British Columbia, Canada. Women's Heal Issues. 2016;26(1):74–9.

87. Giblon R, Bauer GR. Health care availability, quality, and unmet need: a comparison of transgender and cisgender residents of Ontario, Canada . Vol. 17, BMC health services research . England : Springer Science and Business Media LLC ; 2017. p. 210–83.

88. Scheim AI, Jackson R, James L, Sharp Dopler T, Pyne J, Bauer GR. Barriers to well-being for Aboriginal gender-diverse people: Results from the Trans PULSE Project in Ontario, Canada. Ethn Inequalities Heal Soc Care. 2013;6(4):108–20.

89. Dowshen N, Lee S, Franklin J, Castillo M, Barg F. Access to medical and mental health

services across the HIV care continuum among young transgender women: A qualitative study. Transgender Heal. 2017 Jul 1;2(1):81–90.

90. Fairbairn N, Milloy MJ, Zhang R, Lai C, Grafstein E, Kerr T, et al. Emergency department utilization among a cohort of HIV-positive injecting drug users in a Canadian setting. J Emerg Med. 2012;43(2):236–43.

91. Berry SA, Fleishman JA, Moore RD, Gebo KA, Network HIVR. Trends in reasons for hospitalization in a multisite United States cohort of persons living with HIV, 2001-2008. J Acquir Immune Defic Syndr. 2012 Apr 1;59(4):368–75.

92. O'Brien N, Greene S, Carter A, Lewis J, Nicholson V, Kwaramba G, et al. Envisioning Women-Centered HIV Care: Perspectives from Women Living with HIV in Canada. Women's Heal Issues. 2017;27(6):721–30.

93. Goode J, Hoang H, Crocombe L. Homeless adults' access to dental services and strategies to improve their oral health: A systematic literature review. Vol. 24, Australian Journal of Primary Health. CSIRO; 2018. p. 287–98.

94. Patel N, Furin JJ, Willenberg DJ, Apollon Chirouze NJ, Vernon LT. HIV-related stigma in the dental setting: A qualitative study. Spec Care Dent. 2015 Jan 1;35(1):22–8.

95. Parish C, Siegel K, Pereyra M, Liguori T, Metsch L. Barriers and facilitators to dental care among HIV-Infected adults. Spec Care Dent. 2015 Nov 1;35(6):294–302.

96. Brondani MA, Phillips JC, Kerston RP, Mooniri NR. Stigma Around HIV in Dental Care: Patients' Experiences. J Can Dent Assoc. 2016;82(G1).

97. Okala S, Doughty J, Watt RG, Santella AJ, Conway DI, Crenna-Jennings W, et al. The People Living with HIV STIGMASurvey UK 2015: Stigmatising experiences and dental care. Br Dent J. 2018;225(2):143–50.

98. Ford P, Cramb S, Farah C. Oral health impacts and quality of life in an urban homeless population. Aust Dent J. 2014 Jun 1;59(2):234–9.

99. Chamberlain C, Johnson G. Pathways into adult homelessness. J Sociol. 2011 Nov 7;49(1):60–77.

100. Palepu A, Gadermann A, Hubley AM, Farrell S, Gogosis E, Aubry T, et al. Substance Use and Access to Health Care and Addiction Treatment among Homeless and Vulnerably Housed Persons in Three Canadian Cities. PLoS One. 2013 Oct 4;8(10):e75133.

101. Pantalone DW, Rood BA, Morris BW, Simoni JM. A Systematic Review of the Frequency and Correlates of Partner Abuse in HIV-Infected Women and Men Who Partner With Men. J Assoc Nurses AIDS Care. 2014;25(SUPPL1).

102. Anderson JT, Collins D. Prevalence and Causes of Urban Homelessness Among Indigenous Peoples: A Three-Country Scoping Review. Hous Stud. 2014 Oct 3;29(7):959–76.

103. Government of Canada. Reaching Home: Canada's Homelessness Strategy Directives [Internet]. 2020. Available from: https://www.canada.ca/en/employment-social-development/programs/homelessness/directives.html#h2.3-h3.7

104. Radimer KL, Radimer KL. Measurement of household food security in the USA and other industrialised countries. Public Health Nutr [Internet]. 2002 Dec [cited 2020 Oct 30];5(6a):859–64. Available from: https://pubmed.ncbi.nlm.nih.gov/12633509/

105. Barreto D, Shoveller J, Braschel M, Duff P, Shannon K. The Effect of Violence and Intersecting Structural Inequities on High Rates of Food Insecurity among Marginalized Sex Workers in a Canadian Setting. J Urban Heal. 2019 Aug 15;96(4):605–15.

106. Campbell L, Boyd N, Culbert L. A thousand dreams : Vancouver's Downtown Eastside

and the fight for its future. Vancouver, Canada: Greystone Books; 2009. 36–49 p.

107. Somers JM, Moniruzzaman A, Rezansoff SN. Migration to the Downtown Eastside neighbourhood of Vancouver and changes in service use in a cohort of mentally ill homeless adults: A 10-year retrospective study. BMJ Open. 2016;6(1):1–9.

108. Edens EL, Tsai J, Rosenheck RA. Does stimulant use impair housing outcomes in low-demand supportive housing for chronically homeless adults? Am J Addict. 2014 May 1;23(3):243–8.

109. Riley ED, Shumway M, Knight KR, Guzman D, Cohen J, Weiser SD. Risk factors for stimulant use among homeless and unstably housed adult women. Drug Alcohol Depend. 2015 Aug 1;153:173–9.

110. McNaughton CC. Transitions through homelessness, substance use, and the effect of material marginalization and psychological trauma. Drugs Educ Prev Policy. 2008 Jan 1;15(2):177–88.

111. Goldman-Hasbun J, Nosova E, Kerr T, Wood E, DeBeck K. Homelessness and incarceration associated with relapse into stimulant and opioid use among youth who are street-involved in Vancouver, Canada. Drug Alcohol Rev. 2019 May 1;38(4):428–34.

112. Walsh CA, MacDonald P, Rutherford GE, Moore K, Krieg B. Homelessness and incarceration among Aboriginal women: An integrative literature review. Pimatisiwin A J Aborig Indig Community Heal. 2011;9(2):363–86.

113. Parashar S, Chan K, Milan D, Grafstein E, Palmer AK, Rhodes C, et al. The impact of unstable housing on emergency department use in a cohort of HIV-positive people in a Canadian setting. AIDS Care - Psychol Socio-Medical Asp AIDS/HIV. 2014;26(1):53–64.

114. Hawkins K, Reading C (Loppie), Barlow K. Our Search for Safe Spaces: a Qualitative

Study of the Role of Sexual Violence in the Lives of Aboriginal Women Living With HIV/AIDS. Vancouver, Canada; 2009.

115. Shokoohi M, Bauer GR, Kaida A, Lacombe-Duncan A, Kazemi M, Gagnier B, et al. Social determinants of health and self-rated health status: A comparison between women with HIV and women without HIV from the general population in Canada. PLoS One. 2019 Mar 1;14(3).

116. Monette LE, Rourke SB, Gibson K, Bekele TM, Tucker R, Greene S, et al. Inequalities in Determinants of Health Among Aboriginal and Caucasian Persons Living With HIV/AIDS in Ontario: Results From the Positive Spaces, Healthy Places Study. Can J Public Heal / Rev Can Sante'e Publique. 2011 Nov 24;102(3):215–9.

117. Belanger YD, Dekruyf KA, Moncrieff A, Kazakoff T. The Urban Indigenous Housing Experience of NIMBY-ism in Calgary, Alberta. Calgary; 2019.

118. Smelson DA, Zaykowski H, Guevermont N, Siegfriedt J, Sawh L, Modzelewski D, et al. Integrating Permanent Supportive Housing and Co-Occurring Disorders Treatment for Individuals Who Are Homeless. J Dual Diagn. 2016;12(2):193–201.

119. Henwood BF, Rhoades H, Hsu HT, Couture J, Rice E, Wenzel SL. Changes in Social Networks and HIV Risk Behaviors Among Homeless Adults Transitioning Into Permanent Supportive Housing: A Mixed Methods Pilot Study. J Mix Methods Res. 2017;11(1):124–37.

120. Hall G, Singh T, Lim S woo. Supportive Housing Promotes AIDS-Free Survival for Chronically Homeless HIV Positive Persons with Behavioral Health Conditions. AIDS Behav. 2019;23(3):776–83.

121. Buchanan D, Kee R, Sadowski LS, Garcia D. The health impact of supportive housing for

HIV-positive homeless patients: a randomized controlled trial. Am J Public Health. 2009;99 Suppl 3:675–80.

122. Bowen EA, Canfield J, Moore S, Hines M, Hartke B, Rademacher C. Predictors of CD4 health and viral suppression outcomes for formerly homeless people living with HIV/AIDS in scattered site supportive housing. AIDS Care - Psychol Socio-Medical Asp AIDS/HIV. 2017;29(11):1458–62.

123. Dodd SJ, Ruffins J, Arzola D. Improving Health While Saving Money: Lessons Learned from a Supportive Housing Program for Young Adults with HIV. Sex Res Soc Policy. 2018;15(2):163–71.

124. Wenzel SL, Henwood B, Harris T, Winetrobe H, Rhoades H. Provider perceptions on HIV risk and prevention services within permanent supportive housing. AIDS Care - Psychol Socio-Medical Asp AIDS/HIV. 2017;29(10):1331–5.

125. Cescon A, Patterson S, Chan K, Palmer AK, Margolese S, Burchell AN, et al. Gender Differences in Clinical Outcomes among HIV-Positive Individuals on Antiretroviral Therapy in Canada: A Multisite Cohort Study. PLoS One. 2013;8(12):e83649-undefined.

126. Jeanty Y, Cardenas G, Fox JE, Pereyra M, Diaz C, Bednarsh H, et al. Correlates of unmet dental care need among HIV-positive people since being diagnosed with HIV. Public Health Rep. 2012 May 1;127(SUPPL.2):17–24.

127. Baggett TP, O'Connell JJ, Singer DE, Rigotti NA. The unmet health care needs of homeless adults: A national study. Am J Public Health. 2010 Jul 1;100(7):1326–33.

128. Olding M, Enns B, Panagiotoglou D, Shoveller J, Harrigan PR, Barrios R, et al. A historical review of HIV prevention and care initiatives in British Columbia, Canada: 1996-2015. J Int AIDS Soc. 2017;20(1):5–9.

129. Pacific AIDS Network. Module 2: How Housing Works in BC - What types of housing are there? [Internet]. HIV Housing Toolkit. 2019 [cited 2021 Feb 25]. Available from: https://pacificaidsnetwork.org/what-types-of-housing-are-there/

130. Maldonado G, Greenland S. Simulation study of confounder-selection strategies. Am J Epidemiol. 1993 Dec 1;138(11):923–36.

131. Public Health Agency of Canada. Estimates of HIV incidence, prevalence and Canada's progress on meeting the 90-90-90 HIV targets, 2018 [Internet]. Ottawa, Canada; 2020. Available from: https://www.canada.ca/en/public-health/services/publications/diseases-conditions/summary-estimates-hiv-incidence-prevalence-canadas progress-90-90-90.html

132. Statistics Canada. Table 13-10-0485-01 Difficulties accessing routine or on-going care. 2021.

133. Statistics Canada. Table 13-10-0487-01 Difficulties accessing immediate care for a minor health problem. 2021.

134. Santos GM, Wilson EC, Rapues J, Macias O, Packer T, Raymond HF. HIV treatment cascade among transgender women in a San Francisco respondent driven sampling study. Sex Transm Infect. 2014;90(5):430–3.

135. Baguso GN, Turner CM, Santos G-M, Raymond HF, Dawson-Rose C, Lin J, et al. Successes and final challenges along the HIV care continuum with transwomen in San Francisco. J Int AIDS Soc. 2019 Apr 1;22(4):e25270.

136. Vancouver Coastal Health. Downtown Community Health Centre (DCHC) - Vancouver Coastal Health [Internet]. [cited 2021 Mar 3]. Available from: http://www.vch.ca/Locations-Services/result?res_id=1360

137. Eugenia Socías M, Shoveller J, Bean C, Nguyen P, Montaner J, Shannon K. Universal

Coverage without Universal Access: Institutional Barriers to Health Care among Women Sex Workers in Vancouver, Canada. PLoS One. 2016;11(5):1–15.

138. Collins AB, Parashar S, Hogg RS, Fernando S, Worthington C, McDougall P, et al. Integrated HIV care and service engagement among people living with HIV who use drugs in a setting with a community-wide treatment as prevention initiative: a qualitative study in Vancouver, Canada. J Int AIDS Soc. 2017 Mar 3;20(1):21407.

139. Mcneil R, Kerr T, Coleman B, Maher L, Milloy • M J, Small W. Antiretroviral Therapy Interruption Among HIV Postive People Who Use Drugs in a Setting with a Community-Wide HIV Treatment-as-Prevention Initiative. AIDS Behav. 2017;21(2):402–9.

140. Lightner JS, Rajabiun S, Cabral HJ, Flaherty J, Shank J, Brooks R. Associations of internalized and anticipated HIV stigma with returning to work for persons living with HIV. Daftary A, editor. PLoS One [Internet]. 2021 Jun 4 [cited 2021 Jun 15];16(6):e0252783. Available from: https://dx.plos.org/10.1371/journal.pone.0252783

141. Doering K, Nassar HM. Vancouver most expensive city in Canada (again) according to new ranking [Internet]. News 1130. 2021 [cited 2021 Jul 2]. Available from: https://www.citynews1130.com/2021/06/23/vancouver-expensive-city-ranking/

142. The Canadian Press. Vancouver Most Expensive City In Canada: Mercer Survey. Huffington Post Canada [Internet]. 2013 Sep 22 [cited 2021 Jul 16]; Available from: https://www.huffingtonpost.ca/entry/3639800

143. Young M, Mulvale JP. Possibilities and Prospects: The Debate Over a Guaranteed Income [Internet]. Ottowa; 2009. Available from: http://www.socialrightscura.ca/documents/publications/margot/CCPA_Guaranteed_Income.pdf

144. Macdonald D. A Policymaker's Guide to Basic Income [Internet]. Ottawa; 2016. Available from: https://www.policyalternatives.ca/publications/reports/policymakers-guide-basic-income

145. York F, Chan K, Mugabo L, Taylor E. Displaced: 2018 CCAP hotel survey & housing report [Internet]. Vancouver; 2019. Available from: www.carnegieaction.org

146. St. Denis J. Rats, Cockroaches and Dirt: SRO Tenants Say Buildings Make Them Sick | The Tyee. The Tyee [Internet]. 2021 Jun 3 [cited 2021 Jun 8]; Available from: https://thetyee.ca/News/2021/06/03/SRO-Tenants-Say-Buildings-Make-Them-Sick/

147. Adams L, Warner P, Driver R, Perkal T. Keeping women and children housed: women's homelessnes prevention project [Internet]. Victoria, Australia; 2017. Available from: https://justiceconnect.org.au/wp-content/uploads/2018/08/Keeping-Women-and-Children-Housed-web.pdf

148. Martin C, Walia H. Red women rising: Indigenous women survivors in Vancouver's Downtown Eastside [Internet]. Vancouver; 2019. Available from: https://online.flowpaper.com/76fb0732/MMIWReportFinalMarch10WEB/#page=6

149. St. Denis J. The Gastown Hotel Is Dirty and Dangerous, Say Tenant and Staff. The Tyee [Internet]. 2021 Feb 10 [cited 2021 Jun 8]; Available from: https://thetyee.ca/News/2021/02/10/Gastown-Hotel-Dirty-Dangerous-Say-Tenant-Staff/

150. British Columbia. Residential Tenancy Act [SBC 2002] CHAPTER 78, Part 4. Canada; 2002.

151. Fleming T, Collins AB, Bardwell G, Fowler A, Boyd J, Small W, et al. Home and health among people living with HIV who use drugs: A qualitative study. Int J Drug Policy. 2020/05/07. 2020 Jun;80:102729.

152. Kamarulzaman A, Reid SE, Schwitters A, Wiessing L, El-Bassel N, Dolan K, et al. Prevention of transmission of HIV, hepatitis B virus, hepatitis C virus, and tuberculosis in prisoners. Lancet. 2016;388(10049):1115–26.

153. St. Denis J. Rising COVID-19 Cases and a Dysentery Outbreak Hit Downtown Eastside. The Tyee [Internet]. 2021 Mar 2; Available from: https://thetyee.ca/News/2021/03/02/Rising-COVID-19-Cases-Dysentery-Outbreak-DTES/

154. BC Society of Transition Houses. Getting Home Project: Overcoming Barriers to Housing after Violence - Community Needs Assessment Report [Internet]. Vancouver; 2019. Available from: https://bcsth.ca/projects/getting-home/

155. Ohtsuka M. Prevalence and correlates of HIV status disclosure without consent among women living with HIV in Metro Vancouver, Canada. In: ISA. 2021.

156. Ghose T, Ali S, Shubert V, Stanton M, Walker L, Chaudhuri S. "It's my Room and my Life": Housing's Influence on Medication Adherence for HIV-positive Women Released from Incarceration. J Health Care Poor Underserved. 2019 Feb;30(1):182–201.

157. First Nations Health Authority. FNHA's Policy Statement on Cultrual Safety and Humility [Internet]. West Vancouver; 2016. Available from: www.fnha.ca

158. Wathen C, Varcoe C. Trauma- & Violence-Informed Care (TVIC): A Tool for Health & Social Service Organizations & Providers [Internet]. London; 2021. Available from: https://equiphealthcare.ca/resources/toolkit/trauma-and-violence-informed-care/

159. BC Ministry of Health. Harm Reduction: A British Columbia Community Guide [Internet]. 2005. Available from: www.health.gov.bc.ca/prevent/pdf/hrcommunityguide.pdf

160. World Health Organization. Integrating Gender into HIV/AIDS Programmes in the Health

Sector: Tool to Improve Responsiveness to Women's Needs [Internet]. Geneva: World Health Organization; 2009 [cited 2021 Jul 2]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK143050/

161. Arthur E, Seymour A, Dartnall M, Beltgens P, Pool N, Smylie D, et al. Trauma-informed practice guide [Internet]. 2013. Available from: https://bccewh.bc.ca/recent-work/trauma-informed-practice/

162. Poole N, Talbot C, Nathoo T, BC Centre of Excellence for Women's Health. Healing Families, Helping Systems: a trauma-informed practice guide for working with children, youth and families [Internet]. 2017. Available from: gov.bc.ca/traumainformedpractice

163. Klinic Community Health Centre. Trauma-informed: the trauma toolkit, second edition [Internet]. Winnipeg; 2013. Available from: https://trauma-informed.ca/wp-content/uploads/2013/10/Trauma-informed_Toolkit.pdf

164. Metro Vancouver Aboriginal Homeless Count. Aboriginal Homeless Count in Metro Vancouver 2018. 2018.

165. Fineblit E. Indigenizing Housing: A Guide to Providing Culturally-Appropriate Housing for Aboriginal Communities in British Columbia [Internet]. West Vancouver; 2015. Available from: http://www.ahma-bc.org/

166. Hook JN, Davis DE, Owen J, Worthington EL, Utsey SO. Cultural humility: Measuring openness to culturally diverse clients. J Couns Psychol [Internet]. 2013 Jul [cited 2021 Jul 2];60(3):353–66. Available from: /record/2013-15106-001

167. Tervalon M, Murray-García J. Cultural humility versus cultural competence: A critical distinction in defining physician training outcomes in multicultural education. J Health Care Poor Underserved. 1998;9(2):117–25.

168. Yeager KA, Bauer-Wu S. Cultural humility: Essential foundation for clinical researchers. Appl Nurs Res. 2013 Nov;26(4):251–6.

169. Hughes V, Delva S, Nkimbeng M, Spaulding E, Turkson-Ocran RA, Cudjoe J, et al. Not missing the opportunity: Strategies to promote cultural humility among future nursing faculty. J Prof Nurs. 2020 Jan 1;36(1):28–33.

170. Bennett B, Gates TG. Teaching cultural humility for social workers serving LGBTQI Aboriginal communities in Australia. Soc Work Educ. 2019 Jul 4;38(5):604–17.

171. Nelson G. Gender Responsive National Communications Toolkit. Geneva; 2015.

172. Canadian HIV/AIDS Legal Network. Sex, work, rights. Changing Canada's criminal laws to protect sex workers' health and human rights [Internet]. Toronto; 2005. Available from: www.aidslaw.ca

173. Pool N, Urquhart C, Talbot C. Women-Centred Harm Reduction. Gendering the National Framework (Vol .4). Vancouver: BC Centre of Excellence for Women's Health; 2021.

174. Bardwell G, Collins AB, McNeil R, Boyd J. Housing and overdose: an opportunity for the scale-up of overdose prevention interventions? Vol. 14, Harm reduction journal. BioMed Central; 2017. p. 77.

175. Clemenzi-Allen AA, Hickey M, Conte M, Das D, Geng E, Riley E, et al. Improving Care Outcomes for PLWH Experiencing Homelessness and Unstable Housing: a Synthetic Review of Clinic-Based Strategies. Curr HIV/AIDS Rep. 2020;17:259–67.

176. BC Centre on Substance Use. Risk Mitigation: In the Context of Dual Public Health Emergencies. Interim Clinical Guidance [Internet]. Vancouver; 2020. Available from: https://www.bccsu.ca/risk-mitigation-in-the-context-of-dual-public-health-emergencies-v1-5/

177. Canadian Association of People who Use Drugs. Safe Supply: Concept Document [Internet]. 2019. Available from: https://idpc.net/publications/2019/12/safe-supply-concept-document

178. Tyndall M. A safer drug supply: A pragmatic and ethical response to the overdose crisis. Vol. 192, CMAJ. Canadian Medical Association; 2020. p. E986–7.

179. Ivsins A, Boyd J, Mayer S, Collins A, Sutherland C, Kerr T, et al. "It's Helped Me a Lot, Just Like to Stay Alive": a Qualitative Analysis of Outcomes of a Novel Hydromorphone Tablet Distribution Program in Vancouver, Canada. J Urban Heal. 2021 Feb 1;98(1):59–69.

180. Watson B. Vancouver's drug-dispensing machine: Why it exists and how it works | CBC News. CBC News [Internet]. 2020 Jan 17 [cited 2021 Jun 26]; Available from: https://www.cbc.ca/news/canada/british-columbia/vancouver-drug-dispensing-machine-opioids-overdoses-1.5429704

181. Meyer IH. Prejudice, Social Stress, and Mental Health in Lesbian, Gay, and Bisexual Populations: Conceptual Issues and Research Evidence. Vol. 129, Psychological Bulletin. NIH Public Access; 2003. p. 674–97.

182. Tan KKH, Treharne GJ, Ellis SJ, Schmidt JM, Veale JF. Gender Minority Stress: A Critical Review. J Homosex. 2020 Aug 23;67(10):1471–89.

183. Bowleg L, Bauer G. Invited Reflection: Quantifying Intersectionality. Psychol Women Q. 2016 Sep 1;40(3):337–41.

184. Bauer GR, Scheim AI. Methods for analytic intercategorical intersectionality in quantitative research: Discrimination as a mediator of health inequalities. Soc Sci Med. 2019 Apr 1;226:236–45.