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ORIGINAL PAPER

Structural Barriers to Antiretroviral Therapy Among Sex Workers Living with HIV: Findings of a Longitudinal Study in Vancouver, Canada

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Abstract In light of limited data on structural determinants of access and retention in antiretroviral therapy (ART) among sex workers, we examined structural correlates of ART use among sex workers living with HIV over time. Longitudinal data were drawn from a cohort of 646 female sex workers in Vancouver, Canada (2010–2012) and linked pharmacy records on ART dispensation. We used logistic regression with generalized estimating equations (GEE) to examine correlates of gaps in ART use (i.e., treatment interruptions or delayed ART initiation), among HIV seropositive participants ($n = 74$). Over a 2.5-year period, 37.8 % of participants experienced gaps in ART use (i.e., no ART dispensed in a 6-month period). In a multivariable GEE model, younger age, migration/mobility, incarceration, and non-injection drug use independently correlated with gaps in ART use. In spite of successes scaling-up ART in British Columbia, younger, mobile, or incarcerated sex workers face persistent gaps in access and retention irrespective of drug use. Community-based, tailored interventions to scale-up entry and retention in ART for sex workers should be further explored in this setting.

Keywords Antiretroviral therapy · Sex workers · Structural factors · HIV/AIDS · Migration

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Introduction

Unequal access and retention in antiretroviral therapy (ART) for people living with HIV remains a public health and human rights issue of paramount concern. Global efforts to scale-up access as well as retention in the HIV care cascade have increased as a result of evidence suggesting significant health and community benefits of early ART initiation and enhanced adherence supports, including lower morbidity and mortality, as well as reduced sexual transmission of HIV [1–5]. Despite substantial progress in scaling-up access and retention in the HIV care cascade, access and outcomes for key populations, including sex workers, often lag behind the general population [6–9].

Female sex workers experience a greatly elevated HIV burden in both concentrated and generalized HIV epidemics [9, 10], as well as a multitude of structural barriers to HIV prevention and care, including high levels of violence [11–18], stigma [19–21], criminalization [22–26], and mobility [27–31]. However, few epidemiological studies have assessed the impacts of structural determinants on ART uptake and retention among sex workers, and longitudinal data on ART use remain especially limited. Most prior research on this topic has been conducted in Sub-Saharan African settings, which has suggested that women in the sex industry often experience significant

gaps in ART access. For example, in a study among 870 Zimbabwean sex workers, half of those with confirmed HIV infection were unaware of their status, with the majority not on ART [7]. Research from Sub-Saharan Africa suggests that sex workers, like some other populations of highly marginalized women, may face challenges in accessing treatment due to fear of disclosing their HIV status (e.g., concerns of partner violence, stigma), food insecurity, a lack of social support, and economic concerns [6, 32, 33]. Such barriers to ART access may be exacerbated for sex workers, who often face distinct vulnerabilities related to criminalization, physical and sexual violence, and unsafe working and living conditions. However, limited research has explicitly sought to examine structural determinants of ART use for women in sex work.

In the province of British Columbia (BC), Canada, ART is available free-of-charge to people living with HIV through governmental healthcare coverage. Access to ART has increased steadily in BC since 2003, and this has been accelerated in recent years as a result of the provincial government-sponsored 'treatment as prevention' efforts to scale-up access to HIV testing and treatment [34], coupled with harm reduction services, which aimed to curb HIV morbidity and mortality, while also reducing HIV transmission in the general population [1, 3] and people who inject drugs (PWID) [35]. However, little is known regarding access to ART for women in the sex industry in BC, who face a disproportionate burden of HIV (>12 %), which varies by work environment [27]. As in many other settings, sex workers and their clients are criminalized in Canada, which often displaces sex work transactions to unsafe locations where sex workers' capacity to negotiate condoms and access healthcare may be compromised [17, 25, 36, 37]. Stemming from a legacy of colonial oppression, dispossession, and displacement, women of Indigenous (i.e., Aboriginal) ancestry are highly over-represented in Canada's HIV epidemic, as well as in its sex industry, particularly in street-based sex work in urban centres [38, 39]. Given gaps in epidemiological evidence regarding ART access and retention among sex workers outside of Sub-Saharan Africa and the notable absence of longitudinal studies examining structural determinants, our objective was to identify structural determinants of ART use in a prospective cohort of female sex workers living with HIV in Vancouver, BC, over time.

Methods

Longitudinal data were drawn from an open prospective cohort, An Evaluation of Sex Workers Health Access (AESHA), and confidential linkages to provincial health administrative databases on ART pharmacy dispensation.

An Evaluation of Sex Workers Health Access (AESHA)

Between January 2010 and August 2012, 646 female sex workers (both HIV seropositive and negative) were enrolled in an open prospective cohort and completed surveys and HIV/STI testing at baseline and on a semi-annual basis. AESHA is based on collaborations with sex work agencies which have existed since 2005 [40] and is monitored by a Community Advisory Board of >15 organizations. All procedures are approved by the Providence Health Care/University of British Columbia Research Ethics Board.

As previously described [37, 41], participants in the cohort complete interviewer-administered questionnaires at study offices in Metro Vancouver or at their work or home and received $40 CAD at each visit for their time, expertise and travel. For the purposes of this analysis on ART use, analyses were restricted to HIV-seropositive sex workers at baseline. Eligibility criteria include self-identifying as female (transgender male-to-female inclusive), being ≥years of age, having exchanged sex for money within the last month and providing informed consent. Exclusion criteria include being <14 years old, not having exchanged sex in the prior month, being unable to provide informed consent, and not residing in Metro Vancouver. Time-location sampling is used to recruit participants through weekly outreach to on- and off-street sex work venues across Metro Vancouver, which are identified through community mapping [40] and regularly updated. Following an open cohort design, sex workers continue to be actively recruited throughout the life of the cohort, through extensive and ongoing outreach to street and indoor venues. Between 10 and 15 % of individuals screened are deemed ineligible for the cohort. The primary reason for ineligibility is not being actively engaged in sex work at baseline (e.g., did not work within the last 30 days); other reasons account for <5 % of those screened as ineligible, and include living outside the Metro Vancouver area or being unable to give informed consent. Annual retention of participants under active follow-up is >90 %, and primary reasons for attrition include mortality and migration outside Metro Vancouver. Extensive efforts are made to continue to follow sex workers who move outside Metro Vancouver during the study, including mobile outreach/interview teams and phone interviews, to support high retention rates.

Independent Variables of Interest/Confounders

Participating sex workers complete interviewer-administered questionnaires in English, Cantonese, or Mandarin by trained interviewers and HIV/STI testing by a project nurse (AESHA research staff include both experiential and non-experiential). Time-fixed variables derived from the AESHA questionnaire include *socio-demographic characteristics* such as age,

education, birthplace, ethnicity, and languages spoken. All other variables are considered as time-updated variables of occurrences within the past 6 months at each semi-annual study visit. Individual and partner-level risks included *condom negotiation and use* (e.g., inconsistent condom use with clients) and *substance use* (e.g., non-injection and injection drug use, alcohol use), which were assessed using standardized measures used in previous sex work and drug use research [42–45]. Inconsistent condom use is defined as reporting that condoms were 'usually', 'sometimes', or 'occasionally' used for vaginal or anal sex with either or both of one-time and regular clients in the prior 6 months. Non-injection and injection drug use include drugs (other than marijuana and alcohol) used in the last 6 months, including non-injection (e.g., crack cocaine, cocaine, crystal meth, inhalants) and injection (e.g., heroin, cocaine, speedballs, street methadone) drugs. *Mental health status* is also assessed (e.g., lifetime and recent diagnoses with mental health problems); the project nurse provides active referral to health and social supports for those in need/not currently receiving care (e.g., mental health services).

Questions on *structural factors* include migration and mobility, incarceration, homelessness, and work environment in the past 6 months. *Internal migration/mobility* includes migration (moved to Metro Vancouver from another province or city) and mobility (lived in another province, or city outside Metro Vancouver) in the last 6 months. *Incarceration* is assessed by asking, "In the last 6 months, have you been in detention, prison, or jail overnight or longer?" *Work environment* covers places of solicitation and servicing clients, interactions with third parties (e.g., managers), police, security, and city licensing, and workplace violence. *Place of service* is measured by asking, "In which of the following types of places have you ever serviced/taken clients in the last 6 months?" and coded as outdoor/public space (e.g., street, public washroom, vehicle), informal indoor venue (e.g., bar/nightclub, dance/strip club, hotel/hourly rental, crack/drug house, clients' place, your place), or formal sex work establishment ("in-call venues, e.g., massage/beauty parlour, micro-brothel, managed indoor space). *Workplace violence* is assessed by asking about violence by clients in the preceding 6 months (e.g., abducted/kidnapped, forced unprotected sex, raped, strangled, physical assault, assaulted with a weapon), as well as violence by police, third parties and strangers.

HIV/STI Measures

Following pre-test counseling and informed consent, HIV seropositive participants receive CD4 and HIV-1 RNA viral load testing at the BC Centre for Excellence in HIV/AIDS to assess HIV disease progression. Nursing staff provide referral and active connections to HIV service providers for all HIV seropositive women not currently connected to an HIV provider. All participants receive post-test counseling. Free STI and Papanicolaou testing are also offered, regardless of study enrolment.

ART Dispensation Data

Information on ART dispensation was accessed via confidential linkage to records from a provincial health administrative database managed by the British Columbia Centre for Excellence in HIV/AIDS' Drug Treatment Program (DTP). As previously described [46–48], the DTP collects comprehensive information on province-wide ART dispensation. The DTP also collects HIV/AIDS monitoring information, including CD4 cell counts and plasma viral load for each participant. At the time of study, provincial eligibility for ART included all HIV-seropositive individuals with a CD4 cell count $\leq$500 and other key health indicators and risks (e.g., AIDS-defining illnesses, HCV co-infection, pregnant women, serodiscordant couples), consistent with current WHO guidelines. Early entry into ART regardless of CD4 cell count is continues to be encouraged in British Columbia by provincial guidelines, based on a 'Treatment as Prevention' approach [49].

Dependent Variable

The dependent variable, experiencing a gap in ART use, was a time-updated measure based on pharmacy dispensation records from the DTP. Experiencing a gap in ART use was considered as a time-updated measure at each semi-annual study visit defined as not having any ART dispensed in the 6-month period preceding the survey date of a participant who was previously diagnosed as HIV-seropositive. Gaps in ART use included cases of treatment interruptions as well as delayed ART initiation. In cases of missing data, we substituted questionnaire responses of participants regarding their current ART use.

Data Analysis

Descriptive statistics were calculated for independent variables of interest, stratified by ART use. The differences between those who experienced gaps in ART use and those who did not were assessed using the Mann–Whitney test for continuous variables and Pearson's Chi square test (or Fisher's exact test for small cell counts) for categorical variables. Following this, we used generalized estimating equations (GEE) with an exchangeable correlation structure [50, 51] to longitudinally examine correlates of events of gaps in ART use (ART treatment interruptions or

delayed initiation) among sex workers living with HIV over the 2.5-year study period. Bivariable and multivariable GEE analyses included data from baseline and follow-up visits, accounting for repeated measures among the same participants. Socio-demographic characteristics (e.g., age, Aboriginal ancestry) were treated as fixed covariates, and all other variables were treated as time-updated covariates of occurrences at each semi-annual visit. Variables hypothesized a priori to be related to ART access (i.e., known potential confounders and independent variables of interest) and which were significant at $p < 0.10$ in bivariate GEE analyses were considered for inclusion in the multivariable model. A maximum of five variables were considered for the multivariable model, in light of our sample size. Using the GENMOD procedure [52] in SAS version 9.3 (SAS, Cary, NC), a manual backward model selection process was used to identify the model with the best fit, as indicated by the lowest quasi-likelihood under the independence model criterion value [53]. All *p*-values are two sided.

Results

A total of 74 sex workers living with HIV enrolled in the AESHA cohort between 2010 and 2012 were eligible and therefore included in the analysis. Participants completed a median of 3.5 study visits (Interquartile Range (IQR): 2.0–5.0), with a median follow-up duration of 18.40 months (IQR: 11.76–24.57). Among the 74 participants, there were 242 observations and 63 events of gaps in ART use (i.e., 6-month periods in which no ART was dispensed to an eligible participant) over a 2.5-year period.

The majority of participants were Canadian-born (97.3 %) and of Aboriginal ancestry (63.5 %), and over half had ever been diagnosed with a mental health issue. Over one in ten participants (10.8 %) had recently moved to Vancouver from another province or city, or had lived in a province or city other than Vancouver in the past 6 months (i.e., internal migration/mobility); similar proportions reported mobility within BC versus other provinces. Most sex workers serviced clients in outdoor/public spaces

Table 1 Characteristics of female sex workers living with HIV ($n = 74$) at baseline, stratified by whether experienced gaps in ART use, 2010

Variable	Gap in ART use, past 6 months			
	Yes ($N = 27$) *n* (%)	No ($N = 47$) *n* (%)	Total ($N = 74$) *n* (%)	*P* value
Individual factors				
Duration of known HIV positivity, years (*median, IQR*)*	2.88 (1.05–7.93)	10.60 (3.64–15.10)	7.91 (1.42–12.26)	<0.001
CD4 count, cells/mm^3 (*median, IQR*)*	520 (315–620)	320 (170–550)	395 (260–580)	0.035
Viral load, log_{10} copies/mL (*median, IQR*)*	4.03 (3.34–4.55)	1.60 (1.54–3.24)	2.79 (1.54–4.28)	<0.001
Age, years (*median, IQR*)	31 (28–35)	38 (33–45)	35 (29–43)	0.006
Canadian born	26 (96.30 %)	46 (97.87 %)	72 (97.30 %)	1.000
Aboriginal ancestry	19 (70.37 %)	28 (59.57 %)	47 (63.51 %)	0.353
Diagnosed with a mental health issue**	18 (66.67 %)	21 (44.68 %)	39 (52.70 %)	0.068
Interpersonal/behavioral factors				
Inconsistent condom use (clients)*	4 (14.81 %)	8 (17.02 %)	12 (16.22 %)	1.000
Non-injection drug use*	26 (96.30 %)	43 (91.49 %)	69 (93.24 %)	0.647
Injection drug use*	20 (74.07 %)	31 (65.96 %)	51 (68.92 %)	0.468
Structural exposures				
Primary place of service*				
Outdoor/public space (ref)	13 (48.15 %)	22 (46.81 %)	35 (47.30 %)	
Informal indoor	12 (44.44 %)	21 (44.68 %)	33 (44.59 %)	0.947
Brothel/quasi-brothel	2 (7.41 %)	4 (8.51 %)	6 (8.11 %)	0.858
Homelessness*	8 (29.63 %)	16 (34.04 %)	24 (32.43 %)	0.696
Client physical/sexual violence*	3 (11.11 %)	7 (14.89 %)	10 (13.51 %)	0.738
Internal migration or mobility*	5 (18.52 %)	3 (6.38 %)	8 (10.81 %)	0.132
Incarceration*	6 (22.22 %)	5 (10.64 %)	11 (14.86 %)	0.194

All data refer to *n* (%) of participants, unless otherwise specified

* In last 6 months

** In lifetime

Table 2 Factors longitudinally correlated with gaps in ART use among female sex workers living with HIV ($n = 74$) over time, 2010–2012

Variable	Unadjusted odds ratio	95 % CI	Adjusted odds ratio	95 % CI
Viral load, log_{10} copies/mL	2.03	1.62–2.53		
Age, per year younger	1.08	1.01–1.16	**1.09**	**1.01–1.17**
Non-injection drug use	4.86	1.16–20.44	**5.04**	**1.31–19.34**
Injection drug use	1.95	1.01–3.77		
Primary place of service				
Informal indoor (vs. outdoor/public)	1.16	0.64–2.11		
Brothel/quasi-brothel (vs. outdoor/public)	0.62	0.10–3.92		
Homelessness	1.22	0.60–2.49		
Client-perpetrated physical/sexual violence	1.13	0.57–2.26		
Internal migration/mobility	5.65	1.61–19.82	**5.19**	**1.38–19.56**
Incarceration	2.80	1.27–6.18	**2.54**	**1.04–6.20**

Variables in bold represent those that were statistically significant at $p \leq 0.05$

Generalized estimating equations (GEE) with an exchangeable correlation structure were used to longitudinally examine correlates of gaps in ART use. Analyses included data from baseline and follow-up visits, accounting for repeated measures among the same participants. Variables hypothesized a priori to be related to gaps in ART use and which were significant at $p < 0.10$ in bivariate GEE analyses were considered for inclusion in the multivariate model. A backward model selection process was used to identify the model with the best fit, as indicated by the lowest quasi-likelihood under the independence model criterion value

Note All variables refer to the last 6 months, except for age, which was treated as a time-fixed covariate

(e.g., street, vehicle) (47.3 %) or informal indoor venues (e.g., bar/nightclub, crack/drug house, private home, hotel) (e.g., 44.6 %). In comparison with women who used ART, those not using ART at baseline had a higher plasma viral load (median: 4.03 log_{10} copies/mL vs. 1.60 log_{10} copies/mL) (Table 1).

In bivariable GEE analysis of factors correlated with gaps in ART use over the 2.5-year observation period, experiencing a gap in ART use was correlated with higher plasma viral load (Odds Ratio (OR): 2.03, 95 % Confidence Interval (CI) 1.62–2.53), younger age (OR: 1.08, 95 % CI 1.01–1.16), using non-injection drugs (e.g., crack, crystal methamphetamine) (OR: 4.86, 95 % CI 1.16–20.44), and injecting drugs (e.g., heroin, cocaine) (OR: 1.95, 95 % CI 1.01–3.77). In terms of structural determinants, recent internal migration/mobility (OR: 5.65, 95 % CI 1.61–19.82) and recent incarceration episodes (OR: 2.80, 95 % CI 1.27–6.18) were both correlated with gaps in ART use in bivariate GEE analysis. There were no significant bivariate differences in ART use over time by Aboriginal ancestry, mental health status, place of service, or inconsistent condom use with clients, which was very low across the sample. Among participants who had previously used ART and had stopped taking it, primary self-reported reasons for not using ART during the observation period included adherence challenges/difficulties taking the medication every day (18.2 %), followed by side effects/toxicities (6.06 %), housing instability (6.06 %), and distance/transportation issues (6.06 %).

In a multivariable GEE model, younger age (AOR: 1.09, 95 % CI 1.01–1.17), non-injection drug use (AOR: 5.04, 95 % CI 1.31–19.34), internal migration/mobility [Adjusted OR (AOR): 5.19, 95 % CI 1.38–19.56], and incarceration (AOR: 2.54, 95 % CI 1.04–6.20) remained independently correlated with experiencing gaps in ART use over a 2.5-year period (Table 2).

Discussion

Our results showed that almost forty percent of female sex workers living with HIV experienced delays or interruptions in ART use over a 2.5-year observation period. In spite of major successes in scaling-up ART access and retention and reducing HIV-related morbidity and mortality in BC in the general population and in some key populations (e.g., PWID), this study demonstrates that sex workers continue to face serious gaps in access and retention in ART. These gaps appear to largely relate to structural factors (e.g., incarceration, mobility) as well as the unique challenges faced by marginalized young women living with HIV in accessing and staying on ART. Our results pertaining to the relationship between younger age and gaps in ART are supported by previous research in which youth have been found to be more likely to face barriers to ART use, have poorer adherence, and enter ART later than adults, due to concerns such as violence, unequal relationship power, limited access to social support, stigma, and barriers to healthcare access [54–58]. Importantly, while sex workers who use drugs were more likely to experience treatment barriers, correlations with younger age, migration/mobility, and incarceration remained irrespective of drug use. Despite

previous concerns that ART use among marginalized and drug-using populations may result in lower condom use, our study adds to a body of evidence suggesting this to be unsubstantiated among sex workers [59, 60]. Unsurprisingly, we also found that women who experienced gaps in ART use had a higher plasma viral load than those retained in treatment. Efforts to scale-up voluntary and supportive access to ART for sex workers remains critical to ensure equitable access to this life-saving and health-promoting treatment, which has significant implications for both individual and public health.

To the best of our knowledge, this is the first prospective study to explicitly examine structural determinants of ART access or retention among female sex workers. Our findings regarding the potential for migration/mobility and incarceration to interrupt ART access and retention are supported by prior epidemiological and qualitative studies with PWID [46, 47, 61–63], which have identified incarceration and mobility as barriers to ART use. For example, research in British Columbia has found a dose–response relationship between numbers of incarceration events and non-adherence to ART [47], as well as associations between exposure to incarceration, non-suppression of viral load, and syringe sharing [63] among PWID. Findings of our study are also supported by research with broader cohorts of people living with HIV, which have found that mobility and migration can adversely affect ART adherence [61]. Though epidemiological studies pertaining to migration and health have infrequently examined issues of ART use, mobility patterns have been linked to HIV-related risks and barriers to health care access among sex workers, as well as some protective factors; for example, short-term migration/mobility are associated with barriers to health care, condom refusal, client violence, and higher income [27, 31, 64], whereas long-term international migration to some higher-income settings is associated with lower sexual and drug-related risks [29, 65]. Further research is needed to unpack how migration/mobility patterns impact access to and engagement with the continuum of HIV care for women engaged in sex work.

These findings likely reflect treatment barriers as a result of disconnections to care and limited social supports experienced within the context of migration/mobility as well as incarceration. Previous studies have indicated that both incarceration and migration/mobility can enhance health-related vulnerabilities and interrupt healthcare access as the result of the rupturing of social networks [30, 66, 67], insurance barriers (e.g., lack of immediate access to health insurance upon moving to a new province), unfamiliarity with new healthcare system, and the disruption of previously established relationships with healthcare providers and services [68, 69]. These may be among the reasons that migrant/mobile women were more likely to experience gaps in ART use after moving to Vancouver. We did not document any recent migration/mobility events among HIV-positive women during the follow-up period, which is likely related to challenges accessing HIV care outside the Metropolitan Vancouver area (e.g., lack of insurance coverage or knowledge of physicians/pharmacies in other provinces) and the concentration of HIV-related services (e.g., harm reduction, ART, subsidized housing) in the city's most marginalized downtown core neighborhoods (e.g., the downtown eastside). Anecdotal reports indicate that although marginalized women living with HIV may wish to leave these neighborhoods for safety, housing, and family reasons, difficulties accessing services (e.g., housing, HIV care) or a community of HIV-positive persons outside this neighborhood may prevent them from doing so. Further research is required to examine this hypothesis, since research among PWID [70] suggests that out-migration from inner-city communities where HIV and injection drug use are concentrated may relate to reduced health-related harms.

Our findings regarding incarceration are supported by research with PWID, which has found strong linkages between incarceration and difficulties adhering to ART [47], plasma viral load [71], and ART discontinuation [46]. In a recent study among PWID, both sex work involvement and recent incarceration predicted plasma viral load rebound [71]. Although ART is technically available within criminal justice settings in Canada, concerns have been raised regarding barriers to ART for incarcerated populations. These include a lack of continuity of care between community and in-prison providers, disruptions in health care access (e.g., loss of rapport previously established with providers) upon entry and release, and a desire to conceal one's HIV status due to stigma and discrimination within criminal justice settings [47, 72]. Our study adds to a body of evidence underscoring the negative impacts of criminalization on marginalized populations' health and safety, and is one of few to examine this issue in relation to ART use among sex workers [6]. The criminalization of sex work has been previously shown to severely undermine health and safety, both in Canada and internationally [9, 15, 17, 23, 24, 37, 73, 74]. In Canada, HIV non-disclosure (i.e., in cases where either a condom or detectable viral load are present, but not both) remains criminalized, even in cases where no transmission occurs. Furthermore, the Canadian government recently proposed new laws that further criminalize sex work (e.g., criminalization of the purchase of sex). These forms of criminalization can substantially impede the scale-up of HIV care for sex workers. In addition to concerns of further marginalization related to partner/client violence, stigma, housing insecurity, and lost income, women may fear HIV testing or picking up ART due to criminalization. Policy

reforms remain needed to ensure that sex workers have access to the same health and human rights as other populations (i.e., the removal of criminal sanctions surrounding HIV and sex work; safer indoor workspaces).

Implications for Policy and Practice

Multi-pronged, combination (i.e., biomedical, behavioural and structural) interventions are needed to scale-up access to and retention in ART for female sex workers and address structural barriers to ART, especially for younger women who may have less social support and therefore require special intervention strategies. Interventions to support entry into and continuity of HIV care within the context of migration/mobility patterns (e.g., linkage to HIV providers, community-based organizations, and social supports in common destination settings; addressing insurance barriers for women moving between provinces) and within the criminal justice system (e.g., programs supporting sensitive and effective linkages to care upon entry and release) are recommended. Additionally, broader efforts to provide social supports (e.g., housing, transportation, access to social support) are recommended, particularly for recent arrivals to Vancouver, women who regularly visit communities outside Vancouver, and younger women recently diagnosed with HIV.

Evidence suggests that when appropriate supports are provided, sex workers can be effectively engaged in HIV care [75] and achieve high levels of ART adherence [8]. This often depends on the provision of strong supports, including close follow-up with outreach teams and peer-educators [8]. As models to promote ART access among sex workers have been infrequently studied [76], efforts to develop, test, and scale-up tailored, peer- and community-based ART access models for sex workers are recommended.

Lessons from HIV prevention research suggest that community and peer-based interventions that incorporate sex worker-tailored services can be highly effective to support the health and human rights of sex workers [76–78], including access and retention in ART. One example is *Ashraya*, a community-based organization in India started by sex workers living with HIV. This program provides peer advocates to help navigate the health system, peer support groups, and advocacy to reduce stigma and discrimination, which have collectively improved ART access for sex workers living with HIV in the community [75]. Although the ability for sex workers and other marginalized populations living with HIV to self-organize represents a key health promotion strategy that could successfully support ART programs in other settings [26, 77], unacceptably high rates of continued criminalization and social exclusion undermine the potential health advances that such approaches could achieve [73].

Strengths and Limitations

This study has some limitations. Our measure of ART use was based on prescription refills as captured by provincial pharmacy records, rather than directly observed therapy, which could overestimate actual ART use. We selected this outcome since pharmacy records have been found to be more reliable than self-report [79], and previous work has demonstrated that ART prescription refill data is a reliable predictor of viral suppression [80, 81] and survival [1, 35, 82]. As this could underrepresent ART use among sex workers who moved outside BC, we used the questionnaire responses of internally mobile/migrant women (i.e., self-reported ART use) to verify consistency with our pharmacy dispensation-based outcome—that is, to ensure that migrant/mobile women were not missed by our outcome due to accessing ART outside of BC. While our study was based on a relatively small sample of sex workers living with HIV enrolled in a larger cohort, our small sample size would have made it more difficult to detect the associations we noted between ART use, incarceration, and migration/mobility. Larger prospective cohorts investigating structural determinants of HIV treatment and care (e.g., ART adherence, viral load) among sex workers and other populations of marginalized women living with HIV remain needed to better understand treatment access and retention rates, and to map out the most effective strategies to reduce structural barriers and enhance engagement in care. As sex work remains largely hidden in Vancouver due to persistent criminalization, official estimates of the general population of sex workers are unavailable. Our cohort employs various strategies to ensure that the cohort is as representative as possible, including use of time-location sampling to facilitate recruitment across diverse venues and neighbourhoods, strong community partnerships, and regular outreach efforts, which have resulted in our ability to recruit a large and diverse cohort.

Conclusion

In spite of success in scaling-up access and retention in the HIV cascade of care in BC, structural barriers, including migration/mobility and incarceration, continue to impede engagement with ART for sex workers living with HIV. The fact that sex workers, a population heavily impacted by HIV and other health and social disparities, do not have equal access to the health-preserving and preventive benefits of ART represents a serious human rights and health concern. Sex worker-led, community-based interventions should be further explored as a means to scale-up access to the HIV care continuum and to promote sex workers' equitable access to health and human rights.

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