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Access and engagement in HIV care among a national cohort of women living with HIV in Canada

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ABSTRACT

Attrition along the cascade of HIV care poses significant barriers to attaining the UNAIDS targets of 90-90-90 and achieving optimal treatment outcomes for people living with HIV. Understanding the correlates of attrition is critical and particularly for women living with HIV (WLWH) as gender disparities along the cascade have been found. We measured the proportion of the 1425 WLWH enrolled in the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS) who had never accessed HIV medical care, who reported delayed linkage into HIV care (>3 months between diagnosis and initial care linkage), and who were not engaged in HIV care at interview (<1 visit in prior year). Correlates of these cascade indicators were determined using univariate and multivariable logistic regression. We found that 2.8% of women had never accessed HIV care. Of women who had accessed HIV care, 28.7% reported delayed linkage and 3.7% were not engaged in HIV care. Indigenous women had higher adjusted odds of both a lack of access and delayed access to HIV care. Also, a younger age, unstable housing, history of recreational drug use, and experiences of everyday racism emerged as important barriers to ever accessing care. Programmatic efforts to support early linkage to and engagement in care for WLWH in Canada must address several social determinants of health, such as housing insecurity and social exclusion, and prioritize engagement of Indigenous women through culturally safe and competent practices.

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Introduction

Providing optimal care to people living with HIV entails ensuring full engagement along the cascade of HIV care (Gardner, McLees, Steiner, Del Rio, & Burman, 2011). Given known gender disparities in HIV care and outcomes (Tapp et al., 2011), understanding the correlates of attrition at stages of the cascade for women living with HIV (WLWH) is essential.

Several barriers to entry and retention in care for WLWH exist. These include non-Caucasian ethnicity (Fleishman, Yehia, Moore, Korhuis, & Gebo, 2012), younger age (Blackstock, Blank, Fletcher, Verdecias, & Cunningham, 2015), unstable housing (Haley et al., 2014), food insecurity (Lo, MacGovern, & Bradford,

2002), depression (Pecoraro et al., 2013), substance use (Eastwood et al., 2015) and intersecting or occupational stigma and discrimination (Lazarus et al., 2012).

In Canada, analysis of the cascade among WLWH has primarily focused on women who experience marginalization (Logie, James, Tharao, & Loutfy, 2012; Shannon, Bright, Duddy, & Tyndall, 2005); few studies have examined the broader demographic profiles and barriers of WLWH in accessing care across Canada. The purpose of this study was to determine the proportion of Canadian WLWH who have never accessed HIV care, who report delayed linkage into care, and who are not engaged in routine care, and to identify the correlates of lack of access to and non-engagement in care.

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Table 1. Socio-demographic and access characteristics of women living with HIV in Canada ($n = 1313$).

Variables	<i>N</i>	%	Mean (SD) or Median (IQR)
Age			43.1 (10.4)
Above 50	374	28.5	
41–50	425	32.4	
31–40	401	30.5	
16–30	113	8.6	
Gender (% cisgender)	1250	95.4	
Sexual orientation ($n = 1308$) (% heterosexual)	1146	87.6	
Relationship status			
Married/Common-law/Relationship	425	32.4	
Single/Separated/Divorced/Widowed/Other	888	67.6	
Legal status in Canada ($n = 1275$)			
Canadian citizen	1054	80.3	
Landed immigrant/Permanent resident	161	12.6	
Refugee/other immigration status	60	4.6	
Ethnicity			
White/Caucasian	530	40.4	
Indigenous	288	21.9	
African/Caribbean/Black	398	30.3	
Other ethnicity	97	7.4	
Education level ($n = 1306$) (% high school or higher)	1105	84.6	
Household gross yearly income ($n = 1273$)			
>\$40,000 per year	181	14.2	
\$20,000–\$40,000 per year	266	20.9	
<\$20,000/year	826	64.9	
Province			
Quebec	338	25.7	
British Columbia	334	25.4	
Ontario	641	48.8	
Geographic location (% large city vs. small/medium city)	1073	81.7	
Number of financial dependents living in Canada ($n = 578$)			1.6 (1.4)
Duration of years living with HIV ($n = 1311$)			10.7 (5.8–16.6)
<6	338	25.8	
6–14	533	40.6	
>14	440	33.6	
Never accessed HIV care	37	2.8	
Never accessed HIV care (diagnosed 1983–2001) ^a	2	0.4	
Never accessed HIV care (diagnosed 2002–2008)	2	0.4	
Never accessed HIV care (diagnosed 2009–2015)	31	2.7	
Duration of years living with HIV among those who have never accessed HIV care ($n = 35$) (Median, IQR)			2.0 (1.9–3.1)
Delayed linkage into HIV care ^b	363	28.7	
Delayed linkage into HIV care (diagnosed 1983–2001)	192	35.4	
Delayed linkage into HIV care (diagnosed 2002–2008)	132	29.3	
Delayed linkage into HIV care (diagnosed 2009–2015)	39	14.6	
Time in months to linkage into HIV care for those with delayed linkage (Mean, SD)			
Diagnosed 1983–2001			47.2 (50.9)
Diagnosed 2002–2008			30.0 (23.4)
Diagnosed 2009–2015			10.9 (8.5)
Not engaged in HIV care in the past year	47	3.7	
Past-year non-engagement (diagnosed 1983–2001) ^c	13	2.4	
Past-year non-engagement (diagnosed 2002–2008)	19	4.2	
Past-year non-engagement (diagnosed 2009–2015)	14	5.1	

IQR: interquartile range; SD: standard deviation

^aProportion is based on those who have year of diagnosis data: never accessed HIV care ($n = 35$); not retained in care ($n = 46$).

^bProportion is based on those who have time to access of care data ($n = 1265$).

^cVariables with no “n” provided has data on the full data set of 1313.

Methods

We used baseline data from 1425 WLWH collected between August 2013 to May 2015 from the Canadian HIV Women’s Sexual and Reproductive Health Cohort Study (CHIWOS) (Loutfy et al., [in press](#)). WLWH trained as peer research associates (PRAs) recruited self-identified WLWH aged 16 years or older using purposive and venue-based sampling methods (e.g., HIV clinics). All participants provided electronic informed consent, completed a structured, online questionnaire

administered by PRAs, and received a \$50 honorarium. Ethics approval was obtained.

Outcomes

Participants who had non-missing access-to-care data were included in the analysis ($n = 1313$). “Ever accessing HIV care” was dichotomized to never versus ever. Among those who had ever accessed care, time to linkage to care was calculated in months between date of HIV

diagnosis and first accessing of HIV medical care, with “delayed linkage” defined >3 months between time of diagnosis and first access. Not receiving HIV medical care in the past year was considered “non-engagement” for those who had ever accessed care.

Correlates

Sociodemographic factors included age, gender, sexual orientation, legal relationship status, immigration status, ethnicity, education, income, size of geographic location of residence, years living with HIV, age at time of diagnosis, and age at time of HIV diagnosis squared to account for non-linear associations.

Psychosocial factors included recreational drug use (RDU), housing status, food security, mental health condition diagnoses, history of incarceration, and standardized measures for hazardous alcohol use (adapted 3-item AUDIT-C) (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993), depression (10-item CES-D) (Zhang et al., 2012), health-related quality of life (HIV/AIDS Quality of Life Scale) (Holmes & Shea, 1998), resilience (10-item version of the Resilience Scale) (Wagnild, 2009), social support (4-item version of the Medical Outcomes Survey Social Support Survey) (Gjesfjeld, Greeno, & Kim, 2008), HIV stigma (HIV Stigma Scale (Berger, Ferrans, & Lashley, 2001), racism and sexism (modified (8-item) versions of the 9-item Everyday Discrimination Scale) (Williams, Yan, Jackson, & Anderson, 1997).

Clinical factors measured included method of HIV acquisition, current CD4 count, self-reported viral load (VL), and hepatitis B and C status.

Analyses

Univariate and multivariable logistic regression analyses were conducted with each outcome, utilizing penalized maximum likelihood estimation to account for small outcome proportions (Williams, 2016). For the multivariable models of never accessing and not being engaged in HIV care, all correlates with a bivariate $p < 0.05$ were entered; sociodemographic factors $p < 0.05$ were controlled for (Cohen, Cohen, West, & Aiken, 2002). For the delayed linkage to care model, time invariant variables were entered. All statistical analyses were performed using STATA version 14 (College Station, TX) or SPSS, version 23 (Armonk, NY).

Results

Participants ($n = 1313$) were a mean age of 43.1 years (standard deviation: 10.4 years), primarily Canadian citizens (80.3%) and of white/Caucasian (40.4%) or African,

Caribbean, or Black (ACB) (30.3%) ethnicity (Table 1). Approximately 65% reported a gross yearly household income of less than \$20,000.

Overall, 2.8% of women had never accessed HIV care, 28.7% of those who had ever accessed care reported delayed linkage and 3.7% were not engaged in routine HIV care. Trends suggest that the proportion of those who have never accessed care is highest for those diagnosed most recently ($\chi^2(2) = 86.35$, $p < 0.001$) and that the proportion of those reporting delayed linkage to care has decreased over time ($\chi^2(2) = 38.2$, $p < 0.001$).

In multivariable analyses controlling for confounders (Table 2), Indigenous ethnicity, unstable housing and experiences of racism were associated with increased adjusted odds of never having accessed HIV care while RDU, and living with HIV for 6–14 years and >14 years were associated with decreased odds of never having accessed HIV care. In multivariable analysis with time invariant variables, factors associated with increased odds of delayed linkage to care included age at time of HIV diagnosis, age at time of HIV diagnosis squared, Indigenous, ACB or other ethnicity compared to white/Caucasian, years since diagnosis, and acquiring HIV through sharing/contaminated needles compared to through consensual intercourse. While the association between age at time of HIV diagnosis and delayed access to care implies that older age is associated with increased odds, the association between age at time of HIV diagnosis squared and the outcome suggests that both older women and younger women have increased odds of delayed access to care. In multivariable analyses controlling for confounders, a self-reported detectable VL was associated with increased odds of not being engaged in care in the past year; residency in British Columbia was associated with decreased odds of not being engaged in HIV care in the past year.

Discussion

Our study utilized the cascade of care framework to identify sociodemographic, psychosocial and clinical care factors associated with attrition upon entry into and engagement in HIV care. In this study of Canadian WLWH, 2.8% of women had never accessed care, 28.8% reported delayed linkage and 3.7% were not engaged in routine care. These findings have important implications for individual WLWH, as well as for health care policies and practices.

Our study demonstrated that substance use was an important barrier to HIV care. RDU was associated with lower odds of never having accessed HIV care; conversely, RDU was associated with higher odds of delayed access to care. This implies that additional support

Table 2. Sociodemographic, psychosocial, and clinical characteristics associated with never accessing HIV care ($n = 1313$), delayed linkage to HIV care ($n = 1265$), and not being engaged in HIV care in the past year ($n = 1276$).

	Never accessed HIV care		Delayed linkage to HIV care		Not engaged in HIV care	
	Unadjusted OR (95% CI)	Adjusted OR ^a (95% CI)	Unadjusted OR (95% CI)	Adjusted OR ^b (95% CI)	Unadjusted OR (95% CI)	Adjusted OR ^c (95% CI)
Socio-demographic factors						
Age						
Above 50 (ref)	1				1	
41–50	3.03 (0.74, 12.51)				1.47 (0.65, 3.34)	
31–40	6.38 (1.67, 24.30)*	NS ^b			1.71 (0.76, 3.85)	
16–30	16.72 (4.18, 66.79)**	NS			3.00 (1.12, 8.03)*	NS
Age at time of HIV diagnosis						
(continuous)	Not included	0.98 (0.97, 0.99)**	1.08 (1.01, 1.15)*	Not included		
(squared)	Not included	1.00 (1.00, 1.00)***	0.99 (0.99, 0.99)**	Not included		
Gender (transgender or other gender identity vs. cisgender)						
	4.63 (1.91, 11.24)**	NS	1.18 (0.65, 2.21)		2.42 (0.88, 6.64)	
Sexual orientation (sexual minority vs. heterosexual)						
	2.43 (1.14, 5.16)*	NS	0.94 (0.64, 1.37)		1.60 (0.75, 3.42)	
Relationship status (single/separated/divorced/widowed/Other vs. married/common-law/relationship)						
	0.62 (0.32, 1.18)		0.90 (0.70, 1.17)		0.99 (0.53, 1.83)	
Legal status in Canada						
Canadian citizen (ref)	1				1	
Landed immigrant/Permanent resident	0.31 (0.06, 1.63)		1.72 (1.21, 2.43)**	Time variant	1.51 (0.70, 3.25)	
Refugee/other immigration status	2.09 (0.82, 5.31)		1.13 (0.63, 2.03)		0.78 (0.21, 2.87)	
Ethnicity						
White/Caucasian (ref)	1		1		1	
Indigenous	7.68 (2.98, 19.82)***	4.30 (1.31, 14.13)*	1.88 (1.36, 2.61)***	2.04 (1.42, 2.92)***	0.95 (0.43, 2.10)	
African/Caribbean/Black	2.33 (0.81, 6.71)		1.66 (1.23, 2.23)**	2.79 (1.95, 3.98)***	1.22 (0.63, 2.36)	
Other ethnicity	2.50 (0.55, 11.33)		1.46 (0.90, 2.38)	1.76 (1.03, 3.00)*	0.69 (0.18, 2.64)	
Education level (less than high school vs. high school or higher)						
	0.40 (0.11, 1.46)		1.31 (0.95, 1.82)		1.34 (0.65, 2.77)	
Household gross yearly income						
>\$40,000 per year (ref)	1		1		1	
\$20,000–\$40,000 per year	3.96 (0.69, 22.68)		1.28 (0.81, 2.01)	Time variant	3.01 (0.92, 9.82)	
<\$20,000/year	4.14 (0.79, 21.58)		1.64 (1.12, 2.41)**		2.01 (0.66, 6.15)	
Province						
Quebec (ref)	1		1		1	
British Columbia	1.83 (0.39, 8.66)		1.27 (0.92, 1.77)		0.22 (0.05, 0.85)*	
Ontario	6.94 (1.90, 25.35)**	NS	0.87 (0.65, 1.17)		1.69 (0.86, 3.35)	
Geographic location (small/medium vs. large)						
	0.75 (0.30, 1.87)		0.72 (0.52, 1.00)		0.81 (0.37, 1.79)	
Duration of years living with HIV						
<6 (ref)	1		Not included		1	
6–14	0.05 (0.01, 0.17)***	0.06 (0.02, 0.24)***			0.83 (0.43, 1.62)	
>14	0.06 (0.02, 0.20)***	0.11 (0.03, 0.42)***			0.46 (0.21, 1.03)	
Years since diagnosis (continuous)						
	Not included		1.06 (1.05, 1.08)***	1.07 (1.05, 1.10)***	Not included	
Psychosocial factors						
Housing status (unstable vs. stable)						
	6.61 (3.37, 12.97)***	4.06 (1.82, 9.06)***	1.36 (0.91, 2.03)		2.14 (0.99, 4.60)	
Food security (insecure vs. secure)						
	2.36 (1.05, 5.28)*	NS	1.09 (0.85, 1.41)		3.24 (1.48, 7.13)**	NS
Incarceration (ever vs. never)						
	1.35 (0.70, 2.59)		1.44 (1.12, 1.85)**	Time variant	1.44 (0.81, 2.59)	

(Continued)

Table 2. Continued.

	Never accessed HIV care		Delayed linkage to HIV care		Not engaged in HIV care	
	Unadjusted OR (95% CI)	Adjusted OR ^a (95% CI)	Unadjusted OR (95% CI)	Adjusted OR ^b (95% CI)	Unadjusted OR (95% CI)	Adjusted OR ^c (95% CI)
Hazardous alcohol use	0.74 (0.04, 12.43)		1.01 (0.96, 1.06)		1.52 (0.29, 8.12)	
History of injection drug use (ever vs. never)	0.54 (0.24, 1.20)		1.96 (1.52, 2.53)***	Time variant	0.93 (0.50, 1.76)	
History of recreational drug use (yes vs. no)	0.43 (0.21, 0.88)*	0.23 (0.09, 0.57)***	1.30 (1.02, 1.66)*	Time variant	0.76 (0.42, 1.37)	
Depression	0.96 (0.92, 1.01)		1.01 (1.00, 1.03)		0.95 (0.91, 0.99)*	NS
Ever diagnosed with a mental health issue (yes vs. no)	0.65 (0.32, 1.32)		0.89 (0.69, 1.14)		0.57 (0.30, 1.09)	
HIV-related quality of life	1.11 (1.03, 1.20)**	NS	1.00 (0.97, 1.02)		0.96 (0.91, 1.02)	
Resilience	0.98 (0.94, 1.01)		1.00 (0.99, 1.01)		1.05 (1.00, 1.11)*	NS
Social support	1.02 (0.95, 1.11)		0.97 (0.95, 1.00)		1.03 (0.96, 1.10)	
Personalized HIV stigma	1.06 (1.02, 1.11)**	NS	1.00 (0.98, 1.01)		1.02 (0.98, 1.06)	
Disclosure HIV stigma	1.04 (0.97, 1.12)		0.98 (0.96, 1.00)*	Time variant	1.01 (0.95, 1.07)	
Negative self-image HIV stigma	1.04 (1.01, 1.08)*	NS	0.99 (0.98, 1.01)		0.96 (0.93, 1.00)	
Public attitudes HIV stigma	1.14 (1.05, 1.24)***	NS	0.99 (0.97, 1.01)		1.01 (0.95, 1.07)	
Racism	1.06 (1.03, 1.09)***	1.04 (1.01, 1.08)*	1.01 (1.00, 1.02)		1.02 (0.99, 1.04)	
Sexism	1.06 (1.03, 1.09)***	NS	1.00 (0.99, 1.01)		1.01 (0.98, 1.04)	
Clinical factors						
HIV acquisition method						
Consensual intercourse (ref)	1		1		1	
Non-consensual (forced) intercourse	0.71 (0.28, 1.81)		1.43 (1.02, 2.03)	Not selected	1.32 (0.58, 3.01)	
Sharing needles/contaminated needles	0.50 (0.18, 1.40)		1.90 (1.38, 2.59)	1.88 (1.33, 2.67)***	1.29 (0.59, 2.85)	
Blood transfusion/other medical, perinatal	0.40 (0.08, 2.12)		0.99 (0.60, 1.65)	Not selected	0.80 (0.21, 3.03)	
Most recent viral load (detectable vs. undetectable)	Not included		0.68 (0.47, 0.99)	Time variant	5.15 (2.71, 9.79)***	3.00 (1.32–6.79)**
Most recent CD4 count (<200–500 cells/mm ³ vs. >500 cells/mm ³)	Not included		1.01 (0.78, 1.33)		2.32 (1.12, 4.81)*	NS
Hepatitis C (yes vs. no)	0.75 (0.37, 1.64)		1.89 (1.46, 2.44)***	Time variant	1.03 (0.56, 1.91)	
Hepatitis B (yes vs. no)	0.45 (0.09, 2.33)		2.07 (1.38, 3.10)***	Time variant	1.39 (0.56, 3.46)	

OR, odds ratio; NS, non-statistically significant (i.e., $p > 0.05$).

^aAdjusted for age, gender identity, sexual orientation, ethnicity, province, and duration living with HIV.

^bAll time invariant variables entered in one step. Analyzed using backwards stepwise regression, final step shown.

^cAdjusted for age and province.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

services and ongoing efforts in reducing substance use stigma and increasing treatment services for women who use drugs remain essential (Krusi, Wood, Montaner, & Kerr, 2010).

Access to HIV care for WLWH in Canada has improved. Among women diagnosed between 2009 and 2015, 14.6% reported delayed access to care, compared with 35.4% diagnosed between 1983 and 2001. Furthermore, time to first access has improved from a mean of 47.2 months to 10.9 months. This finding has important implications on the integration of test-and-treat strategies. However, given that both older and

younger women had higher odds of delayed access to care, future studies should attend to non-linear associations between continuous variables (e.g., age) and access.

WLWH who reported detectable VLs were three-fold more likely to not be engaged in routine HIV care, suggesting that barriers exist to achieving good virological outcomes in the absence of clinical care. Future research may seek to understand women's HIV knowledge, explore social supports, and determine whether specific program components can mediate engagement.

Our study demonstrated that Indigenous ethnicity was a risk factor for suboptimal access to HIV care. Future studies should explore barriers for Indigenous WLWH, such as injection drug use (Public Health Agency of Canada, 2014), engagement in survival sex work (Lemstra, Rogers, Thompson, Moraros, & Buckingham, 2012), and a history of sexual abuse (Mehrabadi et al., 2008). These findings reinforce the need for decolonizing research methods to understand the health care priorities for Indigenous WLWH and for culturally-competent HIV care created for and by Indigenous women.

Our study confirmed existing evidence that unstable housing is associated with decreased retention in HIV care (Haley et al., 2014). Research focusing on marginally-housed women may consider developing partnerships with organizations that address housing, and identifying alternative contact methods (Haley et al., 2014).

Our study has limitations. Our purposive, non-random sampling strategy may have introduced selection bias. To mitigate this, we recruited many women who experience multiple forms of social and structural marginalization (Loutfy et al., *in press*). Data were self-reported and subject to recall and social desirability bias. To overcome these biases, we engaged PRAs as interviewers, and we found a high degree of correlation between self-reported and laboratory VLs (Carter et al., 2017).

In conclusion, our study highlights several important factors associated with lack of entry into and engagement in HIV care in a large cohort of Canadian WLWH. Programmatic efforts for WLWH in Canada should focus on the social determinants of health.

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References

- Berger, B. E., Ferrans, C. E., & Lashley, F. R. (2001). Measuring stigma in people with HIV: Psychometric assessment of the HIV stigma scale. *Research in Nursing and Health*, *24*, 518–529.
- Blackstock, O. J., Blank, A. E., Fletcher, J. J., Verdecias, N., & Cunningham, C. O. (2015). Considering care-seeking behaviors reveals important differences among HIV-positive women not engaged in care: Implications for intervention. *AIDS Patient Care & STDS*, *29*, S20–26. doi:10.1089/apc.2014.0271
- Carter, A., de Pokomandy, A., Loutfy, M., Ding, E., Sereda, P., Webster, K., ... Kaida, A. (2017). Validating a self-report measure of HIV viral suppression: An analysis of linked questionnaire and clinical data from the Canadian HIV women's sexual and reproductive health cohort study. *BMC Research Notes*, *10*, 191. doi:10.1186/s13104-017-2453-8
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2002). *Applied multiple regression/correlation analysis for the behavioral sciences*. Mahwah, NJ: L. Erlbaum Associates.
- Eastwood, E. A., Fletcher, J., Quinlivan, E. B., Verdecias, N., Birnbaum, J. M., & Blank, A. E. (2015). Baseline social characteristics and barriers to care from a special projects of national significance women of color with HIV study: A comparison of urban and rural women and barriers to HIV care. *AIDS Patient Care & STDS*, *29*, S4–S10. doi:10.1089/apc.2014.0274
- Fleishman, J. A., Yehia, B. R., Moore, R. D., Korthuis, P. T., & Gebo, K. A. (2012). Establishment, retention, and loss to follow-up in outpatient HIV care. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *60*, 249–259. doi:10.1097/QAI.0b013e318258c696
- Gardner, E. M., McLees, M. P., Steiner, J. F., Del Rio, C., & Burman, W. J. (2011). The spectrum of engagement in HIV care and its relevance to test-and-treat strategies for prevention of HIV infection. *Clinical Infectious Diseases*, *52*, 793–800. doi:10.1093/cid/ciq243
- Gjesfeld, C. D., Greeno, C. G., & Kim, K. H. (2008). A confirmatory factor analysis of an abbreviated social support

- instrument: The MOS-SSS. *Research on Social Work Practice*, 18, 231–237. doi:10.1177/1049731507309830
- Haley, D. F., Lucas, J., Golin, C. E., Wang, J., Hughes, J. P., Emel, L., ... Hodder, S. L. (2014). Retention strategies and factors associated with missed visits among low income women at increased risk of HIV acquisition in the US (HPTN 064). *AIDS Patient Care & STDS*, 28, 206–217. doi:10.1089/apc.2013.0366
- Holmes, W. C., & Shea, J. A. (1998). A new HIV/AIDS-targeted quality of life (HAT-QoL) instrument: Development, reliability, and validity. *Medical Care*, 36, 138–154.
- Krusi, A., Wood, E., Montaner, J., & Kerr, T. (2010). Social and structural determinants of HAART access and adherence among injection drug users. *International Journal of Drug Policy*, 21(1), 4–9. doi:10.1016/j.drugpo.2009.08.003
- Lazarus, L., Deering, K. N., Nabess, R., Gibson, K., Tyndall, M. W., & Shannon, K. (2012). Occupational stigma as a primary barrier to health care for street-based sex workers in Canada. *Culture Health & Sexuality*, 14, 139–150. doi:10.1080/13691058.2011.628411
- Lemstra, M., Rogers, M., Thompson, A., Moraros, J., & Buckingham, R. (2012). Risk indicators associated with injection drug use in the aboriginal population. *AIDS Care*, 24, 1416–1424. doi:10.1080/09540121.2011.650678
- Logie, C. H., James, L., Tharao, W., & Loutfy, M. R. (2012). “We don’t exist”: A qualitative study of marginalization experienced by HIV-positive lesbian, bisexual, queer and transgender women in Toronto, Canada. *Journal of the International AIDS Society*, 15, 17392. doi:10.7448/IAS.15.2.17392
- Lo, W., MacGovern, T., & Bradford, J. (2002). Association of ancillary services with primary care utilization and retention for patients with HIV/AIDS. *AIDS Care*, 14, 45–57. doi:10.1080/0954012022014992049984
- Loutfy, M., de Pokomandy, A., Carter, A., O’Brien, N., Lewis, J., Nicholson, V., et al. (in press). Cohort profile: The Canadian HIV women’s sexual and reproductive health cohort study (CHIWOS). *International Journal of Epidemiology*.
- Mehrabadi, A., Craib, K. J., Patterson, K., Adam, W., Moniruzzaman, A., Ward-Burkitt, B., ... Cedar Project, P. (2008). The cedar project: A comparison of HIV-related vulnerabilities amongst young aboriginal women surviving drug use and sex work in two Canadian cities. *International Journal of Drug Policy*, 19(2), 159–168. doi:10.1016/j.drugpo.2007.07.005
- Office of National AIDS Policy (ONAP). (2015). *National HIV strategy for the United States: Updated to 2020*. Retrieved from <https://www.aids.gov/federal-resources/national-hiv-aids-strategy/nhas-update.pdf>
- Pecoraro, A., Royer-Malvestuto, C., Rosenwasser, B., Moore, K., Howell, A., Ma, M., & Woody, G. E. (2013). Factors contributing to dropping out from and returning to HIV treatment in an inner city primary care HIV clinic in the United States. *AIDS Care*, 25, 1399–1406. doi:10.1080/09540121.2013.772273
- Public Health Agency of Canada. (2014). *HIV/AIDS Epi Updates, Chapter 8: HIV/AIDS among Aboriginal People in Canada*.
- Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption--II. *Addiction (Abingdon, England)*, 88(6), 791–804.
- Shannon, K., Bright, V., Duddy, J., & Tyndall, M. W. (2005). Access and utilization of HIV treatment and services among women sex workers in Vancouver’s downtown eastside. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 82, 488–497. doi:10.1093/jurban/jti076
- Tapp, C., Milloy, M. J., Kerr, T., Zhang, R., Guillemi, S., Hogg, R. S., ... Wood, E. (2011). Female gender predicts lower access and adherence to antiretroviral therapy in a setting of free healthcare. *BMC Infectious Diseases*, 11, S1. doi:10.1186/1471-2334-11-86
- Wagnild G. (2009). A review of the Resilience Scale. *Journal of Nursing Measurement*, 17(2), 105–113.
- Williams, R. (2016). *Analyzing rare events with logistic regression*. Retrieved from <https://www3.nd.edu/~rwilliam/stats3/RareEvents.pdf>
- Williams, D. R., Yan, Y., Jackson, J. S., & Anderson, N. B. (1997). Racial differences in physical and mental health: Socio-economic status, stress and discrimination. *Journal of Health Psychology*, 2, 335–351. doi:10.1177/135910539700200305
- Zhang, W., O’Brien, N., Forrest, J. I., Salters, K. A., Patterson, T. L., Montaner, J. S., ... Lima, V. D. (2012). Validating a shortened depression scale (10 item CES-D) among HIV-positive people in British Columbia, Canada. *PLoS One*, 7, e40793. doi:10.1371/journal.pone.0040793