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Testing and Treatment for Human Immunodeficiency Virus and Hepatitis C Virus Infections among Canadian Federal Inmates

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Testing and Treatment for Human Immunodeficiency Virus and Hepatitis C Virus Infections among Canadian Federal Inmates

Dianne Zakaria

Jennie Mae Thompson

Ashley Jarvis

Jonathan Smith

Correctional Service of Canada

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Executive Summary

Testing for human immunodeficiency virus (HIV) and hepatitis C virus (HCV) infections ensures those who are infected are offered appropriate treatment and education, including information about how to prevent further spread of their infection. Testing is particularly important in correctional institutions because communicable diseases, such as HIV and HCV, are concentrated among people entering the correctional system.

Although Correctional Service Canada's (CSC) infectious disease surveillance system can provide information on testing and treatment, it cannot provide information on barriers to testing and treatment within CSC. To address this and other deficiencies, CSC conducted the National Inmate Infectious Diseases and Risk-Behaviours Survey (NIIDRBS), a self-administered paper questionnaire completed by a large sample of Canadian federal inmates in 2007. The questionnaire focussed on issues relevant to blood-borne and sexually transmitted infections, particularly HIV and HCV. This report presents findings on the HIV and HCV testing and treatment experiences of Canadian federal inmates.

More than 70% of men and 80% of women have been tested for HIV and/or HCV while in federal prison for their current sentence. Differences in the rate of testing existed by gender and Aboriginal self-identification. Compared to men, women were consistently more likely to be tested for HIV and HCV over time. The relationship between Aboriginal self-identification and testing, however, differed by gender. Being Aboriginal was associated with more testing among men and less testing among women. The most commonly reported reason for not being tested at CSC was not being offered the test. This is surprising given that inmates meet with a health professional shortly after admission. It may be that some inmates were unable to recall being offered tests in the distant past, particularly if they were overwhelmed with their circumstances during the admission process. Few inmates reported fear of test result, lack of confidentiality at CSC, or discrimination at CSC as reasons for not being tested. Although some inmates may have forgotten being offered the test when first admitted to CSC, the findings suggest that the rate of testing could be increased by further promoting screening and testing throughout incarceration; particularly since substantial proportions of inmates were more willing to be tested for HIV and HCV as compared to when they were admitted or in the community. Additional research is necessary, however, to provide evidence for policy options available for optimizing infectious disease screening and testing among inmates.

The overall rate of HIV (4.6%) and HCV (31.0%) infections among tested inmates were substantially greater than Canadian population rates. The rates were also greater among women inmates (HIV 7.9%, HCV 37.0%) than men inmates (HIV 4.5%, HCV 30.8%), but this gender differential was driven by the high rates of self-reported infections among Aboriginal women. Specifically, the rate of self-reported HIV infection among Aboriginal women (11.7%) was more than two times greater than the rate among non-Aboriginal women (5.5%) and all men (4.5%). Similarly, the rate of self-reported HCV infection among Aboriginal women (49.1%) was more than 50% greater than the rate among non-Aboriginal women (30.3%) and all men (30.8%). These data highlight the need to ensure that culturally appropriate, effective interventions that decrease risk-behaviours and increase utilization of harm-reduction measures are offered to meet the needs of Aboriginal women.

The proportion of HIV-positive inmates currently receiving anti-retrovirals (53%) may be less than that reported in the general community. Among HCV-positive inmates, however, treatment (33%) and efficacy (51%) rates compared favourably with those reported for the general community.

Opportunities were identified to improve the care of inmates ever told they have HIV and/or HCV infections. First, more than half of HIV-positive inmates worried about discrimination in CSC because of their HIV status. Second, among HIV-positive inmates who had ever started anti-retroviral treatment, 60% reported previous treatment interruptions at CSC. Some interruptions were due to practical operational issues, such as a temporary unavailability of medication at the institutional pharmacy or transfers between institutions, and others to the inmate's own behaviour. Last, among HCV-positive inmates who had seen a CSC medical professional but had not started taking medication, 23% reported being in the process of starting or being on a waiting list. This last finding may indicate a need for additional resources to ensure timely access to HCV treatment in the correctional environment.

Finally, the primary limitations of this research, such as measurement error and social desirability bias, are typical of cross-sectional self-report surveys that attempt to capture detailed information about sensitive issues over time. Other research designs, such as longitudinal research employing biosampling, may have been more effective but are difficult to conduct in correctional settings and were precluded in this instance due to competing operational issues.

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Introduction

Testing for human immunodeficiency virus (HIV) and hepatitis C virus (HCV) infections ensures those who are infected are offered appropriate treatment and education, including information about how to prevent further spread of their infection. Testing is particularly important in correctional institutions because communicable diseases, such as HIV and HCV, are concentrated among people entering the correctional system. For example, studies involving Canadian federal inmates have estimated the overall seroprevalence[1] of HIV at 2% and HCV at 26% to 33% (De, Connor, Bouchard & Sutherland, 2004; Ford et al., 2000). Conversely, the prevalence of HIV is estimated at 0.3% in the Canadian adult population (15-49 years old) (UNAIDS, 2006), and the prevalence of HCV is estimated at 0.8% in the Canadian population as a whole (Zou, Tepper, & Giulivi, 2001). Thus, the correctional system is an efficient environment for providing public health interventions, such as testing, treatment and education, to a marginalized segment of society while they are secured in a relatively stable environment (Niveau, 2006).

During the reception process at Correctional Service Canada (CSC), all newly admitted inmates undergo a thorough health assessment that involves screening for risk-behaviours and ascertaining infectious disease testing history. Based on this assessment, the infectious disease nurse makes recommendations regarding testing for infectious diseases (CSC, 2008a). Furthermore, throughout an inmate's sentence, infectious disease testing is available upon request by the inmate or by recommendation of a healthcare professional. As is the case in the community, all testing is voluntary but strongly encouraged for those identified to be at risk for infection (CSC, 2008b).

Testing for HIV and HCV among Canadian Inmates

Two Canadian studies conducted between 1995 and 1997 estimated that 58% to 64% of male inmates had ever been tested for HIV (Burchell et al., 2003; Price Waterhouse, 1996). Furthermore, about 32% had ever been tested for HIV while incarcerated (Burchell et al., 2003). More recent research, conducted in 2001 and 2002, indicated higher testing rates among federally incarcerated women. Approximately 89% and 78% reported being tested for HIV and HCV

[1] Prevalence based on biosampling (e.g., blood or saliva tests) rather than self-report.

infections, respectively, while in prison. For testing in the community, the corresponding rates were 64% and 62% (Rehman, Gahagan, DiCenso, & Dias, 2004). Finally, according to CSC surveillance data for 2004, the proportion of new admissions undergoing testing (confirmatory or screening) for HIV and HCV was 51% and 71%, respectively (CSC, 2008b).

Overall, these findings suggest that the rate of testing for HIV and HCV in prison is increasing over time. Furthermore, the testing rates for HIV in prison compare favourably to the rate in the general Canadian population (aged 15 years and older) where only 29% of women and 24% of men have ever been tested (PHAC, 2007).

Reasons for Testing and Not Testing Among Canadian Inmates

Research involving Canadian inmates has examined the reasons for not being tested in penitentiaries. Among Ontario provincial inmates who had been tested in the community, reasons for not being tested in prison included: "I am careful about what I do", 62%; "I don't think I am at risk", 50%; "because I feel healthy", 39%; "there is no confidentiality among prison staff", 24%; "I fear the reaction of other inmates", 18%; and, "prison is hard enough", 18% (Burchell et al., 2003). Additional reasons, identified by a smaller study (n = 39) involving Ontario federal inmates, included knowledge of one's positive infection status and not wanting to know one's infection status (Calzavara, Myers, Millson, Schlossberg, & Burchell, 1997). Thus, previous research indicates that inmates forego testing in prison primarily because they don't perceive themselves to be at risk.

Treatment for HIV and HCV infections in Prison

As previously stated, one of the goals of testing is ensuring inmates are offered appropriate treatment while in prison.

HIV treatment in prison

Previous research indicates that 36% to 69% of HIV-positive inmates are prescribed or receive anti-retrovirals in prison (Baillargeon, Borucki, Zepeda, Jenson, & Leach, 2000; Blanco, Perez, & March, 2005; CSC, 2008b; Ruiz Perez et al., 2006) and this estimate increases to 80% among HIV-positive inmates eligible for anti-retroviral therapy (eligibility defined as CD4 cell counts $\leq$ 500 cells/ul or elevated HIV-1 RNA levels) (Altice, Mostashari, & Friedland, 2001). In

comparison, a relatively recent large study of HIV-positive adults in the U.S. general population (excludes the homeless) indicated that 81% had ever used HIV anti-retroviral medication and that 69% were currently using anti-retrovirals (Kidder, Wolitski, Campsmith, & Nakamura, 2007). Further, studies of HIV infected people in medical care and eligible for antiretroviral therapy in the general US population found that 53% to 85% were receiving antiretroviral therapy according to guidelines in place at the time of the study (Cunningham et al., 2000; Kaplan et al., 1999; McNaghten, Hanson, Dworkin, & Jones, 2003).

HCV treatment in prison

Recently published research examining the treatment of HCV infections in adult incarcerated populations has indicated that 23% to 42% of infected inmates initiate antiviral treatment (Allen et al., 2003; Batey, Jones, & Mcallister, 2008; Farley, Wong, et al., 2005; Sabbatani, Giuliani, & Manfredi, 2006; Strock, Mossong, Hawotte, & Arendt, 2009); 38% to 89% of those who initiate treatment complete treatment (Allen et al., 2003; Batey et al., 2008; Moloughney, 2003; Sabbatani et al., 2006; Strock et al., 2009); and, 21% to 56% of those who initiate treatment experience initial or prolonged undetectable HCV levels (Allen et al., 2003; Batey et al., 2008; Farley, Vasdev, et al., 2005; Moloughney, 2003; Sabbatani et al., 2006; Strock et al., 2009). Apart from sentence length requirements, reasons for not being treated in prison are similar to those in the community and include: undetectable HCV RNA, normal liver enzyme levels, liver tissue damage not considered severe enough, loss to follow-up, medical contraindication, psychiatric contraindication, active alcoholism or drug addiction, non-adherence, liver biopsy requirements and patient refusal (Allen et al., 2003; Batey et al., 2008; Farley, Wong, et al., 2005; Moloughney, 2003; Strock et al., 2009). Hence, lack of treatment in penitentiaries does not necessarily indicate poor patient management. Barriers to completing therapy include side effects such as fatigue, flu like symptoms, and anorexia (Allen et al., 2003).

Although the proportion of infected inmates receiving treatment appears low, it compares favourably with general population rates ranging from 17.4% for two communities within France between 1994 and 2001 (Hatem et al., 2005) to 25% for consecutive HCV antibody positive patients referred to a liver clinic in Cleveland, Ohio during 1998 and 1999 (Falck-Ytter et al., 2002). In addition, rates of treatment success appear greater in the incarcerated population (21% to 56%) than the general population (13%) (Falck-Ytter et al., 2002).

Rationale for Present Research

Summarizing, previous research indicates that the proportion of inmates tested for HIV and HCV infections in penitentiaries is increasing over time and high relative to rates of testing in the community. In addition, the proportion of infected inmates receiving treatment and the efficacy of the treatment may be comparable to the treatment experiences of the general community. Although CSC's infectious disease surveillance system can provide information on testing and treatment, it cannot provide information on barriers to testing and treatment within CSC. To address this and other deficiencies, CSC conducted the National Inmate Infectious Diseases and Risk-Behaviours Survey (NIIDRBS), a self-administered paper questionnaire completed by a large sample of Canadian federal inmates in 2007. The questionnaire focussed on issues relevant to blood-borne and sexually transmitted infections, particularly HIV and HCV. This report presents findings on the HIV and HCV testing and treatment experiences of Canadian federal inmates.

Method

Development of Survey Instrument

To obtain the data to meet the study objectives, a project team drawn from several federal government departments[2] opted to use a self-administered paper and pencil questionnaire (Zakaria, Thompson, & Borgatta, in press) as the data collection instrument. Questionnaire development included consultations with inmates in five different penitentiaries, including a women's facility and an Aboriginal inmate group, through focus groups. To maximize comprehension, the questions did not exceed a Grade 8 literacy level. Further, inmates could choose between the English or French version of the questionnaire.

The final questionnaire was 50 pages long and took inmates approximately 45 to 55 minutes to complete. The questionnaire captured information on risk-behaviours associated with the spread of blood-borne and sexually transmitted infections in both the community and prison; inmate awareness and use of health education and harm-reduction programs; inmate testing and treatment for HIV and HCV infections; and, inmate knowledge of HIV and HCV. To optimize recall accuracy, only inmates admitted within the past three years reported on their risk-behaviours during the last six months in the community prior to their current incarceration.

Prior to data collection, Health Canada's Research Ethics Board reviewed and approved the survey methodology.

Measures

Questionnaire sections relevant to this report include testing and treatment for HIV and HCV infections (Zakaria et al., in press). Derived variables are described hereafter.

Tested during current sentence

Using responses for testing at and since admission to CSC, a variable was derived to indicate testing for each of HIV and HCV infections during the current sentence. Inmates responding "yes" to testing at or since admission were considered tested; inmates responding "no" to testing at and since admission were considered not tested; inmates responding with a combination of "no" and "don't know" were assigned a "don't know" status as were inmates

[2] CSC Research Branch, CSC Public Health Branch, and the Public Health Agency of Canada HIV/AIDS Policy, Coordination and Programs Division and Community Acquired Infections Division.

consistently responding “don’t know”; and, all other inmates were considered to be missing this information.

Ever tested

An “ever tested” variable was derived for each of HIV and HCV using self-reported infection status and responses for testing before, at, and since admission. The following hierarchy was used: inmates self-reporting as infected or indicating they had ever been tested were considered “ever tested”; inmates reporting not being tested prior to, at, and since admission were considered not tested; inmates indicating they “didn’t know” if they were tested prior to, at, or since admission were classified as having an unknown testing status; and, all other inmates were considered to be missing this information.

Ever being told you are infected

An “ever being told you’re infected” variable was derived for each of HIV and HCV using self-reported infection status and responses for testing before, at, and since admission. The following hierarchy was used: inmates indicating they had ever tested positive or self-reporting as positive were considered to have ever been told they are infected; all other inmates were assigned according to their response to the question “have you ever been told you have HIV/HCV?”

HIV treatment status

Inmates ever told they have HIV were asked whether they had ever seen a doctor or nurse about how the HIV could be treated (response options: yes or no). Those indicating “yes” were asked whether they had been started on anti-retrovirals (response options: yes or no). Based on the responses to these two questions, inmates were categorized as follows: have not seen a doctor or nurse about HIV treatment; have seen a doctor or nurse about HIV treatment, but anti-retrovirals have not been initiated; and, have seen a doctor or nurse about HIV treatment and anti-retrovirals have been initiated. Inmates missing a response to either of these two questions were considered to be missing “HIV treatment status.”

HCV treatment status

Inmates ever told they have HCV were asked whether they had seen a CSC doctor or

nurse about how the HCV could be treated (response options: yes or no). Those indicating "yes" were asked whether they had taken the medication for HCV (response options: yes or no). Based on the responses to these two questions, inmates were categorized as follows: have not seen a CSC doctor or nurse about HCV treatment; have seen a CSC doctor or nurse about HCV treatment, but did not take the medication; and, have seen a CSC doctor or nurse about HCV treatment and took the medication. Inmates missing a response to either of these two questions were considered to be missing "HCV treatment status."

Sampling

Survey design and sample size estimation

The sample frame was all inmates in federal penitentiaries, numbering approximately 13,749 just prior to the time of the survey (March, 2007). Excluded from the frame were inmates unable to understand, orally or in writing, English or French (less than 0.5% of the inmate population). Each penitentiary served as a stratum, the size of which varied from stratum to stratum. For each male penitentiary, a sample size was calculated to ensure estimated proportions had a small margin of error (±5%), 8 times out of 10 [$\alpha = 0.20$ (two-tailed), $\sigma^2 = 0.25$, finite population correction factor applied] (Cochran, 1977, p. 75). If the estimated sample size for a specific institution was 80% or more of the institution's population, the whole population of the institution was invited to participate. This occurred with small penitentiary populations so the extra survey cost was minimal. Given the small number (N = 479) of women inmates, all were invited to participate. The final sample size estimate for the entire federal population, including both men and women, was 4,981 inmates.

Institutional sample lists

For each male penitentiary, simple random sampling without replacement from the sample frame generated a primary list. Two or more replacement lists (secondary lists) helped maintain required sample sizes in the event an inmate refused to participate in the study or was not in the institution. Lists sorted by Aboriginal self-identification, primary official language (English or French), and aggregate sentence length facilitated substitutions. If an inmate on the primary list declined to participate or was not in the penitentiary for any reason, another inmate from the secondary list with the same characteristics could substitute for the originally sampled

inmate.

Survey Implementation

Selection and training of survey coordinators

Regional (Atlantic, Quebec, Ontario, Prairies, and Pacific) survey coordinators were nominated by the Assistant Deputy Commissioners for Institutional Operations. In addition, each institution's warden nominated an institutional survey coordinator. Regional coordinators acted as liaisons with institutional coordinators and held weekly teleconferences with the Research Branch to resolve logistical issues during survey implementation. The Research Branch prepared an extensive survey training manual for the coordinators and conducted face-to-face training sessions to encourage survey ownership and standardize approaches and messaging.

Promoting awareness of the survey

Regional Management Committees, wardens, security staff and unions were briefed regarding the survey and indicated their support. To raise awareness in institutions about the survey, a general communication and frequently asked questions were sent to all CSC employees, and posters announcing the survey were posted in all institutions (Zakaria et al., in press). These posters emphasized the voluntary nature of the survey; guaranteed participants anonymity and confidentiality; and, reinforced that the overall purpose of the survey was to improve inmate health. Wardens also assisted by informing institutional management committees, inmate committees and local unions.

Inmate recruitment

Institutional coordinators received lists of eligible inmates two to three weeks prior to the scheduled data collection period. Before inmates were approached, both primary and secondary lists were reviewed by an institution's Warden or his/her designate to identify security risks. Inmates deemed security risks were either excluded from further consideration or remained eligible to complete the questionnaire in their cell.

Institutional survey coordinators invited inmates on the sample list to participate in the study and to sign a consent form if they agreed (Zakaria et al., in press). For efficiency, group information sessions were organized with eligible inmates to describe the survey and review the

consent form. Consent, however, was not obtained in a group setting but privately from each inmate. Inmates in segregation were recruited individually. Educational attainment information and experiences interacting with an inmate were used to decide whether to ask an inmate if he/she would like assistance completing the questionnaire. A small version (13.9 cm by 21.6 cm) of the survey poster was left with each inmate approached for participation (Zakaria et al., in press).

After scheduling was complete, CSC Security reviewed the list of inmates scheduled to complete the survey in a group setting to ensure compatibility among inmates scheduled for the same group session. Thereafter, each inmate was informed of when and where they were to complete the questionnaire and were reminded the day before. Recruitment activities continued, as necessary, until the end of the data collection period for a specific institution. This allowed replacement of inmates who were unable to complete the questionnaire for any reason.

Data collection

From May 22 to July 6, 2007, a private firm administered the questionnaire in each institution to those inmates with a signed consent form. The survey coordinator was responsible for organizing inmates for the day and time the survey contractor arrived to distribute questionnaires. Since the contractor did not have the sample list and inmates were specifically instructed not to put their name or the name of anyone else on the questionnaire, it was impossible to link the consent form with the completed questionnaire. In this manner, inmates could be assured of their anonymity and confidentiality.

Each inmate completed a self-administered questionnaire: behind a privacy screen when completed in a group setting; in his/her cell if in segregation; or through private one-on-one interviews if an inmate requested assistance. All participating inmates received the answers to the questionnaire's HIV and HCV knowledge questions after data collection was complete within their institution (Zakaria et al., in press).

Several factors limit inmate recruitment and survey completion in the correctional environment including the transfer of inmates between institutions, the departure of inmates at warrant expiry, and inmates on conditional leave during the survey period. In total, 3,370 inmates (3,006 men, 351 women, 13 transgendered) completed a questionnaire. Operational issues limited the majority of facilities from maintaining detailed records of the total number of inmates asked

to participate; however, 13 institutions, accounting for approximately 27% of the total federal inmate population at the time of the survey, provided adequate detail to estimate a survey consent and response rate. Across these 13 institutions, which included inmates residing in minimum to maximum security levels, 1,687 inmates were asked to participate, 996 consented (consent rate = 59%) and 811 completed a questionnaire (response rate = 48%). In comparison, the 1995 National Inmate Survey reported a response rate of 64.2% [response rate = number who completed a questionnaire/(number who completed a questionnaire + number who refused)]. If inmate illnesses, releases, and transfers are included in the denominator, however, the response rate declines to 59.7% (Price Waterhouse, 1996, derived from Exhibit 1.3 on p.12). The difference in the response rates across the two surveys could be due to several factors, such as a change in the inmate profile over time or the greater sensitive content of the NIIDRBS.

The contractor retained all completed questionnaires and provided a database of anonymous survey records in August 2007. Preliminary analyses to test the integrity of the data were conducted in the fall and winter of 2007/08. The contractor destroyed all completed questionnaires in June 2008 after all data integrity issues were resolved.

General Analytical Approach

Statistical procedures for complex sample surveys

Typically, statistical procedures assume data were obtained through a simple random sample. Under such circumstances each inmate in the sample represents one inmate from the population and estimates derived from the sample relate to the population. In the NIIDRBS, inmates were randomly selected, but the sampling fraction was not consistent across institutions ranging from approximately 8% to 94%. Consequently, each inmate in the sample represented anywhere from about 1 to 13 inmates. Analyzing the NIIDRBS data as if it were obtained through simple random sampling (i.e., each inmate in the sample represents one inmate in the population) would produce incorrect population estimates and variances (Lee & Forthofer, 2006). All statistical estimates shown in this report acknowledge the NIIDRBS' complex sample design by incorporating weights that convey the number of inmates in the population represented by each inmate in the sample. The inverse of the institution's sampling fraction formed the weight for a record. Thus, estimates presented in this report relate to the Canadian federal inmate population.

All analyses used SAS® 9.1 or 9.2 survey procedures (SAS Institute Inc., 2004, 2008) that take the complex sampling design into account. Inferences to the population use common decision criteria (e.g., two-tailed alpha of 0.05). To calculate the variance of an estimate, Taylor series (linearization)[3] was used with the finite population correction factor. During bivariate analyses, we used the Rao-Scott chi-square test[4] for association if the data were categorical and the Wald F statistic[5] for continuous data.

When sample sizes are adequate, estimates are presented separately for men and women. Further, for each gender, estimates that significantly differ by Aboriginal self-identification are presented.

Question non-response and small subpopulations

Question non-response is a limitation of most self-report surveys that probe personal or private matters such as sexual behaviour. Although sophisticated procedures exist for addressing low response rates on certain questions, this report used an approach similar to other studies found in the survey literature: on any given question we assume that non-responders and responders share similar characteristics. Tables shown in the report note those analyses using questions where the item non-response rate varied between 20% and 50% (based on the weighted distribution) to alert the reader to this issue. Furthermore, when item non-response exceeded 50%, we chose to suppress the reporting of estimates. For reasons of confidentiality and privacy, we do not report estimates where there are fewer than five inmates sharing a characteristic. Finally, due to their small number (n = 13), results for the transgendered are not presented in this report.

[3] See SAS Institute Inc. (2004, p. 166) for details and related references.
[4] See SAS Institute Inc. (2004, p. 4216) for details and related references.
[5] See SAS Institute Inc. (2008, p. 6558) for details.

Results

Representativeness of the Sample and Population Characteristics

A comparison of inmate characteristics derived from the NIIDRBS and CSC administrative data indicated the sample was representative of the population (see Appendix A). Based on the NIIDRBS, the majority of inmates were English-speaking (78%), non-Aboriginal people (79%), born in Canada (89%), who had a high school diploma or greater at the time of the survey (54%), and were not in committed relationships (69%). Gender differences existed. Compared to women, men were older (34 vs. 38, $F(1, 3192) = 106.64$, $p < 0.05$), had served a longer duration of their current sentence (2.2 vs. 4.8 years, $F(1, 2975) = 274.15$, $p < 0.05$), and were less likely to be Aboriginal (36% vs. 21%, $\chi^2(1, n = 3,234) = 94.37$, $p < 0.05$).

Testing Prior to Admission to CSC

At least 60% of men and 73% of women were tested for HIV and/or HCV prior to admission (see Table 1). Testing significantly differed by gender and Aboriginal self-identification. Women were more likely to have been tested for HIV (81% vs. 67%, $\chi^2(2, n = 3,148) = 75.45$, $p < 0.05$) and HCV (73% vs. 60%, $\chi^2(2, n = 3,061) = 47.12$, $p < 0.05$) compared to men. Among men, Aboriginal inmates were more likely to have been tested for HIV (72% vs. 65%, $\chi^2(2, n = 2,737) = 6.96$, $p < 0.05$) and HCV (65% vs. 59%, $\chi^2(2, n = 2,666) = 6.08$, $p < 0.05$) compared to non-Aboriginal inmates.

An examination of all previous test locations indicated that testing in federal prison was common for both women and men. The most common location of the last test prior to admission was the community for women while for men the community and federal prison were equally likely.

Table 1

HIV and HCV Testing Before Admission to CSC Among Canadian Federal Inmates

	HIV					HCV				
	Men n = 3,006 N = 13,222		Women n = 351 N = 479			Men n = 3,006 N = 13,222		Women n = 351 N = 479		
	n	% (95% CI)	n	% (95% CI)	χ2 (df)	n	% (95% CI)	n	% (95% CI)	χ2 (df)
Tested for HIV/HCV										
Yes	1845	67 (65, 68)	268	81 (79, 83)	75.45 (2)*	1602	60 (58, 62)	234	73 (71, 76)	47.12 (2)*
No	877	30 (29, 32)	59	18 (16, 20)		987	35 (33, 36)	76	23 (20, 25)	
Don't know	95	3 (3, 4)	‡	‡		149	6 (5, 6)	13	4 (3, 5)	
Among Tested Inmates:										
Test Locations†										
Community	936	51 (49, 53)	165	62 (59, 65)	21.62 (1)*	706	45 (42, 47)	135	57 (54, 61)	23.47 (1)*
Provincial/territorial jail	549	33 (31, 35)	121	47 (43, 50)	33.59 (1)*	486	34 (32, 36)	111	49 (46, 53)	37.37 (1)*
Federal prison	1020	56 (53, 58)	138	53 (49, 56)	1.54 (1)	855	54 (51, 56)	89	40 (36, 44)	28.09 (1)*
Location of Last Test										
Community	653	38 (36, 40)	115	47 (44, 51)	20.01 (2)*	527	37 (34, 39)	95	45 (42, 49)	33.01 (2)*
Provincial/territorial jail	352	24 (22, 26)	58	25 (22, 28)		335	26 (24, 29)	65	33 (29, 37)	
Federal prison	654	38 (36, 40)	63	28 (25, 31)		543	37 (35, 40)	42	22 (19, 25)	

Note. Percentages may not add to 100 due to rounding. HIV = human immunodeficiency virus; HCV = hepatitis C virus; CSC = Correctional Service Canada; n = sample size; N = estimated population size.

‡Suppressed because fewer than five inmates reported the characteristic. †Inmates could select multiple locations.

*$p < 0.05$.

Testing at Admission to CSC

About half of men and two-thirds of women were tested for HIV and/or HCV at admission (see Table 2). Again, testing differed by gender and Aboriginal self-identification. Women were more likely to have been tested for HIV (68% vs. 48%, $\chi^2(2, n = 3,088) = 99.39$, $p < 0.05$) and HCV (67% vs. 52%, $\chi^2(2, n = 3,032) = 52.33$, $p < 0.05$) compared to men. Among women, non-Aboriginal inmates were more likely to have been tested for HIV (73% vs. 58%, $\chi^2(2, n = 322) = 25.85$, $p < 0.05$) and HCV (71% vs. 61%, $\chi^2(2, n = 312) = 23.95$, $p < 0.05$) compared to Aboriginal inmates.

The most frequently reported reason for not being tested was not being offered the test (see Table 2); a reason more frequently reported by men than women for HIV (65% vs. 53%, $\chi^2(1, n = 1,146) = 10.68$, $p < 0.05$) and HCV (63% vs. 45%, $\chi^2(1, n = 1,005) = 26.01$, $p < 0.05$). About one in five inmates indicated "lack of risk" as a reason for not being tested. Few reported fear of test result, lack of confidentiality at CSC, or discrimination at CSC as reasons for not being tested.

Among untested women, Aboriginal inmates were just as likely as non-Aboriginal inmates to report not being offered the test for HIV (53% vs. 55%, $\chi^2(1, n = 79) = 0.0725$, $p >$

0.05) and HCV (48% vs. 43%, $\chi^2(1, n = 80) = 0.6142$, $p > 0.05$). Aboriginal women were less likely than non-Aboriginal women to report "lack of risk" as a reason for not being tested for HIV (12% vs. 30%, $\chi^2(1, n = 79) = 12.00$, $p < 0.05$), and were more likely to report "knowing they had HCV" as a reason for not being tested for HCV (35% vs. 21%, $\chi^2(1, n = 80) = 5.17$, $p < 0.05$).

Table 2

HIV and HCV Testing At Admission to CSC Among Canadian Federal Inmates

	HIV					HCV				
	Men n = 3,006 N = 13,222		Women n = 351 N = 479			Men n = 3,006 N = 13,222		Women n = 351 N = 479		
	n	% (95% CI)	n	% (95% CI)	χ2 (df)	n	% (95% CI)	n	% (95% CI)	χ2 (df)
Tested for HIV/HCV										
Yes	1355	48 (47, 50)	217	68 (65, 70)	99.39 (2)*	1430	52 (50, 54)	208	67 (64, 69)	52.33 (2)*
No	1150	42 (40, 44)	86	25 (22, 27)		980	36 (35, 38)	85	25 (23, 28)	
Don't know	255	9 (8, 11)	25	8 (6, 9)		304	11 (10, 13)	25	8 (6, 10)	
Among Inmates Not Tested:										
Reason for Not Being Tested†										
It wasn't offered to me	692	65 (62, 68)	43	53 (48, 59)	10.68 (1)*	580	63 (60, 66)	37	45 (40, 50)	26.01 (1)*
I didn't think I was at risk	235	22 (19, 24)	16	21 (16, 27)	0.01 (1)	195	21 (18, 23)	14	17 (14, 21)	1.65 (1)
I was at risk, but I didn't want to know	14	2 (1, 2)	‡	‡	-	14	2 (1, 2)	‡	‡	-
I was afraid of having my name reported at CSC if I went for testing	20	2 (1, 3)	‡	‡	-	9	1 (0, 1)	‡	‡	-
I was afraid of being discriminated against at CSC if I went for testing	20	2 (1, 2)	‡	‡	-	11	1 (1, 2)	‡	‡	-
I knew I had the infection	19	2 (1, 2)	5	6 (4, 8)	15.58 (1)*	80	9 (7, 11)	23	29 (24, 34)	53.47 (1)*
I knew I didn't have the infection	185	18 (15, 20)	12	15 (11,19)	0.77 (1)	143	16 (13, 18)	10	13 (9, 17)	0.70 (1)
I was tested before I was admitted to CSC	118	11 (9, 13)	13	18 (13, 23)	5.69 (1)*	79	10 (8, 12)	13	16 (12, 21)	7.29 (1)*

Note. Percentages may not add to 100 due to rounding. HIV = human immunodeficiency virus; HCV = hepatitis C virus; CSC = Correctional Service Canada; n = sample size; N = estimated population size.
†Inmates could select multiple reasons. ‡Suppressed because fewer than five inmates reported the characteristic.
*$p < 0.05$.

Testing since Admission to CSC

More than 60% of men and 70% of women reported being tested for HIV and/or HCV since admission (see Table 3). Testing differences continued by gender. Women were more likely to have been tested for HIV (72% vs. 61%, $\chi^2(2, n = 3,044) = 33.59$, $p < 0.05$) and HCV (73% vs. 65%, $\chi^2(2, n = 3,009) = 16.91$, $p < 0.05$) compared to men. No testing differences existed by Aboriginal self-identification.

Generally, the three most common reasons for not being tested since admission included:

not being offered the test, lack of risk, and knowledge of one's negative infection status. Among women, knowledge of one's HCV-positive status was also reported by one in four not tested for HCV. As per testing at admission, men were more likely than women to report "not being offered the test" for HIV (44% vs. 28%, $\chi^2(1, n = 842) = 15.94$, $p < 0.05$) and HCV (47% vs. 30%, $\chi^2(1, n = 724) = 13.11$, $p < 0.05$); and, few reported fear of test result, lack of confidentiality at CSC, or discrimination at CSC as reasons for not being tested.

Table 3
HIV and HCV Testing Since Admission to CSC Among Canadian Federal Inmates

	HIV					HCV				
	Men n = 3,006 N = 13,222		Women n = 351 N = 479			Men n = 3,006 N = 13,222		Women n = 351 N = 479		
	n	% (95% CI)	n	% (95% CI)	χ2 (df)	n	% (95% CI)	n	% (95% CI)	χ2 (df)
Tested for HIV/HCV										
Yes	1656	61 (59, 63)	230	72 (70, 75)	33.59 (2)*	1730	65 (63, 67)	232	73 (70, 75)	16.91 (2)*
No	834	30 (29, 32)	75	23 (20, 25)		715	26 (25, 28)	65	20 (17, 22)	
Don't Know	233	9 (8, 10)	16	5 (4, 7)		243	9 (8, 10)	24	8 (6, 9)	
Among Inmates Not Tested:										
Reason for Not Being Tested†										
It wasn't offered to me	338	44 (41, 48)	20	28 (23, 34)	15.94 (1)*	306	47 (43, 51)	17	30 (24, 37)	13.11 (1)*
I don't think I'm at risk	269	36 (32, 39)	22	32 (26, 38)	0.80 (1)	186	29 (25, 32)	8	15 (9, 21)	9.50 (1)*
I am at risk, but I don't want to know	13	2 (1, 3)	‡	‡	-	11	2 (1, 3)	‡	‡	-
I'm afraid of having my name reported at CSC if I were to go for testing	13	2 (1, 2)	‡	‡	-	8	1 (0, 2)	‡	‡	-
I'm afraid of being discriminated against at CSC if I were to go for testing	15	2 (1, 3)	‡	‡	-	6	1 (0, 1)	‡	‡	-
I have the infection	24	3 (2, 4)	6	9 (5, 12)	12.11 (1)*	71	11 (9, 14)	15	25 (20, 31)	20.03 (1)*
I don't have the infection	245	31 (28, 34)	25	37 (30, 43)	1.89 (1)	208	30 (26, 33)	22	40 (34, 47)	6.24 (1)*

Note. Percentages may not add to 100 due to rounding. HIV = human immunodeficiency virus; HCV = hepatitis C virus; CSC = Correctional Service Canada; n = sample size; N = estimated population size.
†Inmates could select multiple reasons. ‡Suppressed because fewer than five inmates reported the characteristic.
*$p < 0.05$.

Testing Patterns Over Time

Testing during current sentence

More than 70% of men and 80% of women have been tested for HIV and/or HCV during their current sentence (see Table 4). Testing differences, however, existed by gender and Aboriginal self-identification. Women were more likely than men to be tested for HIV (85% vs. 71%, $\chi^2(2, n = 3,084) = 77.12$, $p < 0.05$) and HCV (83% vs 74%, $\chi^2(2, n = 3,032) = 30.83$, $p < 0.05$). Aboriginal men were more likely to be tested for HIV than non-Aboriginal men (77% vs

69%, $\chi^2(2, n = 2,678) = 10.32, p < 0.05$) while Aboriginal women were less likely than non-Aboriginal women to be tested for HIV (82% vs. 88%, $\chi^2(2, n = 323) = 7.79, p < 0.05$) and HCV (79% vs. 86%, $\chi^2(2, n = 316) = 7.23, p < 0.05$).

Ever being tested

Greater than 85% of men and women have ever been tested for HIV and HCV (see Table 4). Testing differences, however, existed by gender and Aboriginal self-identification. Women were significantly more likely than men to have ever been tested for HIV (98% vs. 88%, $\chi^2(2, n = 3,147) = 117.32, p < 0.05$) and HCV (95% vs. 86%, $\chi^2(2, n = 3,092) = 44.89, p < 0.05$); and, Aboriginal men were more likely to have ever been tested for HIV (92% vs. 86%, $\chi^2(2, n = 2,732) = 9.23, p < 0.05$) compared to non-Aboriginal men.

Table 4
HIV and HCV Testing Over Time and Self-Reported Test Results for Canadian Federal Inmates

	HIV					HCV				
	Men n = 3,006 N = 13,222		Women n = 351 N = 479			Men n = 3,006 N = 13,222		Women n = 351 N = 479		
	n	% (95% CI)	n	% (95% CI)	χ2 (df)	n	% (95% CI)	n	% (95% CI)	χ2 (df)
Testing During Current Sentence										
Yes	1,948	71 (69, 72)	278	85 (83, 87)	77.12 (2)*	1,985	74 (72, 75)	265	83 (81, 85)	30.83 (2)*
No	588	21 (20, 23)	40	11 (10, 13)		484	17 (16, 19)	39	11 (10, 13)	
Don't know	219	8 (7, 9)	11	3 (2, 4)		241	9 (8, 10)	18	6 (4, 7)	
Ever Been Tested										
Yes	2,458	88 (86, 89)	324	98 (97, 98)	117.32 (2)*	2376	86 (85, 87)	308	95 (93, 96)	44.89 (2)*
No	218	8 (7, 9)	8	2 (2, 3)		209	7 (6, 8)	7	2 (1, 3)	
Don't know	138	5 (4, 6)	‡	‡		181	7 (6, 8)	11	4 (2, 5)	
Among Inmates Ever Tested:										
Ever Told Have HIV/HCV	103	4.5 (3.6, 5.4)	24	7.9 (6.2, 9.6)	11.19 (1)*	678	30.8 (28.8, 32.7)	114	37.0 (34.1, 39.9)	9.61 (1)*

Note. Percentages may not add to 100 due to rounding. HIV = human immunodeficiency virus; HCV = hepatitis C virus; n = sample size; N = estimated population size.
‡Suppressed because fewer than five inmates reported the characteristic.
*p < 0.05.

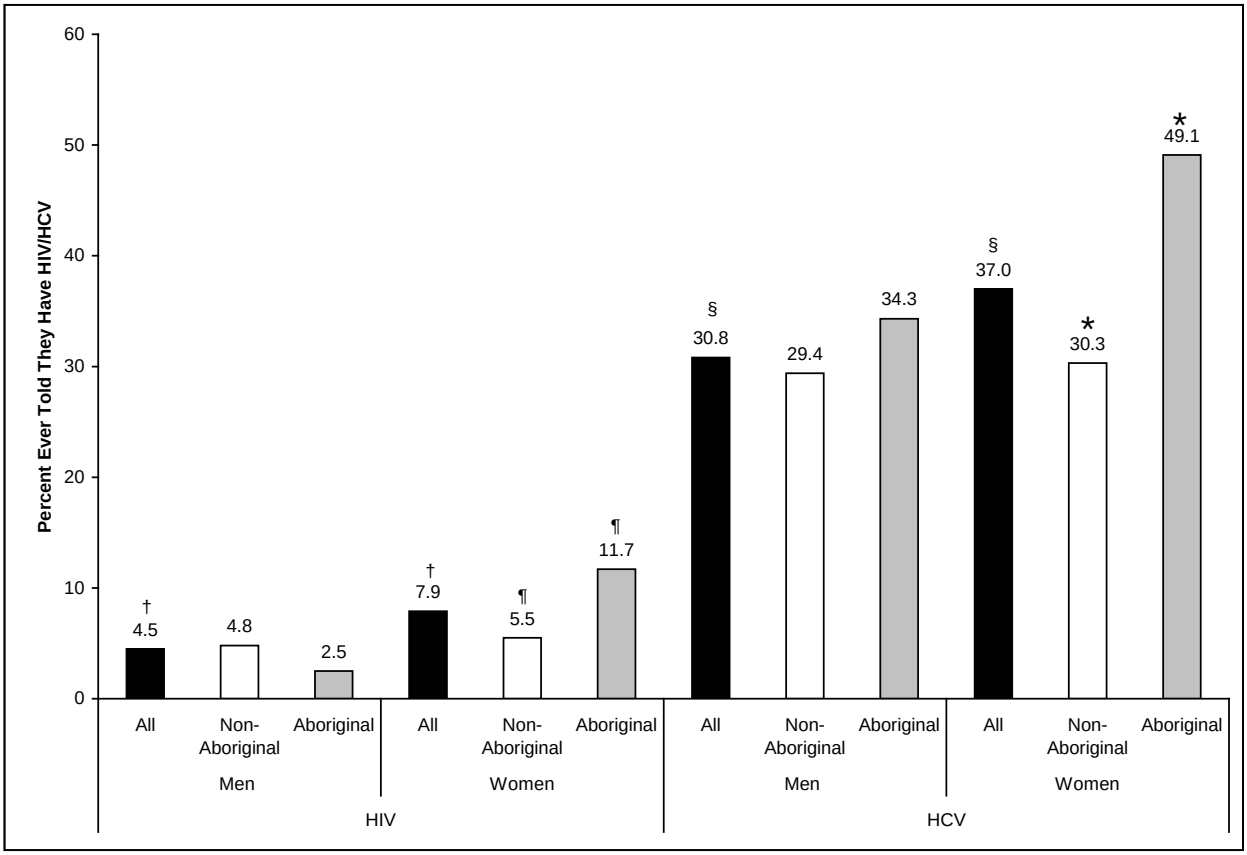
Ever Being Told You Have an HIV/HCV Infection

Among inmates who had ever been tested for HIV, the rate of reported infection was 76% greater among women than men (7.9% vs. 4.5%, $\chi^2(1, n = 2,646) = 11.19, p < 0.05$) (see Table 4 and Figure 1). This gender differential, however, was primarily driven by the high rate among Aboriginal women (11.7%, 95% CI: 8.6, 14.8); a rate more than two times greater than the rate among non-Aboriginal women (5.5%, 95% CI: 3.5, 7.6) and all men (4.5%, 95% CI: 3.6, 5.4).

Similarly, among inmates who had ever been tested for HCV, the rate of reported

infection was 20% greater among women than men (37.0% vs. 30.8%, $\chi^2(1, n = 2{,}586) = 9.61$, $p < 0.05$) (see Table 4 and Figure 1). Again, this gender differential was primarily driven by the high rate among Aboriginal women (49.1%, 95% CI: 44.5, 53.6); a rate more than 50% greater than that among non-Aboriginal women (30.3%, 95% CI: 26.7, 34.0) and all men (30.8%, 95% CI: 28.8, 32.7).

Figure 1. Percent Reporting a Positive HIV/HCV Test Result by Gender and Aboriginal Self-Identification Among Canadian Federal Inmates Who Have Ever Been Tested



Note. Rates were compared between men and women, and between Aboriginal and non-Aboriginal inmates within each gender. Rates with the same symbol significantly differ ($p < 0.05$). HIV = human immunodeficiency virus; HCV = hepatitis C virus.

Attitudes About Discrimination and Confidentiality Among Inmates Ever Told They Have HIV/HCV

Among inmates ever told they have HIV, more than half were worried about being discriminated against in CSC because of their HIV status (see Table 5). Conversely, among inmates ever told they have HCV, less than one in five reported concerns about discrimination and confidentiality in CSC.

Table 5

Attitudes About Discrimination and Confidentiality Among Canadian Federal Inmates Ever Told They Have HIV/HCV

	HIV					HCV				
	Men n = 103 N = 518		Women n = 24 N = 37			Men n = 678 N = 3,509		Women n = 114 N = 168		
	n	% (95% CI)	n	% (95% CI)	χ2 (df)	n	% (95% CI)	n	% (95% CI)	χ2 (df)
Discrimination										
I am worried about being discriminated against in CSC because I have HIV/HCV	34	69[¶] (62, 76)	7	51[¶] (36, 66)	3.70 (1)	112	19 (16, 23)	12	14(10, 19)	2.11 (1)
Confidentiality										
I am afraid of having my name reported in CSC because I have HIV/HCV	§	§	6	43[¶] (32, 53)	1.13 (1)	86	15 (12, 18)	12	14[¶] (10, 19)	0.08 (1)

Note. HIV = human immunodeficiency virus; HCV = hepatitis C virus; CSC = Correctional Service Canada; n = sample size; N = estimated population size.

[¶]Greater than 20% to 50% missing data (based on weighted distribution). [§]Suppressed because greater than 50% missing data (based on weighted distribution).

*p <0.05.

Attitudes About Testing Among Inmates Never Told They Have HIV/HCV

Among inmates who have never been told they have HIV, less than one in five reported concerns about discrimination, confidentiality, or fear of test results (see Table 6). Such concerns were even less prevalent among inmates who had never been told they have HCV. Further, substantial proportions were more willing to be tested for HIV and HCV as compared to when they were admitted or in the community. In particular, men were significantly more likely than women to report an increased willingness to be tested for HIV (43% vs. 34%, $\chi^2(1, n = 2,175) = 12.69, p < 0.05$) and HCV (40% vs. 32%, $\chi^2(1, n = 1,788) = 8.53, p < 0.05$) compared to when they were admitted.

With respect to fear of test result and willingness to be tested, differences existed by Aboriginal self-identification (see Figure 2). Generally, compared to non-Aboriginal inmates, a greater proportion of Aboriginal inmates indicated they were not willing to be tested because of fear of the test result, and that they were more willing to be tested now than at admission or when they were in the community.

Table 6

Attitudes About Testing Among Canadian Federal Inmates Never Told They Have HIV/HCV

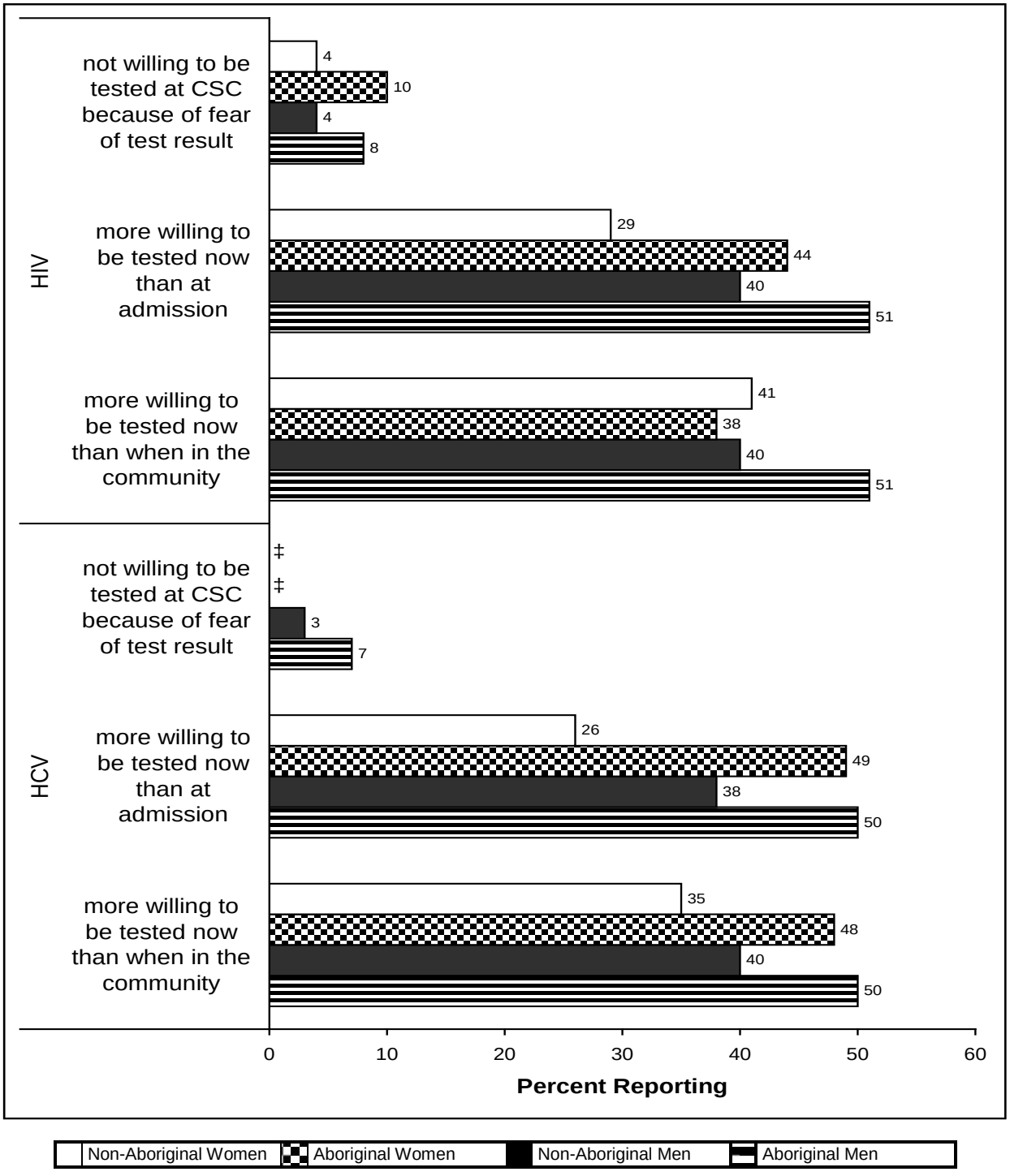
	HIV					HCV				
	Men n = 2,591 N = 12,704		Women n = 294 N = 442			Men n = 1,980 N = 9,713		Women n = 204 N = 311		
	n	% (95% CI)	n	% (95% CI)	$\chi 2$ (df)	n	% (95% CI)	n	% (95% CI)	$\chi 2$ (df)
Discrimination I am worried about being discriminated against in CSC if I test positive for HIV/HCV	344	17[¶] (16, 19)	31	14[¶] (12, 17)	2.78 (1)	184	12 (10, 13)	12	7 (5, 9)	6.74 (1)*
Confidentiality I am afraid of having my name reported in CSC if I test positive for HIV/HCV	347	17[¶] (16, 19)	30	14[¶] (11, 17)	3.05 (1)	201	12 (11, 14)	13	8[¶] (6, 10)	5.22 (1)*
Fear of Test Result I am not willing to be tested in CSC because I'm afraid of the result of the HIV/HCV test	99	5[¶] (4, 6)	12	6[¶] (4, 7)	0.42 (1)	63	4 (3, 5)	5	3[¶] (2, 5)	0.50 (1)
Willingness to be Tested I'm now more willing to get tested for HIV/HCV than when I went through the admission process to CSC	801	43[¶] (40, 45)	73	34[¶] (31, 37)	12.69 (1)*	644	40 (38, 43)	53	32[¶] (29, 36)	8.53 (1)*
I'm now more willing in CSC to have an HIV/HCV test than when I was in the community	817	43[¶] (40, 45)	87	40[¶] (36, 43)	1.27 (1)	671	42 (39, 44)	63	39[¶] (35, 43)	1.45 (1)

Note. HIV = human immunodeficiency virus; HCV = hepatitis C virus; CSC = Correctional Service Canada; n = sample size; N = estimated population size.

[¶]Greater than 20% to 50% missing data (based on weighted distribution).

*$p < 0.05$.

Figure 2. Attitudes Towards HIV/HCV Testing by Gender and Aboriginal Self-Identification for Canadian Federal Inmates Never Told They Have HIV/HCV



Note. For each gender, Aboriginal inmates were compared to non-Aboriginal inmates. All comparisons were statistically significant except for "more willing to be tested [for HIV] than when in the community" among women. HIV = human immunodeficiency virus; HCV = hepatitis C virus; CSC = Correctional Service Canada.
‡Suppressed because fewer than five inmates reported the characteristic.

Treatment Experiences of Inmates Ever Told They Have HIV

Among inmates ever told they have HIV, 87% had seen a medical professional regarding treatment and started taking anti-retrovirals (see Table 7). Although the majority (55%) started anti-retroviral treatment in the community, a substantial proportion initiated treatment at CSC (39%). Those inmates who had sought medical treatment but had not started taking anti-retrovirals (9%) were predominantly following the advice of their physician.

Among inmates who had started anti-retroviral medication, 61% were currently taking their medication. Small sample sizes prevented an evaluation of reasons for not currently taking anti-retrovirals. Sixty percent reported previous treatment interruptions at CSC. Among inmates reporting past treatment interruptions, the most common reasons were a temporary unavailability of medication at the institutional pharmacy (44%), inmates taking themselves off treatment (36%), and transfers between institutions (33%).

Table 7
Treatment Experiences of Canadian Federal Inmates Ever Told They Have HIV

	Men and Women n = 127 N = 555	
	n	% (95% CI)
Treatment Status		
Have not seen a medical professional about treatment	‡¶	‡¶
Have seen a medical professional about treatment but have not started anti-retrovirals	8	9[¶] (5, 11)
Have seen a medical professional about treatment and have started anti-retrovirals	72	87[¶] (81, 92)
Among Inmates Seeing a Medical Professional but Not Starting Anti-retrovirals:		
Reason Not Starting Anti-retrovirals		
The doctor said that I shouldn't start medication yet	6	82[a]
I didn't want to go on medication	‡	‡
I don't know	‡	‡
Among Inmates Seeing a Medical Professional and Starting Anti-retrovirals:		
Location of Treatment Initiation		
In the community	31	55[¶] (46, 64)
In provincial/territorial jail	‡¶	‡¶
In federal prison	22	39[¶] (30, 49)
Currently Taking Medication		
No	20	39[¶] (30, 49)
Yes	31	61[¶] (51, 70)
Past Treatment Interruptions in CSC		
No	23	40[¶] (27, 53)
Yes	31	60[¶] (47, 73)
Among Inmates Reporting Past Treatment Interruption(s) in CSC:		
Reasons for Interruption(s)[†]		
I was transferred from another institution and my medication was temporarily unavailable	10	33 (19, 48)
My medication was temporarily unavailable because the pharmacy didn't have any	12	44 (32, 56)
I took myself off treatment for HIV	11	36 (22, 49)
My medication ran out before I asked for a new prescription	6	16 (6, 27)
The medication was temporarily unavailable for some other reason	‡	‡
My doctor took me off treatment for HIV	‡	‡

Note. HIV = human immunodeficiency virus; CSC = Correctional Service Canada; n = sample size; N = estimated population size.
[¶]Greater than 20% to 50% missing data (based on weighted distribution). [‡]Suppressed because fewer than five inmates reported the characteristic. [†]Inmates could select multiple reasons.
[a]Confidence interval not calculable because of lack of intra-stratum variance.

Treatment Experiences of Inmates Ever Told They Have HCV

Among inmates ever told they have HCV, 33% had seen a CSC medical professional regarding treatment and initiated medication (see Table 8). Treatment was successful for 51%, unsuccessful for 15%, and discontinued because of side effects for 12%. Approximately 21% were still taking their medication at the time of questionnaire completion.

Among inmates ever told they have HCV, 55% had seen a CSC medical professional regarding treatment but had not started on medication. The most frequently reported reasons for

not taking medication included: being on a waiting list or in the process of starting (23%), being ineligible or unsuitable (23%), feeling fine (17%), and hearing hepatitis C medication makes one sick (14%). Few indicated concerns about confidentiality (1%) or safety (6%) as reasons for not taking the medication. Among the men, differences existed by Aboriginal self-identification. Specifically, Aboriginal men were more than twice as likely as non-Aboriginal men to indicate a lack of interest in taking medication (19% vs. 8%, $\chi^2(1, n = 319) = 6.62, p < 0.05$).

Table 8
Treatment Experiences of Canadian Federal Inmates Ever Told They Have HCV

	Men and Women n = 792 N = 3,677	
	n	% (95% CI)
Treatment Status		
Have not seen a medical professional at CSC about treatment	80	12 (9, 15)
Have seen a medical professional at CSC about treatment but did not take the medication	390	55 (51, 58)
Have seen a medical professional at CSC about treatment and took the medication	242	33 (30, 37)
Among Inmates Seeing a Medical Professional at CSC but Not Taking the Medication:		
Reason(s) for Not Taking the Medication[†]		
I felt fine	67	17 (13, 21)
I wasn't interested in taking any hepatitis C medication	39	10 (7, 13)
I heard that hepatitis C medication made you sick	49	14 (10, 17)
I was told that I was not eligible/suitable	84	23 (19, 28)
I didn't want people in CSC to find out/know about my hepatitis C	5	1 (0, 3)
I didn't feel safe about taking hepatitis C medication here in prison	19	6 (3, 9)
I'm on a waiting list or in the process of starting	95	23 (18, 27)
Among Inmates Seeing a Medical Professional at CSC and Taking the Medication:		
Outcome of Treatment[†]		
I'm still taking the hepatitis C medication	52	21 (16, 26)
The medication worked and I was told that hepatitis C could no longer be detected in my blood	124	51 (45, 58)
The medication didn't work for me	31	15 (10, 20)
I or the doctor decided to discontinue treatment because of the side effects	24	12 (7, 17)
I was taken off treatment because I was doing drugs	‡	‡

Note. HCV = hepatitis C virus; CSC = Correctional Service Canada; n = sample size; N = estimated population size.
[†]Inmates could select multiple responses.[‡]Suppressed because fewer than five inmates reported the characteristic.

Discussion

Overall, the majority of inmates were tested during their current sentence at CSC. Self-reported rates of HIV and HCV infections among ever tested inmates were substantially higher than Canadian population rates, particularly among Aboriginal women inmates. The NIIDRBS identified opportunities to improve the testing and treatment experiences of Canadian federal inmates. More detailed findings are summarized below.

More than 70% of men and 80% of women have been tested for HIV and/or HCV while in federal prison for their current sentence. This high rate of testing compares favourably to the Canadian adult population where only 29% of women and 24% of men have ever been tested for HIV (PHAC, 2007). It also appears higher than more dated rates of testing among Canadian male inmates (Burchell et al., 2003; Price Waterhouse, 1996), but is in line with more recent rates among Canadian federal women inmates (Rehman et al., 2004). The rate of HCV testing at admission differed between CSC surveillance data and the NIIDRBS. Specifically, CSC's surveillance data indicated that 71% of inmates were tested for HCV on admission to CSC in 2004. In comparison, the NIIDRBS indicated 53% of inmates were tested on admission. Methodological differences probably account for the disparity in rates. Specifically, the NIIDRBS provided self-report estimates of testing for a sample of inmates who were admitted over a range of years and still resided within the penitentiary at the time of the study. Conversely, CSC's surveillance system provides estimates of the proportion of all inmates tested at admission by calendar year of admission (CSC, 2008b).

The rate of testing differed by gender and Aboriginal self-identification. Compared to men, women were consistently more likely to be tested for HIV and HCV over time. The relationship between Aboriginal self-identification and testing, however, differed by gender. Being Aboriginal was associated with more testing among men and less testing among women. Further research is necessary to determine why the relationship between Aboriginal self-identification and testing is not consistent across gender.

The most commonly reported reason for not being tested at CSC was not being offered the test. This is surprising given that inmates meet with a health professional shortly after admission. It may be that some inmates were unable to recall being offered tests in the distant past, particularly if they were overwhelmed with their circumstances during the admission

process. Few inmates reported fear of test result, lack of confidentiality at CSC, or discrimination at CSC as reasons for not being tested. Although some inmates may have forgotten being offered the test when first admitted to CSC, the findings suggest that the rate of testing could be increased by further promoting screening and testing throughout incarceration; particularly since substantial proportions of inmates were more willing to be tested for HIV and HCV as compared to when they were admitted or in the community. Additional research is necessary, however, to provide evidence for policy options available for optimizing infectious disease screening and testing among inmates. Such research will involve analyzing CSC surveillance and NIIDRBS data as well as reviewing research external to CSC. Another commonly reported reason for not being tested was "lack of risk"; a reason previously reported in studies involving Canadian inmates. To determine if inmates understand their testing needs, future NIIDRBS analyses will explore the relationships between reported risk-behaviours, self-perceived risk for infection, and HIV/HCV testing status.

The overall rate of HIV (4.6%) and HCV (31.0%) infections among tested inmates were substantially greater than Canadian population rates: 0.3% for HIV (UNAIDS, 2006) and 0.8% for HCV (Zou et al., 2001). The rates were also greater among women inmates (HIV 7.9%, HCV 37.0%) than men inmates (HIV 4.5%, HCV 30.8%), but this gender differential was driven by the high rates of self-reported infections among Aboriginal women. Specifically, the rate of self-reported HIV infection among Aboriginal women (11.7%) was more than two times greater than the rate among non-Aboriginal women (5.5%) and all men (4.5%). Similarly, the rate of self-reported HCV infection among Aboriginal women (49.1%) was more than 50% greater than the rate among non-Aboriginal women (30.3%) and all men (30.8%). Consequently, CSC needs to ensure that culturally appropriate, effective interventions that decrease risk-behaviours and increase harm-reducing behaviours are offered to meet the needs of Aboriginal women.

Comparisons of NIIDRBS rates of HIV and HCV infections with other published studies are limited by differences in methodology. The NIIDRBS relied on self-report from ever tested inmates sampled from the entire inmate population, including entrants. In comparison, previous research has predominantly relied on the testing of blood or saliva (biosampling) and has often limited its participants to offenders entering correctional institutions. Estimates based on self-report are less reliable than those based on biosampling (Thornton et al., 2000). Further, inmates who have ever been tested for HIV and/or HCV may represent a higher risk population often

targeted by public health initiatives. For example, Thorton et al. (2000) found that inmates who injected drugs were about four times more likely to have been tested for HIV and about eight times more likely to have been tested for HCV compared to inmates never injecting drugs. Thus, infection rates based on ever tested inmates may overestimate the rate of infection in the total inmate population.

Notwithstanding methodological differences, infection rates derived from the NIIDRBS are consistent with published estimates. According to recent Canadian, American, European, and Australian research using biosampling, HIV-positive rates among incarcerated adults range from 0% to 9.9% (Allwright et al., 2000; Altice et al., 2005; Babudieri et al., 2005; Barros, Ramos, & Lucas, 2008; Butler & Papanastasiou, 2008; CDC, 2006; Christensen, Krarup, Niesters, Norder, & Georgsen, 2000; CSC, 2008b; De et al., 2004; de Ravello et al., 2005; Ford et al., 2000; Harrison, Bachman, Freeman, & Inciardi, 2001; Kassira et al., 2001; Long et al., 2001; Macalino et al., 2004; Poulin et al., 2007; Rotily et al., 2001; Weild et al., 2000; Wu, Baillargeon, Grady, Black, & Dunn, 2001). A recent meta-analysis of international research employing biosampling found HCV infection rates ranged from 2% to 58% among adults in the general inmate population. In most studies, however, 30% to 40% of inmates were HCV-positive (Vescio et al., 2008). Further, in those studies producing gender-specific estimates, rates of HIV and HCV infections were always higher among women (Butler & Papanastasiou, 2008; Kassira et al., 2001; Poulin et al., 2007; Vescio et al., 2008; Weild et al., 2000; Wu et al., 2001).

More than half of HIV-positive inmates worried about discrimination in CSC because of their HIV status. To alleviate fears of discrimination among all inmates, particularly HIV-positive inmates, awareness could be increased about HIV transmission pathways (i.e., how HIV can and cannot be transmitted) and CSC's policies regarding privacy, confidentiality, and the intolerance of discrimination. Particular attention to privacy and confidentiality must be paid when delivering health care in the correctional environment, as inmates are often aware of other's movements to health care.

About 53% of HIV-positive inmates were currently taking anti-retrovirals (53% = 87% had ever started taking anti-retrovirals X 61% were currently taking anti-retrovirals). This treatment rate is consistent with previously reported rates for inmates: 36% to 69% (Baillargeon et al., 2000; Blanco et al., 2005; CSC, 2008b; Ruiz Perez et al., 2006). It is, however, less than that reported for the U.S. general population (excludes the homeless): 69% (Kidder et al., 2007).

Future research should attempt to determine what proportion of HIV-positive inmates clinically eligible for anti-retrovirals actually receive them. Altice et al. (2001) have shown treatment rates increase to 80% among inmates clinically eligible for anti-retrovirals; a rate which compares favourably with U.S. general population rates (53% to 85%) (Cunningham et al., 2000; Kaplan et al., 1999; McNaghten et al., 2003).

Among HIV-positive inmates who had ever started anti-retroviral treatment, 60% reported previous treatment interruptions at CSC. Some interruptions were due to practical operational issues and others to the inmate's own behaviour. According to the NIIDRBS, treatment interruptions at CSC could be reduced through increased efforts to ensure: awareness of institutional pharmacy policies regarding anti-retroviral supply and prescription refills; treatments are not interrupted during transfers between institutions; and, inmates are aware of the health consequences of their non-compliance with treatment.

About 33% of HCV-positive inmates had ever seen a CSC medical professional and initiated treatment. Of those initiating treatment, 51% reported it was successful. These treatment and efficacy rates are consistent with previous inmate research and compare favourably with treatment and efficacy rates reported for the general community. Nevertheless, an opportunity for improvement may exist. Among HCV-positive inmates who had seen a CSC medical professional but had not started taking medication, 23% reported being in the process of starting or being on a waiting list. This finding may indicate that additional resources are needed to ensure timely access to HCV treatment in the correctional environment.

Limitations

The primary limitations of this research, such as measurement error and social desirability bias, are typical of cross-sectional self-report surveys that attempt to capture detailed information about sensitive issues over time. Due to the number and complexity of issues being assessed, the questionnaire was a lengthy 50 pages. This complexity and length may have impacted the results. Since events taking place in the past are more difficult to recall, findings relating to past testing and treatment experiences may be less accurate. Other research designs, such as longitudinal research employing biosampling, may have been more effective but are difficult to conduct in correctional settings and were precluded in this instance due to competing operational issues.

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Appendix A: Canadian Federal Inmate Characteristics by Data Source

	NIIDRBS (n=3,357) (N=13,701)					CSC Administrative Data (N=13,041)			
	Men (n=3,006) (N=13,222)		Women (n=351) (N=479)		X^2(df) or $F(v_1,v_2)$	Men (N=12,574)		Women (N=467)	
Characteristics	n	Mean or % (95% CI)	n	Mean or % (95% CI)		N	Mean or %	N	Mean or %
Age (years)	2,899	38 (38, 39)	335	34 (34, 35)	106.64* (1,3192)	12,554	38	466	35
Highest level of education at time of survey (%)									
Less than highschool diploma	1,252	46 (44, 48)	156	48 (45, 51)	0.68	-	-	-	-
Highschool diploma or greater	1,533	54 (52, 56)	176	52 (49, 55)	(1)	-	-	-	-
Marital status (%)									
Married/common law	884	31 (29, 32)	121	35 (32, 38)	4.90*	4,839	39	165	36
Single/separated/divorced/widowed	2,043	69 (68, 71)	224	65 (62, 68)	(1)	7,654	61	297	64
Country of birth (%)									
Canada	2,622	89 (88, 90)	320	92 (91, 94)	5.87*	11,175	89	412	89
Other	305	11 (10, 12)	26	8 (6, 9)	(1)	1,386	11	53	11
Aboriginal self-identification (%)									
Aboriginal	612	21 (19, 22)	129	36 (33, 38)	94.37*	2,466	20	147	32
Non-Aboriginal	2,281	79 (78, 81)	212	65 (62, 67)	(1)	10,023	80	310	68
Race (%)									
White/caucasian	1,852	65 (63, 67)	179	55 (52, 58)	82.52*	8,482	68	258	56
Aboriginal	612	21 (20, 23)	129	36 (34, 38)	(2)	2,466	20	147	32
Other visible minority	356	14 (13, 15)	28	9 (7, 11)		1,541	12	52	11
Language most comfortable speaking (%)									
English	2,154	78 (77, 79)	302	84 (83, 86)	32.90*	8,425	74	317	79
French	719	20 (20, 21)	37	14 (13, 15)	(2)	2,342	21	62	15
Other	54	2 (1, 2)	6	2 (1, 2)		642	6	22	5
Years served of current sentence	2,702	4.8 (4.6, 5.1)	318	2.2 (2.0, 2.4)	274.15* (1, 2975)	12,554	4.4	466	3.0
Region (%)									
Atlantic	317	10 (10, 10)	50	13 (13, 13)	-	1,297	10	62	13
Quebec	868	24 (24, 24)	42	16 (16, 16)		2,990	24	73	16
Ontario	627	27 (27, 27)	84	26 (26, 26)		3,344	27	123	26
Prairie	847	25 (25, 25)	137	33 (33, 33)		3,168	25	151	32
Pacific	347	15 (14, 15)	38	13 (12, 13)		1,772	14	58	12
Security level (%)									
Maximum	581	21 (21, 21)	0		-	3,199	25	102	22
Medium	1,488	60 (60, 60)	0			6,934	55	196	42
Minimum	869	18 (18, 18)	4	1 (1, 1)		1,907	15	161	34
Unknown	68	1 (1, 1)	347	99 (99, 99)		534	4	8	2

Note. Percentages may not add to 100 due to rounding. Education level derived from administrative data is not comparable to NIIDRBS estimates because of inconsistency in method of capture (i.e., standardized testing at admission versus self-report at time of survey). Since NIIDRBS security level is based on institutional security level, it is unknown for the majority of women inmates residing in multi-level security institutions. The chi-square test was not calculable for region because of lack of stratum variance. NIIDRBS = 2007 National Inmate Infectious Diseases & Risk-Behaviours Survey; CSC = Correctional Service Canada; n = sample size; N = estimated population size.
*$p < 0.05$.