

\_\_\_\_\_ **Research Report** \_\_\_\_\_

**Use of bleach and the methadone  
maintenance treatment program as harm  
reduction measures in Canadian Penitentiaries**

Ce rapport est également disponible en français. Pour en obtenir un exemplaire, veuillez vous adresser à la Direction de la recherche, Service correctionnel du Canada, 340, avenue Laurier Ouest, Ottawa (Ontario) K1A 0P9.

This report is also available in French. Should additional copies be required, they can be obtained from the Research Branch, Correctional Service of Canada, 340 Laurier Ave. West, Ottawa, Ontario K1A 0P9.



**Use of bleach and the methadone maintenance treatment program as  
harm reduction measures in Canadian Penitentiaries**

Jennie Thompson

Dianne Zakaria

&

Ashley Jarvis

Correctional Service of Canada

August 2010



## **Acknowledgements**

The authors would like to thank Frederic Borgatta for his work on the development and implementation of the National Inmate Infectious Diseases and Risk Behaviours Survey (NIIDBRS) and the NIIDRBS Working Group for their guidance and insightful feedback throughout questionnaire design and report development (Jacqueline Arthur, Katherine Dinner, Marie-Line Gilbert, Emily Henry, Gayatri Jayaraman, Rhonda Kropp, Tammy Maheral, Marissa McGuire, Mary Beth Pongrac, Jonathan Smith, Greg Springer, and Jill Tarasuk). The support, cooperation and dedication of the National Senior Project Manager (Heather Lockwood), the Regional Survey Coordinators (Kimberley Andreassen, Michelle Beyko, Teresa Garrahan, David Lewis, and Hélène Racicot) and institutional survey coordinators (Tim Ankers, Cathy Ball, Bob Barkley, Louise Barriage, Gaston Bélanger, Réjean Bérard, Diane Bergeron, Sherry Blakeney, Laura Bodvarsen, Lori Boss-Greenhow, Michèle Boutin, Celeste Bowes-Koep, Randall Breaton, Pam Briar, Marsha Brown, Bev Bruce, Joan Christianson, Pénélope Cossette, Shelley Crawford, Solange Cyr, Johanne Demètre, Micheline Désilets, Penny Drury, Mary Ann Dundas, Annette Dupuis, Claire Erkan, Donna Fillmore, Linda Fumerton, Debbie Fury, Lyne Giroux, Carla Grace, Sue Groody, Derek Hutchings, Kevin Jean, Pat Jones, Virginia Jugo, Wally Klein, Luc Lavigne, Sylvain Lefebvre, Gail Lévesque, Cherie Maceachern, Daniel Major, Alison Martin, Penny Martin, Dorothy McGregor, Mark Noon-Ward, Tim O'Hara, Enid Oke, Viateur Perreault, Christian Rivest, Johanne Roy, Eva Sabir, Holly Samuels, Suzanne Scott, Dale Shackelford, Marg Smith, Natalie Soroka, Stéphanie Fournier, Jeff Strange, Paul Taylor, Tana Taylor, Brenda Tilander-Masse, Liza Trohan, Darlene Turk, Mario Veilleux, Vicki Vervynck, Katherine Visser, Lorena Watson, Marilyn Winters, and Carol Young) was integral to survey implementation and data collection. Finally, none of this work would have been possible without the participation of Correctional Service of Canada management, federal penitentiary staff and inmates.



## **Executive Summary**

To prevent the transmission of blood-borne infections (BBIs), including human immunodeficiency virus (HIV) and hepatitis C virus (HCV), Correctional Service Canada (CSC) directs that bleach be “easily and discreetly” accessible to inmates for the cleaning of injecting, tattooing and piercing equipment (CSC, 2004). Further CSC provides a Methadone Maintenance Treatment Program (MMTP) to inmates severely addicted to opiates (CSC, 2003). To date, there has not been a thorough examination of the demand for bleach (defined as any attempt to access bleach between November 2006 and completion of the survey) and use of MMTP for the purpose of harm reduction in Canadian Penitentiaries.

To address this gap in knowledge, CSC conducted the National Inmate Infectious Diseases and Risk-Behaviours Survey (NIIDRBS) in 2007. This questionnaire was completed by a large sample of Canadian federal inmates (n=3,370). This report presents NIIDRBS findings on the use of injection drug use (IDU), tattooing and piercing; awareness of and demand for bleach; and, participation in MMTP.

Overall, a minority of inmates reported risk factors for BBIs: 17% reported injecting drugs, 38% reported tattooing, and 13% reported piercing while at CSC. These inmates may be exposed to BBIs through the use of someone else’s equipment for injecting, tattooing, and piercing. A large proportion of inmates who used injection drugs reported using someone else’s used equipment (68%). Notably, fewer inmates used someone else’s equipment for tattooing and piercing on a CSC range (ranging from 15% to 40%).

Among all inmates, 87% reported being aware of CSC’s policy ensuring easy access to bleach and 57% reported a demand for bleach. The majority of inmates who engaged in injecting, tattooing and/or piercing at CSC reported using bleach-cleaned equipment. Furthermore, demand for bleach was higher among inmates who reported using someone else’s used injecting equipment. Overall, bleach is being used as intended among inmates engaging high risk-behaviours associated with the transmission of BBIs.

Thirty-seven percent of inmates who had a demand for bleach reported problems accessing it. Inmates reported maintenance issues as the primary problem in accessing bleach (men 69%, women 48%). Forty-eight percent of women also reported that they had to ask staff for bleach. Overall availability of bleach could be increased through decreasing these two issues.

Generally, inmates who reported injecting opiates were more likely to use someone else’s used injecting equipment than inmates who reported injecting non-opiates. Hence, injecting opiates may increase the risk of exposure to BBIs through increased risky injecting practices. MMTP is a harm reduction measure offered by CSC to reduce the frequency of opiate use and thus exposure to BBIs. At the time of the survey, 7% of inmates reported being on MMTP. Among those who reported being on MMTP, 60% did not report opiate use recently in a penitentiary. For those not on the program but who had previously tried to get on it, 53% reported not meeting the program requirements; the remaining inmates reported that they had taken themselves off (29%), were

taken off because of diversion (<1%), or they were taken off for other reasons (17%).

Overall, the NIIDRBS provides descriptive estimates of inmates' risk- and harm-reducing behaviours associated with the transmission of BBIs. The survey's cross-sectional design, however, limited the measurement of some indicators. Future research should examine the direct associations between demand for bleach, the use of bleach as a cleaning product and factors associated with using non-sterile equipment. In particular, greater knowledge is needed regarding why inmates do not use the available harm reduction measures. Furthermore, greater detail on risk-behaviours prior to and after MMTP initiation would assist in examining and possibly improving program effectiveness.





## Table of Contents

Acknowledgements.....	ii
Executive Summary .....	iii
Table of Contents .....	v
List of Tables .....	vii
List of Appendices .....	viii
Introduction.....	1
Method .....	5
Development of Survey Instrument.....	5
Measures .....	5
Awareness and Use of Bleach.....	6
Awareness of CSC’s Policy Ensuring Easy Access to Bleach .....	6
Recent Demand for Bleach. ....	6
Problems Accessing Bleach.....	6
Behaviours Associated with IDU, Tattooing, and Piercing while in a Penitentiary.....	6
Recent Use of Someone Else’s Needle after they used it. ....	7
Recent Sharing of a Needle with a Person with a Positive or Unknown Blood-borne Infection (BBI) Status. ....	7
Recent Use of Someone Else’s Works after they used them. ....	7
Use of Bleach-Cleaned Needle at Last Injection. ....	7
Using Someone Else’s Tattoo Equipment for Your Tattoos. ....	8
Using Someone Else’s Tattoo Ink for Your Tattoos.....	8
Use of Bleach-Cleaned Tattoo Equipment. ....	8
Using Someone Else’s Piercing Equipment for Your Piercing. ....	8
Use of Bleach-Cleaned Piercing Equipment.....	8
Drug-Related Behaviours and Use of the Methadone Maintenance Treatment Program (MMTP) and Reasons for Not Being on the Program .....	8
Recent Use of Opiates while in a Penitentiary.....	9
Drug History. ....	9
Use of MMTP. ....	9
Reasons for not being on MMTP at time of survey.....	9
Sampling .....	10

Survey Design and Sample Size Estimation.....	10
Sample Lists.....	10
Survey Implementation.....	11
Selection and Training of Survey Coordinators.....	11
Promoting Awareness of the Survey.....	11
Inmate Recruitment.....	11
Data Collection .....	12
General Analytical Approach .....	13
Statistical Procedures for Complex Sample Surveys.....	13
Question Non-Response and Small Subpopulations.....	14
Specific Analyses.....	15
Point Estimates and Confidence Intervals of Key Behaviours .....	15
Examining Associations Between Key Variables using Logistic Regression .....	15
Results.....	16
Representativeness of the Sample and Population Characteristics.....	16
Bleach .....	16
Awareness .....	16
Demand.....	17
Policy Awareness and Demand .....	20
Access .....	21
Injection Drug Use.....	21
Use of Someone Else’s Used Injecting Equipment .....	21
Needle-cleaning Practices .....	22
Tattooing and Piercing.....	24
Use of Someone’s Else Equipment.....	24
Equipment-cleaning Practices.....	25
Methadone Maintenance Treatment Program (MMTP) .....	27
Injection of Opiates and Use of Someone Else’s Used Equipment .....	27
Participation .....	28
Discussion .....	30
References.....	34
Annexes.....	37



## List of Tables

Table 1 Awareness CSC's policy ensuring easy access to bleach and the demand for bleach by demographic characteristics.....	17
Table 2 Awareness of CSC's policy about ease of access to bleach and the demand for bleach by incarceration characteristics .....	19
Table 3 Problems accessing bleach among inmates with a demand for bleach.....	20
Table 4 Drug-use and sharing of someone else's used injecting equipment in a penitentiary ...	22
Table 5 Demand for bleach by recent injection drug use and sharing of someone else's used injecting equipment in a penitentiary .....	23
Table 6 Needle-cleaning practices at last injection among inmates who inject drugs in a penitentiary .....	24
Table 7 Tattooing and piercing behaviours in penitentiaries.....	25
Table 8 Tattoo and Piercing Equipment-cleaning practices on a CSC Range.....	26
Table 9 Use and sharing of someone else's used injecting equipment in a penitentiary by type of drug recently injected .....	27
Table 10 Participation in the Methadone Maintenance Treatment Program (MMTP) at CSC by drug history.....	28
Table 11 Reasons for not being on Methadone Maintenance Treatment Program (MMTP) by drug history among inmates who were not on MMTP but had tried to join it at CSC .....	29



## **List of Appendices**

Appendix A : Canadian Federal inmate characteristics by data source.....	37
Appendix B: Logistic Regression of demand for bleach among inmates.....	39
Appendix C: Logistic regression of needle-cleaning practices at last injection among inmates who recently injected drugs in a penitentiary .....	40
Appendix D: Logistic regression of tattoo equipment-cleaning practices among inmates ever tattooed on a CSC range .....	41





## **Introduction**

Injecting, tattooing and piercing behaviours present a risk of blood-borne infection (BBI) such as human immunodeficiency virus (HIV) and hepatitis C (HCV) (PHAC, 2008a). The risk of BBI transmission associated with these practices is related to the sharing of equipment that has been used by someone else. Several broad-based strategies can be used to reduce the harm associated with these practices including: the use of bleach as a cleaning agent for injecting, tattooing and piercing equipment and the use of Methadone Maintenance Treatment Programs for individuals who inject opiates (PHAC 2003; 2004). Decreasing BBI transmission through these practices and other means are key to the health of all Canadians, including offenders both during incarceration and after reintegration in the community.

Infectious disease management can be a challenge in correctional settings due to the high rates of BBIs, and risky behaviours such as injection drug use (IDU), tattooing and piercing among people entering the correctional system (PHAC, 2008b). While jurisdictions prohibit IDU, tattooing and piercing within their facilities some inmates continue to engage in these activities with escalated risk of infection due to the need to share equipment. For example, among Canadian studies, the reported level of IDU ranges from 5% to 28% in federal institutions and 1% to 8% in provincial correctional centres (Alary, Godin & Lambert, 2005; Calzavara & Burchell, 1999; Calzavara et al., 2003; Calzavara, Myers, Millson, Schlossbert, & Burchell, 1997; Dufour et al., 1996; Ford, 1999; Ford et al., 2000; Martin, Gold & Murphy, 2005; PASAN, 2003; Poulin et al., 2007; Price Waterhouse, 1996; Rehman, 2004; Small et al., 2005). These rates are higher when capturing ever injecting in prison (8% to 28%) compared to shorter periods of time such as the past 12 months (1% to 11%).

Furthermore, it is estimated that 2% to 52% of inmates in Canadian correctional facilities reported ever tattooing on a range, and the proportion is generally higher among the federally sentenced (27% to 52%) than the provincially sentenced inmates (2% to 35%) (Alary et al., 2005; Burchell et al., 2003; Calzavara & Burchell, 1999; Calzavara et al., 1997; Ford et al., 2000; PASAN, 2003; Price Waterhouse, 1996). Finally, roughly 15% of federal inmates reported being pierced in prison compared to less than 4% in provincial correctional centres (Alary et al., 2005; Calzavara & Burchell, 1999; PASAN, 2003; Price Waterhouse, 1996). Overall, many inmates in Canadian correctional facilities could be at elevated risk of BBI due to these types of

behaviours.

Most concerning, however, are the rates of equipment sharing that are linked with the transmission of BBIs. Generally, substantial proportions of Canadian inmates who inject drugs, whether in federal or provincial institutions, report sharing equipment; estimates range from 32% to 100% (Alary et al., 2005; Calzavara & Burchell, 1999; Calzavara et al., 1997; Calzavara et al., 2003; Dufour et al., 1996; Ford, 1999; Ford et al., 2000; Martin et al., 2005; Poulin et al., 2007; Small et al., 2005). Unlike studies of IDU, research examining tattooing suggests that the majority of inmates are tattooed with new equipment or equipment they perceive to be clean and safe. For example, Calzavara and Burchell (1999) found that less than one percent of inmates reported using tattooing equipment that had been used by someone else. Additionally, evidence suggests that cleaned tattooing equipment is often used in place of sterile equipment. Calzavara et al. (1997) found that 71% of inmates reported tattooing in prison with clean equipment and the remaining 29% of inmates reported using sterilized needles for tattooing. 72% of federally sentenced men at CSC in 1995 reported the tattoo equipment they used, since arriving at their institution, was clean and safe (Price Waterhouse, 1996). There is some evidence that the use of non-sterile equipment for piercing in prison may be higher than tattooing equipment. Among inmates in Quebec provincial facilities, Alary et al. (2005) reported that 21% of men and 30% of women pierced in prison used non-sterile piercing equipment; however, there was no examination of whether this equipment had been cleaned. Yet, 72% of federally sentenced men at CSC in 1995 reported the piercing equipment they used, since arriving at their institution, was clean and safe (Price Waterhouse, 1996). Overall, a significant proportion of inmates who are injecting drugs, tattooing and piercing in the prison environment are at increased risk of contracting or transmitting BBIs due to the sharing of used equipment.

Given this, CSC has implemented a range of harm reduction strategies within federal penitentiaries to prevent the spread of infectious disease among inmates, and ultimately communities. Commissioner's Directive (CD) 821 Management of Infectious Diseases (CSC, 2004) to prevent the spread of BBIs, directs that bleach be easily and discretely accessible to inmates; however, studies have suggested that accessibility to bleach in penitentiaries may be low. PASAN (2003) found that 66% of federally sentenced women in their sample reported problems with bleach accessibility. These women reported that having to ask staff for bleach was a major barrier. Small (2005) found that inmates reported lack of availability, limited access to

non-diluted bleach, and indiscrete access locations. These issues were also highlighted in a CSC evaluation of the bleach program (CSC, 1999).

Despite issues accessing bleach, previous literature suggests that the majority of inmates report cleaning needles before injection. Calzavara (2003) found that 50% of inmates in provincial correctional centres who injected with used needles reported cleaning the needles with full-strength bleach. In a sample from Burnaby Correctional Centre for Women, which housed both provincial and federal inmates, 91% of those who injected drugs reported cleaning the syringe with bleach before injection (Martin et al., 2005). Price Waterhouse (1996) found that among men who injected drugs since arriving at their federal institution, 59% reported using a clean needle; however, method of cleaning was not explored. Finally, Calzavara et al. (1997) found that 43% of inmates who had shared a needle in federal penitentiaries since 1985 had either used an unclean or an inadequately cleaned needle.

As an additional harm reduction measure, CSC provides the Methadone Maintenance Treatment program (MMTP) for inmates with severe opiate addictions. The MMTP aims to reduce the transmission of BBIs through decreasing the rate of IDU. Participation in this program is restricted to those who meet the *Specific Guidelines for Methadone Maintenance Treatment* at CSC (CSC, 2003). CSC's MMTP complies with all provincial Colleges of Physicians and Surgeons and Health Canada Standards. Only two studies<sup>1</sup>, both involving women, were identified that examined participation in MMTPs in Canadian correctional facilities (PASAN, 2003; Martin et al., 2005). PASAN (2003) found that general awareness of the program was high (97%). Martin et al. (2005) found that 27% of the women interviewed at Burnaby Correctional Centre for Women were currently in MMTP, 43% were previously in the program and 8% reported having difficulty with the program. Thus, little is known about the drug-related behaviours of inmates who try to join or are on MMTPs within the Canadian correctional system. Yet research in other jurisdictions suggests that those on MMTPs often continue injecting although at a reduced rate (reductions in behaviour ranging from 55-75%) and that equipment sharing behaviours associated with use of injection drugs also decreased

---

<sup>1</sup> Johnson, van de Ven & Grant (2001) also conducted an examination of Methadone Maintenance Treatment Program (MMTP) in Canadian federal correctional facilities; however, they did not examine participation in this program but rather examined the impact of the Methadone Maintenance Treatment on institutional behaviour and recidivism. At the time of the study, MMTP was a pilot program and the criteria of eligibility were limited in comparison to the current program. An examination of participation in the program and drug-related behaviours did not occur in this study.

(reductions in behaviour of 47-73%) (Larney, 2010).

Although previous research clearly indicates that a significant proportion of inmates are at risk of BBIs, this literature has some drawbacks. For example, much of the information regarding the behaviours of federal inmates is dated, based on few respondents and in only some cases is gender-specific. Moreover, there is a lack of precision in the previous research such as the focus on sharing equipment rather than specifically examining the use of someone else's equipment after they have used it<sup>2</sup> and the sharing of needles rather than both needles and the equipment used for the preparation of injection drugs such as cooker/spoon, filter, and liquid, known as works. Furthermore, only limited examinations of the use of bleach as a harm reduction measure have been conducted, especially regarding its use for tattooing and piercing equipment in both federal and provincial prisons. Finally, no research in Canada has examined the drug-related behaviour of inmates on MMTP.

In conducting 2007 National Inmate Infectious Diseases and Risk Behaviours Survey (NIIDRBS), a self-administered paper questionnaire focussing on issues relevant to blood-borne and sexually transmitted infections (STIs), CSC aimed to address the “limited” knowledge of the equipment-sharing behaviours and use of bleach and MMTP for reducing harm associated with these behaviours among federal inmates.

This report extends the scope of previous literature by examining the use of injecting equipment after someone else has used it (both needles and works); quantifying access issues for bleach; and, providing information about the drug-related behaviours of inmates in or attempting to access MMTP. Such information can be used for CSC health policy and programming decisions.

---

<sup>2</sup> The term sharing actually consists of two acts: passing and receiving. A person is not at risk if they only pass a needle; however, a person is always at risk if they receive and use a needle used by someone else. In assessing risk, receiving is the more pertinent of the two acts of sharing.

## **Method**

### **Development of Survey Instrument**

To obtain the data to meet the study objectives, a project team drawn from several federal government departments<sup>3</sup> 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 BBSTIs in both the community and in penitentiaries; 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**

Data for this report were taken from the NIIDRBS. Several sections of the survey instrument were useful in examining the current harm reduction practices of inmates. The focus of this report is on the use of bleach and MMTP and as such certain sections of the survey are relevant such as the questions regarding the use of someone else's equipment for injecting, tattooing, piercing, the use of bleach and MMTP while in a penitentiary. Additionally, incarceration and demographic characteristics collected in the survey were used. The full survey

---

<sup>3</sup> 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.

is presented in Zakaria et al., in press).

### **Awareness and Use of Bleach**

*Awareness of CSC's Policy Ensuring Easy Access to Bleach.* Respondents were asked whether they were aware of CSC's policy ensuring inmates have easy access to bleach. Response options included "yes" and "no."

*Recent Demand for Bleach.* One question asked inmates "since November 2006 did you have any problems getting bleach in CSC?" Response options included: 1) "I haven't tried to get bleach"; 2) "no, I didn't have any problems getting bleach"; and, 3) "yes, I did have a problem getting bleach." An inmate who did not try to get bleach in this period of time<sup>4</sup> was classified as having no demand for bleach; all others were classified as having a demand regardless of access issues.

*Problems Accessing Bleach.* Inmates reporting a problem getting bleach were asked the source(s) of the problem. Inmates were directed to select all applicable access issues: "dispensers were empty", "dispensers were broken", "people could see me take bleach from the dispenser", "other inmates hoarded it", "other inmates limited my access to it", "the bleach was diluted", and "I had to ask staff to get it."

To combine related issues, two composite indicators were created: maintenance issues and other inmates' behaviours. Maintenance issues included any problems caused by dispensers that were empty, broken or providing diluted bleach. Other inmates' behaviours included other inmates hoarding and/or limiting access to bleach.

### **Behaviours Associated with IDU, Tattooing, and Piercing while in a Penitentiary**

Inmates reporting IDU in CSC, between November 2006 and completion of the survey, completed a series of questions about use of someone else's used injecting equipment while in a penitentiary during this period. Inmates reporting they had ever obtained a tattoo and/or piercing on a CSC range also completed a series of questions about the use of someone else's tattooing

---

<sup>4</sup> The period refers to the time between November 2006 and survey completion which occurred between May 22 and July 6, 2007 depending on institution. The period of time ranged anywhere from 6 months to 9 months depending on the timing of survey completion.

and/or piercing equipment.

*Recent Use of Someone Else's Needle after they used it.* Inmates were asked “since last November in prison, did you **use someone else's rig after they** had used it?” Response options were “no” and “yes”.

*Recent Sharing of a Needle with a Person with a Positive or Unknown Blood-borne Infection (BBI) Status.* Participants were asked “since last November in prison have you shared a rig with anyone who *you knew* was infected with HIV or hepatitis C?” Response options included “no”, “yes”, and “didn't know if they were infected or not.” Both answers of “yes” and “didn't know if they were infected or not” were considered risky because of the potential transmission of BBIs.

*Recent Use of Someone Else's Works after they used them.* Inmates were asked “since last November in prison, did you **use someone else's works after they** had used them?” Works in this case refer to water, filter, and cooker/spoon. Response options included: “yes” and “no” (due to small numbers, inmates who did not use works were retained in the no category because they were not considered to be at risk from this behaviour).

*Recent Sharing of Works with a Person with a Positive or Unknown BBI Status.* Inmates were asked “since last November in prison have you ever shared works with anyone who *you knew* was infected with HIV or hepatitis C?” Response options included “no”, “yes”, and “didn't know if they were infected or not”. Both answers, yes and didn't know if they were infected or not were considered risky because of the potential transmission of BBIs. Inmates who did not use works were retained in the no category because they were not considered to be at risk from this behaviour.

*Use of Bleach-Cleaned Needle at Last Injection.* Inmates were asked whether the needle used before their last injection was cleaned. Response options included “no”, “don't know”, and “yes.” Those responding yes were asked how the needle was cleaned. Three response options were provided: “with bleach”, “some other way”, and “don't know.” These two questions were combined into a single variable with three categories: 1) needle not clean or inmate unsure if it was; 2) needle cleaned using bleach; and 3) needle cleaned using some other method (this combined some other way and don't know how the needle was cleaned).

*Using Someone Else's Tattoo Equipment for Your Tattoos.* Inmates who reported that they had ever obtained a tattoo on a CSC range were asked "did you use someone else's tattoo equipment for your tattoos?" Response options were "yes" and "no."

*Using Someone Else's Tattoo Ink for Your Tattoos.* Inmates who reported that they had ever obtained a tattoo on a CSC range were asked "did you use someone else's ink for your tattoo(s)?" Response options were "yes" and "no."

*Use of Bleach-Cleaned Tattoo Equipment.* Inmates ever tattooed on a CSC range were asked "was the tattoo equipment cleaned each time you used it?" The response options included "no", "don't know", and "yes." Those who responded yes were asked "how was the tattoo equipment cleaned?" Three response options were available: "with bleach", "some other way", and "don't know." These two questions were combined into a single variable with three categories: 1) tattoo equipment not cleaned or inmate unsure if clean; 2) tattoo equipment cleaned using bleach; and, 3) tattoo equipment cleaned some other way (this combined some other way and don't know how the equipment was cleaned).

*Using Someone Else's Piercing Equipment for Your Piercing.* Inmates who reported that they had ever obtained piercing(s) on a CSC range were asked "did you use someone else's piercing equipment for your piercing(s)?" Response options were "yes" and "no."

*Use of Bleach-Cleaned Piercing Equipment.* Inmates who ever obtained piercing(s) on a CSC range were asked "was the piercing equipment cleaned each time you used it?" The response options included "no", "don't know", and "yes." Those who said yes were asked "how was the piercing equipment cleaned?" Three response options were available: "with bleach", "some other way", and "don't know." These questions were combined into a single variable with three categories: 1) piercing equipment not cleaned or inmate unsure if clean; 2) piercing equipment cleaned using bleach; and, 3) piercing equipment cleaned some other way (this combined some other way and don't know how the equipment was cleaned).

### **Drug-Related Behaviours and Use of the Methadone Maintenance Treatment Program (MMTP) and Reasons for Not Being on the Program**

The association between several drug-related behaviours, such as recent injection of opiates while in a penitentiary and drug history, and the use of CSC's MMTP were also



examined. MMTP status and reasons for not being on the program were examined.

*Recent Use of Opiates while in a Penitentiary.* Inmates were classified as having used opiates if they reported recent drug use in a penitentiary (between November 2006 and survey completion) and also reported opiates as one of their three most often used drugs with needles and/or works in the same time period. Those who reported using drugs other than opiates were considered to use non-opiates only. If no type of drug was specified then inmates could not be classified. Another variable was created in the same manner for the recent injection of opiates.

*Drug History.* Inmates were classified as having specific drug-histories based on drug-related behaviours captured by several items throughout the survey. Inmates who reported that they had never done drugs and/or chemicals were classified as never used drugs. Inmates who reported that they had done drugs but not recently used drugs in a penitentiary were classified as previously used drugs. Inmates who reported that they had recently done drugs in a penitentiary were also asked the three drugs they used most often in that period. These individuals were furthered classified into two categories. Inmates who reported opiates as one of their three most frequently used drugs with needles and/or works were classified as recently using opiates in a penitentiary. Those who did not report opiates as one of their three most frequently used drugs with needles and/or works were classified as recently using non-opiates in a penitentiary. In total, drug history was comprised of four categories: never used drugs, previously used drugs<sup>5</sup>, in use of non-opiates only in a penitentiary and use of opiates in a penitentiary.

*Use of MMTP.* Inmates who ever reported using drugs were asked to complete a series of questions regarding their experience with CSC's MMTP. Inmates were asked whether they were currently on the program. Three response options were available: "no", "yes", and "I no longer need to be treated with methadone." Inmates responding that they were not currently on the program (i.e., no) were probed about whether they had ever tried to get on it at CSC. The response categories for this question were "yes" and "no." The single variable used in this report combines these two survey items and has four categories: not currently on MMTP and never tried to get on it, not currently on MMTP but tried to get on it, currently on it, and I no longer need to be treated with methadone.

*Reasons for not being on MMTP at time of survey.* Inmates who were not on MMTP at the time of the survey but had tried getting on it at CSC were asked "why are you not currently

---

<sup>5</sup> Previous use could have occurred in any location.

on methadone treatment in CSC?” Response options included: “I was told I didn’t meet the requirements for treatment”; “I started treatment and then was taken off because I was selling and/or giving my methadone to someone else”; “I took myself off”; and, “I was taken off methadone treatment for some other reason.”

## **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 ( $\pm 5\%$ ), 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. The final sample consisted of 3,357 inmates and is described in the first section of the results (also see Appendix A).

### **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. 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. It appears that few inmates were excluded for

security reasons from participating in the survey; however, several completed the survey 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 the 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 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 on parole and other forms of conditional leave or in a few cases warrant expiry 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<sup>®</sup> 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)<sup>6</sup> was used with the finite population correction factor. During bivariate analyses, we used the Rao-Scott chi-square test<sup>7</sup> for association if the data were categorical and the Wald F statistic<sup>8</sup> for continuous data.

### **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. When item non-response exceeded 50%, however, 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.

---

<sup>6</sup> See SAS Institute Inc. (2004, p. 166) for details and related references.

<sup>7</sup> See SAS Institute Inc. (2004, p. 4216) for details and related references.

<sup>8</sup> See SAS Institute Inc. (2008, p. 6558) for details.

## **Specific Analyses**

### **Point Estimates and Confidence Intervals of Key Behaviours**

In this report, several estimates were calculated of awareness of and demand for bleach, use of equipment for injecting, tattooing, and piercing, and use of MMTP. These estimates are the percentage of inmates and a 95% confidence interval. If sample sizes were large enough, the percentages are presented separately for men and women otherwise these groups are combined. Again when sample size allowed, further analyses generally examined how percentages varied by demographic and incarceration characteristics (i.e., Aboriginal self-identification, age, region, years served of present sentence, and security level). When appropriate, comparisons were also made by awareness of bleach policy, injecting behaviours, type of drugs injected, and drug history. Rao-Scott chi-square test was used to assess these differences.

### **Examining Associations Between Key Variables using Logistic Regression**

Generally, logistic regression was used to predict variables associated with the awareness of and demand for bleach, and the cleaning of equipment for injecting, tattooing and piercing. The prediction variables typically included demographic and incarceration characteristics (i.e., Aboriginal self-identification, age, region, years served of present sentence, and security level). Naturally, predicting variables changed according to outcome being analyzed. For example, awareness of the bleach policy was also included as a variable regressed on demand for bleach, risky injecting behaviours were used in analyses examining needle-cleaning practices<sup>9</sup>, and risky tattooing or piercing behaviours when examining use of cleaned needles for these purposes<sup>10</sup>. In all cases, all variables associated with the outcome variable in bivariate analyses at  $p < 0.25$  were placed in the logistic regression model. Briefly, if the overall model was statistically significant as assessed by the likelihood ratio test, the Wald chi-square test was used to assess the statistical significance of variables in the model.

---

<sup>9</sup> In this analysis, needle-cleaning practices were dichotomized (i.e., needle cleaned with bleach vs. needle not cleaned with bleach).

<sup>10</sup> In these analyses, equipment-cleaning practices were dichotomized (i.e., equipment cleaned with bleach vs. equipment not cleaned with bleach)

## **Results**

This section of the report is split into three major sections. First, the representativeness of the sample is described. Next, the awareness and use of bleach are discussed generally. Then a specific examination of the use of bleach-cleaned injecting, tattooing, and piercing is presented. Finally, there is an examination of participation in MMTP.

### **Representativeness of the Sample and Population Characteristics**

A comparison of inmate characteristics derived from the National Inmate Infectious Disease and Risk-behaviour Survey (NIIDRBS) and Correctional Service Canada (CSC) administrative data indicated the sample was representative of the population. 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%). These estimates are consistent with the inmate population around the time of the survey (see Appendix A). Gender differences in the sample and these differences are consistent with those in the inmate population as well. On average, men were older (38 vs. 34 years), had served a longer duration of their current sentence (4.8 vs. 2.2 years), and were less likely to be Aboriginal (21% vs. 36%) compared to women.

### **Bleach**

#### **Awareness**

Most inmates (87%) were aware of CSC's policy ensuring easy access to bleach. Awareness did not differ by demographic or incarceration characteristics (see Table 1 and 2).



Table 1

*Awareness CSC's policy ensuring easy access to bleach and the demand for bleach by demographic characteristics*

	<b>Aware Bleach Easily Accessible</b>		<b>Demand for Bleach</b>	
	<b>n</b>	<b>% (95% CI)</b>	<b>n</b>	<b>% (95% CI)</b>
<b>All</b>	2,558	87 (86, 88)	1,651	57 (55, 59)
<b>Gender</b>				
Men	2,280	87 (86, 88)	1,456	57 (55, 59)
Women	278	88 (86, 90)	195	63 (61, 66)
$\chi^2$ (1)		0.89		12.72*
<b>Aboriginal Self-Identification</b>				
Aboriginal	576	87 (84, 89)	365	59 (55, 63)
Non-Aboriginal	1,916	87 (86, 89)	1,246	56 (54, 58)
$\chi^2$ (1)		0.09		0.79
<b>Age</b>				
18-29	658	87 (84, 89)	471	63 (59, 66)
30-39	776	87 (84, 89)	515	58 (55, 62)
40-49	665	88 (86, 91)	416	57 (53, 60)
50 years and older	401	87 (84, 90)	205	44 (40, 49)
$\chi^2$ (3)		0.94		29.38*

*Note.* Sample size is n=3,357, and estimated population size is N=13,701; CSC= Correctional Service Canada.

\* p < 0.05.

### **Demand**

Demand for bleach was defined as any recent attempt to access bleach and 57% of inmates tried to get bleach. The way in the bleach was used was not specifically examined, but could include general cleaning and personal hygiene as well as cleaning equipment for tattooing, piercing or injection drug use. The demand for bleach differed across several demographic and

incarceration characteristics: gender, age, years served of present sentence, region, and security level among men (see Table 1 and Table 2). Proportionally fewer men than women reported a demand for bleach, 59% vs. 63%,  $\chi^2 (1, n=2,966) = 12.72, p < 0.05$ . Those 50 years and older were less likely to report a demand for bleach than their youngest counterparts, 44% vs. 63%,  $\chi^2 (1, n=2,904) = 29.38, p < 0.05$ . Inmates who had served one year or less of their present sentence were also less likely than inmates, who had served more time, to report a demand for bleach, 49% vs. 62%,  $\chi^2 (1, n=2,812) = 31.89, p < 0.05$ . Inmates in the Atlantic regions were less likely to report a demand for bleach in comparison to inmates in other regions, 45% vs. 58%,  $\chi^2 (1, n=2,976) = 15.95, p < 0.05$ . Finally, among men, inmates in minimum security were less likely than those at other levels of security to report a demand for bleach, 47% vs. 59%,  $\chi^2 (1, n=2,621) = 28.60, p < 0.05$ .

These relationships were maintained and often increased in strength when all characteristics were taken into consideration simultaneously using logistic regression (see Appendix B). For example, the odds of demanding bleach were 27% lower among men compared to women, OR: 0.73 (0.61, 0.87), Wald  $\chi^2 (1, n=2,632) = 12.98, p < 0.05$ . The demand for bleach was lower as age increased; the odds of those 40 years old or older having a demand for bleach were 36% less than that of 18 to 39 year olds, OR: 0.64 (0.54, 0.76), Wald  $\chi^2 (1, n=2,632) = 26.70, p < 0.05$ . The odds of having a demand for bleach were 62% greater among inmates who had served more than a year of their sentence compared to inmates who had served less time, OR: 1.62 (1.37, 1.93), Wald  $\chi^2 (1, n=2,632) = 30.14, p < 0.05$ . Compared to inmates in the Atlantic region, the odds of having a demand for bleach were at least 68% greater among inmates in all other regions, Wald  $\chi^2 (4, n=2,632) = 33.98, p < 0.05$ . Finally, among men, the odds of having a demand for bleach were 42% less among inmates in minimum security compared to those in maximum security, OR: 0.58 (0.45, 0.74), Wald  $\chi^2 (2, n=2,291) = 24.09, p < 0.05$ . Taken together these analyses suggest that men, older inmates, inmates who had served less of their current sentence, inmates in Atlantic region, and men in minimum security all have lower demand for bleach than their counterparts. In some cases, this reflects less IDU among individuals in these groups (i.e., men in minimum security, older inmates, inmates who have served less than a year of their current sentence); however, in others it may not, as in the case of Atlantic region where injection drug use is high, but demand for bleach is low.

Table 2

*Awareness of CSC's policy about ease of access to bleach and the demand for bleach by incarceration characteristics*

	<b>Aware Bleach Easily Accessible</b>		<b>Demand for Bleach</b>	
	<b>n</b>	<b>% (95% CI)</b>	<b>n</b>	<b>% (95% CI)</b>
<b>Years served of present sentence</b>				
One year or less	989	86 (84, 88)	567	49 (46, 52)
More than one year	1,436	88 (86, 89)	991	62 (59, 64)
$\chi^2$ (1)		1.19		31.89*
<b>Region</b>				
Pacific	314	86 (82,90)	213	59 (53,64)
Prairies	768	89 (87,91)	440	55 (52,59)
Ontario	554	89 (86,91)	360	57 (53,61)
Quebec	652	85 (82,87)	497	62 (59,65)
Atlantic	270	84 (81,88)	141	45 (40,50)
$\chi^2$ (4)		7.02		18.84*
<b>Security Level<sup>a</sup></b>				
Minimum	674	86 (84,89)	352	47 (44,50)
Medium	1,137	88 (86,90)	761	58 (56,61)
Maximum	420	86 (83,89)	310	61 (56,65)
$\chi^2$ (2)		5.87		26.40*

*Note.* Sample size is n=3,357, and estimated population size is N=13,701; CSC= Correctional Service Canada.

<sup>a</sup> Estimates calculated for men only. NIIDRBS security level is based on institutional security level; it is unknown for the majority of women inmates residing in multi-level security institutions.

\*  $p < 0.05$ .

## Policy Awareness and Demand

Inmates who were aware of the policy ensuring easy access to bleach were more likely to have a recent demand for bleach than those not aware of the policy, 59% vs. 43%,  $\chi^2$  (1, n=2,826) = 23.94,  $p < 0.05$ . After adjusting for demographic and incarceration characteristics, the odds of having a recent demand for bleach were approximately two times greater among those aware of the policy compared to those unaware, OR: 1.95 (1.52, 2.50), Wald  $\chi^2$  (1, n=2,632) = 27.76,  $p < 0.05$  (see Appendix B).

Table 3

*Problems accessing bleach among inmates with a demand for bleach*

	Men (n =1,456) (N=7,483)		Women (n =195) (N=304)		$\chi^2$ (1)
	n	% (95% CI)	n	% (95% CI)	
<b>Had problems accessing bleach</b>	551	37 (35,40)	55	28 (24,32)	12.65*
<b>Access issues among inmates who had problems accessing bleach:</b>					
<b>Reasons for problem:</b>					
Maintenance issues	391	69 (65,73)	22	48 (42,53)	28.46*
Others could see me take bleach	28	6 (4, 8)	‡	‡	-
Had to ask staff for bleach	117	23 (19, 26)	25	48 (40, 55)	5.93*
Other inmates' behaviour	163	33 (29,36)	10	19 (13,25)	7.82*

*Note.* n = sample size; N = estimated population size. Inmates could choose multiple reasons. Maintenance issues include dispensers that were empty, broken and/or providing damaged bleach. Other inmates' behaviour includes other inmates hoarding and/or limiting access.

‡ Suppressed because fewer than five inmates reported the characteristic.

\* $p < 0.05$ .

## **Access**

Among those who had a recent demand for bleach, men were more likely than women to report issues accessing bleach, 37% vs. 28%,  $\chi^2 (1, n=1,651) = 12.65, p < 0.05$  (see Table 3). Generally, men were more likely than women to report each of the specific problems associated with accessing bleach, with the exception of having to ask staff for bleach. The primary access issue reported was a maintenance issue such as empty or broken dispensers or diluted bleach<sup>11</sup> (men, 69%; women, 48%). Additionally, 48% of women reported having to ask staff for bleach.

## **Injection Drug Use**

### **Use of Someone Else's Used Injecting Equipment**

Seventeen percent (17%) of inmates reported recently injecting drugs. A substantial proportion of these inmates increased their risk of acquiring a blood-borne infection (BBI) by using someone else's used injecting equipment (see Table 4 for gender-specific estimates). Of those who recently injected drugs, 37% of inmates reported sharing a needle with a person with a positive or unknown BBI status and 42% reported using someone else's works after they had used them. Additionally, men were more likely than women to report using someone else's used needle, 55% vs. 41%,  $\chi^2 (1, n=438) = 6.22, p < 0.05$  and sharing works with a person with a positive or unknown BBI status, 33% vs. 23%,  $\chi^2 (1, n=397) = 4.40, p < 0.05$ .

---

<sup>11</sup> CD 821 stipulates that inmates must have access to full-strength (between 5.25% and 7%) household bleach to be used as a disinfecting agent. Some inmates believe that bleach has been diluted by staff when it is prepared, but no evidence of this exists. Dilution (or a chemical breakdown) of bleach may occur due to exposure to light or heat and over time.

Table 4

*Drug-use and sharing of someone else's used injecting equipment in a penitentiary*

	<b>Men</b>		<b>Women</b>		$\chi^2(1)$
	<b>(n=3,006)</b>		<b>(n=351)</b>		
	<b>(N=13,222)</b>		<b>(N=479)</b>		
<b>Among all inmates:</b>	<b>n</b>	<b>% (95% CI)</b>	<b>n</b>	<b>% (95% CI)</b>	
Recent Injection Drug Use	433	17 (15,18)	48	14 (12,16)	2.77
<b>Among inmates who recently injected drugs in a penitentiary:</b>					
Used someone else's used needle	199	55 (50,59)	18	41 (33,48)	6.22*
Shared a needle with a person with a positive or unknown BBI status	125	38 (33,42)	12 <sup>¶</sup>	29(24,34)	2.64
Used someone else's used works	142	42 (37,47)	13 <sup>¶</sup>	33 (26,40)	2.70
Shared works with a person with a positive or unknown BBI status	113	33 (28,38)	8 <sup>¶</sup>	23 (17,29)	4.40*

Note. n = sample size; N = estimated population size; BBI = blood-borne infection.

<sup>¶</sup>greater than 20% to 50% missing data (based on weighted distribution).

\*p < 0.05.

### Needle-cleaning Practices

Demand for bleach was higher among those who recently injected drugs in a penitentiary and higher yet among those who engaged in risky injecting practices (see Table 5). First, inmates who recently injected a penitentiary reported a higher demand for bleach compared to those who did not recently inject drugs in prison, 78% vs. 53%,  $\chi^2(1, n=2,892) = 72.96, p < 0.05$ . Further, inmates who injected using someone else's used needle were more likely to demand bleach than inmates who did not use someone else's used needle, 89% vs. 70%,  $\chi^2(1, n=373) = 16.38, p < 0.05$ . This pattern was also observed among inmates who used or shared works. Taken as a whole, these findings suggest that most of the individuals engaging in these high risk-behaviours are using equipment cleaned with bleach.

Table 5

*Demand for bleach by recent injection drug use and sharing of someone else's used injecting equipment in a penitentiary*

	Demand for bleach		$\chi^2(1)$
Among all inmates:	n	% (95% CI)	
Recent Injection Drug Use			
No	1,311	53 (51,55)	72.96*
Yes	304	78 (75,82)	
Among inmates who recently injected drugs in a penitentiary:			
Used someone else's used needle			
No	121	70 (64, 76)	16.38*
Yes	167	89 (85, 94)	
Shared a needle with a person with a positive or unknown BBI status			
No	169	79 (74, 84)	2.68
Yes	100	87 (81, 92)	
Used someone else's used works			
No	149	74 (68, 80)	14.41*
Yes	120	92 (87, 95)	
Shared works with a person with a positive or unknown BBI status			
No	170	75 (70, 81)	11.31*
Yes	94	92 (88, 97)	

Note. n = 2,892 and N = 13,701; BBI = blood-borne infection.

\*p < 0.05.

The survey also asked respondents who recently injected drugs about how their needle was cleaned at last injection. The majority (69%) used a bleach-cleaned needle, 11% used a needle cleaned some other way, and 20% of inmates used a needle that was not clean or they were unaware if it was cleaned (see Table 6 for gender-specific estimates).

An examination of the use of cleaned needles revealed that some incarceration characteristics and injecting risk-behaviours were associated with whether an inmate reported that their needle had been cleaned with bleach at last injection. Region and number of years

served of present sentence were associated with using bleach-cleaned needles at last injection (see Appendix C). More specifically, the odds of inmates in Quebec and Atlantic Regions last injecting with bleach-cleaned needles were 79% and 73% less than inmates in Ontario Region, respectively (Quebec Region OR: 0.21 (0.07, 0.59); Atlantic Region OR: 0.27 (0.08, 0.94) ,  $\chi^2$  (4, n=264) = 15.65 p < 0.05). Further, the odds of injecting with bleach-cleaned needles were more than three times greater in those who had served more than one year compared to those who had served less time, OR: 3.31 (1.51, 7.24),  $\chi^2$  (2, n=264) = 11.49 p < 0.05.

Using someone else's used needle also greatly increased the odds of inmates using bleach-cleaned needles at last injection. The odds of an inmate using a bleach-cleaned needle were nine times greater among those who used someone else's used needle compared to those who did not, OR: 9.17 (4.04, 20.83),  $\chi^2$  (1, n=264) = 28.04 p < 0.05.

Table 6

*Needle-cleaning practices at last injection among inmates who inject drugs in a penitentiary*

	<b>Men</b>		<b>Women</b>		$\chi^2$ (2)
	<b>(n=320)</b>		<b>(n=29)</b>		
	<b>(N=2,248)</b>		<b>(N=67)</b>		
	<b>n</b>	<b>% (95% CI)</b>	<b>n</b>	<b>% (95% CI)</b>	
Needle not cleaned or unsure if cleaned	70	20 (16,24)	8	30 (21, 40)	3.47
Needle was cleaned some other way	38	11 (7,14)	‡	‡	
Needle was cleaned with bleach	212	69 (65,74)	19	61 (54,69)	

*Note.* 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.

\*p < 0.05.

## Tattooing and Piercing

### Use of Someone's Else Equipment

Of all inmates, 38% reported being tattooed on a CSC range<sup>12</sup> and of these, 32% reported using someone else's equipment while 25% reported using someone else's ink; both activities

<sup>12</sup> This excludes inmates who reported being tattooed in the CSC tattoo shop



increase the risk of BBIs. Additionally, 13% of all inmates were pierced on a CSC range. Men were half as likely as women to report using someone else's piercing equipment on the range, 15% vs. 27%,  $\chi^2(1, n=371) = 6.95, p < 0.05$  (see Table 7 for gender-specific estimates). These sharing behaviours are known to increase the risk of BBI.

Table 7

*Tattooing and piercing behaviours in penitentiaries*

	<b>Men</b>		<b>Women</b>		$\chi^2(1)$
	<b>(n=3,006)</b>		<b>(n=351)</b>		
	<b>(N=13,222)</b>		<b>(N=479)</b>		
<b>Among all inmates:</b>	<b>n</b>	<b>% (95% CI)</b>	<b>n</b>	<b>% (95% CI)</b>	
Tattooed on a CSC range	1,072	38 (36,39)	131	39 (36,41)	0.28
<b>Among inmates tattooed on the CSC range:</b>					
Using someone else's tattoo equipment	324	32 (29,35)	40	31 (27,36)	0.03
Using someone else's tattoo ink	263	25 (23,28)	38	29 (25, 33)	1.86
<b>Among all inmates:</b>					
Pierced on a CSC range	360	13 (12,14)	35	10 (9,12)	4.08*
<b>Among inmates pierced on a CSC range:</b>					
Using someone else's piercing equipment	50	15 (11,19)	10	27 (20,34)	6.95*

*Note.* n = sample size; N = estimated population size; CSC= Correctional Service Canada.

\*p < 0.05.

### Equipment-cleaning Practices

The majority of inmates (68%) tattooed on a CSC range always used bleach-cleaned equipment (see Table 8); 20% used equipment cleaned by some other method and 12% used equipment that was not clean or that they were unsure if it was clean. Using cleaned tattooing equipment was associated with using someone else's tattoo equipment. Specifically, the odds of

using bleach-cleaned equipment were 55% lower among inmates using equipment of others compared to those who did not meaning that inmates who used someone else's equipment were less likely to use bleach-cleaned equipment compared to those using their own equipment, OR: 0.45 (0.33, 0.61), Wald  $\chi^2$  (1, n=1,026) = 24.89 p < 0.05 (see Appendix D).

Table 8

*Tattoo and Piercing Equipment-cleaning practices on a CSC Range*

	<b>Men</b>		<b>Women</b>		<b><math>\chi^2(1)</math></b>
	<b>(n=3,006)</b>		<b>(n=351)</b>		
	<b>(N=13,222)</b>		<b>(N=479)</b>		
<b>Among all inmates:</b>	<b>n</b>	<b>% (95% CI)</b>	<b>n</b>	<b>% (95% CI)</b>	
Tattooed on a CSC range	1,072	38 (36,39)	131	39 (36,41)	0.28
<b>Among inmates who obtained a tattoo on a CSC range:</b>					
Equipment not always cleaned or unsure if it was	126	12 (10,14)	17	13 (10,16)	1.46
Equipment always cleaned with bleach	695	68 (65,70)	90	70 (66,74)	
Equipment always cleaned some other method	206	20 (18,23)	22	17 (14,21)	
<b>Among all inmates:</b>					
Pierced on CSC range	360	13 (12,14)	35	10 (9,12)	4.08*
<b>Among inmates who obtained a piercing on a CSC range:</b>					
Equipment not always cleaned or unsure if it was	20	6 (4,9)	‡	‡	4.36
Equipment always cleaned with bleach	207	60 (55,65)	17	51 (41, 61)	
Equipment always cleaned some other method	114	34 (29,39)	13	37 (27, 46)	

Note. n = sample size; N = estimated population size. CSC= Correctional Service Canada.

‡ suppressed because fewer than five inmates reported the characteristic.

\*p < 0.05.

Among inmates who had been pierced on a CSC range, 60% reported always using bleach-cleaned equipment, 34% always used equipment cleaned by some other method and 6% did not always use clean piercing equipment or did not know if it was cleaned (see Table 8). In this case, using bleach-cleaned equipment was not associated with any demographic or incarceration characteristics or risk-behaviours.

## **Methadone Maintenance Treatment Program (MMTP)**

### **Injection of Opiates and Use of Someone Else's Used Equipment**

Overall, 87% of inmates who recently injected drugs in a penitentiary reported opiates as one of their three most used drugs. Although the number of inmates who reported injecting only non-opiate drugs was small, comparisons between this group and opiate users suggests that injecting opiates may be associated with the use of someone else's used equipment (see Table 9). Inmates who recently injected opiates were more likely, than those who recently injected non-opiates, to use someone else's used needle, 81% vs. 48%,  $\chi^2 (1, n=251) = 13.92, p < 0.05$ , and works, 59% vs. 36%,  $\chi^2 (1, n=236) = 3.98, p < 0.05$ .

Table 9

*Use and sharing of someone else's used injecting equipment in a penitentiary by type of drug recently injected*

	<b>Injecting Non-Opiates</b>		<b>Injecting Opiates</b>		<b><math>\chi^2(1)</math></b>
	<b>n</b>	<b>% (95% CI)</b>	<b>n</b>	<b>% (95% CI)</b>	
<b>Among inmates who recently injected drugs in a penitentiary:</b>					
Used someone else's used needle	15	48 (31,64)	174	81 (76,86)	13.92*
Shared a needle with a person with a positive or unknown BBI status	11	38 (21,54)	112	52 (45,59)	1.86
Used someone else's used works	10	36 (19,54)	121	59 (52, 66)	3.98*
Shared works with a person with a positive or unknown BBI status	10	31 (16, 47)	97	47 (40, 53)	2.04

*Note.* Sample size is n=481, and estimated population size is N=2,329; BBI= blood-borne infection. \*  $p < 0.05$ .

## Participation

At the time of the survey, 7% of all inmates reported being on MMTP. An additional 9% of all inmates reported not being on the program but previously trying to get on it at CSC. The remaining 84% of inmates reported never trying to join the program (63%), never using drugs (20%), and no longer needing the program (<1%).

Participation in MMTP was associated with drug use in penitentiaries. Of inmates who were on MMTP, 60% reported not using opiates recently in a penitentiary; however, 40% did (see Table 10). Similarly, of those who were not on CSC's MMTP but had tried to get on the program, almost equal proportions reported no drug use in a penitentiary (45%) and recent opiate use a penitentiary (44%). Conversely, the majority of inmates who never tried to get on MMTP at CSC reported no recent opiate use in a penitentiary (87%) and a minority (12%) reported recent opiate use in a penitentiary.

Table 10

*Participation in the Methadone Maintenance Treatment Program (MMTP) at CSC by drug history*

	Used Drugs Previously (n=1,488) (N=6,642)		Recent Use of Non- Opiates in a penitentiary (n=332) (N=2,324)		Recent Use of Opiates in a penitentiary (n=420) (N=1,885)		$\chi^2(6)$
MMTP Participation	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Currently on MMTP	77	40 (33, 48)	32	20 (14,26)	55	40 (31,48)	142.83*
No longer need MMTP	6	34 (10,57)	‡	‡	5	55 (30,81)	
Not on MMTP, but tried to get on it	108	45 (38, 51)	24	12 (7, 16)	86	44 (37, 51)	
Not on MMTP, and has not tried to get on it	1,068	64 (62,68)	313	23 (21,26)	165	12 <sup>b</sup> (11,14)	

Note. n = sample size; N = estimated population size.

‡ suppressed because fewer than five inmates reported the characteristics.

\*p < 0.05

Inmates who were not on MMTP at the time of the survey but had tried to get on it at CSC fell within two groups: 1) those failing to meet program requirements last time they tried

(53%) and 2) those previously in the program but stopped (47%). Among those failing to meet the program criteria, only 40% reported recent use of opiates in a penitentiary at the time of survey completion (see Table 11). This subgroup of present opiate users who have tried to access the program in the past represents less than two percent of the total inmate population.

The second group is comprised of those who had stopped participating in MMTP. In total, less than 1% of this group was taken off the program for diverting methadone to someone else, 17% reported being taken off for other reasons and 29% reported taking themselves off the program. Approximately half of the inmates who took themselves off or were taken off MMTP reported recent opiate use in a penitentiary. Very few reported being taken off the program for diverting their methadone (<1%).

Table 11

*Reasons for not being on Methadone Maintenance Treatment Program (MMTP) by drug history among inmates who were not on MMTP but had tried to join it at CSC*

	<b>Used Drugs Previously (n=108) (N=527)</b>		<b>Recent Use of Non- Opiates in a penitentiary (n=24) (N=259)</b>		<b>Recent Use of Opiates in a penitentiary (n=86) (N=516)</b>	
<b>Reasons for not being on MMTP</b>	<b>n</b>	<b>% (95% CI)</b>	<b>n</b>	<b>% (95% CI)</b>	<b>n</b>	<b>% (95% CI)</b>
Last time I tried I was told that I did not meet the requirements for treatment	55	50 (39,59)	11	11 (5, 17)	34	40 (29, 50)
Took myself off	27	47 (33, 61)	5	8 (0, 16)	22	45 (32,58)
I started treatment and then was taken off because I was diverting my methadone to some else	‡	‡	‡	‡	‡	‡
I was taken off for methadone treatment for some other reason	13	34 (19,50)	‡	‡	15	58 (41,75)

*Note.* n = sample size; N = estimated population size.

‡ suppressed because fewer than five inmates reported the characteristics.

\*p < 0.05

## Discussion

Inmates in this study may be at higher risk of blood-borne infections (BBIs) through the use of someone else's equipment for injecting, tattooing, and piercing; however, there is evidence that offenders are trying to clean their equipment and take advantage of bleach for that purpose. Specifically, 17% reported injecting drugs, 38% reported tattooing and 13% reported piercing in a penitentiary. While these estimates of risky behaviour may seem high, they fall within the range of estimates provided by other studies of incarcerated populations in Canada.

Gender was associated with risky injecting and piercing behaviours. In contrast to Alary et al. (2005) and Dufour et al. (1996), NIIDRBS' estimates suggest that men are more likely than women to engage in risky injecting practices. On the other hand, women were slightly less likely to be pierced on a CSC range than men. They were almost twice as likely to report using someone else's piercing equipment, which is consistent with Alary et al. (2005). These behavioural differences may lead to higher exposure to BBIs among men through risky injecting practices and among women through piercing.

Additionally, the recent injection of opiates in a penitentiary was associated with engaging in risky injecting practices. Although this may suggest that injecting opiates increases the risk of exposure to BBIs, the observed relationship between opiate use and the sharing of injecting equipment is difficult to untangle because the timing of events was not examined in the survey, making it difficult to ascertain causality. Additional longitudinal and detailed research would be required to understand this relationship fully.

CSC makes bleach available to inmates to reduce the harm associated with the use of non-sterile equipment, especially those related to the transmission of BBIs. Although a small percentage of inmates engaged in these risk behaviours, 87% of inmates were aware of CSC's policy ensuring easy access to bleach and 57% of inmates tried to get bleach at CSC. The disproportional demand for bleach is often explained by its use as a personal hygiene item for cleaning and laundry purposes. This anecdotal evidence was previously reported by women inmates (PASAN, 2003). Additionally, there is a strong relationship between being aware of the policy ensuring ease of access and trying to get bleach. This suggests that high awareness of the available harm reduction items at CSC should be maintained to ensure that those in the highest

risk groups continue to access bleach.

The majority of inmates engaging in IDU, tattooing and/or piercing in a penitentiary not only reported using equipment that was cleaned, but equipment cleaned with bleach. This is a positive finding, because although general cleaning or cleaning with bleach does not eliminate risk, there is some evidence that it may reduce risk of infectious disease (Tweed, 2004). Hence, inmates engaging in high risk-behaviours appear to be taking active steps to reduce the harm associated with these behaviours. This finding is consistent with previous research examining cleaning but not the specific use of bleach. Calzavara et al. (2003) reported that 50% of inmates in Ontario provincial correctional centres who injected drugs cleaned needles with full-strength bleach and Martin et al. (2005) found that 91% of women who injected drugs at Burnaby Correctional Centre for Women used bleach-cleaned needles. Similarly, previous studies found that approximately 70% of inmates in Canadian correctional facilities reported using cleaned equipment for tattooing and piercing (Alary et al., 2005; Calzavara et al., 1997; Price Waterhouse, 1996). Equipment-cleaning practices of inmates at CSC appear to be average among inmate populations; however, it is concerning that approximately one-third of inmates engaging in IDU, tattooing, and/or piercing at CSC are reporting the use of needles that have not been cleaned with bleach. It appears that among inmates who use injection drugs, those who have served a year or less of their present sentence may be a particularly vulnerable group because of the use of needles that have not been cleaned. All things equal, the odds of last injecting with a bleach-cleaned needle were 3.3 times greater in those who served more than a year of their present sentence compared to those who had served less. Targeted programs may be successful in changing this behaviour for those in the first year of their sentence.

Demand for bleach and use of bleach-cleaned needles was higher among inmates who used someone else's used injecting equipment. This suggests that bleach is used as intended among those at high-risk for BBIs (i.e., those who use someone else's used equipment). This finding is more insightful than those made in previous Canadian studies on cleaning of injecting, tattooing, and piercing equipment because they only examined cleaning rather than method of cleaning.

Contrary to expectations, inmates who reported using someone else's tattoo equipment were less likely to use tattoo equipment cleaned with bleach. This unique finding may be related to how the items assessing tattooing and piercing equipment cleaning with bleach while at CSC

were measured. The measure asked about all experiences at CSC rather than the frequency of equipment cleaning or examining a single time point such as last tattoo or piercing. Greater precision could have been achieved with a more specific question. This precision may have allowed a better understanding of what appear to be contradictory findings.

Thirty-seven percent of inmates reported a problem accessing bleach. This was especially true for men compared to women. The primary reasons for access issues were dispensers that were empty, broken or provided diluted bleach. Women were also having to ask staff for bleach. These problems have been noted in other examinations of bleach use by inmates in Canadian prisons; however, they have not been quantified in previous research (CSC, 1999; PASAN, 2003; Small et al., 2005). Although the proportion of inmates reporting access issues to bleach was low, CSC could increase the overall availability of bleach in its institutions through the reduction of the specific issues mentioned above and work on this has already begun. An increase in the overall availability of bleach may further increase the proportion of inmates using bleach-cleaned equipment as well.

Participation in MMTP was also examined as a measure of harm reduction at CSC. Participation in the program was associated with drug use in a penitentiary. Sixty percent of inmates who were in the program reported not using opiates recently in a penitentiary; however, 40% reported recently using opiates. The continued but less frequent use of opiates has been noted in other incarcerated populations using MMTPs (Dolan et al., 2003; Dolan, Hall, & Wodak, 1996; Heimer et al., 2006; Larney, 2010; Magura, Rosenblum, Lewis, & Joseph, 1993) and in the community.

Inmates who were not on MMTP at the time of the survey but had tried to join the program at CSC fell within two main groups: 1) those who failed to meet the requirements of the program last time they tried (53%) and 2) those who were previously in the program but stopped (47%). The proportion of inmates failing to meet requirements should be interpreted cautiously because of changes to MMTP requirements over time. However, regardless of program changes, a small group of inmates (2%) reported not meeting program criteria and recently using opiates in a penitentiary. These inmates may be at high-risk of BBIs because of the association between opiate use and use of someone else's used injecting equipment and because of this may benefit from participation in MMTP at CSC. Further investigation into the reasons for failure to meet program criteria is merited to ensure accessibility of this program.



The examination of participation in MMTP and drug use was limited by the lack of survey items that assessed the timing of events which is essential in ascertaining causality from a survey with a cross-sectional design. This design issue made it difficult to assess how drug use may be associated with participation in MMTP and how this participation may change drug behaviours.

Although steps have been taken at CSC to aid inmates in reducing their risk of BBI, through the provision of harm reduction programs, future research may increase the efficiency of current programs and aid in the development of new interventions. Future research should examine the direct associations between demand for bleach, the use of bleach as a harm reduction measure and use of non-sterile equipment. This research would allow greater understanding of how to target risk-groups for interventions to reduce the transmission of BBI. Moreover, greater knowledge is needed regarding why inmates continue to engage in risky behaviours without accessing the available harm reduction measures. This information will aid in the development of interventions to increase awareness and use of harm reducing programs and possibly to decrease the likelihood of risk-behaviours as well. Finally, greater detail on risk-behaviours prior to and after MMTP initiation would assist in examining and possibly improving program effectiveness. This future research will help CSC to decrease BBI transmission and keep communities safe.

## References

- Alary, M., Godin, G., & Lambert, G. (2005). *Étude de prévalence du VIH et de l'hépatite C chez les personnes incarcérées au Québec et pistes pour l'intervention*. Québec, Canada: Centre hospitalier affilié universitaire de Québec.
- Burchell, A., Calzavara, L., Myers, T., Schlossberg, J., Millson, M., Escobar, M. et al. (2003). Voluntary HIV testing among inmates: sociodemographic, behavioral risk, and attitudinal correlates. *Journal of Acquired Immune Deficiency Syndromes*, 32(5):534-41.
- Calzavara, L., & Burchell, A. (1999). HIV/AIDS in prisons. Developing effective HIV prevention programs for inmates: Results from an Ontario-wide survey. *Canadian HIV/AIDS Policy & Law Newsletter*, 5(1), 32-34.
- Calzavara, L., Burchell, A., Schlossberg, J., Myers, T., Escobar, M., Wallace, E., et al. (2003). Prior opiate injection and incarceration history predict injection drug use among inmates. *Addiction*, 98, 1257-1265.
- Calzavara, L., Myers, T., Millson, M., Schlossbert, J., & Burchell, A. (1997). *Understanding HIV-related risk behaviour in prisons: The inmates' perspective*. Toronto: HIV Social, Behavioural and Epidemiological Studies Unit, Faculty of Medicine, University of Toronto.
- Cochran, W.G. (1977). *Sampling Techniques*, 3<sup>rd</sup> edition. New York: John Wiley & Sons, Inc.
- Correctional Service of Canada (2004, November 11). *Commissioner's Directive 821: management of infectious diseases*. Ottawa, Ontario: Correctional Service of Canada. Retrieved (2009, January 29) from <http://www.csc-scc.gc.ca/text/plcy/cdshtm/821-cde-eng.shtml>
- Correctional Service Canada. (2003, November). Specific guidelines for methadone maintenance treatment. Retrieved from (October 28, 2008) <http://www.csc-scc.gc.ca/text/pblct/methadone/index-eng.shtml>
- Correctional Service of Canada (1999). *Evaluation of HIV/AIDS harm reduction measures in the Correctional Service of Canada*. Ottawa, Ontario: Correctional Service of Canada.
- Dolan, K., Hall, W., & Wodak, A. (1996). Methadone maintenance reduces injecting in prison. *British Medical Journal*, 312, 1162-1162.

- Dolan, K., Shearer, J., MacDonald, M., Mattick, R.P., Hall, W., & Wodak, A.D. (2003). A randomised controlled trial of methadone maintenance treatment versus wait list control in an Australian prison system. *Drug and Alcohol Dependence*, 72, 59-65.
- Dufour, A., Alary, M., Poulin, C., Allard, F., Noël, L., Trottier, G., et al. (1996). Prevalence and risk behaviours for HIV infection among inmates of a provincial prison in Québec City. *AIDS*, 10, 1009-1015.
- Ford, P. (1999). HIV/AIDS in prisons: HIV and Hep C seroprevalence and associated risk behaviours in a Canadian prison. *Canadian HIV/AIDS Policy & Law Newsletter*, 4(2/3), 52-54.
- Ford, P., Pearson, M., Sankar-Mistry, P., Stevenson, T., Bell, D., & Austin, J. (2000). HIV, hepatitis C and risk behaviour in a Canadian medium-security federal penitentiary. *QJM: An International Journal of Medicine*, 93, 113-119.
- Heimer, R., Catania, H., Newman, R.G., Zambrano, J., Brunet, A., & Ortiz, A.M. (2006). Methadone maintenance in prison: Evaluation of a pilot program in Puerto Rico. *Drug and Alcohol Dependence*, 83, 122-129.
- Johnson, S.L., van de Ven, J.T.C., & B.A. Grant. (2001). Methadone maintenance treatment: Impact on release outcome and institutional behaviour. R-119 Ottawa, ON: Correctional Service of Canada. Retrieved from (January 4, 2010) [http://www.csc-scc.gc.ca/text/rsrch/reports/r119/r119\\_e.pdf](http://www.csc-scc.gc.ca/text/rsrch/reports/r119/r119_e.pdf)
- Larney, S. (2010). Does opioid substitution treatment in prisons reduce injecting-related HIV risk behaviours? A systematic review, *Addiction* 105(2), 216-223.
- Magura, S., Rosenblum, A., Lewis, C., Joseph, H. (1993). The effectiveness of in-jail methadone maintenance. *Journal of Drug Issues*, 23(1), 75-99.
- Martin, R.E., Gold, F., Murphy, W., Remple, V., Berkowitz, J., & Money, D. (2005). Drug use and risk of blood-borne infections: A survey of female prisoners in British Columbia. *Canadian Journal of Public Health*, 96(2), 97-101.
- Poulin, C., Alary, M., Lambert, G., Godin, G., Landry, S., Gagnon, H., et al. (2007). Prevalence of HIV and hepatitis C virus infections among inmates of Quebec provincial prisons. *Canadian Medical Association Journal*, 177(3), 252-256.
- Price Waterhouse (1996). *1995 National inmate survey: final report* (No. SR-02). Ottawa, Ontario: Correctional Service Canada.

- Prisoners' HIV/AIDS Support Action Network (PASAN) (2003). *Unlocking our futures: a national study on women, prisons, HIV, and Hepatitis C*. Toronto, Ontario: PASAN.
- Public Health Agency of Canada (2003). *Hepatitis C and injection drug use*. Retrieved (2009, December 31) from <http://origin.phac-aspc.gc.ca/hepc/pubs/hpcidu-hpcudi/index-eng.php>
- Public Health Agency of Canada (2003). *The effectiveness of bleach in prevention of hepatitis C transmission: Final report*. Retrieved (2009, December 31) from <http://www.phac-aspc.gc.ca/hepc/pubs/bleach-javel/pdf/bleach-eng.pdf>
- Public Health Agency of Canada (2008a). *Hepatitis C fact sheet*. Retrieved (2009, February 19) from [http://www.phac-aspc.gc.ca/hcai-iamss/bbp-pts/hepatitis/hep\\_c-eng.php](http://www.phac-aspc.gc.ca/hcai-iamss/bbp-pts/hepatitis/hep_c-eng.php)
- Public Health Agency Canada (PHAC). (2008b, June 26). *Canadian Guidelines on Sexually Transmitted Infections*. Retrieved January 29, 2009, from [http://www.phac-aspc.gc.ca/std-mts/sti\\_2006/pdf/Guidelines\\_Eng\\_complete\\_06-26-08.pdf](http://www.phac-aspc.gc.ca/std-mts/sti_2006/pdf/Guidelines_Eng_complete_06-26-08.pdf)
- Rehman, L., Gahagan, J., DiCenso, A.M., & Dias, G. (2004). Harm reduction and women in the Canadian national prison system: Policy or practice? *Women & Health*, 40(4), 57-73.
- SAS Institute Inc. (2004). *SAS/STAT® 9.1 User's Guide*. Cary, NC: SAS Institute Inc.
- SAS Institute Inc. (2008). *SAS/STAT® 9.2 User's Guide*. Cary, NC: SAS Institute Inc.
- Small, W., Kain, S., Laliberte, N., Schechter, M.T., O'Shaughnessy, M., & Spittal, P.M. (2005). Incarceration, addiction and harm reduction: Inmates experience injecting drugs in prison. *Substance Use & Misuse*, 40, 831-843.
- Tweed, A., & Krajden, M. (2004). *The effectiveness of bleach in the prevention of hepatitis C transmission - final report*. Retrieved March 22, 2010, from <http://origin.phac-aspc.gc.ca/hepc/pubs/bleach-javel/>.
- Zakaria, D., Thompson, J., Borgatta, F. (in press). Study materials for the 2007 National Inmate Infectious Diseases and Risk-Behaviours Survey. Research Report R-212. Ottawa: Correctional Service Canada.

## Annexes

### Appendix A : Canadian Federal inmate characteristics by data source

Characteristics	National Inmate Infectious Disease and Risk-behaviour Survey (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 <sup>2</sup> (df) or F (v <sub>1</sub> ,v <sub>2</sub> )	Men (N=12,574)		Women (N=467)	
	n	M (95% CI )	n	M (95% CI )		N	M	N	M
	Age (years)	2,899	38 (38, 39)	335	34 (34, 35)	106.64* (1,3192)	12,554	38	466
Highest level of education at time of survey (%)									
Less than high school diploma	1,252	46 (44, 48)	156	48 (45, 51)	0.68	-	-	-	-
High school 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

Characteristics	National Inmate Infectious Disease and Risk-behaviour Survey (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 <sup>2</sup> (df) or F (v <sub>1</sub> ,v <sub>2</sub> )	Men (N=12,574)		Women (N=467)	
	n	M (95% CI )	n	M (95% CI )		N	M	N	M
<b>Years of present sentence served</b>	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
<b>Region (%)</b>									
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
<b>Security level (%)</b>									
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 secured in multiple 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.

## Appendix B: Logistic Regression of demand for bleach among inmates

	Men and Women (n=2,632) (N=13,701)	Men Only <sup>a</sup> (n=2,291) (N=13,222)
Characteristic	Adjusted OR (95% CI)	Adjusted OR (95% CI)
<b>Gender</b>		
Female	1.00	
Male	0.73 (0.61, 0.87)*	
<b>Age</b>		
18 to 39 years old	1.00	1.00
40 years and older	0.64 (0.54, 0.76)*	0.66 (0.55, 0.79)*
<b>Region</b>		
Atlantic	1.00	1.00
Quebec	2.29 (1.73, 3.03)*	2.24 (1.67, 3.01)*
Ontario	1.73 (1.29, 2.33)*	1.70 (1.24, 2.33)*
Prairies	1.68 (1.28, 2.21)*	1.81 (1.34, 2.43)*
Pacific	1.91 (1.36, 2.66)*	1.82 (1.28, 2.59)*
<b>Years of present sentence served</b>		
One year or less	1.00	1.00
More than one year	1.62 (1.37, 1.93)*	1.63 (1.36, 1.95)*
<b>Aware of policy ensuring access to bleach</b>		
No	1.00	1.00
Yes	1.95 (1.52, 2.50)*	1.87 (1.44, 2.43)*
<b>Security Level</b>		
Maximum		1.00
Medium		0.85 (0.67, 1.08)
Minimum		0.58 (0.45, 0.74)*
	<b>Model Fit Statistics</b>	<b>Model Fit Statistics</b>
Overall likelihood ratio test (df)	487.95 (8) p <.0001	529.05 (9) p <.0001
R <sup>2</sup>	0.17	0.20

*Note.* n = sample size; N = estimated population size. <sup>a</sup> 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. When security level was significant at the p < 0.25 level in bivariate analysis, multivariate analysis to assess the impact of security level was limited to men.

\*p < 0.05.

**Appendix C: Logistic regression of needle-cleaning practices at last injection among inmates who recently injected drugs in a penitentiary**

<b>Characteristic</b>	<b>Men and Women</b>
	<b>(n=264) (N=2,329) Adjusted OR (95% CI)</b>
<b>Region</b>	
Ontario	1.00
Atlantic	0.27 (0.08, 0.94)*
Quebec	0.21 (0.07, 0.59)*
Prairies	0.95 (0.27, 3.41)
Pacific	0.29 (0.08, 1.02)
<b>Years served of present sentence</b>	
One year or less	1.00
More than one year	3.31 (1.51, 7.24)*
<b>Using someone else's used needle</b>	
No	1.00
Yes	9.17 (4.04, 20.83)*
<b>Sharing a needle with a person who has a positive or unknown BBI status</b>	
No	1.00
Yes	0.49 (0.20, 1.19)
<b>Model Fit Statistics</b>	
Overall likelihood ratio test (df)	347.59 (7) p <.0001
R <sup>2</sup>	0.73

*Note.* n = sample size; N = estimated population size; BBI= blood-borne infection.

\*p < 0.05.



**Appendix D: Logistic regression of tattoo equipment-cleaning practices among inmates  
ever tattooed on a CSC range**

		<b>Men and Women</b>
		<b>(n=1,026)</b>
		<b>(N=5,206)</b>
<b>Characteristic</b>		<b>Adjusted OR (95% CI)</b>
<b>Age</b>		
18 to 29 years old		1.00
30 to 39 year old		1.76 (1.19, 2.60)*
40 to 49 years old		1.66 (1.09, 2.52)*
50 years and older		1.22 (0.77, 1.92)
<b>Years served of present sentence</b>		
One year or less		1.00
More than one year to three years		0.69 (0.46, 1.03)
More than three years		0.80 (0.57, 1.13)
<b>Using someone else's tattoo equipment</b>		
No		1.00
Yes		0.45 (0.33, 0.61)*
<b>Model Fit Statistics</b>		
Overall likelihood ratio test (df)		199.61 p <.0001
R <sup>2</sup>		0.18

*Note.* n = sample size; N = estimated population size.

\*p < 0.05.