Colorectal cancer screening in First Nations People living in Manitoba

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Abstract

Background: Since the burden of colorectal cancer (CRC) appears to be increasing in First Nations, it is important to better understand CRC screening utilization. The objective of this study was to describe CRC screening among First Nations living in Manitoba.

Methods: The Federal Indian Register was linked to two provincial databases. A negative binomial model was used to compare the probability of First Nations having a fecal occult blood test (FOBT), colonoscopy, or flexible sigmoidoscopy (FS) with all other Manitobans.

Results: First Nations who lived Winnipeg were significantly less likely to have had a FOBT in the previous two years than all other Manitobans who lived in Winnipeg (Rate Ratio (RR)=0.40, 95% Confidence Interval (CI) 0.37-0.44). There was no difference in the likelihood of having a colonoscopy or FS for First Nations individuals who resided in northern Manitoba compared all other Manitobans (RR=1.04, 95% CI 0.91-1.19). However, First Nations who lived in the rural south or urban areas were less likely than all other Manitobans to have had a colonoscopy or FS (RR=0.81, 95% CI 0.75-0.87, rural south; RR=0.86, 95% CI 0.81-0.92, urban).

Conclusions: First Nations living in Winnipeg were significantly less likely to be screened for CRC using the FOBT. Colonoscopy and FS use depended on area of residence.

Impact: First Nations experience barriers that impede the use of CRC screening. Further research is needed to understand these barriers to extend the benefit of CRC screening to this population.
Introduction

Colorectal cancer (CRC) is the third most common cancer and the second most frequent cause of cancer deaths among Canadians (1). Although it is responsible for a large component of cancer burden, CRC incidence in Canada has been declining in men and women since 2000 (1). Recent analyses in Manitoba have also found that the incidence of CRC in the province has decreased (2). However, when examined by ethnicity, CRC incidence for First Nations individuals has increased over time. The age-standardized CRC incidence increased from 29.6 per 100,000 in 1984-88 to 79.0 per 100,000 in 2004-08 for First Nations individuals but decreased from 68.4 per 100,000 in 1984-88 to 66.8 per 100,000 in 2004-08 for all other Manitobans (2).

The observed reduction in CRC incidence among in Canada and all other Manitobans is likely due to changes in exposures to risk factors and the early detection and removal of precancerous polyps through screening. Several large randomized controlled trials have found that screening for CRC using the guaiac-based fecal occult blood test (FOBT) reduced mortality from CRC by 15 to 33% (3). In 2001, the Canadian Task Force on Preventive Health Care recommended screening for CRC using a FOBT annually or biennially or flexible sigmoidoscopy (FS) (with an unspecified interval) for average risk individuals over 50 years of age (4). The Canadian Association of Gastroenterology currently recommends that average risk individuals over 50 years of age be screened with a FOBT every two years, FS every five years, or colonoscopy every ten years (5).

Presently, Canadian provincial screening guidelines vary slightly with respect to the population eligible for screening and the type of FOBT recommended (guaiac-based FOBT or fecal immunochemical test (FIT)) but the majority recommend screening using a FOBT or FIT
every two years for individuals 50 to 74 years of age with colonoscopy follow-up for positive screening results (6). Although the sensitivity of colonoscopy is higher than FOBT, since colonoscopy can result in serious harms such as bowel perforation, it is not currently recommended by any province for population-based screening (7).

In 2007, Manitoba launched a province-wide CRC screening program using the guaiac-based FOBT Hemoccult II SENSA for average risk individuals 50 to 74 years of age. At that time, 44% of Manitobans 50 to 74 years of age reported having had a FOBT in the previous two years (8). Previous Canadian studies have examined screening for breast and cervical cancer among First Nations people but none have examined the utilization of CRC screening. Since the burden of CRC appears to be increasing in First Nations communities, it is important to understand CRC screening utilization among First Nations people. The objective of this study was to describe the frequency of CRC screening among First Nations people living in Manitoba in comparison to all other Manitobans.

**Materials and Methods**

**Setting and Population**

The province of Manitoba, located in central Canada, has a population of approximately 1.2 million. Half of the population lives in the capital city of Winnipeg. In 2011, there were 105,815 registered First Nations individuals living in Manitoba, which represented 8.8% of the provincial population (9). Registered refers to those First Nations individuals who, under the Federal Indian Act, are entitled to Treaty rights (10). First Nations groups in Manitoba include Ojibway, Cree, Ojibway-Cree, Dakota, and Dene. First Nations are the largest Indigenous group in Canada (45.5% of the total Indigenous population living in Canada that includes First Nations, Inuit, Métis and 1.9% of the total Canadian population) (11). First Nations individuals reside in
urban and rural areas including 63 First Nations communities in Manitoba some of which are
isolated, northern communities (9).

Data sources

Three data sources were used for this study: the Federal Indian Register, the Manitoba
Health Population Registry (MHPR), and the Medical Claims database. The Federal Indian
Register is the official record identifying Registered Indians in Canada. Registered Indians are
people who are registered with the federal government as defined by the Federal Indian Act (12).
Registered Indians have certain rights and benefits that are not available to non-registered
Indians or Métis people. The Indian Register was initiated in 1951 which explains the use of the
outdated term “Indian” instead of First Nations. Permission from Aboriginal Affairs and
Northern Development Canada (the federal data steward) was received to link the Federal Indian
Register to the MHPR (13). The MHPR includes all Manitoba residents covered by the
Manitoba Health insurance program (approximately 99% of the population). Through a multi-
step data linkage process, registered First Nations individuals were identified in the MHPR
creating a First Nations file (13). The Indian Register file contained 143,274 records; 133,882
(93.4%) were successfully linked to the MHPR. This de-identified First Nations file also
included a scrambled identifier unique to CancerCare Manitoba.

The First Nations file was then linked to the Medical Claims database using the
scrambled identifier to identify individuals who had had a FOBT, colonoscopy, or FS. The
provincial Medical Claims database is generated by claims filed by physicians for payment of
services and includes a billing tariff code, service date, an International Classification of
Diseases 9th version (ICD-9) diagnosis code, and provider identification. Both the MHPR and
the Medical Claims databases have been previously validated for accuracy and have been used extensively to study many health outcomes (14,15).

A person was considered screened for CRC if they had at least one medical claim with a FOBT tariff code in the two years before the last day of the screening time period and/or a colonoscopy or flexible sigmoidoscopy in the five years before the last day of the screening time period. Individuals who lived outside of Winnipeg were excluded from the analyses that only examined FOBT use because a significant proportion of FOBTs in rural and northern areas are not registered in the Medical Claims database. Therefore, rural and northern FOBT rates likely underestimate the true FOBT utilization rate.

Statistical analyses

Descriptive statistics were used to illustrate the characteristics of the individuals in the study. Negative binomial regression modelling was used to compare the rates of FOBT, colonoscopy, and flexible sigmoidoscopy use in First Nations and all other Manitobans. The following co-variables were included in the regression model: age group (50-54, 55-59, 60-64, 65-69, and 70-74), gender (female and male), area of residence (urban, north, and rural south), and time period. These variables were included since previous research has found that CRC screening increases with age, is higher for females than males, and may be lower for individuals who live in a rural area (16,17). For FOBT, time period was defined as the two years prior to December 31st of each index year. For colonoscopy and FS, time period was defined as the five years prior to December 31st of each index year. Index years were 1996, 1998, 2000, 2002, 2004, 2006, and 2008. All analyses were conducted in SAS version 9.2 (SAS Institute Inc., Cary, NC).
Ethics approvals were received from the University of Manitoba Health Research Ethics Board, Manitoba Health’s Information Privacy Committee, the Research and Resource Impact Committee at CancerCare Manitoba, and the Assembly of Manitoba Chief’s Health Information and Research Governance Committee.

Results

Between 1995-96 and 2007-08, 453,124 AOM and 18,416 First Nations individuals 50 and 74 years of age were identified as living in Manitoba. Table 1 shows the characteristics of First Nations and all other Manitobans in 1995-96 compared to 2007-08. Overall, the distribution of demographic characteristics in 2007-08 did not change substantially from 1995-96. In 1995-96, 2.6% of all other Manitobans lived in the north compared to 38.7% of First Nations. This distribution changed only slightly in 2007-08 (2.6% of all other Manitobans lived in the north compared to 36.8% of First Nations). In 1995-96, fewer all other Manitobans were 50-54 years of age (25.5%) compared to First Nations (32.4%) and more were 70-74 years of age (17.3% for all other Manitobans compared to 9.3% for First Nations). By 2007-08, 28% of all other Manitobans were 50-54 years of age and 12.2% were 70-74 years of age while 35% of First Nations individuals were 50-54 years of age and 8.7% were 70-74 years of age. The sex distribution was similar in both time periods (51.5% of all other Manitobans and 51.4% of First Nations individuals were female).

FOBT use

Figure 1 shows the percentage of First Nations and all other Manitobans who resided in Winnipeg who had an FOBT in the two years before the last day of each index year. For First Nations individuals, FOBT use increased from 4.9% (95% Confidence Interval (CI) 3.9-5.9) in 1995-96 to 13.4% (95% CI 12.3-14.6) in 2007-08 (p<0.0001). For all other Manitobans who
resided in Winnipeg, FOBT use increased from 12.2% (95% CI 12.0-12.3) in 1995-96 to 32.9% (95% CI 32.7-33.1) in 2007-08 (p<0.0001). The average percentage change in FOBT rates per two-year time period from 1995-96 to 2007-08 was 20.0% for First Nations and 18.2% for all other Manitobans. However, the gap in FOBT use between First Nations and all other Manitobans increased from 7.3% in 1996 to 19.5% in 2008 (Table 2). In all time periods, FOBT rates were higher for all other Manitobans than for First Nations (p<0.0001).

After adjusting for gender, age group, and time period, First Nations individuals who resided in Winnipeg were significantly less likely than all other Manitobans who resided in Winnipeg to have had an FOBT (Rate Ratio (RR)=0.40, 95% CI 0.37-0.44, p=0.0001) (Table 3). Men were less likely to be screened for CRC in the previous two years using an FOBT than women (RR=0.88, 95% CI 0.85-0.92, p=0.002). FOBT use was highest for individuals 65 to 69 years of age compared to those 50 to 54 years of age (RR=1.65, 95% CI 1.53-1.77, p=0.08) and increased with time (RR=2.80, 95% CI 2.70-2.90, p=0.02 for 2007-2008 compared to 1995-96). There were no significant interactions between any of the variables.

FOBT, colonoscopy, and flexible sigmoidoscopy use

Figure 2 shows the percentage of First Nations and all other Manitobans 50 to 74 years of age who resided in Winnipeg who had an FOBT in the two years or a colonoscopy or FS in the five years before the last day of each index year. In all time periods, FOBT, colonoscopy, and FS rates were lower for First Nations compared to all other Manitobans and the differential increased over time (p<0.0001). For First Nations who resided in Winnipeg, FOBT, colonoscopy, or FS use increased from 11.7% (95% CI 10.2-13.2) in 1996 to 25.5% (95% CI 24.1-27.0) in 2008 (p<0.0001). For all other Manitobans who resided in Winnipeg, FOBT, colonoscopy, or FS use increased from 18.8% (95% CI 18.6-19.0) in 1996 to 42.9% (95% CI
42.7-43.1) in 2008 (p<0.0001). The gap in FOBT, FS, and colonoscopy use between First Nations and all other Manitobans increased from 17.1% in 1996 to 17.4% in 2008 (Table 2).

Colonoscopy or flexible sigmoidoscopy use

Although FOBT data were only available for the city of Winnipeg, information on colonoscopy and FS use was available for the entire province. For First Nations in Manitoba, the rate of colonoscopy or FS use increased from 5.9% (95% CI 5.4-6.5) during 1992-96 to 12.8% (95% CI 12.2-13.4) during 2004-08. For all other Manitobans, the rate of colonoscopy or FS use increased from 8.2% (95% CI 8.1-8.3) in 1992-96 to 17.3% (95% CI 17.2-17.4) in 2004-08. Figure 3 illustrates the percentage of First Nations and all other Manitobans who had a colonoscopy or FS in the five years before the last day of each index year by area of residence. In the north, the percentage of individuals who had a colonoscopy or FS was similar or slightly higher for First Nations (5.2%, 95% CI 4.5-6.0 from 1992-96 to 11.4%, 95% CI 10.5-12.3 from 2004-08) compared to all other Manitobans (4.7%, 95% CI 4.2-5.3 from 1992-96 to 10.6%, 95% CI 9.9-11.3 from 2004-08). In the rural south, the percentage of individuals who had a colonoscopy or FS was lower for First Nations (5.6%, 95% CI 4.8-6.4 from 1992-96 to 12.6%, 95% CI 11.7-13.5 from 2004-08) compared to all other Manitobans (6.9%, 95% CI 6.7-7.1 from 1992-96 to 19.9%, 95% CI 16.7-17.1 from 2004-08). Lower rates of colonoscopy or FS use for First Nations compared to all other Manitobans were also observed in urban areas (7.7%, 95% CI 6.5-8.9 from 1992-96 to 14.9%, 95% CI 13.8-16.1 from 2004-08 for First Nations and 9.0%, 95% CI 8.8-9.1 from 1992-96 to 17.8%, 95% CI 17.6-17.9 from 2004-08 for all other Manitobans).

Table 4 shows the relative rate of having a colonoscopy or FS in the previous five years by ethnicity, residence, gender, age group, and index year. In the unadjusted models, there was
no difference in the likelihood of having a colonoscopy or FS for First Nations individuals compared to all other Manitobans (RR=0.90, 95% CI 0.77-1.05, p=0.21). After adjusting for area of residence, gender, age group, and year, there was a significant interaction between ethnicity and residence. In the rural south and urban areas, First Nations were less likely than all other Manitobans to have a colonoscopy or FS (RR=0.81, 95% CI 0.75-0.87 for the rural south, RR=0.86, 95% CI 0.81-0.92 for urban areas, p=0.02). However, there was no difference in the likelihood of having a colonoscopy or FS for First Nations and all other Manitobans who lived in the north (RR=1.04, 95% CI 0.91-1.19). Males were significantly less likely to have had a colonoscopy or FS compared to females (RR=0.82, 95% CI 0.78-0.86), p<0.0001). The relative rate of colonoscopy and FS use increased with age (RR=1.21, 95% CI 1.14-1.29 for 50-54 years of age to 1.85, 95% CI 1.68-2.02 for 70-74 years of age, p<0.0001) and time period (RR=1.17, 95% CI 1.14-1.19 for 1996 to 2.23, 95% CI 21.3-2.35 for 2008, p<0.0001).

**Discussion**

Previous analyses have found that the CRC incidence among First Nations individuals living in Manitoba has increased over time (2). This trend has also been observed in other jurisdictions; American Indians and Alaska Natives who live in the Unites States have a higher burden of CRC and stable or increasing CRC mortality (18). Population-based, organized screening using an FOBT is an important strategy that can help reduce the incidence and mortality of CRC. Our study found that over time, the rate of FOBT use has increased for both FN and AOMs living in Winnipeg but the participation of First Nations individuals remained significantly lower than that for all other Manitobans (13.4% for First Nations in 2008 compared to 32.7% for all other Manitobans). In addition, the gap in screening rates between First Nations and all other Manitobans has increased over time. The first CRC screening guidelines appeared
in the United States in late 1990s and in Canada in 2001; compliance with these guidelines is
likely to occur earlier and more rapidly among individuals that have fewer barriers to screening
which may partially explain the observed gap (4,19).

Screening, regardless of ethnicity, remains below the recommended Canadian national
target of 60% (20). These findings are consistent with other studies examining FOBT use among
Indigenous groups outside of Canada. In the United States, CRC screening rates using the FOBT
are lower for American Indians compared to other ethnic groups (21,22). In Australia, 17% of
individuals who identified themselves as Indigenous accepted an offer of FOBT use compared to
38.6% of non-Indigenous people (23).

Our study also found that the rate of colonoscopy or FS in the province has increased
over time for First Nations although the rate was significantly lower than that for all other
Manitobans. As well, the likelihood of having a colonoscopy or FS depended on area of
residence. First Nations individuals who lived in northern Manitoba had the same rate of
colonoscopy or FS as all other Manitobans while First Nations who lived in the rural south or
urban area were less likely than AOM to have had a colonoscopy or FS. This suggests a referral
inequity for endoscopy services for First Nations individuals based on where they reside in the
province.

Barriers to CRC screening arise from a variety of demographic, psychological, and
provider-related factors (24). In a review of literature on the equity of participation in CRC
screening among different ethnic populations, Javanparast et al. (2010) found that socio-cultural
factors play an important role in the acceptability, accessibility, and utilization of screening (16).
Culturally-specific barriers found among First Nations individuals include speaking an
Indigenous language and perceived discrimination in a health care setting (25,26). Filippi et al.
(2012) explored American Indian women’s barriers to CRC screening and found that embarrassment, privacy issues, fear of the procedure and possible results, and cost were key factors in screening participation (27). Logistical issues, such as child care duties, work schedules, long wait periods, and lack of transportation, were also important barriers (27). The most common barriers cited among American Indian men were privacy, embarrassment, and distrust of the health care system (28). American Indian community leaders also felt that there was little knowledge about CRC, risk factors, or screening recommendations (24).

Additional barriers to CRC screening include the required dietary and drug restrictions and the practicality of completing the guaiac-based FOBT (29-31). Since its introduction in the 1950s, the use of the guaiac-based FOBT has necessitated the elimination of red meat, high-peroxidase vegetables, vitamin C, and non-steroidal anti-inflammatory drugs for several days before and during the testing period. Newer, more sensitive guaiac-based FOBTs, such as the Hemoccult II SENSA currently used by the CRC screening program in Manitoba, require removing only vitamin C from the diet. Whether or not a reduction in the number of dietary restrictions will lead to improved screening participation has yet to be determined.

Research has also found that individuals are more reluctant to participate in CRC screening if they perceive the test as impractical, awkward, or embarrassing (32-34). The guaiac-based FOBT requires individuals to apply a small sample from three separate bowel movements onto a test card with the aid of a cardboard spatula (35). The responsibility for completing the screening test by the individual and any perceived difficulty may lead to lower levels of participation. Von Wagner et al. (2011) found that the intention to participate in CRC screening decreased when participants were given detailed information about how to collect fecal samples for a guaiac-based FOBT (32). The FIT, which does not require dietary restrictions and
only one stool sample, has been found to result in significantly higher participation rates than the guaiac-based FOBT (30,36). The effect of using a FIT on screening participation is currently being evaluated in Manitoba.

Until 2008, CRC screening in Manitoba using the FOBT was provided opportunistically, which relies on the recommendation and provision of the test by a primary care provider. However, in a recent survey, only 38% of Manitobans stated that their physician had initiated a conversation with them about CRC screening (8). Kelly et al. (2007) found that less than 40% of Native American women and men reported a physician recommendation for FOBT screening (37). Ideally, providing CRC screening as part of an organized, population-based program should achieve better accessibility by directly inviting eligible individuals to participate (38).

Since its introduction, the provincial CRC screening program has used several multi-level strategies to encourage screening participation within First Nations communities, including working with Health Canada’s First Nations and Inuit Health Branch and local primary health care providers, sending personalized invitation letters, media messaging, and social marketing campaigns. Previous research has found that addressing First Nations cultural structures and traditional ways are important aspects of reducing cancer screening disparities (24,28). Therefore, further work exploring the comprehensibility of the FOBT kit’s instructions in First Nations communities and the development of culturally-specific education and training is underway.

Our findings should be considered in the context of several study limitations. FOBT data were not available from the Medical Claims database for rural and northern Manitoba. Therefore, the results for Winnipeg may not be generalizable to other areas of the province. We were also not able to distinguish between colonoscopy and FS performed for screening versus...
those performed because of symptoms or for diagnostic purposes. It is likely in Manitoba that most colonoscopy and FS are diagnostic since population-based screening using these tests is not currently recommended.

We did not include any measures of socio-economic status (SES) in the analysis. Previous studies have found that education and income are often independent predictors of screening and that differences in screening uptake due to ethnicity are reduced after the adjustment for SES (39). Finally, this study included registered First Nations who represented 93% of all First Nations living in Manitoba; it did not include First Nations not registered nor did we distinguish between several distinct First Nations cultural groups. This information, however, is an important part of collaborating with FN communities and planning local strategies designed to improve cancer screening in the population.

In summary, First Nations individuals who resided in Winnipeg were significantly less likely to be screened for CRC using the FOBT. Throughout Manitoba, First Nations who lived in the north had the same rate of colonoscopy or flexible sigmoidoscopy as all other Manitobans while First Nations who lived in the rural south or urban area were less likely to have had a colonoscopy or FS. The disparities identified in FOBT, colonoscopy, and FS use are likely related to many factors and suggest that barriers to CRC screening exist for First Nations individuals. Addressing these barriers and improving CRC screening rates are particularly important since the incidence of CRC in First Nations is increasing and First Nations people have higher rates of diabetes and obesity which also increase the risk of CRC (11,40-42).

This research on CRC screening provides a baseline which can be used to assess the effectiveness of new strategies and changes in screening service delivery. Further research is needed to understand the barriers to CRC screening for First Nations people and to evaluate the
effectiveness of interventions that will help extend the benefit of CRC screening to the entire population. It is also important that future research include First Nations individuals and health care providers when identifying barriers and solutions to the lower CRC screening rates observed in Manitoba. Finally, more analyses are needed to evaluate whether or not the introduction of the organized, province-wide, population-based CRC screening program in 2008 has improved CRC screening participation for First Nations people and reduced the gap in screening observed in this study.
Acknowledgements

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References


(20) Canadian Partnership Against Cancer. Quality determinants and indicators for measuring colorectal cancer screening program performance in Canada. Toronto, ON: Canadian Partnership Against Cancer; 2013.


Tables

Table 1. Characteristics of registered First Nations and all other Manitobans in 1995-96 and 2007-08

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<th>1995-96 n</th>
<th>%</th>
<th>2007-08 n</th>
<th>%</th>
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<td>5,996</td>
<td>2.6</td>
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<td>Rural south</td>
<td>79,810</td>
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Total 232,164 | 7,987
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Table 2. Percent increase (gap) in fecal occult blood test use (FOBT) and FOBT, colonoscopy, and flexible sigmoidoscopy (FS) use for all other Manitobans compared to First Nations by year

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<td>7.3</td>
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<td>13.3</td>
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Table 3. Relative rates of fecal occult blood test utilization for registered First Nations and all other Manitobans who lived in Winnipeg by demographic characteristic

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<td>2.80 2.70 - 2.90</td>
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Notes: CI – Confidence Interval. Includes Winnipeg residents 50 to 74 years of age who had at least one fecal occult blood test in the two years before the last day of the index year. In the adjusted model, each variable was adjusted for all other variables. *The number of individuals in the age group and year categories will not sum to the total number of individuals in the ethnicity and gender categories as some individuals may have been screened more than once over the 12 year time frame.
Table 4. Relative rates of colonoscopy or flexible sigmoidoscopy utilization for registered First Nations and all other Manitobans

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<th>Crude model</th>
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<th>Adjusted model</th>
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<td>Rate</td>
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<td>2.23</td>
<td>2.13 - 2.35</td>
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</table>
Notes: CI – Confidence Interval. Includes Manitoba residents 50 to 74 years of age who had at least one colonoscopy or flexible sigmoidoscopy in the five years before the last day of the index year. In the adjusted model, each variable was adjusted for all other variables. *The number of individuals in the area of residence, age group and year categories will not sum to the total number of individuals in the ethnicity and gender categories as some individuals may have been screened more than once over the 12 year time frame.
Figure Legends

Figure 1. Percentage of First Nations and all other Manitobans who lived in Winnipeg and had a fecal occult blood test by index year
Notes: Includes Winnipeg residents 50 to 74 years of age who had at least one fecal occult blood test in the two years before the last day of the index year.

Figure 2. Percentage of First Nations and all other Manitobans who lived in Winnipeg and had a fecal occult blood test, colonoscopy, or flexible sigmoidoscopy by index year
Notes: Includes Winnipeg residents 50 to 74 years of age who had at least one fecal occult blood test in the two years or a colonoscopy or flexible sigmoidoscopy in the five years before the last day of the index year.

Figure 3. Percentage of First Nations and all other Manitobans who had a colonoscopy or flexible sigmoidoscopy by area of residence and index year
Notes: Includes Manitoba residents 50 to 74 years of age who had a colonoscopy or flexible sigmoidoscopy in the five years before the last day of the index year.
Figure 1

The graph shows the percentage of cancer diagnoses attributable to tobacco use among First Nations and All other Manitobans from 1996 to 2008. The x-axis represents the index year, ranging from 1996 to 2008, and the y-axis represents the percent of cancer diagnoses. The black line with diamonds represents First Nations, and the gray line with squares represents All other Manitobans. The percentages are as follows:

- First Nations:
  - 1996: 4.9%
  - 1998: 5.1%
  - 2000: 6.5%
  - 2002: 6.8%
  - 2004: 7.4%
  - 2006: 12.3%
  - 2008: 13.4%

- All other Manitobans:
  - 1996: 12.2%
  - 1998: 13.2%
  - 2000: 16.4%
  - 2002: 20.2%
  - 2004: 23.1%
  - 2006: 28%
  - 2008: 32.9%
Figure 3

The graph shows the percentage of First Nations, Urban, First Nations, Rural South, First Nations, North, All other Manitobans, Urban, All other Manitobans, Rural South, and All other Manitobans, North over the years from 1996 to 2008.
Colorectal cancer screening in First Nations People living in Manitoba

Kathleen M. Decker, Alain A. Demers, Erich V. Kliwer, et al.

Cancer Epidemiol Biomarkers Prev  Published OnlineFirst October 21, 2014.

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