Colorectal Cancer Screening in First Nations People Living in Manitoba

Kathleen M. Decker1,2, Alain A. Demers1,3, Erich V. Kliewer1,3,4, Grace Musto3, Emma Shu3, Natalie Biswanger2, Brenda Elias1, Jane Griffith1,3, and Donna Turner1,3

Abstract

Background: Because the burden of colorectal cancer (CRC) seems 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 in Winnipeg were significantly less likely to have had a FOBT in the previous 2 years than all other Manitobans who lived in Winnipeg [rate ratio (RR) = 0.40; 95% confidence intervals (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 with 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.

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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 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 the 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 2 years, FS every 5 years, or colonoscopy every 10 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 2 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, because 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 2 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. Because the burden of CRC seems 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 utilization among First Nations people.
screening among First Nations people living in Manitoba in comparison with 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 recognized 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; ref. 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, 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 nonregistered 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 multistep 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 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 nonregistered 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 multistep 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 Medical Claims database. The Medical Claims database is generated by claims for payment of services and includes a billing tariff code, some of which are isolated, northern communities (9).

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 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 2 years before the last day of the screening time period and/or a colonoscopy or FS in the 5 years before the last day of the screening time period. Individuals who lived outside Winnipeg were excluded from the analyses that only examined FOBT use because a significant proportion of FOBTs in rural and northern areas is 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 modeling was used to compare the rates of FOBT, colonoscopy, and FS use in First Nations and all other Manitobans. The following covariables were included in the regression model: age group (50–54, 55–59, 60–64, 65–69, and 70–74 years), 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 2 years before December 31 of each index year. For colonoscopy and FS, time period was defined as the 5 years before December 31 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.).

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 all other Manitobans 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.

| Table 1. Characteristics of registered First Nations and all other Manitobans in 1995–96 and 2007–08 |
|-----------------|-----------------|-----------------|
| Region          | 1995-96         | 2007-08         |
| North           | 79,110          | 64,355          |
| Rural south     | 99,302          | 79,357          |
| Urban           | 146,508         | 147,952         |
| Age group, y    | 50–54           | 60–64           |
| 55–59           | 47,273          | 60,947          |
| 60–64           | 43,297          | 60,947          |
| 65–69           | 42,186          | 60,947          |
| 70–74           | 40,214          | 60,947          |
| Gender          | Female          | Male            |
| 119,650         | 112,514         |
| 51.5            | 48.5            |
| 4,106           | 3,881           |
| 51.4            | 48.6            |
| Total           | 252,164         | 232,164         |
|                | 7,987           | 7,987           |

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with 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 Manitobans lived in the north compared with 38.7% of First Nations. This distribution changed only slightly in 2007–08 (2.6% of all Manitobans lived in the north compared with 36.8% of First Nations). In 1995–96, fewer all Manitobans were 50 to 54 years of age (25.5%) compared with First Nations (32.4%) and more were 70 to 74 years of age (17.3%) for all other Manitobans compared with 9.3% for First Nations. By 2007–08, 28% of all other Manitobans were 50 to 54 years of age and 12.2% were 70 to 74 years of age, whereas 35% of First Nations individuals were 50 to 54 years of age and 8.7% were 70 to 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 2 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 between 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 2 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 with 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 with 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 and who had an FOBT in the 2 years or a colonoscopy or FS in the 5 years before the last day of each index year. In all time periods, FOBT, colonoscopy, and FS rates were lower for First Nations compared with 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 5 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 with 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) during 1992–96 to 12.6%, 95% CI, 11.7–13.5 from 2004–08) compared with 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 with 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 5 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 with 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 with 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, 2.13–2.35 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 United 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 First Nations and all other Manitobans 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 with 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 with other ethnic groups (21, 22). In Australia, 17% of individuals who identified themselves as Indigenous accepted an offer of FOBT use compared with 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
Barriers to CRC screening arise from a variety of demographic, psychologic, and provider-related factors (24). In a review of literature on the equity of participation in CRC screening among different ethnic populations, Javanparast and colleagues found that sociocultural 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 and colleagues 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 the key factors in screening participation (27). Logistic 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 colorectal cancer risk factors: a systematic review (19).

Field trials within the previous 15 years have shown that there is no single approach that will significantly increase the rate of compliance for CRC screening among American Indian populations (24). The Canadian Lung Health Study was conducted in 1989–1990 and showed that education and checking compliance in clinics did significantly increase the rate of screening among American Indians (25). A colonoscopy is recommended for those who have a family history of CRC and at least one affected relative on either side of the family (26). In this case, screening was conducted at age 50, and all other American Indians were screened at age 55 (27). In a study of First Nations women, education significantly increased the rate of screening (28). Filippi and colleagues found that sociocultural 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). American Indian community leaders also felt that there was little knowledge about CRC, risk factors, or screening recommendations (24).

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### Table 4. Relative rates of colonoscopy or FS utilization for registered First Nations and all other Manitobans

<table>
<thead>
<tr>
<th>Area of residence: ethnicity</th>
<th>Number of individuals</th>
<th>Crude model</th>
<th>Adjusted model</th>
</tr>
</thead>
<tbody>
<tr>
<td>North: First Nations</td>
<td>3,969</td>
<td>1.00 Ref.</td>
<td>1.00 Ref.</td>
</tr>
<tr>
<td>North: All other Manitobans</td>
<td>8,928</td>
<td>1.00 Ref.</td>
<td>1.00 Ref.</td>
</tr>
<tr>
<td>Rural south: First Nations</td>
<td>2,625</td>
<td>0.80 Ref.</td>
<td>0.80 Ref.</td>
</tr>
<tr>
<td>Rural south: All other Manitobans</td>
<td>75,653</td>
<td>1.00 Ref.</td>
<td>1.00 Ref.</td>
</tr>
<tr>
<td>Urban: First Nations</td>
<td>2,221</td>
<td>0.88 Ref.</td>
<td>0.88 Ref.</td>
</tr>
<tr>
<td>Urban: All other Manitobans</td>
<td>156,086</td>
<td>1.00 Ref.</td>
<td>1.00 Ref.</td>
</tr>
</tbody>
</table>

**NOTE:** Includes Manitoba residents 50 to 74 years of age who had at least one colonoscopy or FS in the 5 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.
Provided facilities, etc.): K.M. Decker, A.A. Demers, B. Elias, D. Turner

Acquisition of data (provided animals, acquired and managed patients, provided facilities, etc.): A.A. Demers, E. Shu, B. Elias

Analysis and interpretation of data (e.g., statistical analysis, biostatistics, computational analysis): K.M. Decker, A.A. Demers, E.V. Kliewer, E. Shu, N. Binwanger, B. Elias, D. Turner

Writing, review, and/or revision of the manuscript: K.M. Decker, A.A. Demers, E.V. Kliewer, E. Shu, N. Binwanger, B. Elias, D. Turner

Study supervision: K.M. Decker, A.A. Demers, B. Elias, D. Turner

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Disclosure of Potential Conflicts of Interest

No potential conflicts of interest were disclosed.

Authors’ Contributions

Conception and design: K.M. Decker, A.A. Demers, E.V. Kliewer, B. Elias, J. Griffith, D. Turner


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