



## The prevalence and burden of musculoskeletal disorders amongst Indigenous people in Pimicikamak, northern Manitoba, Canada: A community health survey

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### ABSTRACT

**Objectives:** To investigate the prevalence of spine symptoms and spine disability, self-care and care seeking behaviors in a random sample of Indigenous adults residing in Cross Lake, northern Manitoba, Canada.

**Study design and setting:** Orally administered survey in Cree or English to a representative sample of Pimicikamak citizens from the treaty ( $n = 150/1931$  houses) and non-treaty ( $n = 20/92$  houses) land, between May and July 2023. Questions ( $n = 154$ ) were derived from the 2018 First Nations Regional Health Survey, 2020 Canadian Community Health Survey, and 2021 The Global Burden of Disease study, covering demographics, spine symptoms, chronic conditions, activity limitations, general health, self-care, medication, and satisfaction with care. We used descriptive and cross-tabulations and consulted the community for data interpretation.

**Results:** The survey was completed by 130 adults (65 % females, mean age, 48.4 years). Nearly all participants (89.6 %) reported having spine symptoms in the past four weeks, with a majority experiencing activity limitations lasting one day or more due to neck (77.9 %) or low back pain (55.6 %). Chronic neck and low back pain "sometimes or often" limited activities of daily living (52.8 % and 74.1 % respectively). Nearly two-third (65.4 %) did not have concomitant mood problems. Future preferred care included self-care (88.5 %), over-the-counter medication (64.6 %), seeing an allied care provider (45.4 %), a traditional healer (26.2 %), a nurse or a medical doctor (22.3 %).

**Abbreviations:** CCHS, Canadian Community Health Survey; FNIM, First Nations, Inuit, and M etis; FNRHS, First Nations Regional Health Survey; GBD, Global Burden of Diseases; NSAIDs, non-steroidal anti-inflammatory drugs; WSC, World Spine Care; WSCC, World Spine Care Canada..

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*Conclusion:* Spine symptoms were highly prevalent and significantly impacted activities of daily living. Nearly half of respondents felt that they could benefit from care provided by allied health providers.

## 1. Introduction

Musculoskeletal conditions including spine pain, osteoarthritis, injuries, and inflammatory arthritis affect approximately 1.71 billion people worldwide (Cieza et al., 2021), and since 1990, are the leading cause of global disability (Chen et al., 2022). Low back pain affects over 619 million people globally, and is responsible for 7.7 % of global years lost to disability (Chen et al., 2022). Spine pain disproportionately affects women, older persons, the economically marginalized, and people living in rural and remote communities (Ferreira et al., 2023; Safiri et al., 2020).

In 2018, the First Nations Regional Health Survey (FNRHS), conducted in Manitoba, Canada found that over the past 20 years, arthritis and chronic back pain remain the two most commonly reported musculoskeletal conditions among First Nations, Inuit, and Metis Peoples (FNIM) adults with prevalence rates of 18.3 % and 12.4 % respectively (First Nations Information Governance C, 2018). International clinical practice guidelines recommend people with spine pain be managed primarily through physical and psychosocial interventions, and discourage the use of pain medication (Corp et al., 2021; World Health Organization, 2023a). Alarming, the rate of opioid use, opioid use disorder, and associated mortality and morbidity are higher among Indigenous Peoples compared to other Manitobans (Phillips-Beck et al., 2023). Key risk factors for opioid use include historical trauma, (Richer and Roddy, 2022) chronic pain (Pierce et al., 2019), and mood problems (Santo Jr. et al., 2022). Conversely, initial care seeking from allied care provider may help reduce the risk of developing opioid issues (Corcoran et al., 2020; Zouch et al., 2022).

In Canada, FNIM Peoples bear an excessive burden of injury and acute and chronic diseases compared to non-Indigenous populations (Canadian Pain Task Force, 2020; Hudson and Cohen, 2018). The long-standing and ongoing conditions of structural violence, political marginalization and social discrimination that profoundly shapes the delivery and experience of health care have significantly contributed to the high burden of musculoskeletal disorders and chronic conditions among FNIM communities (First Nations Information Governance C, 2018; Phillips-Beck et al., 2020). These pervasive harms and inequalities are rooted in colonization and are perpetuated by institutions, policies, jurisdictional gaps, and care practices that create oppressive and unsafe conditions for FNIM Peoples accessing the Canadian healthcare system (Kim, 2019; Smylie et al., 2020). However, Indigenous People are not passive in their negotiation of these disparities. Indigenous scholars entreat white-settler providers and researchers to recognize the immense “resilience and resourcefulness in the face of exclusion and marginalization” that Indigenous People engage in to move through and intervene in, conditions of systemic racism and discrimination across the healthcare landscape (Smylie et al., 2020). These forms of resilience, enacted over decades, have resulted in the creation of Indigenous led health services, health authorities, cultural safety training, and Indigenous data sovereignty (First Nations Health Authority (FNHA), 2022; Hayward et al., 2021a; Hardy et al., 2023; Indigenous Health Department PHSAV, 2024). These factors have not been considered in other epidemiological studies in Indigenous research in Canada.

The current study is part of a mixed methods implementation project of World Spine Care Canada (WSCC) exploring the need for and feasibility to implement an evidence-based model of care for the assessment and treatment of adults with spine symptoms or concerns (Johnson et al., 2018; Speerin et al., 2020) in Cross Lake, Manitoba, from the perspective of our partners across ecological levels (Bussières et al., 2024).

Over the past two years, WSCC a not-for-profit, charitable organization established partnerships with community leaders of Cross Lake Band/Pimicikamak Cree Nation and Cross Lake Health Services in northern Manitoba, Canada. (Government of Canada, 2022) Cross Lake is located approximately 800 km north of Winnipeg, the capital city of Manitoba, and has a population of 6734 on the treaty and 2715 on the non-treaty land. (Government of Canada, 2022) Inhabitants include First Nations, Métis and non-Indigenous people. The majority of the population are treaty status; Cree and English are spoken in this community (GBD 2021 Neck Pain Collaborators, 2024).

This study aimed to 1) investigate the prevalence of spine pain, spine-related disability, and the general health status among adult community members; 2) assess self-care practices and care-seeking behaviors, and 3) explore the associations between opioid and non-opioid medication use and the presence of chronic conditions, spine related activity limitations, residential school attendance, and preference for seeing an allied care provider.

## 2. Methods

The study reporting adhered to the Checklist for Reporting Of Survey Studies (CROSS) (Sharma et al., 2021).

### 2.1. Study design

This Cross-sectional study involved adults aged 18 years and over living in Cross Lake, Manitoba between May and July 2023. 170 community households were randomly selected between March 17 and April 24, 2023, from a list provided by Cross Lake Urban Planning ( $n = 150/1931$  houses on treaty side, and  $n = 20/92$  houses on non-treaty side). Up to three consenting adults living in the same house could participate. The survey was orally administered by two research assistants (JW, MS), one of whom is a community member and who could translate questions into Cree (MS). Independent double data entry was used for entering paper-based survey data into an application specifically designed for the study using JavaScript Object Notation (JSON), securely and automatically saved on the University of Manitoba server.

A sample size estimate determined that 96 respondents were needed for a population of 10,000 at 90CI% (margin of error = 10 %) for this exploratory study. To account for participant attrition and the effect of missing data, we recruited 30 % more participants in this study. Participants received \$50 gift cards to the local grocery store in compensation for their time.

### 2.2. Ethical considerations

A research agreement between the Cross Lake Band, WSCC, University of Manitoba and Université du Québec à Trois-Rivières was signed on July 7, 2022, and a data transfer agreement between the Global Spine Care Initiative, Health and Welfare Canada Cross Lake Nursing Station was signed on August 22, 2022. Ethics approval was granted by the University of Manitoba’s Research Ethics Board (#HE2022–0250).

### 2.3. Questionnaire

The survey contained 154 questions divided in eight sections: demographics, spine symptoms, chronic conditions, activity limitations, general health status, self-care, use of medication and satisfaction with care. Participants could choose to answer, “Don’t Know” and “Refusal”.

Questions were derived from previously published reports, including the 2018 FNRHS (First Nations Information Governance C, 2018), the 2020 Canadian Community Health Survey (Statistic Canada, 2020), and the 2021 Global Burden of Disease study (Institute for Health Metrics and Evaluation (IME), 2021). The FNRHS represents the most appropriate reference point as was designed and delivered by First Nations researchers in Manitoba using a strength-based approach incorporating an Indigenous theoretical framework to guide the production and interpretation of the survey in relation to First Nations understanding of health and well-being (First Nations Information Governance C, 2018). Specifications of each variable are presented in Supplemental Material 1.

### 2.4. Study preparation

The appropriateness of potentially sensitive questions was reviewed by the Chief of Cross Lake Band, an Elder, and the community Health Director to ensure they were culturally sensitive, and their feedback was incorporated. The survey questionnaire was first piloted with the Chief, and then with 10 individuals. One item was removed (i.e., any adults currently away from home), four others were revised for clarity, and demographic questions (gender, marital status, main activity, level of education, residential school, and community activities/gatherings) were moved to the end of the survey. The final survey was reviewed by our partners before being administered to all consenting adults.

### 2.5. Statistical analysis

Most analyses were descriptive providing mean and SD for numerical responses, or percentages (and 95 % CI) endorsing each category for categorical response options. Cross-tabulations were used to examine relationships between presence of spinal pain (low back pain, neck pain) and activity limitations. Cross-tabulations with either  $\chi^2$  test or Fisher's exact tests (dependent on cell sizes) were used to explore associations between the 'Use of opioid medication in the past three months' and 'Prescribed non-opioid medication' as dependent variables and selected variables, namely: diagnosed with one or several chronic (over six months duration) conditions (i.e., low back pain, neck pain, mood problem (depression/anxiety) due to spine pain, arthritis (inflammatory/non-inflammatory); spine related activity limitations; participant/parents/grandparents attended residential schools; and preference for an allied care provider.

All analyses were performed using SAS software v9.4. (Copyright © 2012–2018, SAS Institute Inc., Cary, NC, USA. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA).

### 2.6. Data interpretation

Much of statistical and population-based health data on Indigenous groups has taken a deficit-based approach that has produced decontextualized knowledge designed to focus on disparity, disadvantage, and difference (Smith, 1999; Smylie and Firestone, 2015; Hayward et al., 2021b). Deficit-based approaches do not adequately represent Indigenous epistemologies and ontologies pertaining to health and wellness; they do not promote self-determination; and may be harmful if used incorrectly (Smylie and Firestone, 2015; Hayward et al., 2021b). Using a strength-based approach Requirement for Meaningful Engagement of FNIM, and Indigenous Peoples (Smylie and Firestone, 2015; Hayward et al., 2021b), team members consulted with community partners (leaders, local clinicians) and residents to discuss findings and the interpretation and communication of the results during an onsite engagement workshop held in March 2024. We shared the preliminary results of the study and invited feedback on the data. The session was advertised on Facebook and the local radio, and was led by five team members and a local research assistant.

### 2.7. Positionality and responsibility

We recognize that like all models of knowledge production, quantitative research is situated and contingent insofar as it reflects the social, cultural, historic, economic, political, and relational conditions of its design and execution (Smith, 1999; Walter and Anderson, 2013) (see positionality statements in Supplementary Material 2).

## 3. Results

### 3.1. Characteristics of the study population

Table 1 presents the participants' characteristics. A total of 130

**Table 1**  
Sociodemographic characteristics of a sample of Indigenous adults from Cross Lake, Manitoba, Canada (N = 130), May/July 2023.

Characteristics	Percentage (95 %CI) (unless indicated otherwise)	
Age: mean in years (SD), Range	48.4 (14.3)	21–85
Gender (Female)	65.4	(57.2–73.6)
Language spoken during interview	42.3	(33.8–50.8)
<ul style="list-style-type: none"> <li>• Cree</li> <li>• English</li> </ul>	57.7	(49.2–66.2)
Main activity performed <u>last week</u>	55.4	(46.8–63.9)
<ul style="list-style-type: none"> <li>• Working at a paid job or business</li> <li>• Caring for children</li> <li>• Household work</li> <li>• Retired</li> <li>• Maternity/paternity leave</li> <li>• Long-term illness</li> <li>• Volunteering</li> <li>• Care-giving other than for children</li> <li>• Other</li> </ul>	7.7 0.8 10.0 0.8 3.1 0.8 1.5 10.8	(3.1–12.3) (0.02–4.2) (4.8–15.2) (0.02–4.2) (0.1–6.1) (0.02–4.2) (0.2–5.5) (5.4–16.1)
Worked at a job or business at any time in the past 12 months	54.3	(45.7–62.9)
Level of education (n = 130)	2.3 33.9	(0.5–6.6) (25.7–42.0)
<ul style="list-style-type: none"> <li>• Nursery, kindergarten, and elementary (grades 1–8)</li> <li>• High school (grades 9–12, no degree)</li> <li>• High school graduate or equivalent</li> <li>• Some postsecondary (1–4 years, no diploma, no degree)</li> <li>• College diploma, including occupational or academic diploma</li> <li>• Bachelor's degree/university</li> <li>• Land based training</li> <li>• Don't Know</li> </ul>	13.1 12.3 18.5 16.9 0.8 2.3	(7.3–18.9) (6.7–18.0) (11.8–25.1) (10.5–23.4) (0.02–4.2) (0.5–6.6)
Regularly participates in events or activities that promotes and contributes to their health and well-being (n = 126)	25.4 2.4 4.8	(17.8–33.0) (0.5–6.8) (1.0–8.5)
<ul style="list-style-type: none"> <li>• Community projects</li> <li>• Environmental Projects</li> <li>• Sports' recreation (hockey, baseball, soccer, ice fishing...)</li> <li>• Dance (Pow-wow dancing, Jigging, square dancing, Hip-hop, ...)</li> <li>• Spiritual /religious (Sweat lodge, Sun dance, Fasting, ...)</li> <li>• Seniors' program (Elders home, Community Hall, Elders camp)</li> <li>• Arts and culture, activities (Card games, ...)</li> <li>• Refuse to Answer</li> <li>• Don't Know</li> </ul>	5.6 11.9 1.6 37.3 0.8 10.3	(1.6–9.6) (6.3–17.6) (0.2–5.6) (28.9–45.8) (0.02–4.2) (5.0–15.6)

Note: Normal approximation to binomial was used to construct CIs. exact binomial CIs were constructs if lower bound were inferior to 0.

adults consented to participate in the community health survey (mean age: 48.4 years, women: 65 %). The majority reported working in the past 12 months (55.4 %). Approximately 90 % of respondents regularly participated in events or activities that promoted or contributed to health and wellbeing including community projects (25.4 %), environmental projects (2.4 %), sports recreation (4.8 %), dance (5.6 %), spiritual or religious events (11.9 %), programming for Elders (1.6 %), and arts and culture activities (37.3 %).

### 3.2. Spine pain prevalence, related disability, general health status

Table 2 presents participants' spine symptoms and associated activity limitations. Spine symptoms in the past four weeks were experienced by 93 % of participants, including neck (52.3 %) and/or low back pain (75.4 %). Of those reporting spine symptoms, the majority indicated having activity limitation lasting one day or more due to their neck (77.9 %) or low back problem (55.6 %). The majority indicated spine pain of insidious onset (65.6 %) or from an injury (34.4 %).

Table 3 reports activity limitations due to chronic (over three months duration) spine symptoms. Many participants indicated that their neck and low back pain "sometimes or often" affected their ability to perform activities of daily living (52.8 % and 74.1 % respectively) and reduced the amount or the kind of activity done at home (55.9 % and 74 %) or at work (36.6 % and 54.4 %) respectively.

The majority (85.4 %) rated their general health as good or very good, with few people (7.0 %) reporting worsening of their health status over the past year (Table 2). Over 80.8 % of participants ranked their connection to their community as very strong or somewhat strong. When asked about mental health status, 94.7 % rated their status as good or higher.

### 3.3. Self-care, and care seeking behavior

As reported in Table 4, most participants (88.5 %) actively engaged in self-care for their spine symptoms (e.g., applied ice or heat, did stretching and strengthening exercises, kept moving or doing sports). Nearly 17 % of participants reported seeing a Traditional Healer in the past three months for their back or neck pain. Care received commonly included participating in smudging (63.6 %), sweats (63.6 %), healing ceremonies (45.5 %), other ceremonies (13.6 %), traditional diets (9.1 %), medicine wheel and sacred herbs (9.1 %), and herbal medicines (4.5 %).

About 73 % of participants reported taking over-the-counter analgesics (e.g., ibuprofen, acetaminophen) in the past three months for their spine symptoms. Among those seeking care at the Cross Lake Nursing Station for spine pain, 60 % were prescribed non-opioid medications (e.g., acetaminophen, muscle relaxants, nonsteroidal anti-inflammatory drugs, Gabapentin and Pregabalin or antidepressants). 86.1 % of participants were not prescribed an opioid medication for their spine symptoms, and 80.2 % reported not taking unprescribed opioid medication in the past three months for their spine problems.

In the event of an episode of neck or back pain in the following month, respondents indicated that they would prefer to self-manage (88.5 %), take over-the-counter medication (64.6 %), consult an allied care provider such as a chiropractor, physiotherapist, massage therapist, athletic therapist or acupuncturist (45.4 %), a Traditional Healer (26.2 %) or a nurse or a medical doctor (22.3 %). Two thirds of respondents reported they would not take prescribed medication (66.9 %), use alcohol (83.8 %), or take time off work (81.5 %) in response to their spine pain.

Participants reported that the main strategies used to improve their general health in the past 12 months included engaging in exercises (85.7 %); weight management (50.5 %) and dietary changes (41 %); reducing smoking (27.6 %), reducing alcohol intake (32.4 %), reducing opioid use (16.2 %) and illicit substance use (14.3 %); and spending time in nature (25.7 %) (see Table 4).

**Table 2**

Descriptive results of spine symptoms and general health status in the adult Indigenous population of Cross Lake, Manitoba, Canada, May/July 2023. (N = 130, unless indicated otherwise).

Spine symptoms	Percentage (95 %CI) (unless indicated otherwise)
LBP during past four weeks (n = 135)*	72.6 (65.1–80.1)
Neck pain during past four weeks (n = 135)*	50.4 (41.9–58.8)
LBP and/or neck pain during past four weeks (n = 135)*	89.6 (84.5–94.8)
LBP during past four weeks limiting activities for more than one day (n = 99)	55.6 (45.8–65.3)
Neck pain during past four weeks limiting activities for more than one day (n = 68)	77.9 (68.1–87.8)
Onset of LBP or neck pain (n = 119)	
	10.9 (5.3–16.5)
	12.6 (6.6–18.6)
• Accident at home	10.9 (5.3–16.5)
• Motor vehicle accident	29.4 (21.2–37.6)
• Other type of accident	20.0 (13.0–27.4)
• Work conditions	18.5 (11.5–25.5)
• Disease or illness	5.0 (1.1–9.0)
• Aging	3.4 (0.1–6.6)
• Emotional or mental health problem	3.4 % (0.1–6.6)
• Childbirth, Post-partum, Post epidural	22.7 % (15.1–30.2)
• Sports injury	
• Don't Know	
<b>Chronic conditions (over six months) diagnosed by a health professional</b>	
Chronic LBP (excluding widespread pain and arthritis) (n = 129)	8.5 (3.7–13.3)
Chronic neck pain (excluding widespread pain and arthritis) (n = 129)	10.9 (5.5–16.2)
Mood problems (e.g., depression or high anxiety) due to LBP or neck pain	34.6 (26.4–42.8)
Non-inflammatory or inflammatory arthritis (excluding widespread pain or fibromyalgia)	19.2 (12.5–26.0)
<b>General Health status</b>	
Self-reported general health	8.5 (3.7–13.3)
	40.0 (31.6–48.4)
	45.4 (36.8–53.9)
• Excellent	2.3 (0.5–6.6 %)
• Very good	2.3 (0.5–6.6)
• Good	1.5 (0.2–5.5)
• Fair	
• Poor	
• Don't Know	
General health compared to one year ago (n = 129)	
	7.8 (3.1–12.4)
• Much better now than one year ago	9.3 (4.3–14.3)
• Somewhat better now	62.8 (54.5–71.1)
• About the same	5.4 (1.5–9.3)
• Somewhat worse	1.6 (0.2–5.5)
• Much worse	13.2 (7.3–19.0)
• Don't know	
Overall satisfaction with life (1: Very dissatisfied; 10 Very satisfied)** (n = 124)	
Mean (SD), range	7.4 2–9
	(1.4) (0.02–4.2)
• 2	0.8 (0.02–4.2)
• 4	0.8 (7.6–19.8)
• 5	13.7 (1.1–8.6)
• 6	4.8 (11.0–24.5)
• 7	17.7 (33.3–50.6)
• 8	41.9 (13.1–27.2)
• 9	20.2
<b>General mental health status</b>	
	13.9 (7.9–19.8)
• Excellent	38.5 (30.1–46.8)
• Very good	42.3 (33.8–50.8)
• Good	3.6 (0.5–7.2)
• Fair	1.5 (0.2–5.5)
• Poor	
<b>Overall stress level in own life</b>	
	3.1 (0.1–6.1)
• Not at all stressful	10.8 (5.4–16.1)
• Not very stressful	61.5 (53.2–69.9)

(continued on next page)

**Table 2 (continued)**

Spine symptoms	Percentage (95 % CI) (unless indicated otherwise)	
• A bit stressful	14.6	(8.5–20.7)
• Quite a bit stressful	2.3	(0.5–6.6)
• Extremely stressful	7.6	(3.1–12.3)
• Don't know / no answer		
Daily stress level at work in past 12 months (n = 73)		
	5.5	(0.3–10.7)
	13.7	(5.8–21.6)
• Not at all stressful	53.4	(42–64.9)
• Not very stressful	24.7	(14.8–34.6)
• A bit stressful	2.7	(0.3–9.6)
• Quite a bit stressful		
• Extremely stressful		
Sense of belonging to the local community		
	42.3	(33.8–50.8)
• Very strong	38.5	(30.1–46.8)
• Somewhat strong	13.1	(7.3–18.9)
• Somewhat weak	1.5	(0.2–5.5)
• Very weak	4.6	(1.0–8.2)
• Don't Know		

Abbreviations: **LBP**: Low Back Pain.

\* The total number of participants (n = 135) includes five participants declaring having no spine symptoms in the past four weeks, and who declined to complete the survey.

\*\* Respondent's overall satisfaction with life was measured using a Likert scale, ranging from 1 (Very dissatisfied) to 10 (Very satisfied).

**Table 3**

Descriptive results of activity limitation variables due to chronic (over three months) spine pain in the adult Indigenous population of Cross Lake, Manitoba, Canada, May/July 2023.

Activity limitations	Low back pain Percentage (95 % CI) (N = 127)	Neck pain Percentage (95 % CI) (N = 127)
Difficulty walking, climbing stairs, sitting or standing for more than 10 min, lifting light weights, traveling short distances, sleeping (or difficulty driving if had neck pain)	58.3 (49.7–66.8) 15.8 (9.4–22.1) 22.1 (14.8–29.3)	46.5 (37.8–55.1) 6.3 (2.1–10.5) 39.47.9 (30.8–47.8)
• Sometimes	3.9 (0.6–7.3)	(3.2–12.6)
• Often		
• Never		
• Don't Know		
Reduce amount or kind of home activity	(n = 123) 58.5 (49.8–67.2) 15.5 (9.1–21.8)	(n = 118) 50.0 (41.0–59.0) 5.9 (1.7–10.2)
• Sometimes	22.8 (15.4–30.2)	40.7 (31.8–49.5)
• Often	3.3 (0.1–6.4)	3.4 (0.1–6.7)
• Never		
• Don't Know		
Reduce amount or kind of work activity	(n = 122) 48.4 (39.5–57.2) 9.0 (3.9–14.1)	(n = 126) 31.8 (23.6–39.8) 4.8 (1.0–8.5)
• Sometimes	15.6 (9.1–22.0)	26.9 (19.2–34.7)
• Often	24.6 (17.0–32.2)	32.5 (24.4–40.7)
• Never	2.5 (0.5–7.0)	4.0 (0.6–7.4)
• Does not work		
• Don't Know		
Reduce transportation, leisure or sports	(n = 122) 42.6 (33.9–51.4) 10.7 (5.2–16.1)	(n = 124) 29.8 (21.8–37.9) 4.8 (1.1–8.6)
• Sometimes	41.0 (32.3–49.7)	52.4 (43.6–61.2)
• Often	5.7 (1.6–9.9)	12.9 (7.0–18.8)
• Never		
• Don't Know		

**Table 4**

Descriptive results of previous and foreseen self-care, community spine care, and prevention strategy variables in the adult Indigenous population of Cross Lake, Manitoba, Canada, May/July 2023. (N = 130, unless indicated otherwise).

Self-care	Percentage (95 % CI) (unless indicated otherwise)	
Self-care at home in the past three months (n = 115)	88.5	(83.0–94.0)
• Ice or heat	57.7	(49.2–66.2)
• Massage	54.6	(46.1–63.2)
• Stretching and strengthening	73.1	(65.5–80.7)
• Kept moving/exercise/do sports...	70.8	(63.0–78.6)
• Took OTC medication	73.1	(65.5–80.7)
• Did nothing or no pain	10.0	(4.8–15.2)
Saw a traditional healer for LBP or neck pain in <u>past three months</u> (n = 22)	16.9	(10.5–23.4)
• Sweats	63.6	(43.5–83.7)
• Smudging	77.3	(59.8–94.8)
• Healing circles	45.5	24.7–66.2)
• Ceremonies	13.6	(2.9–34.9)
• Traditional diets	9.1	(1.1–29.2)
• Medicine wheel and sacred herbs	9.1	(1.1–29.2)
• Herbal medicines	4.5	(0.1–22.8)
• Traditional Healer, Elder or Medicine Person	22.7	(5.2–40.2)
• Other	9.1	(1.1–29.2)
• Refuse to Answer	9.1	(1.1–29.2)
Took prescribed non-opioid medication for spine problems in past three months (n = 78)	60.0	(51.6–68.4)
• Nonsteroidal anti-inflammatory drugs (Ibuprofen, ASA)	6.9	(2.6–11.3)
• Acetaminophen	54.6	(46.1–63.2)
• Skeletal muscle relaxants	34.6	(26.5–42.8)
• Antiseizure neuropathic	6.9	(2.6–11.3)
• Antidepressants	0.8	(0.02–4.2)
• Don't Know	3.1	(0.1–6.0)
Took prescribed opioid medication for spine problems in past three months (n = 18)	13.9	(7.9–19.8)
• Codeine	8.5	(3.7–13.6)
• Fentanyl	5.4	(1.5–9.3)
• Morphine/Hydromorphone	0.8	(0.02–4.2)
• Don't Know	3.1	(0.1–6.1)
Took unprescribed opioid medication for spine problems in past three months (n = 14)	19.8	(5.4–16.1)
• Codeine	7.7	(3.1–12.3)
• Fentanyl	3.9	(0.5–7.2)
• Morphine/Hydromorphone	0.8	(0.02–4.2)
• Other	0.8	(0.02–4.2)
Took unprescribed illicit or recreational drugs for spine problems in past three months (n = 98)	40	(31.6–48.4)
• Cannabis	39.2	(30.8–47.6)
• Cocaine	10.8	(5.4–16.1)
• Narcotics	0.8	(0.02–2.3)
<b>Spine care in the community</b>		
Preferred care if had an episode of LBP or neck pain in the next month	88.5	(83.0–94.0)
• Home treatments	64.6	(56.4–72.8)
• Take OTC medication	45.4	(36.8–53.9)
• Take OTC medication	26.2	(18.6–33.7)

(continued on next page)

Table 4 (continued)

Self-care	Percentage (95 % CI) (unless indicated otherwise)
• Consult allied care provider (chiropractor, physiotherapist, massage therapist, sport therapist, acupuncture, other)	33.1 (25.0–41.2)
• Consult a traditional healer	22.3 (15.2–29.5)
• Take prescribed medication	19.2 (12.5–26.0)
• Take some time off work or work less	18.5 (11.8–25.1)
• Take alcohol	16.2 (9.8–22.5)
• Take illicit drugs or medications not prescribed	1.5 (0.2–5.5)
• Do nothing	3.9 (0.5–7.2)
• Don't Know	
<b>Prevention: changes made to improve own health</b>	
Main strategies to improve <u>general health</u> in the past 12 months (n = 105)	80.8 (74–87.5)
	85.7 (79.0–92.4)
	50.5 (40.9–60.0)
• Increased exercise, sports, physical activity	41.0 (31.6–50.4)
• Lost weight	27.6 (19.1–36.2)
• Changed diet / improved eating habits	32.4 (23.4–41.3)
• Quit smoking / reduced amount smoked	16.2 (9.1–23.2)
• Drank less alcohol	14.3 (7.6–21.0)
• Took less opioids	25.7 (17.6–34.1)
• Took fewer street drugs	27.6 (19.1–36.2)
• Spent time in nature	1.9 (0.2–6.7)
• Received some advice or treatments	
• Other	
Main strategies considered to improve <u>physical health</u> (n = 123)	94.6 (90.7–98.5)
	77.2 (69.8–84.7)
	46.3 (37.5–55.2)
• Start or increase exercise, sports, physical activity	40.7 (32.0–49.3)
• Lose weight	32.5 (24.3–40.8)
• Change diet / improve eating habits	30.9 (22.7–39.1)
• Quit smoking / reduce amount smoked	15.3 (9.1–21.8)
• Drink less alcohol	11.4 (5.8–17.0)
• Take less opioids	12.2 (6.4–18.0)
• Take fewer street drugs	19.5 (12.5–26.5)
• Spend time in nature	55.3 (46.5–64.1)
• Receive some advice or treatments	30.1 (22.0–38.2)
• Participate in community programs	0.8 (0.02–4.5)
• Social gathering (church, mosque, temples, spiritual ceremonies)	
• Don't Know	
Barriers to improving own physical health (n = 34)	26.2 (18.6–33.7)
	29.4 (14.1–44.7)
	29.4 (14.1–44.7)
• Family responsibilities	20.6 (7.0–34.2)
• Disability / health problem	20.6 (7.0–34.2)
• Work schedule	17.7 (4.8–30.5)
• Too stressed	17.7 (4.8–30.5)
• Not available - in area	14.7 (2.8–26.6)
• Addiction to drugs / alcohol	14.7 (2.8–26.6)
• Physical condition	11.8 (0.9–22.6)
• Lack of will power / self-discipline	8.8 (1.9–23.7)
• Too costly / financial constraints	5.9 (0.7–19.7)
• Lack of transportation	67.7 (59.7–75.7)
• Weather problems	2.9 (0.1–15.4)
• No particular barriers	8.8 (1.9–23.7)
• Other	
• Don't Know	
Strategies to improve physical health <u>within the next year</u> (n = 86)	66.2 (58.0–74.3)
	80.2 (71.8–88.7)
	53.5 (41.8–62.9)
• Start / increase exercise, sports, physical activity	34.9 (24.8–44.9)
• Lose weight	37.2 (27.0–47.4)
• Change diet / improve eating habits	31.4 (21.6–41.2)
• Quit smoking / reduce amount smoked	18.6 (10.4–26.8)
• Drank less alcohol	15.1 (7.6–22.2)
• Took less opioids	15.1 (7.6–22.7)
• Took fewer street drugs	11.6 (4.9–18.4)
• Spent time in nature	23.3 (14.3–32.2)

Table 4 (continued)

Self-care	Percentage (95 % CI) (unless indicated otherwise)
• Receive medical treatment	50.0 (39.4–60.6)
• Receive some advice or treatments	44.2 (33.7–54.7)
• Participate in community health program	1.2 (0.03–6.3)
• Participate in activities or classes	
• Drink more water	

Abbreviations: **LBP**: Low Back Pain; **OTC**: Over-the-Counter Medication.

Similarly, respondents reported openness to improve their general health by participating in community programs (55.3 %) and engaging in social gatherings (30.1 %). Nearly one third of participants (31.5 %) reported facing barriers to improving their health such as family responsibilities, work schedules, health problems, physical conditions or stress levels, and the unavailability of service in the area.

### 3.4. The association between opioid use and selected variables

Table 5 reports Cross Tabulations on the association between medication use and selected variables (diagnosed chronic conditions; spine related activity limitations; participant/parents/grandparents attended residential schools; preference for allied health providers). ‘Prescribed non-opioid medication’ was significantly associated with ‘diagnosed chronic conditions’ ( $X^2 = 6.28$ ;  $df = 1$ ;  $P = 0.01$ ), and ‘spine related activity limitations’ ( $X^2 = 5.36$ ;  $df = 1$ ;  $P = 0.02$ ). However, no associations were found between ‘Use of opioid medication in the past three months’ and selected variables.

### 3.5. Engagement workshop findings

Table 6 presents community member reflections and suggestions gathered during the engagement workshop. Some participants described the mental and physical data as an accurate reflection of the community, while others postulated that there are more mental health issues and stressors affecting people in Cross Lake than survey participants may have felt comfortable reporting. In discussing the difference between the reported data and their lived experience, workshop participants noted that mental health is perceived as a private issue, and an intergenerational issue, and one that can be exacerbated by external stressors such as housing insecurity and overcrowding.

Community members also provided suggestions for how the Global Spine Care Initiative model of care could adopt or promote approaches to prevent spine pain that are year-round, functional, land-based and Indigenous-led to meet the unique spine care needs of this community. These strategies included seeing Traditional Healers, taking Indigenous medicines and working on and with the land (e.g. chopping wood, spending time in the bush/wilderness, use of ceremony).

## 4. Discussion

Spine symptoms were highly prevalent and significantly impacted activities of daily living. Nearly all survey participants reported having spine symptoms in the past month, with half to three quarters experiencing some activity limitation for one day or more. Similarly, half to three quarters of participants mentioned that their chronic neck and/or low back pain ‘sometimes or often’ limited their activities. Self-care, over-the-counter medication, preference for seeing an allied care provider, a traditional healer, a nurse or a medical doctor were preferred care options in the event of another spine pain episode. Opioid prescribing rate in the community was similar to the Canadian public (*Canadian Centre on Substance Use and Addiction, 2020*), and lower than reported rates across First Nations communities in Canada (*First Nations Information Governance C, 2018*). Diagnosed chronic conditions and

**Table 5**

Associations between use of opioid and non-opioid medication and key variables in the adult Indigenous population of Cross Lake, Manitoba, Canada, May/July 2023.

	Opioid Medication Use in Past three months	Test Statistics $\chi^2$ df p-value (*Fisher's exact p)	Non-Opioid Medication Use in Past three months	Test Statistics $\chi^2$ df p-value (*Fisher's exact p)
	n (%)		n (%)	
Diagnosed Chronic Condition		0.51		6.28
• No (N = 65)	9 (13.9 %)	1	32 (49.2 %)	1
• Yes† (N = 65)	12 (18.5 %)	0.47	46 (70.8 %)	0.01
Spine Related Activity Limitations		0.44		5.36
• No (N = 11)	1 (9.1 %)	1	3 (27.3 %)	1
• Yes† (N = 119)	20 (16.8 %)	0.51 (1.0)	75 (63.0 %)	0.02 (0.027)
Residential School Attendance Respondent		1.64		0.36
• No (N = 122)	21 (17.2 %)	1	74 (60.7 %)	1
• Yes (N = 8)	0 (0.0 %)	0.20 (0.35)	4 (50.0 %)	0.55 (0.71)
Respondent's Parent(s)				
• Don't Know (N = 12)	1 (8.3 %)	2.90	6 (50.0 %)	2.14
• No (N = 53)	12 (22.6 %)	2	29 (54.7 %)	2
• Yes (N = 65)	8 (2.3 %)	0.23	43 (66.2 %)	0.34
Respondent's Grandparent (s)				
• Don't Know (N = 37)	7 (18.9 %)	2.15	21 (56.8 %)	1.58
• No (N = 20)	5 (25.0 %)	2	10 (50.0 %)	2
• Yes (N = 73)	9 (12.3 %)	0.34	47 (64.4 %)	0.45
Prefer Allied Health Professional		4.58		1.68
• No (N = 71)	7 (9.9 %)	1	39 (54.9 %)	1
• Yes (N = 59)	14 (23.7 %)	0.03 (0.054)	39 (66.1 %)	0.20 (0.21)

\*Fisher's exact test p-value reported for cross-tabulations with small cell sizes where  $\chi^2$  test may not be valid.

† reporting any one of the four chronic conditions of over six months duration.

‡ Yes indicates the respondent answered sometimes or often to at least one of four questions regarding spine-related activity limitations: 1) difficulty walking, climbing stairs, sitting, standing etc., 2) reduced activity at home; 3) reduced activity at work; 4) reduced activity related to transportation, leisure or sports.

spine-related activity limitations were associated with prescribed non-opioid medication, but not with opioid use.

To our knowledge, ours is the first survey to report neck pain prevalence in a northern Manitoba Indigenous community as neck pain was not one of the 34 possible conditions listed on the FNRHS (First Nations Information Governance C, 2018). The prevalence of neck and low back pain and spine-related burden among Cross Lake community members appears to be higher than in Canada (Ferreira et al., 2023; GBD 2021 Neck Pain Collaborators, 2024), the United States, Australia, and New Zealand (Lin et al., 2020). The growing burden of musculoskeletal diseases and associated comorbidities requires continued action to improve population health (Lin et al., 2020; Kopec et al., 2024).

We interpreted our results in relation to the Manitoba FNRHS (First Nations Information Governance C, 2018) as other Canadian health surveys have historically excluded FNIM (Statistic Canada, 2020) Untreated chronic pain and a lack of access to non-opioid options to treat

**Table 6**

Feedback received at the engagement workshop from adult Indigenous community members residing in Cross Lake, Manitoba, Canada, March 2024.

Area of Survey Results	Community Reflections	Community Suggestions
<b>General Health Status</b>	<p><i>General Health</i></p> <ul style="list-style-type: none"> <li>• No exaggerations [in the data]* and feels the findings are reflective of reality</li> <li>• Sees community as "Resilient"</li> <li>• Can see [the reported numbers] may be a bit lower because people don't trust the interviewer to share</li> <li>• Can we talk about general health in more specific terms? What does good mean? What does very good mean?</li> <li>• [Results suggest people] gave the answers that [the researchers] wanted to hear. If you look on Facebook you see the reality</li> </ul>	
	<p><i>Stress</i></p> <ul style="list-style-type: none"> <li>• Maybe people cope with stress because they always have to</li> <li>• Stress is prominent. Some people handle it better and some don't</li> <li>• Some people have anxiety, grief but only because they haven't dealt with their LOSS.</li> </ul>	
	<p><i>Mental Health</i></p> <ul style="list-style-type: none"> <li>• Important to consider the survey happened after COVID – significant that people rated health/mental health so well after social isolation</li> <li>• Feels mental health is stable and [data] quite reflective</li> <li>• Mental health helps general health</li> <li>• Feeling of hopelessness can be there. Housing overcrowded</li> <li>• You're a man now, you don't cry</li> <li>• [We] carry stress</li> <li>• When you keep all the emotion inside then you drink to deal with it</li> <li>• A lot of people hide stuff (emotions)</li> <li>• [Workshop participant] does home visits and sees a lot of dysfunction. [Suggests] mental state [in community] is a bit lower than results.</li> <li>• Elders are sad and see the [mental health] problems that are happening and</li> </ul>	

(continued on next page)

Table 6 (continued)

Area of Survey Results	Community Reflections	Community Suggestions
Spine Symptoms	going from one generation to the next.	
	<ul style="list-style-type: none"> <li>Working early in life (50–60 year old) have low back pain</li> <li>Youth have neck pain</li> <li>I have had low back pain for 10 years</li> </ul>	
Activity Limitations related to Spine Symptoms	<ul style="list-style-type: none"> <li>No specific comments made</li> </ul>	
Management of Spine Symptoms	<ul style="list-style-type: none"> <li>Many folks stay at home and deal with the pain</li> <li>I go to Thompson for rehab. Just get stretches that's it</li> <li>Apprehensive about going into ER Dept</li> <li>[Workshop participant] doesn't like going into the nursing station for anything because she is scared to get sick</li> <li>Some folks may feel 'shy' about accessing care at the Nursing Station</li> </ul>	
Prevention of Spine Symptoms	<ul style="list-style-type: none"> <li>Active kids in healthy households have good health (e.g. kids play outside)</li> <li>People being active.</li> <li>[Being active in] Spring and Summer mostly, [some] winter activities. Gets the back Pain Down</li> </ul>	<ul style="list-style-type: none"> <li>Focus on Functional movements. Do stuff outside</li> <li>Have both inside and outside options for activities and exercises</li> </ul> <p><i>Right to Services</i></p> <ul style="list-style-type: none"> <li>Need physiotherapy and chiropractic here in town</li> <li>Create a Facebook page just for chiropractic</li> </ul> <p><i>Resources Needed</i></p> <ul style="list-style-type: none"> <li>A fitness centre here so people can have a place [to exercise]</li> <li>Sidewalks</li> <li>Increase opportunity to exercise. Have more education to teach people how to exercise.</li> </ul> <p><i>Indigenous-led and land-based strategies</i></p> <ul style="list-style-type: none"> <li>Combination of both inside and outside activities.</li> <li>Land based, and a place to walk in winter</li> <li>Less weights, chop wood instead</li> <li>Out in the bush moving and eating fish helps and keeps you in shape. Keeps sugars low</li> <li>Make more people take Indigenous medicines see a healers</li> </ul>

\* [] denotes words added by the research team to clarify the grammar or context of the feedback received during the community engagement sessions. The text is otherwise presented verbatim as it was documented on sticky notes during the engagement sessions.

pain has been linked to the ongoing opioid crisis in Canada (Campbell et al., 2021). Despite nearly 60 years of research, high quality evidence to guide clinical decisions on analgesic medicines for non-specific acute low back pain remains limited (Wewege et al., 2023). In our survey, 40 % of participants reported not taking prescribed medication for their spine symptoms in the past three months. Most respondents had not use prescribed (86.1 %) or non-prescribed (80.2 %) opioids medication in the past three months. While not specific to spine pain, the FNRHS reported that 75.1 % of adults in Manitoba did not use prescribed opioids in the preceding year (First Nations Information Governance C, 2018). This is similar to the finding from Statistics Canada that 76.9 % of people who identify as Indigenous did not use opioid medication for pain in the past 12 months (Go, 2018), suggesting ongoing needs to tackle this public health issue. Furthermore, non-steroidal anti-inflammatory drugs (NSAIDs) are the only pain medication recommended for non-surgical management of chronic low back pain in adults, in primary and community care settings (World Health Organization, 2023a). While only 6.9 % of respondents reported using a prescribed NSAID and/or acetylsalicylic acid, 73 % reported taking over-the-counter medication in the past three months for their spine symptoms.

Clinical practice guidelines recommend reassurance, education and advice on self-care, and non-pharmacological therapies (structured exercise, manual therapy, massage, needling therapy) in first line and second line care for acute and persistent non-specific spine pain (Maher et al., 2017; Kanga and Severn, 2017). Participants indicated their preferred care options for a future spine pain episode included self-care, pointing in part to the resourcefulness of the community to address their spine care needs. Further, 45 % of survey respondents indicated they would prefer to consult an allied health provider for a future episode of neck or back pain such as a chiropractor, physiotherapist, massage therapist, athletic therapist, or acupuncturist. At the time of our survey, the only allied health provider available in community was a massage therapist who visited monthly.

Reducing high burden musculoskeletal disorders globally, including spine pain requires that governments prioritize equitable access to high-quality rehabilitation care (World Health Organization, 2023b; Briggs et al., 2018). Recommended changes among Indigenous communities in colonial states include a system-wide commitment to cultural safety, public funding for rehabilitation care, building the Indigenous health-care workforce, and developing Indigenous-identified indicators in quality improvement, cultural training and support for existing clinicians, rehabilitation-based Indigenous health services, and building healthy relationships with patients and communities (Lin et al., 2020; Crockett et al., 2024; Møller et al., 2023).

The FNRHS study indicated that 25 % of First Nation individuals on-reserve are more likely to use Traditional Healers than to seek care from a physician, and 32.5 % had used traditional medicines (First Nations Information Governance C, 2018). Our study participants showed a high degree of interest in using Traditional medicines, with one third seeking Traditional Healers for managing their neck and back pain. Our survey found that over three-quarter of participants were interested in physical activity as a strategy to improve their health. As echoed by community engagement workshop participants, this knowledge represents an excellent opportunity to promote the use of culturally safe meaningful care (Varcoe et al., 2021; Loyola-Sanchez et al., 2020), and co-design and implement site-specific land-based physical activity interventions with our community partners (Ahmed et al., 2021).

Respondents reported a good (42.3 %), very good (38.5 %), or excellent (13.9 %) mental health status. This rate is consistent with FNRHS findings which reported 87.0 % of First Nations adults in Manitoba rate their mental health as good, very good, or excellent. However, some of the community engagement workshop participants suggested that community members are more impacted by mental health issues than reported in our data. Future research should investigate these perceived disparities, particularly given the role of mental health in spine disorders (Singhal et al., 2021).



### Strengths and weaknesses.

Our survey tool was informed by three validated surveys adapted in collaboration with our community partners, and was limited to adults. We adopted a strength-based approach to the interpretation and reporting of the statistical data collected for this survey. We used the FNRHS (First Nations Information Governance C, 2018) as a north star for the interpretation of these results as it represents the only survey tool designed for and by First Nations People, and asserts the data sovereignty principles of ownership, control, access and possession.

Our survey did not ask questions pertaining to the comfort of disclosing information about mental health or stress which may have helped contextualize some of our findings. Some language employed to describe questions on illicit substance use, through the process of reflection, has been identified as potentially demoralizing, and may have affected the answers provided by respondents. Our survey results were shared with our community partners, and with community members. We encountered low attendance (16 members) during our community engagement workshop which may have been attributed to inclement weather. The sample size was relatively small. We recognize that the lived experiences of people in Cross Lake, MB are not necessarily generalizable to other First Nations communities in Canada, or to the Inuit and Metis Nations.

## 5. Conclusion

Spine pain is very common in the Cross Lake community, and significantly impacts activities of daily living. Our findings highlight contextually specific information about spine pain in Cross Lake and have identified several opportunities for improving access to care in this community. Nearly half of respondents indicated that they could benefit from rehabilitation services, particularly those grounded in Indigenous and land-based frameworks. Future research should focus on identifying indicators of health that are meaningful for the Cross Lake community.

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### Ethical compliance and patient consent statement

This study protocol was developed in accordance with relevant local and international ethical guidelines and regulations, e.g., Declaration of Helsinki. This survey is part of an ongoing implementation study in Cross Lake, Northern Manitoba, and received ethical approval from the University of Manitoba's Research Ethics Board (#HE2022-0250). The questionnaire was anonymous, orally delivered in person by a trained local research assistant in Cree or English, and information on the data protection policies adopted to ensure participant privacy was provided. Data analyzed in this study were anonymized before use. Written consent was obtained from all study respondents' before completing the survey.

### Consent for publication

This manuscript does not contain any individual or identifiable information. Study findings were presented and discussed with Cross Lake community members at a gathering. We received permission to publish findings from leaders of Cross Lake Band, Cross Lake, northern Manitoba.

### CRedit authorship contribution statement

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### Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Andre Bussi eres reports financial support and administrative support were provided by Health Canada. Andre Bussi eres reports financial support and article publishing charges were provided by Canadian Chiropractic Research Foundation. Andre Bussi eres reports financial support was provided by Canadian Chiropractic Association. Andre Bussi eres reports administrative support was provided by Healthcare Excellence Canada. Andre Bussi eres reports financial support, administrative support, and travel were provided by World Spine Care Canada. Melissa Atkinson Graham reports financial support, administrative support, equipment, drugs, or supplies, and travel were provided by World Spine care Canada. Melissa Atkinson Graham reports financial support and travel were provided by Health Canada. Melissa Atkinson Graham reports financial support, administrative support, and travel were provided by Healthcare Excellence Canada. Melissa Atkinson Graham reports financial support was provided by University of Quebec at Trois-Rivi eres. Jennifer Ward reports financial support and travel were provided by Health Canada. Jennifer Ward reports administrative support, equipment, drugs, or supplies, and travel were provided by World Spine Care Canada. Jennifer Ward reports financial support, administrative support, and travel were provided by University of Manitoba. Jennifer Ward reports financial support was provided by Canadian Chiropractic Research Foundation. Jennifer Ward reports financial support was provided by Canadian Chiropractic Association. Muriel Scott reports financial support was provided by University of Manitoba. Muriel Scott reports financial support, administrative support, and travel were provided by World Spine Care Canada. Muriel Scott reports financial support was provided by Healthcare Excellence Canada. Jean Moss reports financial support and administrative support

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pmedr.2024.102960>.

## Data availability

The data that support the findings of this study are available from the University of Manitoba, but restrictions apply to the availability of these data, which were used under the signed research agreement for the current study and so are not publicly available. This study complied with The First Nations principles of Ownership, Control, Access, Possession (OCAP®), asserting that First Nations have control over data collection processes, and that they own and control how this information can be

used. The data are, however, available from the authors upon reasonable request and with the permission of Cross Lake Band, Cross Lake, northern Manitoba.

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