Ontario First Nations Aging Study

Overview & Report
November 2019

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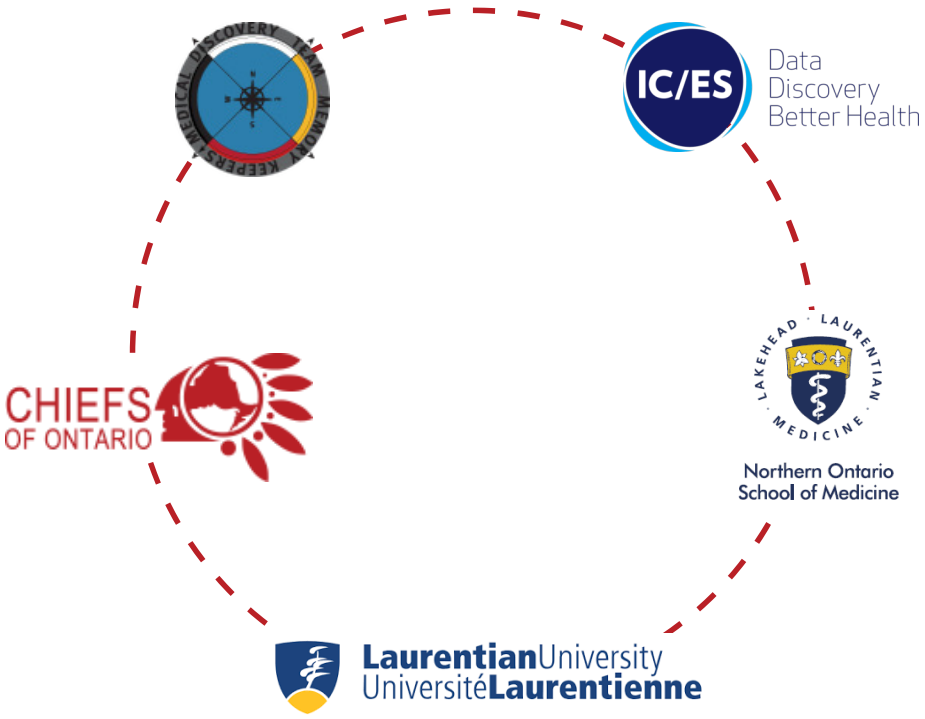

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About the First Nations Aging Study 01

The Ontario First Nations Aging Study, launched in 2015, is a collaboration between the Chiefs of Ontario and university researchers. The study has involved a dedicated and diverse team of advisors, community members, researchers, and leaders. Our goal was to create the first Ontario-wide profile of aging in First Nations populations. This summary report highlights the findings from three key sources of information:

1. a series of **conversations** about aging well with Anishinaabemowin language speakers and older Anishinaabeg on Manitoulin Island;
2. the **First Nations Regional Health Survey**, Phase 2, which was coordinated by Chiefs of Ontario. The survey was done in 24 First Nations communities in Ontario in 2008-2010. For this report, we focused on adults aged 45 and older; and
3. **health services data** (hospital visits, doctor visits, etc) for all First Nations people living in Ontario who have status and are listed in the Indian Register with the federal government. We used the health services data held at ICES for the nearly 55,000 First Nations adults aged 45 and older living in Ontario who have an Ontario Health Card.

02 Aging in First Nations Adults

First Nations teachings value all stages of life and the significance of a strong role for older people. Getting older can be a positive thing. Staying well means taking care of your physical, emotional, mental and spiritual strength. It also means keeping up your connections to other people and the land.

Throughout this work, we have heard many stories about how long First Nations people lived before the massive disruptions, changes, and trauma that have come with colonization.

Today, the number of First Nations people is growing more quickly than the general population and are still younger than other populations.[1] However, many First Nations people are living to older ages. We looked at the nearly 55,000 registered status First Nations adults aged 45 and older living in Ontario who have an Ontario Health card and found:

About **half** of First Nations adults live in Northern Ontario.

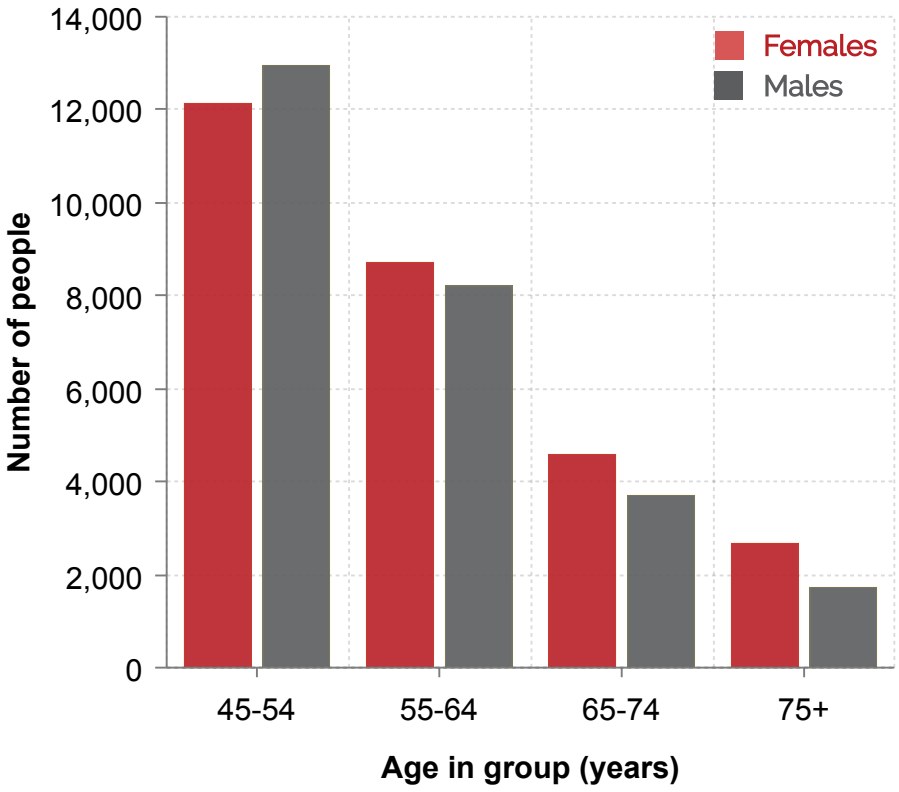


Figure 1. Population distribution by age

In the oldest age groups (55+), there are **more women than men.**

Data Sources: ICES data holdings, including the federal Indian Register (2014) and the Ontario Registered Persons Database (2014)

Most First Nations people **have a primary home address outside of First Nations communities.** This ranges from 32% in the youngest, working age, population (aged 45-54) to 39% in the oldest age (75 and older).

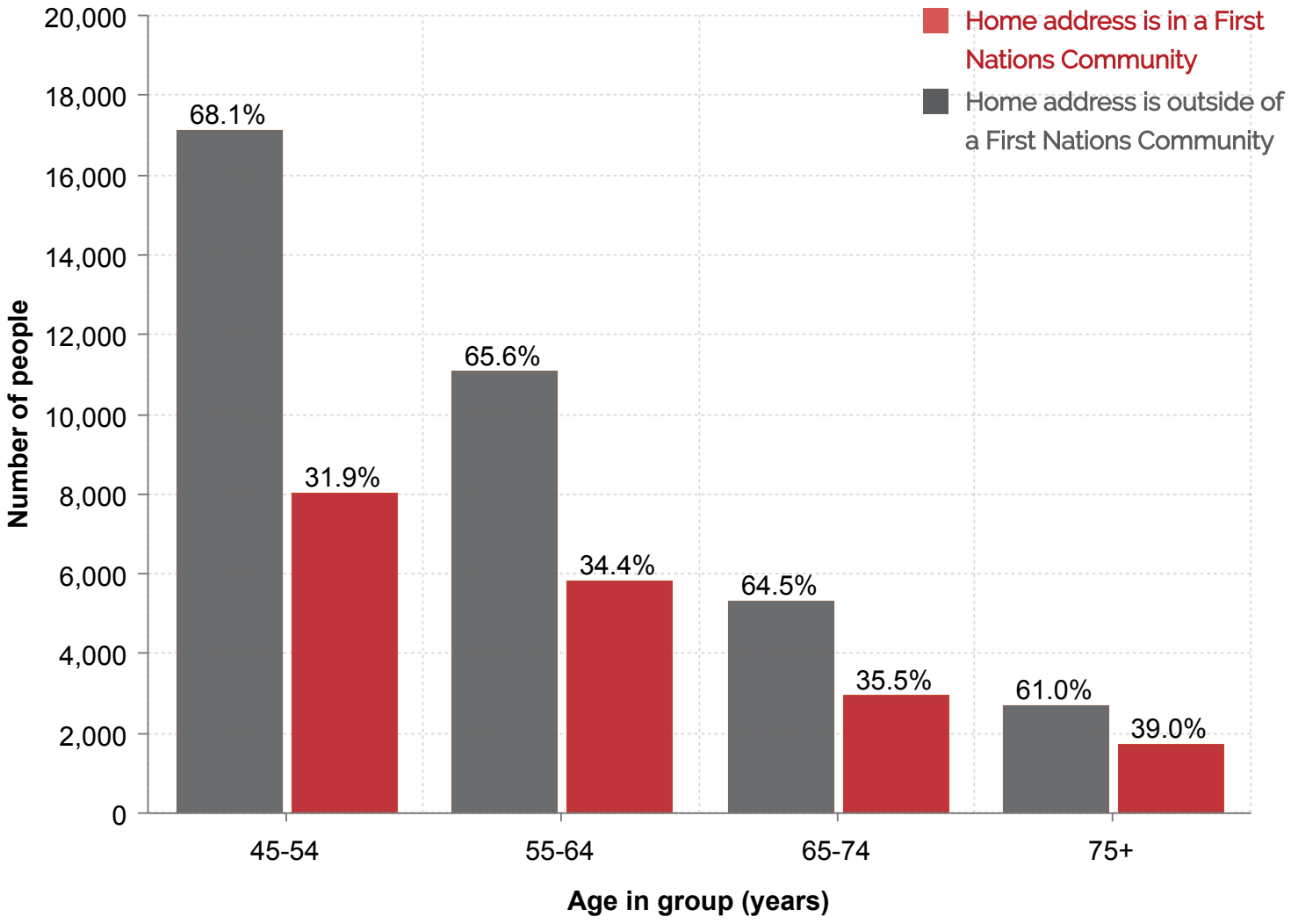


Figure 2. Population distribution by age and community residence

Data Sources: ICES data holdings, including the federal Indian Register (2014) and the Ontario Registered Persons Database (2014)

04 Frailty and Age

Using a biomedical definition of frailty, First Nations people living in First Nations communities in Ontario experience frailty at younger ages than the general Canadian population.

> ***"Frailty is part of the circle of life. It can be identified easily. It needs adjustment of activities to what you are still able to do, examples walk in small spaces inside, have fresh air on your porch, play guitar and sing."***
>
> Language Group Member, Manitoulin Island

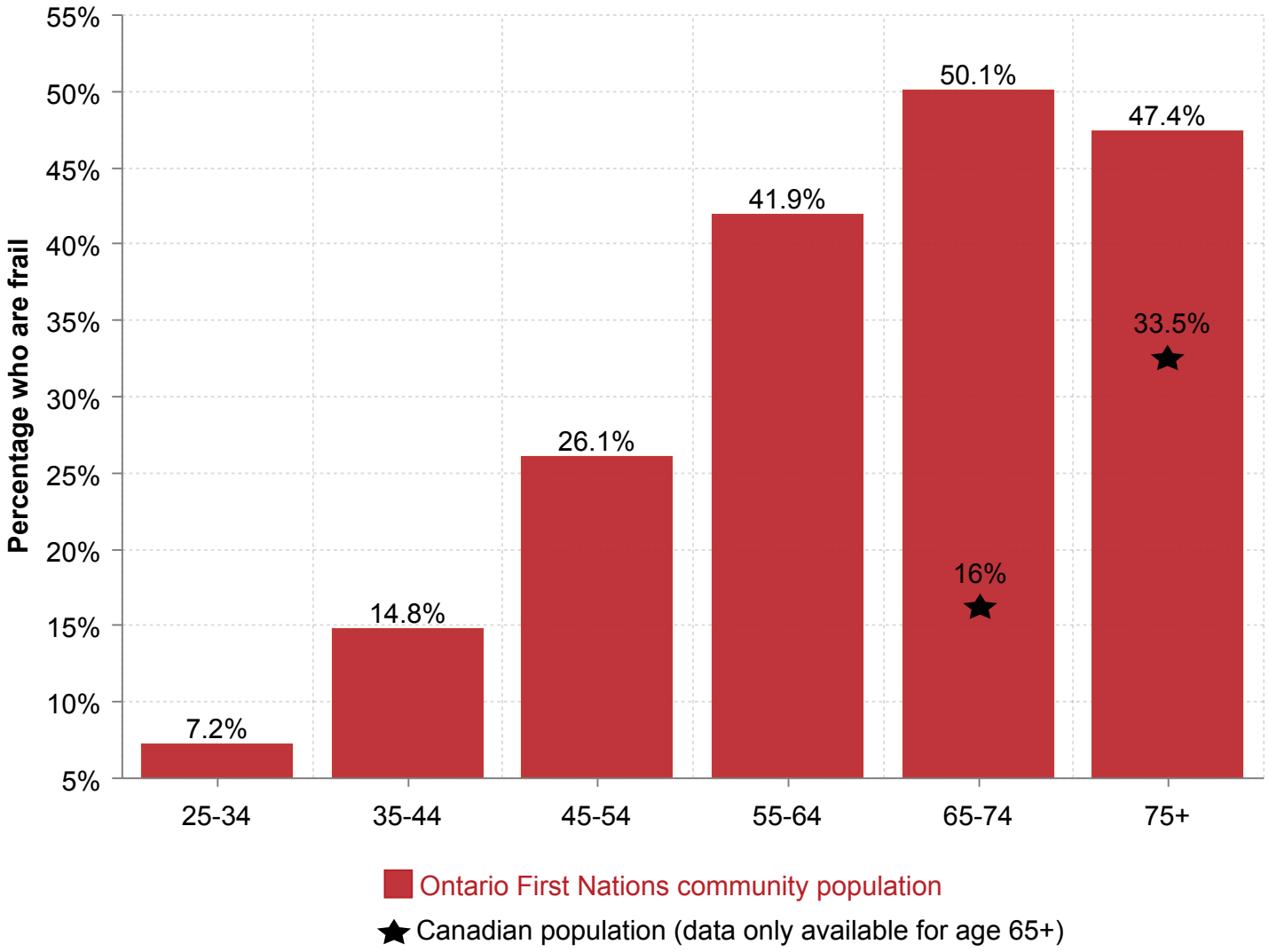


Figure 3. Prevalence of frailty

Data Sources: Ontario First Nations Regional Health Survey, Phase 2 (2008-2010), ★ Hoover et al (2013)[2]

Frailty and Age 05

The high level of frailty and chronic diseases at younger-than-expected ages is one of the key findings of the First Nations Aging Study. It has substantial implications for the supportive needs in First Nations communities, like home care services, and health promotion efforts.

"The other problem is they get a phone call and they say, well Mr. or Mrs., have you cleared the snow out your yard yet? Because if you didn't clear your snow, I'm not coming. This is the public health nurse calling. And it's snowing like mad out there and they're asking this elderly person whether they've cleared their driveway. [...] [She] can't lift a shovel."

Focus Group Participant, Manitoulin Island

"Even with co-morbidities and an event like a stroke or surgery our health care system isn't set up for when you need care (examples no therapy) but these experiences can be balanced by acceptance of assistive devices for the short term, and choosing home where you were raised versus unfamiliarity or institutional care."

Language Group Member, Manitoulin Island

"I live in a, [...] fifty five and over building, and [...] what I've seen there is, [...] the elders, they cook for themselves and so do I. But the thing is, in the winter-times, it's kind of one of the last places the ploughs will come and plough the parking lot."

Focus Group Participant, Manitoulin Island

"Most of these elders [...] when they go to see the doctor, [the doctor uses] big medical terms [and] they don't even understand what's being said. What ramifications it might have."

Focus Group Participant, Manitoulin Island

06 Perspectives on Frailty

From Anishinaabe perspectives.

- "**Energy**" is an important part of aging well. Frailty relates to low energy and the fire getting too low.
- Aging well is supported by **connection with others** as well as the surrounding **environment**.
- Things that promote aging well include: connection to culture, language, land, and medicines; connection to youth, family, and community; maintaining a healthy diet, including traditional foods; healing from trauma; keeping active; visiting, dancing, laughing, fresh air, and getting a good night's sleep; maintaining a positive outlook on life; participating in programs to support healthy aging; and asking for help.

"Many Anishinabek take and drink medicine tea, this is to fuel their Gzhiswiss. This is simply translated to energy, so you could be spry. [This energy] gshiswissit-gives them the ability to help themselves still. When someone is always doing some kind of work, they are really doing well for themselves. Their mind doesn't travel to their [health] condition that makes them change their mind about keeping busy and instead brings on a negative outcome like staying in and doing nothing. This could be a headache causing them to lay down. When they just do something, they are not helping a condition. This is why they are around long. They go places, do things, but if they really want to support their condition they are really quick to deteriorate."

Language Group Member, Manitoulin Island

When First Nations people are frail, they also have poor self-rated health.

However, most still say that they have emotional, physical, spiritual and mental balance.

Our work with older First Nations people on Manitoulin Island and the input of the First Nations Knowledge Circle and team members have emphasized that First Nations measures of frailty and aging should reflect

relationships to other people, the land, and Creation.

New measures to promote wellness among older First Nations adults should incorporate individual strengths, roles/purposes, environmental and social supports, and community resources.

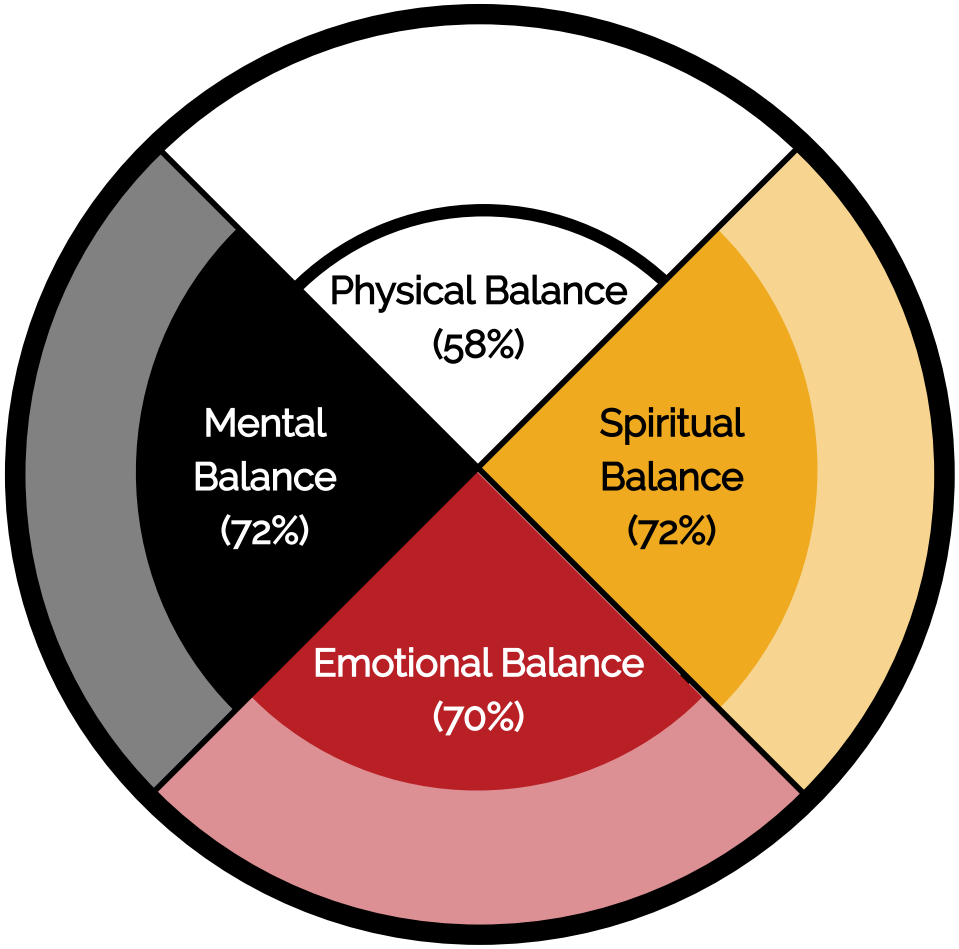


Figure 4: Self-rated health

Data Sources: Ontario First Nations Regional Health Survey, Phase 2 (2008-2010)

"If you're going to be healthy you got to upgrade the mind [...] the holistic. The spiritual, physical, emotional, you know, all these things. [...] If they don't work together then you just don't get well."

Focus Group Participant, Manitoulin Island

"When it comes to healing, they say it's got to be, what do you call it? That inclusive of all, physical, mental, emotional. It's got to compose of all these things otherwise it's not healing."

Focus Group Participant, Manitoulin Island

08 Perspectives on Frailty

From clinical perspectives.

From a medical perspective, being free of health problems is the central part of aging well. An important way of describing the experience of aging is frailty. Frailty relates to an accumulation of health problems and conditions, which are referred to as "deficits". We based our analysis of frailty on an approach that was developed for the general Canadian population in the Canadian Community Health Survey.[2] This has been modified slightly to be used with the First Nations Regional Health Survey,[3] but it still reflects a biomedical view of frailty as a list of health problems that people face.

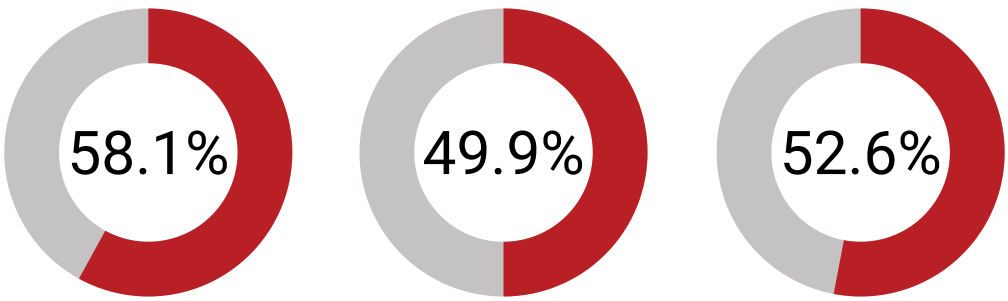
Self-perceived health	Change in health status	Body mass index	Participation and activity limitations
Speech	Emotional health	Pain	Vision
Hearing	Mobility	Cognition	Dexterity
Chronic conditions	Limited in activities of daily living	Fall-related injuries	Walking for exercise

Figure 5. Biomedical view of frailty

"I know some friends, the [older they get] the more they're so devastated [...]. But I think people need to enjoy - enjoy getting older. Then they're going to grow older gracefully."

Focus Group Participant, Manitoulin Island

About half (1/2) of older First Nations adults are not considered frail according to the diagnostic criteria.



of adults aged 55 to 64 | of adults aged 65 to 74 | of adults 75+

Figure 6: Frailty according to the diagnostic criteria
Data Sources: Ontario First Nations Regional Health Survey, Phase 2 (2008-2010)

The First Nations Regional Health Survey (RHS) was used to measure factors associated with frailty

First Nations people who are frail are **1.7 times more likely** to have parents who attended residential schools.

Frailty is also related to:

- **Not having access to affordable, nutritious food**, particularly for First Nations women

- **Not having paid employment**

- **Using illegal drugs**

Those who are frail were 1.7 times more likely to take part in community cultural events.

First Nations **women** who are frail are **5.8 times less likely to move** in and out of First Nations communities than First Nations women who are not frail.

In contrast, First Nations **men** who are frail are **1.6 times more likely to move** in and out of communities.

10 Traditional ways are important as First Nations people age

Ensuring that culture is part of efforts to support First Nations people as they age is important. People told us that disruptions to cultural practices have affected the way they experience aging. Colonialism and its impacts, including disconnection from land, have been harmful.

"And now you can only fish twice a month or else you get mercury in you. Too much mercury. That's what they're saying about the great lakes, eh? Don't eat too much."

Focus Group Participant, Manitoulin Island

"[She would say] my favourite, [...] [was] the fried skin on the fish. It was so good to try. And she said because of the mercury, you have to fillet that [...] I remember her talking about the mercury years ago, and that [...] fish should be filleted."

Focus Group Participant, Manitoulin Island

"Well same thing with the animals, like, you can't eat the liver off the moose anymore [cause] they're spoiled. [...] [Y]et, that's supposed to be the healthiest thing. In our time, that's the first thing they grab was that liver. Cut it up and hey, hey, have a piece, you know?"

Focus Group Participant, Manitoulin Island

Traditional ways are important as First Nations people age

Overall, **49.3%** of all First Nations adults in Ontario have accessed traditional healers. Among First Nations who are frail, **60.7%** have accessed traditional healers.

When First Nations people are frail, they are:

2.4 times more likely to access traditional healers,

1.4 times more likely to eat traditional meat or fish, and

1.8 times more likely to believe that traditional spirituality is important.

Data Sources: Ontario First Nations Regional Health Survey, Phase 2 (2008-2010),

"You have to believe in what helps you, [...]. If a human being feels poorly about themselves they will eventually be very poor, you have to have a strong positive mind. We always have heard this. If there is something making you weak, you have to have strong positive thinking. [...] You have to help yourself."

Language Group Member, Manitoulin Island

"[T]he herbal medicines, [...] I think it's a major part we're missing with the Western medicines. [...] [T]hey don't have the same effect that [...] our medicines [have], because [...] Western medicine only deals with the symptom, not what's around it. But [...] with native medicines it's everything that's around it."

Focus Group Participant, Manitoulin Island

12 Multi-morbidity

Having more than one chronic condition is called "multi-morbidity" in a clinical context. Understanding multi-morbidity is important because higher numbers of chronic conditions makes supporting people more complex. **More people in the oldest age groups are living with five or more chronic conditions.**

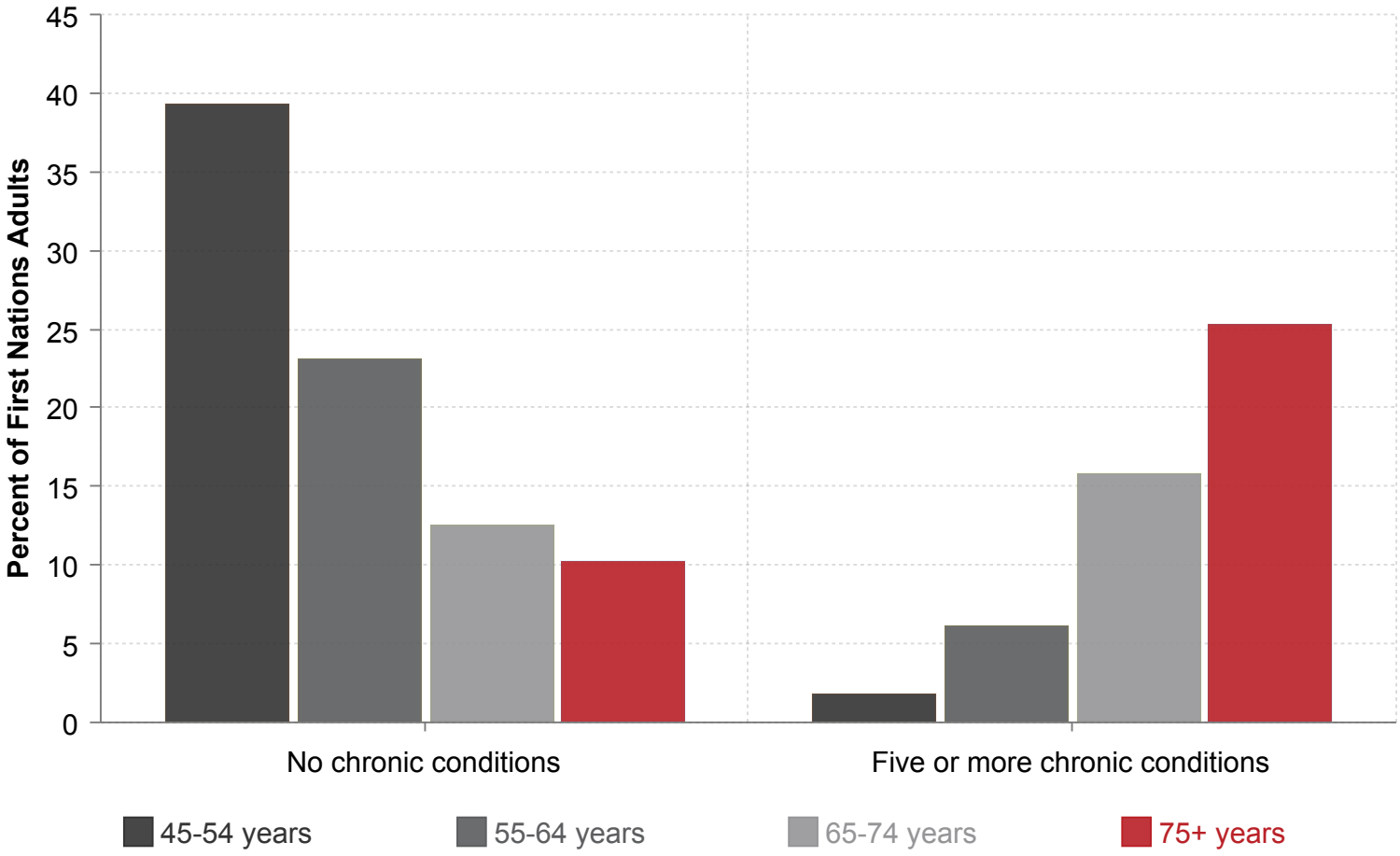


Figure 7. Prevalence of chronic conditions

1/4 of First Nations adults **75+** **have 5+ chronic conditions**

Data source: ICES data holdings for 2014, including the federal Indian Register, Ontario Registered Persons Database, Ontario Health Insurance Plan database (for physician visits), Discharge Abstract Database (for hospital visits), National Ambulatory Care Database (for emergency department visits).

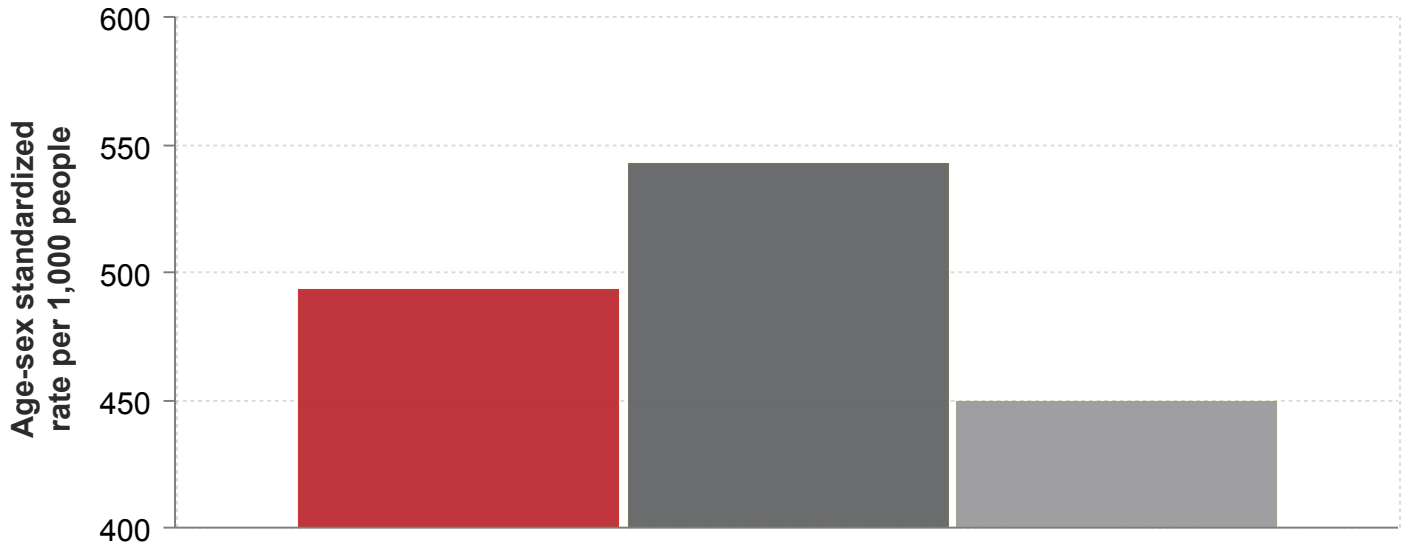


Figure 8. Age-sex standardized rates of multimorbidity (2+ chronic conditions).

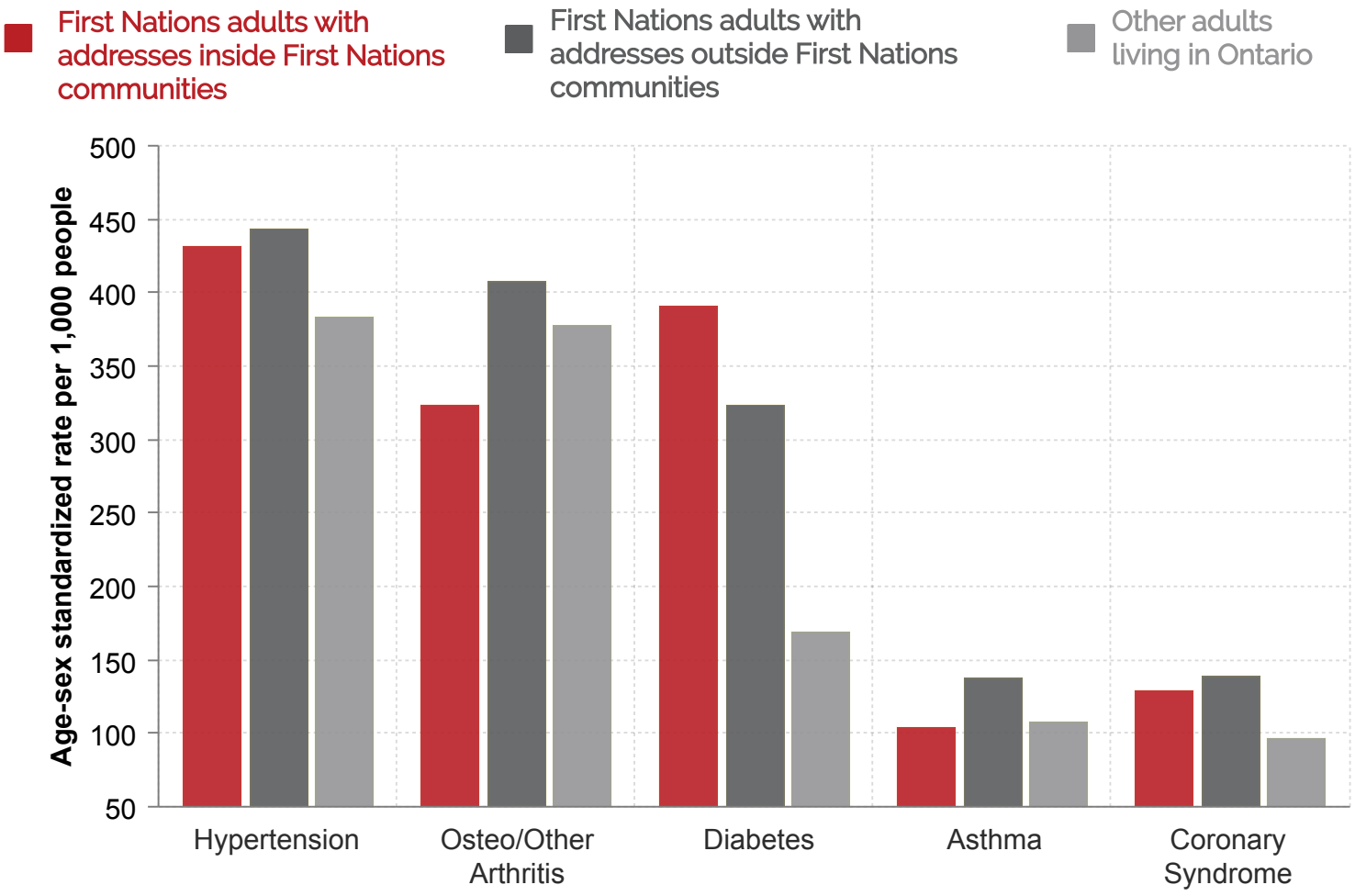


Figure 9. Age-sex standardized rates of top 5 chronic conditions

Data Sources: ICES data holdings, including the federal Indian Register (2014) and the Ontario Registered Persons Database (2014)

14 Unmet caregiving needs for frail older First Nations adults

The **highest needs** reported by frail First Nations adults are **support** for **home maintenance** and **housekeeping**.

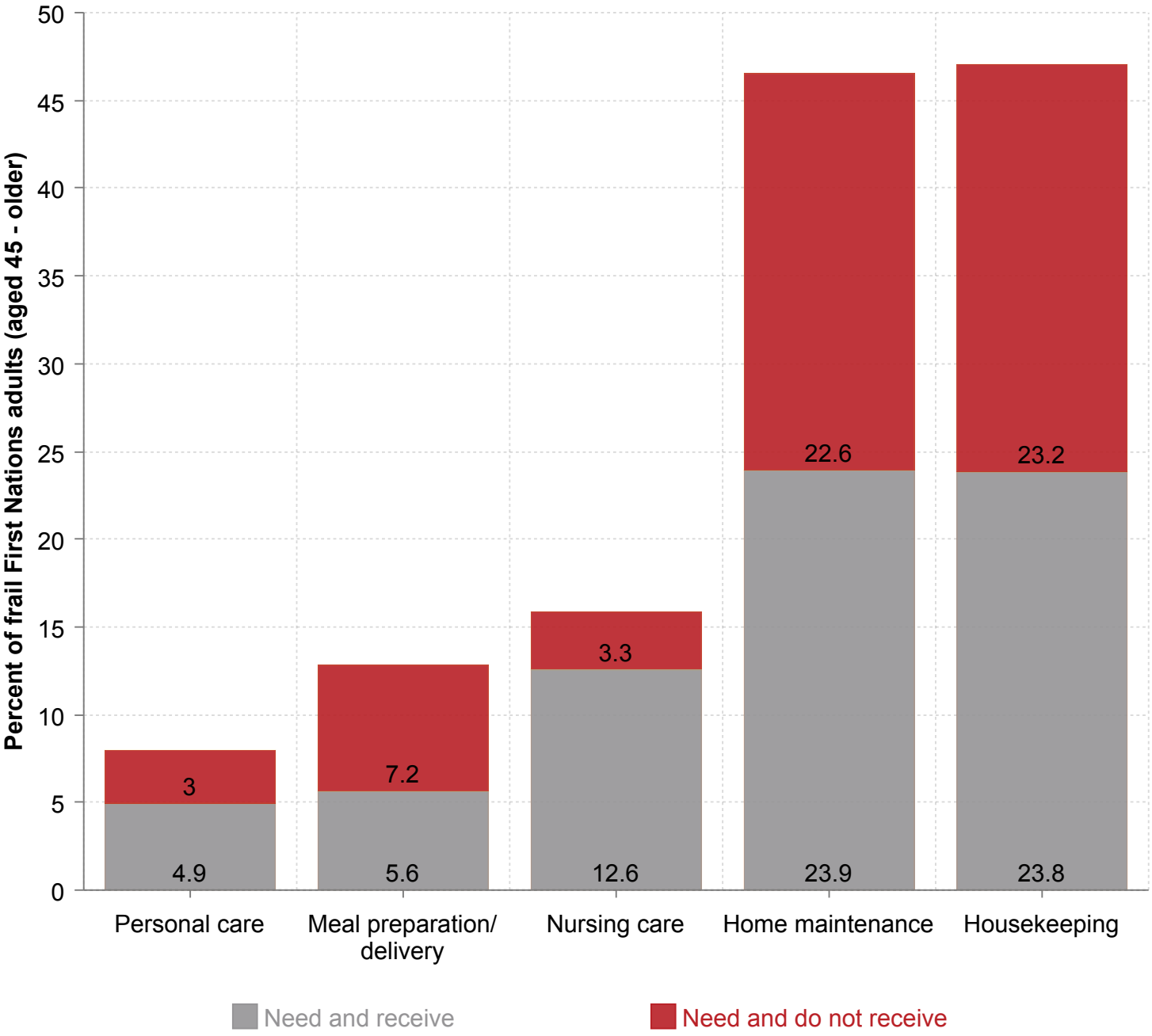


Figure 10. Unmet caregiving needs among frail First Nations adults.

Data Sources: Ontario First Nations Regional Health Survey, Phase 2 (2008-2010)

Number of health service visits per person among First Nations and general Ontario populations

First Nations adults have **higher rates of health services use**. These rates do not account for accessibility. There remain **many access issues for First Nations people**, regardless of geographic location of residence. [4,5]

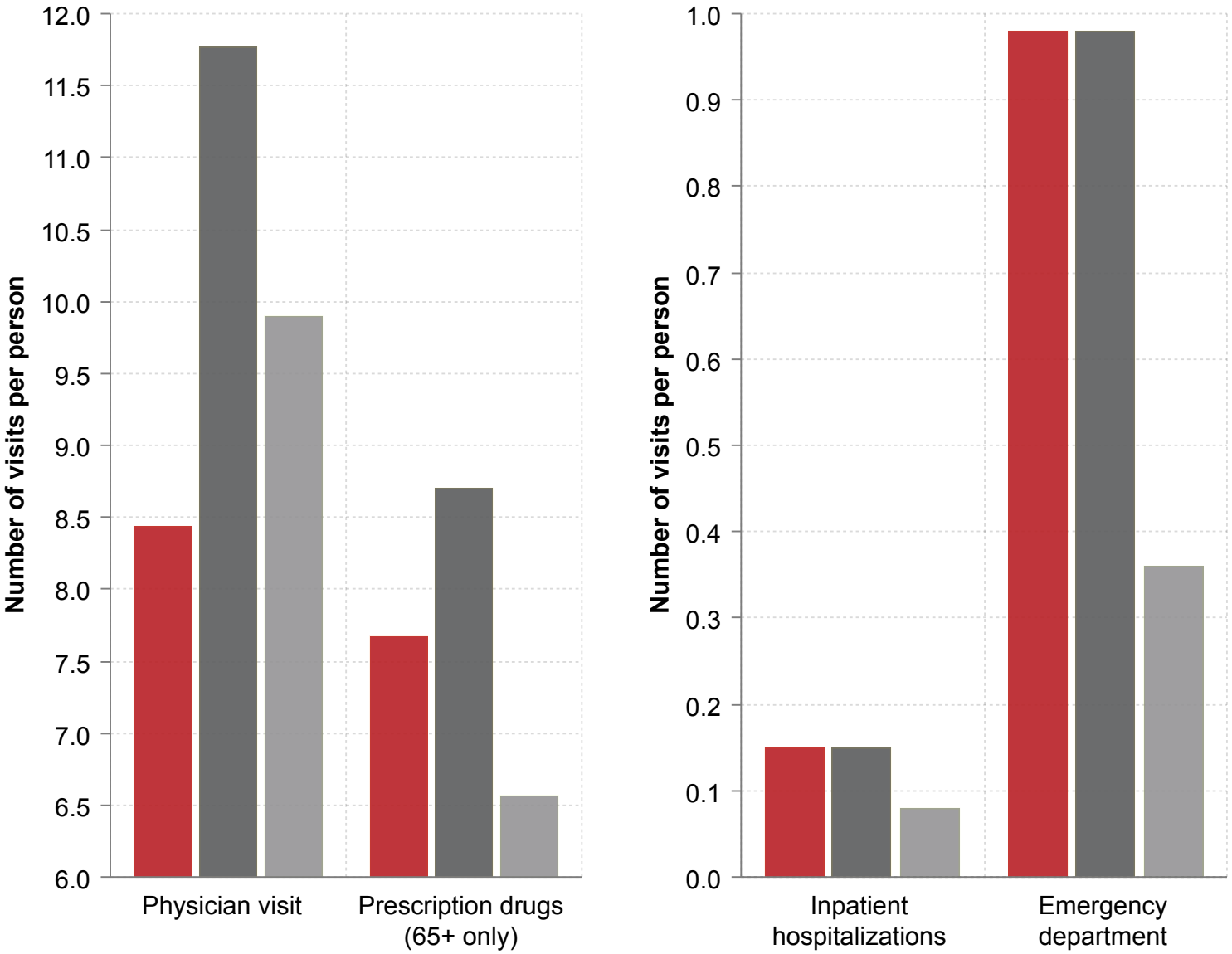


Figure 11. Number of health service visits per person among First Nations and general Ontario populations

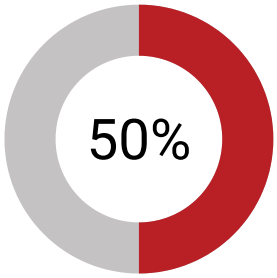
First Nations adults with addresses inside First Nations communities

First Nations adults with addresses outside First Nations communities

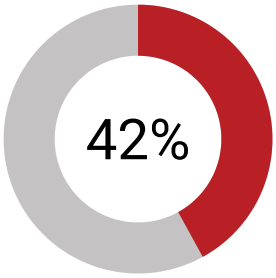
Other adults living in Ontario

Data Sources: ICES data holdings, including the federal Indian Register (2014) and the Ontario Registered Persons Database (2014)

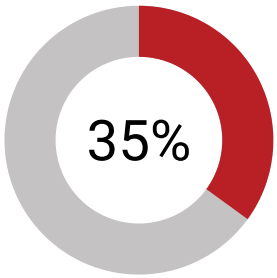
16 Barriers to health care access for frail First Nations adults



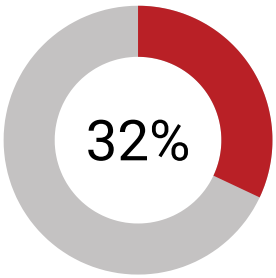
Service was **not covered by NIHB**



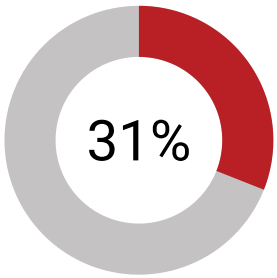
Could **not afford direct cost of care**



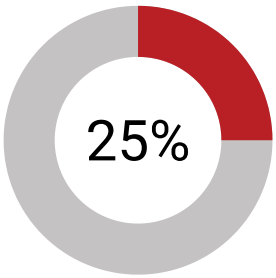
Could **not afford transportation** costs



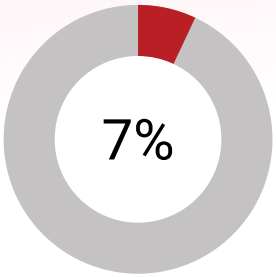
Choose **not to see a health care provider**



Felt **health care provider** was **inadequate**



Difficulty getting traditional care



Could **not afford childcare**

Figure 12. Barriers to health care access for frail First Nations adults

Data Sources: Ontario First Nations Regional Health Survey, Phase 2 (2008-2010)

"[Grandmother] was 98 when I was 5 years old. And [she] gave me a hug like I've never received in my entire life, [...]. [J]ust so powerful I still feel it to this day. I can give it to the community, I can give it to the children, I can give it to friends, you know, that's how powerful that hug was. How many people have been deprived of that? How many people are not able to get that? But that's the power of these people that are in nursing homes."

Focus Group Participant, Manitoulin Island

Older First Nations people's greatest worry is for younger generations

"Well, there's a scary part we're dealing with right now. We can talk about frailty and things like that. There's a lot of our young people dying and they're not frail but they're dying from something else."

Focus Group Participant, Manitoulin Island

"That's what a lot of our young ones are suffering, is from anxiety, and [...] it hurts their heart, or they think they're having a heart attack. I have a daughter that is suffering from anxiety, and there are times that we've taken her to the hospital and they told her that she's just [...] having an anxiety attack. [S]he's fighting this mental illness that's scared the hell out of me [...]."

Focus Group Participant, Manitoulin Island

"[T]he old ones we talked about always kept busy working. Now when you enter where young people are, they look like this [on cell phone-agreement]. [...] [There's] substance abuse they take (bad medicine, smoking). This really messes them up. They are sitting too much, they aren't working. This is how they live now, not like the elders of the past. [...] They have programs of exercise in schools but this doesn't continue at home. [...] All kinds of problems set in because we don't live like the old ones, [...]. No one cooks anymore, they have take out, they use the microwave. How one takes care of themselves is what should be front and center, they let themselves go [...]. They don't think anything of themselves, no pride, no identity, worthless. [...] That's why frailty happens sooner. It's how you take care of yourself in every way, your mind your thought, [...]. And believe in your medicine, it will help when you believe. You have to talk to the Creator. That's another thing young people aren't doing. That's probably why lives get messed up."

Language Group Member, Manitoulin Island

18 What we learned

The number of older First Nations adults in Ontario is growing, with each stage of life presenting unique experiences, opportunities, and challenges. By exploring the health and wellbeing of older First Nations adults in Ontario, the First Nations Aging Study is able to provide information that can be used by First Nations leadership, healthcare providers, researchers, policymakers, and advocates to help ensure that older adults receive the support and care that they need.

Wellbeing in older age **is not solely determined by physical health alone.** Instead, **wellbeing is linked to feelings of balance** across the four areas of the self: **emotional, mental, spiritual, and physical.** It is important for older adults to have opportunities to use and strengthen all aspects of their selves.

Compared to the non-First Nations population in Ontario, **First Nations adults experience frailty at younger ages and at greater rates.** There are likely many complex factors that contribute to these high rates of frailty. For example, First Nations older adults who are frail are nearly twice as likely to have parents who attended residential schools. Most older First Nations adults who experience frailty report experiencing emotional, mental, spiritual, and physical balance. Those who experience frailty are also more likely to visit traditional healers, eat traditional foods, and believe First Nations spirituality is important, compared to First Nations adults who are not experiencing frailty.

The importance of accessing traditional healers, traditional foods and spirituality is echoed in the conversations with members of the Anishinaabeg Expert Language Group and the Community Advisory Group, who also described how cultural practices can help older adults renew their energy and strength. **Wellbeing is supported by healthy connections with family, community, culture, the land, and all the rest of Creation.**

Where do we go from here

It is worthwhile to continue exploring the strengths, and challenges experienced by First Nations adults in Ontario as they age. Key recommendations from the findings of this study are:

- There is a need for First Nations-designed housing, social and health services that support First Nations people with multiple chronic conditions.
- Given the early age of onset for multiple chronic conditions, policy and healthcare provider focus should be placed on prevention of chronic illness.
- Existing and future services, programs and research need to integrate First Nations perspectives on aging well that reflects concepts of resilience including: maintaining and adapting roles, relationship to land and language, and relationships to family and community.
- There is a need to review current policies to ensure younger First Nation adults (45+) have access to supportive services such as home and community care.

What is the First Nations Regional Health Survey (RHS)?

The First Nations Regional Health Survey (RHS) is a cross-sectional survey and the only source of health-related data for First Nations people living in First Nations communities that is under total ownership and control of First Nations people. Three phases of the RHS have been conducted to date, beginning in 1996. This project used data from the Ontario Region Phase 2 of the RHS, which was conducted between August 2008 and November 2010. Twenty-four First Nations communities across Ontario were involved in the survey.[6] The weighted sample of the RHS Phase 2 represents a total of 79,903 Ontario First Nations people.

How did we define frailty?

A previous study of frailty in First Nations seniors[3] modified a frailty index developed for use in the Canadian Community Health Survey (CCHS) and validated in the general Canadian population 65 years and older.[2] The original index measured frailty using an accumulation of deficits. That is, the number of health conditions experienced by an individual was divided by the total number of conditions included in the index to create a "frailty score" between 0 and 1 with higher scores indicating greater levels of frailty. The original index contained 30 deficits, including self-rated health, body mass index, change in health status, and vision, hearing, mobility, cognition, and pain function. The RHS-based frailty index contained 26 of the original 30 deficits.[3] Cut-offs from Hoover et al.'s [2] work with the general Canadian population were used to classify frailty levels. We used categories of frailty to help develop a profile of aging (Table 1).

Table 1: Definition of levels of frailty based on values of the frailty index

Frailty definition	Value of frailty index
Not frail	≤ 0.1
Pre-frail	$> 0.1 - \leq 0.21$
Frail	> 0.21

How did we develop a First Nations frailty framework?

In addition to using the frailty index, we also consulted with a Community Advisory Group (CAG) and Anishinaabeg Expert Language Group (AELG) on Manitoulin Island. These groups have advised other aging-related research projects. We wanted to develop a better understanding of frailty that is informed by the experiences and knowledge of older First Nations adults.

Four sequential focus groups were held to explore different aspects of aging. Focus group topics included: thriving in the context of multi-morbidity, perspectives that contribute to a decline in health when someone has multiple health conditions, factors that contribute to wellbeing, and how frailty should be measured. The focus groups were attended by 5 to 7 older First Nations adults living on Manitoulin. The structure of the focus groups honoured Anishinaabek ways of knowing and sharing by

allowing the participants the time and space to articulate complex views about culture, aging, quality of life, and health and wellbeing. At the end of each focus group, we summarized the main themes. These themes were shared in a back-and-forth process until members of the focus group as well as the Community Advisory Group gave their final approval.

What are social determinants of health and what considerations need to be made regarding First Nations health?

Social determinants of health are the conditions, circumstances, and lifestyles in which people are born, grow, and age. They are influenced by many factors, including the health of the natural environment, the availability and accessibility of local services and programs, individual lifestyles, etc. These determinants affect everyone. For our study, we selected a wide range of variables from self-reported responses to questions in the RHS to ensure that we captured known social determinants of health, such as living environment, education and food security. However, there are other determinants of health that uniquely impact the health of First Nations and other Indigenous populations including access to traditional healers and residential school attendance. The social determinants that impact health generally as well as those that uniquely inform First Nations populations were used to help contextualize our definitions of frailty.[7]

What is social vulnerability and why is it important?

Social vulnerability is a broad term that considers factors like social inequities, sense of life control, social cohesion, etc., of an individual or a community. Social vulnerability, thus defined, has been linked to cognitive decline, frailty, and mortality[8-10] among older adults. We selected variables from the RHS that matched to questions used to measure social vulnerability in other self-reported surveys, such as the Canadian Study of Health and Aging (CSHA) and the National Population Health Survey (NPHS).[8] Questions in the RHS related to social vulnerability were used to help contextualize our definitions of frailty.

How did we determine life balance?

A set of four variables in the RHS capture the principle of balance, the First Nations-based view of well-being as a balance between physical, emotional, mental and spiritual components. For each component, respondents were asked "How often do you feel that you are in balance in the four aspects of your life (physical, emotional, mental, and spiritual)?" We combined responses of "all" with "most of the time" and "some" with "almost none of the time" to create binary measures of balance (i.e., balanced/not in balance).

How did we determine First Nations status?

To determine First Nations status for this study, we used the Indian Register (IR). The IR is essentially a list of all registered/status First Nations people living within or outside of a First Nations community. At ICES, the IR is linked to the Registered Persons Database (RPDB) of individuals living in Ontario who are eligible for the Ontario Health Insurance Plan. The RPDB provides basic demographic information (age, sex, location of residence, date of birth, etc.) for those issued an Ontario health insurance number (Ontario health card). The RPDB also includes the time periods for which an individual was eligible to receive publicly funded health insurance benefits and the best-known postal code for each registrant on July 1st of each year. Linking the IR to the RPDB allowed for the calculation of demographic information for the entire First Nations population in Ontario.

How did we determine if someone's home address was within a First Nations community or outside a First Nations community?

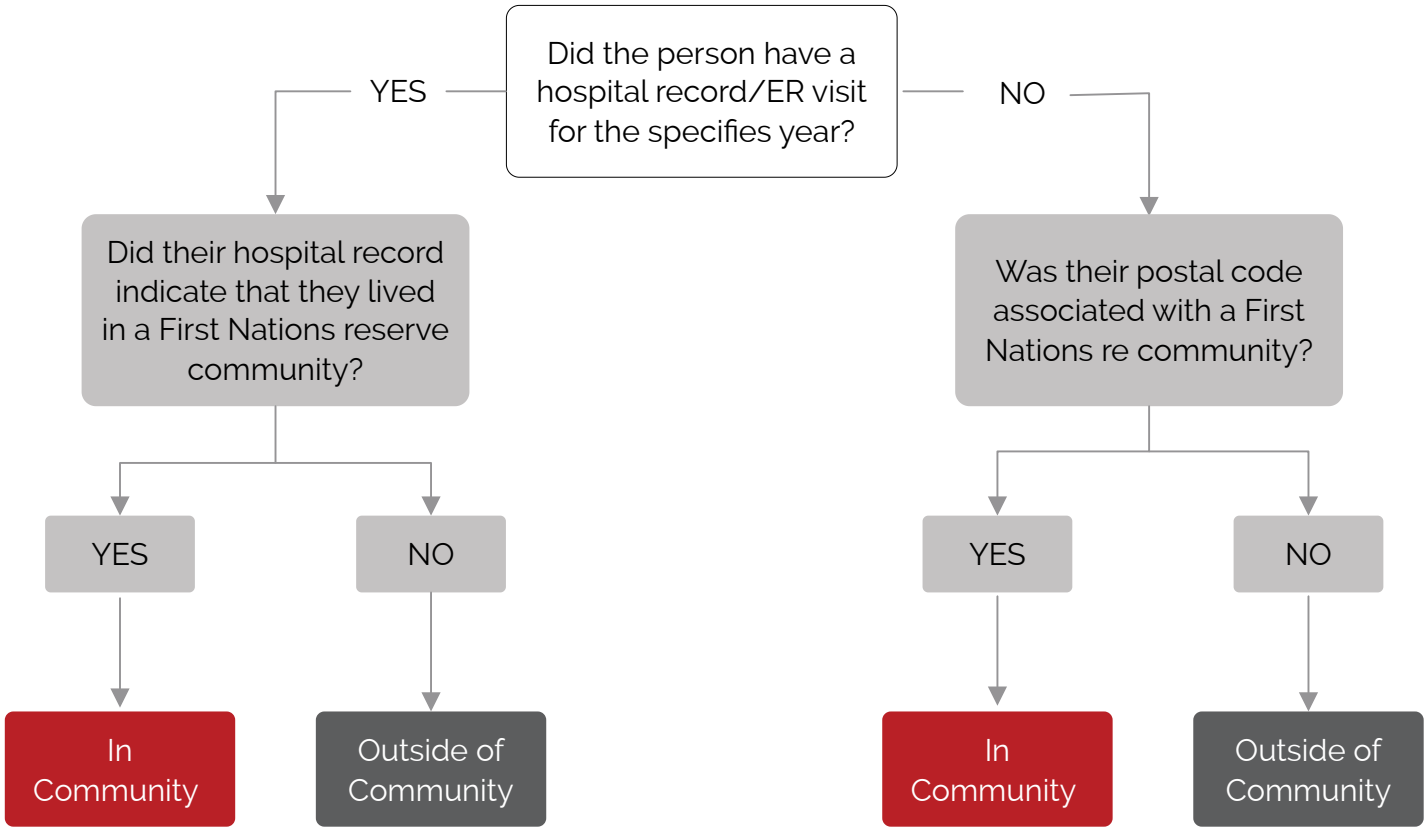


Figure 13. Process to determine home address

How did we determine health care service use?

For the RHS data, we selected a number of self-reported variables to capture health care usage among First Nations people in Ontario. These variables included any need for caregiving (e.g. housekeeping, nursing, and personal care), reported difficulties in accessing traditional medicines, and reported barriers to health care access.

In the administrative health data, we also gathered health services use data from long-term care (Continuing Care Reporting System, CCRS), home care (Resident Assessment Instrument, Home Care Source, RAIHC), emergency department visits (National Ambulatory Care Reporting System, NACRS), and inpatient mental health hospitalizations (Ontario Mental Health Reporting System, OMHRS). Health services were captured over a 1-year look back period, from March 31, 2013 to March 31, 2014.

How did we develop a profile of aging?

We tested bivariate relationships between frailty and social determinants of health (e.g. smoking, employment, food security, etc.), unique considerations for First Nations health (e.g. consulting a traditional healer, attendance at residential school, etc.) and measures of social vulnerability (e.g. having someone to confide in, etc.) using chi-square tests. We also calculated crude and age/sex adjusted odds ratios with 95% confidence intervals (CI) for each factor. To assess if the same relationships occurred across age groups and by sex, we also conducted age and sex stratified analyses.

24 Technical Appendix

We also conducted an analysis on the subset of adults who are considered frail (according to the application of the modified frailty index) to understand the characteristics of those who consider themselves to be well compared to those who do not consider themselves to be well. For each balance measure (physical, emotional, mental, and spiritual), we tested bivariate relationships between wellness, social determinants of health, determinants that uniquely inform First Nations health, and measures of social vulnerability (e.g. having someone to confide in, etc.) using chi-square tests. We also reported measures of self-reported health care utilization (e.g. caregiving needs, barriers to healthcare access, etc.). We calculated crude and age/sex adjusted odds ratios with 95% confidence intervals (CI) for each factor.

Following First Nations Information Governance Centre policies, small cell counts (≤5) were suppressed. Coefficients of variation (CV) were calculated for each estimate and any estimate with a CV >33.3 were suppressed due to high sampling variability. Estimates with a CV between 16.6 and 33.3 should be interpreted with caution; these are noted in the report appropriately.

What are multi-morbidity rates and why are they important?

Multi-morbidity is the experience of having two or more health conditions over a long period of time. To understand the type and number of health conditions experienced by older First Nations peoples compared to the non-First Nations population of Ontario we calculated "multi-morbidity rates." Using information from the hospital discharge database (Discharge Abstract Database, DAD), physician billings (Ontario Health Insurance Plan, OHIP), prescription dispensing (Ontario Drug Benefits, ODB) and health administrative databases as of March 31, 2014, we were able to identify 17 chronic conditions that were experienced by many First Nations older adults,[11] had a greater economic cost,[12] and have been discussed in other multi-morbidity research studies in Ontario.[8,13-17] Similar ways of calculating multi-morbidity rates have been used elsewhere.[18,19] For this study, multi-morbidity was defined as the experience of two or more of these 17 conditions.

Below is a list of diagnostic information for how we defined the 17 selected chronic conditions under investigation in this study. These conditions represent a subset of all possible chronic conditions that may be experienced by individuals over a lifetime but represent the most substantial conditions experienced by older First Nations population.

Condition [reference validated algorithm]	ICD 9 / OHIP	ICD 10	ODB*
Acute Myocardial Infarction (AMI) [1] [20]	410	I21, I22	
Osteo- and other Arthritis:			
(A) Osteoarthritis	715	M15-M19	
B) Other Arthritis (includes Synovitis, Fibrositis, Connective tissue disorders, Ankylosing spondylitis, Gout Traumatic arthritis, pyogenic arthritis, Joint derangement, Dupuytren's contracture, Other MSK disorders)	727, 729, 710, 720, 274, 716, 711, 718, 728, 739	M00-M03, M07, M10, M11-M14, M20-M25, M30-M36, M65-M79	
Arthritis - Rheumatoid arthritis [2] [21]	714	M05-M06	
Asthma [3] [22]	493	J45	
(all) Cancers	140-239	C00-C26, C30-C44, C45-C97	
Cardiac Arrhythmia	427 (OHIP) / 427.3 (DAD)	I48.0, I48.1	
Congestive Heart Failure [23]	428	I500, I501, I509	
Chronic Obstructive Pulmonary Disease [24]	491, 492, 496	J41, J43, J44	
Coronary syndrome (excluding AMI)	411-414	I20, I22-I25	
Dementia [25]	290, 331 (OHIP) / 046.1, 290.0, 290.1, 290.2, 290.3, 290.4, 294, 331.0, 331.1, 331.5, F331.82 (DAD)	F00, F01, F02, F03, G30	Cholinest-erase Inhibitors
Diabetes [26]	250	E08 - E13	
Hypertension [27]	401, 402, 403, 404, 405	I10, I11, I12, I13, I15	

Condition [reference validated algorithm]	ICD 9 / OHIP	ICD 10
(Other) Mental Illnesses	291, 292, 295, 297, 298, 299, 301, 302, 303, 304, 305, 306, 307, 313, 314, 315, 319	F04, F050, F058, F059, F060, F061, F062, F063, F064, F07, F08, F10, F11, F12, F13, F14, F15, F16, F17, F18, F19, F20, F21, F22, F23, F24, F25, F26, F27, F28, F29, F340, F35, F36, F37, F430, F439, F453, F454, F458, F46, F47, F49, F50, F51, F52, F531, F538, F539, F54, F55, F56, F57, F58, F59, F60, F61, F62, F63, F64, F65, F66, F67, F681, F688, F69, F70, F71, F72, F73, F74, F75, F76, F77, F78, F79, F80, F81, F82, F83, F84, F85, F86, F87, F88, F89, F90, F91, F92, F931, F932, F933, F938, F939, F94, F95, F96, F97, F98
Mood, anxiety, depression and other nonpsychotic disorders	296, 300, 309, 311	F30, F31, F32, F33, F34 (excl. F34.0), F38, F39, F40, F41, F42, F43.1, F43.2, F43.8, F44, F45.0, F45.1, F45.2, F48, F53.0, F68.0, F93.0, F99
Osteoporosis	733	M81, M82
Renal failure	403, 404, 584, 585, 586, v451	N17, N18, N19, T82.4, Z49.2, Z99.2
Stroke (excluding transient ischemic attack)	430, 431, 432, 434, 436	I60-I64

NOTES:Abbreviations: ICD = International Classification of Disease; ODB = Ontario Drug Benefit program database; OHIP = Ontario Health Insurance Plan, physician billings database;

All case definitions look back to 2001 to ascertain disease status, with the exception of AMI (1 year prior to index), Cancer (2 years), Mood Disorder (2 years) and Other Mental Illnesses (2 years)

AMI, Asthma, COPD, CHF, Dementia, Diabetes Hypertension and Rheumatoid Arthritis are based on validated case algorithms (see Sources 1-8 below, respectively). All other conditions required at least one diagnosis recorded in acute care (CIHI) or two diagnoses recorded in physician billings within a two-year period.

*ODB prescription drug records are not available for the majority of persons under the age of 65

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