

the Métis
Nation *of*
Ontario

CARDIOVASCULAR DISEASE IN THE MÉTIS NATION OF ONTARIO

LAY REPORT
MARCH 2012

Prepared by:
Clare L. Atzema, MD MSc
Moirá Kapral, MD MSc
Julie Klein-Geltink, MHSc
Eriola Asllani, MSc

ICES Institute for Clinical
Evaluative Sciences

CARDIOVASCULAR DISEASE IN THE MÉTIS NATION OF ONTARIO

Cardiovascular disease is the leading cause of death and disability in Canada, accounting for 36% of deaths. As well, because of the types of services required by the large number of people affected, cardiovascular disease represents a large cost burden to the health care system. Most importantly, cardiovascular disease is both preventable and treatable.

The Métis people represent a significant proportion (approximately 30%) of the Aboriginal population in Canada. In recent years, researchers and health officials have gathered a great deal of information about Canada's Aboriginal populations. However, the research was not geared specifically towards the Métis population (see the Bibliography on page 18 for more details).

The Métis Nation of Ontario (MNO) is the only representative body for the Métis people in Ontario. The MNO sought to conduct research to find out what the actual rate of cardiovascular disease is (known as prevalence) in order to identify the extent of the problem. The MNO was also interested in gathering more information on what level of health care services the Métis people received in the treatment of their cardiovascular disease. Therefore, the MNO launched a research study with funding from the Public Health Agency of Canada.

Unfortunately, Ontario health data do not include identifiers for individuals' ethnic or cultural background and so an alternative way of identifying the Métis population in the data was needed. To obtain data, the MNO worked with the Institute for Clinical Evaluative Sciences (ICES) on this study to look at hospitalizations and deaths due to cardiovascular disease during 2006 to 2008. To create this report, the citizenship registry of the Métis Nation of Ontario was linked with provincial healthcare records held at ICES. All information that might identify individuals was kept strictly confidential.

This report explains how information on the Métis people was gathered and their rates of cardiovascular disease, and uses charts to show what was learned about the disease among the Métis, and how it compares to cardiovascular disease in the rest of the population in Ontario, from 2006 to 2008. The study also looked at how many people had to return to the hospital after initially being treated for the disease, and how many died from cardiovascular disease.

THE EXTENT OF THE PROBLEM

Most of the information on how common cardiovascular disease is in the Métis is provided by surveys undertaken by Statistics Canada where respondents report whether or not they or family members have the disease: these estimates range from 7% to 27.2%. Researchers have determined via data from the Canadian census that for circulatory diseases overall, there were 247.9 deaths per 100,000 among Métis men compared with 192.5 among non-Aboriginal men and 245.7; 160.9 deaths per 100,000 among Métis women compared with 94.0 among non-Aboriginal women. This report also found that circulatory system disease accounted for the highest proportion (33%) of the deaths in the Métis. Nothing is known about the proportion of those who are alive who suffer from it, though.

RESEARCH METHODS

HOW THE INFORMATION WAS GATHERED

This study is based on the citizenship registry of the Métis Nation of Ontario (as of spring 2005), which represents about 18% of Ontario's total Métis population. The registry was linked to everyone who is eligible for a health card in Ontario. In all, 14,021 of the 14,480 individuals in the citizenship registry were found in Ontario health records, and 12,814 of them had a valid Ontario address and Ontario Health Card number as of April 1 2006. This is the Métis population that was studied in this report; in the report, we refer to them simply as "the Métis", or "the Métis

population". All other citizens of Ontario were counted as part of the general population, which includes the Métis who are not part of the registry.

Privacy was protected by substituting coded numbers for real health card numbers. With this method people were kept anonymous, but it was still possible to trace their medical history through Ontario healthcare records. A combination of databases was then used to narrow down the group again, so it included only people who have cardiovascular disease both in the Métis Nation of Ontario, and in the general public.

When referring to "cardiovascular disease", the following diseases are included: AMI/unstable angina (heart attack and pre-heart attack), congestive heart failure, cerebrovascular disease (stroke), atrial fibrillation (irregular heart-beat), congenital heart disease (heart abnormalities that one is born with), and rheumatic heart disease. Detailed descriptions of the types of disease studied follow:

- Acute myocardial infarction and unstable angina (also known as acute coronary syndromes) – When the blood supply to the heart is slowed or stopped because of a blockage, a heart attack occurs. Atherosclerosis, the narrowing of coronary arteries due to plaque build-up causes most heart attacks, though they may also happen when a coronary artery temporarily contracts or goes into a severe spasm effectively shutting off the flow of blood to the heart. The length of time the blood supply is cut off will determine the amount of damage to the heart. Angina occurs when your heart doesn't get as much blood and oxygen as it needs due to a blockage of one or more of the heart's arteries. This blockage causes pain in the chest that people who have it describe as a squeezing, suffocating or burning feeling.
- Congestive heart failure – A common condition that develops after the heart becomes damaged or weakened by diseases of the heart including heart attacks, chronic high blood pressure and other medical conditions. It occurs when the pumping action of the heart is not strong enough to move around blood, which carries oxygen and nutrients, so that the body can function properly, especially during increased activity or under stress. In addition, the heart muscle may not relax properly to accommodate the flow of blood back from the lungs to the heart. These abnormalities in heart function can cause fluid to back up in a person's lungs and in other parts of the body such as the ankles. The congestion in lungs and lack of oxygen may make a person feel tired and short of breath. Sometimes the fluid in lungs can accumulate to the point where it can cause a life-threatening condition called acute pulmonary edema requiring emergency treatment.
- Cerebrovascular disease – A sudden loss of brain function caused by the interruption of flow of blood to the brain (ischemic stroke) or the rupture of blood vessels in the brain (hemorrhagic stroke). The interruption of blood flow or the rupture of blood vessels causes brain cells (neurons) in the affected area to die. The effects of a stroke depend on where the brain was injured, as well as how much damage occurred. A stroke can impact any number of areas including a person's ability to move, see, remember, speak, reason and read and write.
- Atrial Fibrillation – The most common type of arrhythmia, which is a condition involving an irregular heart rhythm. It is most often caused by chronic high blood pressure, though heart attacks and other diseases can cause it as well, and in some patients (who are otherwise very healthy) there is no cause.
- Congenital heart disease - Occurs at birth, due to a defect that happens when the heart or the blood vessels near the heart don't develop normally before birth. Congenital heart defects are present in about 1% of live births and are the most frequent congenital malformations in newborns. In most cases, there is no known cause although sometimes they may result from viral infections such as rubella (measles), certain inherited conditions such as Down Syndrome and drug or alcohol abuse during pregnancy.
- Rheumatic heart disease - Describes a group of acute (short-term) and chronic (long-term) heart disorders that can occur as a result of rheumatic fever. One common result of rheumatic fever is heart valve damage. Rheumatic fever is an inflammatory disease that may affect many connective tissues of the body, especially those of the heart, joints, brain or skin.

Again, to keep things simple, when the report states the "general public" it refers to the general public who have cardiovascular disease who are not part of the Métis Nation of Ontario citizenship registry. Once these groups were defined, government healthcare records were examined for cardiovascular disease-related entries. These are the records that were used:

- The Ontario Health Insurance Plan (OHIP), which records payments to Ontario physicians for consultations, visits and procedures.

- The Discharge Abstract Database (DAD), which has detailed information on each hospital stay in Ontario, including diagnoses and procedures performed during the stay.
- The National Ambulatory Care Reporting System (NACRS), which records diagnoses for all visits to Ontario emergency departments.

The number of cases of each of our six cardiovascular diseases was estimated by looking at physician, emergency department, and hospital visits from 2003 to 2008 (fiscal years).

Because the average age and the distribution of men and woman of the Métis population is different than the Ontario population overall, many of the numbers gathered had to be “standardized” or adjusted. This step allowed for more meaningful comparison between the two groups. For example, cardiovascular disease is more common in older people and in men, but the Métis population has a different age and more men than Ontario overall, so just counting cases could create a false impression of the differences between the two groups. By adjusting the numbers, a more accurate comparison between the Métis population and the overall Ontario population can be made. When statistics have not been adjusted, they are technically referred to as “crude” numbers.

HOW WELL IS CARE WORKING?

One way to measure whether people with cardiovascular disease are receiving good care is to look at how many of them have to return to the hospital within one year of their first disease event, and also how many of them died within that period. It is important to remember, however, that poor cardiovascular disease care is only part of the reason people may suffer these outcomes.

FINDINGS

WHO WAS INCLUDED IN THIS STUDY

Table 1 : Demographic characteristics of the Métis Nation of Ontario citizenship registry versus the Ontario Métis population identified in the 2006 Census.

Characteristic		Métis Nation of Ontario Citizens Registry	Ontario Métis people identified in the 2006 Census
Number of persons		12,814	73,605
Median Age (IQR)		43 (31-54)	33 (not available)
Sex	Female	46.5 %	50.0 %
	Male	53.5 %	50.0 %

IQR: interquartile range

The MNO citizenship registry included in this analysis represents approximately 18% of the total Métis population of Ontario, based on self-report in the 2006 Census by Statistics Canada⁷. The people included in the citizenship registry are older and more likely to be male.

Table 2 : Comparing characteristics of registered citizens of the Métis Nation of Ontario and the Ontario general population.

Characteristic		Métis Nation of Ontario Citizens Registry	General population
Number of persons		12,814	13,445,390
Median Age (IQR)		43 (31-54)	38 (20-53)
Sex (%)	Female	46.5	50.5
	Male	53.5	49.5
Income Quintile* (%)	1 (lowest)	22.8	20.3
	2	20.6	19.8
	3	20.4	19.5
	4	18.0	19.7
	5 (highest)	16.9	19.6
	Missing	1.6	1.1
Local Health Integration Network (LHIN) (%)			
	Erie St. Clair	3.3	5.1
	South West	3.7	7.1
	Waterloo Wellington	2.3	5.4
	Hamilton Niagara Hal- dimand Brant	6.3	10.5
	Central West	1.2	6.1
	Mississauga Halton	1.8	8.5
	Toronto Central	2.4	9.3
	Central	2.2	12.7
	Central East	4.8	11.7
	South East	3.4	3.7
	Champlain	5.2	9.5
	North Simcoe Muskoka	17.1	3.3
	North East	28.4	4.4
	North West	16.7	1.9
	Missing	1.1	0.8

* Income quintile was determined from postal codes obtained from the RPDB and neighbourhood-level median household income from Statistics Canada census data. Quintiles range from poorest (Q1) to wealthiest (Q5).

The median age of the Métis population was older and there were more males than in the general population. Distribution over income quintiles is lower than the general population, and almost half of MNO Citizens live in the North of the province, with the largest group in the North East.

Table 3 : Demographic characteristics of the Métis Nation of Ontario citizenship utilized specifically in the analyses of (1) acute myocardial infarction / unstable angina (acute coronary syndromes), (2) congestive heart failure, (3) cerebrovascular disease, (4) atrial fibrillation, versus the rest of the Ontario population.

Characteristic		Métis Nation of Ontario Citizens Registry	General population
Number of persons, age 20+		12,550	10,014,4002
Median Age (IQR)	44 (32-54)		45 (34-58)
Sex (%)	Female	46.4	51.1
	Male	53.6	48.9

Acute myocardial infarction/unstable angina, congestive heart failure, cerebrovascular disease, and atrial fibrillation usually only affect adults, and when they do occur in children they are a different disease. Because of this we limited our analyses to age 20+ for these analyses. After removal of those less than age 20, the Métis population remaining for analyses was younger than the rest of the population over the age of 20.

WHAT TYPES OF CARDIOVASCULAR DISEASE EXIST AMONG THE MÉTIS

Table 4a : Number of people with cardiovascular disease out of every 100 people between April 1, 2006 and March 31, 2009.

Cases per 100 population	Métis	General population	P-value
Acute Coronary Syndromes			
Crude Rate	1.44	1.11	
Standardized Rate (95% CI)	1.94 (1.73-2.15)	1.11 (1.1-1.12)	<0.0001
Congestive Heart Failure			
Crude Rate	1.07	1.4	
Standardized Rate (95% CI)	1.79 (1.53-2.05)	1.4 (1.39-1.41)	0.0038
Cerebrovascular Disease			
Crude Rate	0.32	0.37	
Standardized Rate (95% CI)	0.5 (0.36-0.63)	0.37 (0.37-0.38)	0.0673

CI: Confidence Interval

Rates of acute coronary syndromes and congestive heart failure were 1.8 and 1.3 times higher in the Métis. The rate of cerebrovascular disease (stroke) was similar in the Métis and the general population.

Table 4b : Incident cases of cardiovascular disease per 100 persons, April 1, 2006 to March 31, 2008 (two year period), crude and age/sex standardized rates.

Cases per 100 population	Métis	General population	p-value
Atrial Fibrillation			
Crude Rate	0.13	0.11	
Standardized Rate (95% CI)	0.19 (0.12-0.26)	0.11 (0.1-0.11)	0.0142
Congenital Heart Disease			
Crude Rate	0.00	-	
Standardized Rate (95% CI)	0.00	-	n/a
Rheumatic Heart Disease			
Crude Rate	0.00	-	
Standardized Rate (95% CI)	0.00	-	n/a

CI: Confidence Interval

Incidence refers to newly diagnosed cases over the measurement period. Incidence of atrial fibrillation was 1.7 times higher in the Métis population during the two year period, while there were no cases of congenital heart disease or rheumatic heart disease in this cohort during this time

Table 5 : Number of people with cardiovascular disease out of every 100 people between April 1, 2006 and March 31, 2009, by age and sex.

Cases per 100 population	Métis (%)	95% confidence interval	General population (%)	95% confidence interval
Acute Coronary Syndromes				
Males				
20-64 years	1.2	(0.9, 1.5)	0.8	(0.7, 0.8)
65-74 years	6.7	(4.6, 8.8)	3.7	(3.6, 3.7)
75+ years	11.8	(6.3, 17.2)	6.3	(6.2, 6.4)
Overall	1.8	(1.5, 2.2)	1.4	(1.4, 1.4)
Females				
20-64 years	0.5	(0.3, 0.7)	0.3	(0.3, 0.3)
65-74 years	5.1	(3, 7.2)	2.1	(2, 2.1)
75+ years	5.1	(1.6, 8.5)	4.6	(4.6, 4.7)
Overall	1	(0.7, 1.2)	0.9	(0.8, 0.9)
Congestive Heart Failure				
Males				
20-64 years	0.6	(0.4, 0.8)	0.5	(0.5, 0.5)
65-74 years	5.7	(3.7, 7.7)	4.3	(4.3, 4.4)
75+ years	14	(8.1, 19.8)	10.6	(10.5, 10.7)
Overall	1.3	(1, 1.6)	1.5	(1.5, 1.5)
Females				
20-64 years	0.2	(0.1, 0.4)	0.3	(0.3, 0.3)
65-74 years	5.3	(3.2, 7.5)	2.8	(2.8, 2.9)
75+ years	6.3	(2.5, 10.1)	8.9	(8.8, 8.9)
Overall	0.8	(0.6, 1)	1.3	(1.3, 1.3)
Cerebrovascular Disease				
Males				
20-64 years	0.3	(0.2, 0.5)	0.1	(0.1, 0.2)
65-74 years	1.1	(0.2, 2.1)	1.1	(1.1, 1.1)
75+ years	2.2	(0, 4.7)	2.3	(2.3, 2.4)
Overall	0.4	(0.3, 0.6)	0.4	(0.4, 0.4)
Females				
20-64 years	0.1	(0, 0.2)	0.1	(0.1, 0.1)
65-74 years	1.2	(0.1, 2.2)	0.8	(0.8, 0.8)
75+ years	1.9	(0, 4)	2.2	(2.2, 2.3)
Overall	0.2	(0.1, 0.3)	0.4	(0.4, 0.4)

Table 5 (continued): Number of people with cardiovascular disease out of every 100 people between April 1, 2006 and March 31, 2009, by age and sex.

Cases per 100 population	Métis (%)	95% confidence interval	General population (%)	95% confidence interval
Atrial Fibrillation				
Males				
20-64 years	0.3	(0.1, 0.4)	0.1	(0.1, 0.1)
65-74 years	1.5	(0.5, 2.6)	0.8	(0.8, 0.8)
75+ years	2.9	(0.1, 5.8)	1.2	(1.2, 1.3)
Overall	0.4	(0.3, 0.6)	0.3	(0.3, 0.3)
Females				
20-64 years	0	(0, 0.1)	0.1	(0.1, 0.1)
65-74 years	1.6	(0.4, 2.8)	0.7	(0.7, 0.7)
75+ years	2.5	(0.1, 5)	1.4	(1.4, 1.4)
Overall	0.2	(0.1, 0.3)	0.3	(0.3, 0.3)
Congenital Heart Disease				
Males				
0-5 years	.	(., .)	0.3	(0.3, 0.3)
6-19 years	0	(0, 0)	0.1	(0.1, 0.1)
20+ years	0	(0, 0.1)	0.1	(0.1, 0.1)
Overall	0	(0, 0.1)	0.1	(0.1, 0.1)
Females				
0-5 years	0	(0, 0)	0.3	(0.3, 0.3)
6-19 years	0	(0, 0)	0.1	(0.1, 0.1)
20+ years	0	(0, 0.1)	0.1	(0.1, 0.1)
Overall	0	(0, 0.1)	0.1	(0.1, 0.1)

Table 5 (continued): Number of people with cardiovascular disease out of every 100 people between April 1, 2006 and March 31, 2009, by age and sex.

Cases per 100 population	Métis (%)	95% confidence interval	General population (%)	95% confidence interval
Rheumatic Heart Disease				
Males				
0-19 years	0	(0, 0)	0	(0, 0)
20-39 years	0	(0, 0)	0	(0, 0)
40-60 years	0	(0, 0)	0	(0, 0)
60+ years	0	(0, 0)	0	(0, 0)
Overall	0	(0, 0)	0	(0, 0)
Females				
0-19 years	0	(0, 0)	0	(0, 0)
20-39 years	0	(0, 0)	0	(0, 0)
40-60 years	0	(0, 0)	0	(0, 0)
60+ years	0	(0, 0)	0	(0, 0)
Overall	0	(0, 0)	0	(0, 0)

RESULTS OF CARDIOVASCULAR DISEASE CARE

Table 6 : Hospital re-admissions within one year of index event per 100 persons, April 1, 2006 to March 31, 2008, crude and age/sex standardized rates.

Re-admissions within 365 days of Index Event, per 100 population	Métis	General population	p-value
Acute Coronary Syndromes			
Crude Rate	0.06	0.13	
Standardized Rate (95% CI)	0.07 (0.06-0.07)	0.13 (0.13-0.13)	0.1424
Congestive Heart Failure			
Crude Rate	0.29	0.15	
Standardized Rate (95% CI)	0.32 (0.31-0.32)	0.15 (0.15-0.15)	0.0221
Cerebrovascular Disease			
Crude Rate	0.08	0.05	
Standardized Rate (95% CI)	0.08 (0.08-0.08)	0.05 (0.05-0.05)	0.4888
Atrial Fibrillation			
Crude Rate	0.13	0.16	
Standardized Rate (95% CI)	0.12 (0.11-0.14)	0.16 (0.16-0.16)	0.7045

CI: Confidence Interval

Readmission rates for congestive heart failure were over two times higher among the Métis compared with the general population, while no significant differences were found for acute coronary syndromes, cerebrovascular disease and atrial fibrillation.

Table 7 : Deaths per 100 people with cardiovascular disease between April 1 2003 and March 31 2009.

Mortality within 365 days of Index Event, per 100 population	Métis	General population	p-value
Acute Coronary Syndromes			
Crude Rate	11.11	17.56	
Standardized Rate (95% CI)	16.91 (6.72-27.1)	17.55 (17.25-17.86)	0.9008
Congestive Heart Failure			
Crude Rate	16.59	25.71	
Standardized Rate (95% CI)	21.84 (14.91-28.76)	25.71 (25.54-25.87)	0.2739
Cerebrovascular Disease			
Crude Rate	20	26.96	
Standardized Rate (95% CI)	26.95 (26.32-27.58)	28.53 (6.95-50.12)	0.8858
Atrial Fibrillation			
Crude Rate	25	9.44	
Standardized Rate (95% CI)	30.95 (15.19-46.71)	9.44 (8.88-9.99)	0.0136

CI: Confidence Interval

The mortality rate for atrial fibrillation was 3.3 times higher in the Métis population compared with the rest of the population. There were no significant differences in mortality secondary to acute coronary syndromes, congestive heart disease, or cerebrovascular disease relative to the rest of the population.

LIMITS OF THE STUDY

Getting information on cardiovascular disease among the Métis people in Ontario is important, but there are some significant limits to the information gathered so far. Researchers use health administration records to understand long-term diseases like cardiovascular because it is an efficient way to get a picture of the impact of the disease – including how many people have it, how long they live and how often they have to come back to hospital with it.

Administrative records are not perfect sources. Diagnostic data from doctors' billing records are used to find out who has a disease, but billings are not routinely checked for accuracy. Hospital records are a little more reliable, however they are not perfect either. Fortunately this data has been studied and found to be very accurate specifically for acute myocardial infarction.

The DAD was relied upon heavily for data for this report. Studies have also found that the DAD captures information for about 75% of all hospital visits.

The numbers produced in this report are very small, given the small size of the MNO citizenship registry. While a slightly larger registry was available as of 2009, using this cohort to look back in time for diseases with a high mortality rate would likely result in an underestimation of the rates of disease in the Métis, since those individuals who died of the disease prior to 2009 would not be included. Thus an analysis of the cohort as of 2006 was chosen, following these individuals forward in time to avoid this problem; however, this limited the sample size, particularly for incidence rates, where one year of follow-up information was required to look for outcomes in these patients.

Again, it is important to note the Métis Nation of Ontario Citizenship Registry does not represent the entire Métis population in the province. It is possible individuals whose citizenship is not registered with the Métis Nation of Ontario may be quite different in their age, behaviour or use of healthcare from those who are, so generalizing these results to all of the Métis people in Ontario may not be appropriate.

CONCLUSIONS

The most striking finding in this report is the gap in rates of heart attacks and pre-heart attacks (acute myocardial infarction and unstable angina) between the Métis versus the rest of the Ontario population. The rate of this disease in the Métis was 1.8 times higher than the rest of the population; this was a new finding. The sister report to this one, on diabetes mellitus, found a higher rate of diabetes in the Métis compared to the rest of the Ontario population. Since diabetes is a significant risk factor for acute coronary syndromes, our finding of more acute coronary syndromes in the Métis makes sense. Rates of other risk factors in the Métis, like smoking, high cholesterol and high blood pressure are not known.

Congestive heart failure was also more common in the Métis, about 1.3 times higher. Atrial fibrillation is the most common cardiac arrhythmia and may increase the risk of stroke several fold: the rate in the Métis was higher than the rest of the population, about 1.7 times higher. Surprisingly, the higher rate of atrial fibrillation in the Métis did not result in a higher rate of strokes. The rates of cerebrovascular disease were not different between the groups in this study.

Finally, there were no new cases of congenital heart disease, nor rheumatic heart disease among the Métis during this time period and there are no previous rates reported in the Métis.

Hospital re-admissions were significantly higher in the Métis only for congestive heart failure (113% relative increase). There were no differences in re-admissions for heart attacks and pre-heart attacks, cerebrovascular disease and atrial fibrillation, and we chose not to look at rheumatic heart disease and congenital heart disease since there were too few cases to study and very small numbers can result in incorrect conclusions.

While rates of acute coronary syndromes were 1.8 times higher in the Métis in this study, the mortality rate in this group was not different from the rest of the population of people with these syndromes. This report does not examine the reasons for this difference. It is possible that there are more mild cases of heart attack in the Métis group, more cases of pre-heart attack than heart attack in the Métis group; better health care in the Métis after the event, or that our attempts to adjust the results for age and gender did not completely account for age and gender-related differences. A future study could examine these possibilities. Mortality rates were otherwise similar, with the exception of atrial fibrillation which was 228% higher in the Métis compared to the rest of the population.

Unfortunately there is little published data with which to compare our findings. The major reason few studies have been done about the Métis is the difficulty in identifying Métis persons: until the registry of the Métis Nation of Ontario (MNO) was created, it was very difficult to identify Métis persons in Ontario's health databases. The Métis do not live on reserves or in well-demarcated regions, making them impossible to identify the Métis by geographic area. The only previous report on the Métis used probability linkages to identify Métis persons, which is an inventive approach but one that may not be completely accurate in identifying the Métis. The MNO registry allowed us to identify only individuals with Métis citizenship. However, these results apply only to those who applied for and received MNO citizenship, and these people may or may not accurately reflect the Métis population as a whole.

ACKNOWLEDGEMENTS

This study was supported by the Institute for Clinical Evaluative Sciences (ICES), which is funded by an annual grant from the Ontario Ministry of Health and Long-Term Care (MOHLTC). The opinions, results and conclusions reported in this paper are those of the authors and are independent from the funding sources. No endorsement by ICES or the Ontario MOHLTC is intended or should be inferred.

Funding for this publication was provided by the Public Health Agency of Canada.

The opinions expressed in this publication are those of the authors/researchers and do not necessarily reflect the official views of the Public Health Agency of Canada.

BIBLIOGRAPHY

Canadian Institute for Health Information. Data Quality Documentation, Discharge Abstract Database, 2008–2009 — Executive Summary. http://www.cihi.ca/cihiweb/en/downloads/DAD_executive_summary_2008_2009_e.pdf. 2009. Ottawa. 2-3-2010.

Canadian Institute for Health Information. "Improving the Health of Canadians: Aboriginal Peoples' Health." Ottawa, 2004.

CCORT. Canadian Cardiovascular Atlas. Tu JV, Ghali W, Pilote L, Brien S, editors. <http://www.ccort.ca/CardiovascularAtlas/AtlasdescriptionDownloadAtlas/tabid/62/Default.aspx> 2006.

Hutchinson P, Evans R, Reid C. Report on the Statistical Description and Analysis of the 2006 Métis Nation British Columbia Provincial Survey. Vancouver, 2010.

Institute for Clinical Evaluative Sciences. <http://www.ices.on.ca/>. 2010.

Métis Nation of Ontario. http://www.metisnation.org/gov_bodies/home.html . 2010. 2-3 2010.

Métis Nation of Ontario. Literature Scan and Review: Métis Health and Healthcare. Ottawa, 2010.

Public Health Agency of Canada. Tracking Heart Disease and Stroke in Canada. 2009, Ottawa.

Shah BR, Cauch-Dudek K, Fangyun Wu C. Diabetes in the Métis Nation of Ontario. 2010.

Statistics Canada. Aboriginal Peoples Survey. <http://www.statcan.gc.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SDDS=3250&lang=en&db=imdb&adm=8&dis=2>. 2006.

Tjepkema M, Wilkins R, Senecal S, Guimond E, Penney C. Mortality of Métis and Registered Indian adults in Canada: An 11-year follow-up study. 82-003-XPE. 2009.

Young TK. Review of research on Aboriginal populations in Canada: relevance to their health needs. BMJ 2003; 327:419-422.