the Métis Nation of Ontario

DIABETES
IN THE MÉTIS NATION OF ONTARIO

TECHNICAL REPORT
MARCH 2012

Prepared by:
Baiju R. Shah, MD PhD
Karen Cauch-Dudek, BA
C. Fangyun Wu, MSc

ICES Institute for Clinical Evaluative Sciences

BACKGROUND AND RATIONALE

Disparities in health between Canada's Aboriginal Peoples and the general population have been well documented. (1-9) However, much of this data has focused on the First Nations peoples. (10,11) Data specific to the Métis people are sparse, even though the Métis comprised nearly 400,000 people according to the 2006 Canadian Census. (12) A lack of population-based data has contributed to the absence of peer-reviewed studies on Métis health and healthcare. (13) Métis populations are younger and more economically disadvantaged than the general Canadian population. Accordingly, this represents a population in which diabetes and its outcomes should be evaluated.

The health and healthcare of the Métis are a primary interest of the Métis Nation of Ontario (MNO), the sole representative body for the Métis in Ontario. The main purpose of the MNO is to support and further the development of self-government institutions for the Métis Nation in Ontario and to represent and advocate for the distinct interests of the Métis people of Ontario.

In order to examine population-based data on diabetes and its consequences in the Métis population of Ontario, the MNO launched a research initiative with funding provided by the Public Health Agency of Canada. Because Ontario health data do not include identifiers for individuals' ethnic or cultural background, an alternative way of identifying the Métis population was needed. Therefore, a research agreement was struck between the MNO and the Institute for Clinical Evaluative Sciences to permit linkage of their citizenship registry with Ontario healthcare administrative data in a secure environment. The following report describes the data linkage, the analytic methods undertaken and the results.

LITERATURE REVIEW

The post-censal Aboriginal Peoples Surveys (APS) were conducted nationally in 1991, 2001 and 2006 and provide some of the only Métis-specific data on diabetes. (14-16) APS respondents were identified from the Canadian census or registered under the Indian Act. The 1991 response rate was 75% of those surveyed in communities with a high concentration of Aboriginal Peoples.

The prevalence of self-reported diabetes among the Métis was 5.5% in 1991, (14) rising to 7% in the 2006 survey. (16) However, the actual rate may be higher; the Métis Health Needs study conducted by Health Canada in 2005 states that the age-standardized prevalence rate of diabetes could be as much as three times that rate. (17) In fact, in the Métis Health Survey conducted in Saskatchewan in 2009 with over 1,400 Métis people, 15.7% reported diabetes. (18)

The 1991 APS data has been used to explore diabetes in the Métis in detail. (19-21) Researchers from the University of Manitoba looked at diabetes risk factors and determined the crude prevalence of diabetes amongst the Métis in western Canada to be 6.1%. (19) Their analysis included 3,062 records corresponding to a weighted sample of 58,894 Métis individuals. In a 2003 study, this same group characterized the diabetes problem amongst the Métis in particular using two data sources: a health interview survey and data linkage of a Manitoba registry of persons with diabetes with the provincial Métis organization's citizenship registry. (21) They found a prevalence of diabetes among Métis people almost double that of the general population.

RESEARCH METHODS

DATA SOURCES

The MNO's citizenship registry as of August 2009 was provided to the Institute for Clinical Evaluative Sciences for linkage with other health data sources. Initial data cleaning of the citizenship registry included range checks and removal of duplicate records. Individual MNO citizens were then linked with the Registered Persons Database, a registry of all persons eligible for a health card in Ontario. Of the 14,480 individuals in the citizenship registry, 14,021 were successfully linked (96.8%), of whom 13,173 (94.0%) had a valid Ontario address recorded in the RPDB. This is the Métis population that was studied; in the report, we refer to them simply as "the Métis", or "the Métis population". These individuals composed the Métis population used in this study; all other Ontario residents were considered to be part of the general population. For the calculation of diabetes incidence (see below), the citizenship registry as of 2005 (which had previously been linked as part of a previous project) was used.

Each person's health card number was then anonymized using a reproducible encryption algorithm. Names and unencrypted health card numbers were deleted from the data to protect confidentiality. The encrypted health card number could then be linked with other Ontario healthcare administrative data sources, all of which share the same encrypted health card number to identify individuals. As a result, individuals can be linked between data sources and across time. These other administrative data sources include:

- The Ontario Health Insurance Plan (OHIP) database, which records all fee-for-service billing claims from Ontario physicians for consultations, visits and procedures.
- The Discharge Abstracts Database (DAD), which records detailed information about each hospitalization to an Ontario hospital, including diagnoses and procedures performed during the hospitalization.
- The National Ambulatory Care Reporting System (NACRS) database, which contains diagnostic information related to all emergency department visits in Ontario.
- The Ontario Drug Benefits (ODB) program database, which contains information on all prescriptions filled under the provincial formulary for people eligible for publicly-funded drug coverage, including all people aged 65 or older.
- The Ontario Diabetes Database (ODD), a validated registry of all people with diagnosed diabetes in Ontario, which is derived from the other administrative data sources. The database does not distinguish between type 1, type 2 or other types of diabetes, so the analyses could not be divided according to diabetes type. However more than 90% of the population with diabetes has type 2 diabetes.

EPIDEMIOLOGY OF DIABETES

Prevalence of diabetes (the proportion of persons living with diabetes) as of April 1, 2007 and incidence of diabetes (the proportion of the population that were newly-diagnosed with diabetes) between April 1, 2006 and March 31, 2007 were calculated for the Métis population by linking the MNO citizenship registry with the ODD. Prevalence and incidence in the general Ontario population were calculated by linking all people recorded in the RPDB who were not in the MNO citizenship registry with the ODD. Because the age structure of the MNO population is different from that of the general Ontario population, rates were standardized on age and sex. These rates were not standardized on socioeconomic status or place of residence, as these factors may form part of the causal pathway explaining differences in diabetes epidemiology between the Métis and general populations.

PROCESSES OF DIABETES CARE

Processes of care are things that physicians or other health care professionals do for patients. Examples of processes include visits, ordering blood tests, measuring blood pressure or prescribing medications. These are useful as measures because the processes through which care is delivered often define quality of care. In addition, many processes of care are applicable to all patients with diabetes, regardless of complications or other comorbid illnesses, lessening the extent to which these factors could confound the analysis. Finally, processes are under the

direct control of health care providers and therefore may be less influenced by biological or behavioural variations between patients.

A cohort was defined of all Ontario residents with diagnosed diabetes as of April 1, 2007 according to the ODD who were still alive and residents of Ontario as of March 31, 2008. The cohort was separated into Métis (based on citizenship registration with MNO) and the general population, and each of the following three processes was measured during the calendar year by linkage with the administrative data sources:

- Primary care visits: The number of office visits with a primary care physician, based on billing claims recorded in the OHIP database. Categorized as 0, 1, 2 to 4, or 5+.
- Diabetes specialist care visits: At least one office visit with an endocrinologist or general internist, based on billing claims recorded in the OHIP database.
- Eye care visits: At least one office visit with an ophthalmologist or optometrist, based on billing claims recorded in the OHIP database. Screening for diabetic eye disease is recommended for most people with diabetes every one to two years.

In addition, the following five prescription-related processes were measured from the ODB database for members of the cohort who were 65 years of age or older (i.e., those individuals for whom complete drug prescription data was available):

- Glucose-lowering regimen: Categorized as "Insulin" if the patient received at least one prescription for an insulin product; or, if not, as "Oral agents" if the patient received at least one prescription for an oral glucose-lowering medication; or, if not, as "Diet only".
- Statin prescription: Receipt of at least one prescription for a statin (a category of cholesterol-lowering medication).
- Blood pressure medication prescription: Receipt of at least one prescription for a blood pressure-lowering medication.
- ACE inhibitor/angiotensin receptor blocker prescription: Receipt of at least one prescription for these particular blood pressure lowering medications, which are recommended as first-line blood pressure lowering therapy for diabetic patients, and which have other beneficial effects including reduction of microalbuminuria and cardiovascular protection.
- Self-monitoring of blood glucose: Receipt of at least one prescription for capillary glucose test strips, used in self-monitoring of blood glucose levels.

Crude frequencies of each measure are reported. Standardized rates are not reported, as processes of care should be mostly independent of sociodemographic differences between populations.

OUTCOMES OF DIABETES CARE

Outcomes of care are actual events that occur to patients, such as complications or hospitalizations. They are the most patient-relevant way to measure quality of care since the purpose of high quality care is to prevent them. However, the occurrence of these events is only partially related to the care received previously and may instead be influenced by a multitude of factors that cannot be measured or adjusted for, so the potential for confounding and bias is significant.

As with the processes of care, the outcomes of care were evaluated between April 1, 2007 and March 31, 2008 in a cohort of all Ontario residents with diabetes, separated into Métis and the general population. The following eight outcomes were measured:

- Hypo- or hyperglycemia: Records of hospitalizations in the DAD or emergency department visits in the NACRS database with hypo- or hyperglycemia as the admitting diagnosis.
- Eye complications: Physician service claims in the OHIP database or hospitalization records in the DAD indicating surgery for laser photocoagulation or vitrectomy, used to treat diabetic retinopathy.

- Renal dialysis: Records of physician billing claims for chronic renal dialysis in the OHIP database.
- Myocardial infarction: Records of hospitalizations in the DAD for acute myocardial infarction.
- Congestive heart failure: Records of hospitalizations in the DAD for congestive heart failure.
- Coronary revascularization: Records of hospitalizations in the DAD for coronary artery by-pass surgery or for percutaneous coronary interventions.
- Stroke: Records of hospitalizations in the DAD for acute stroke.
- Non-traumatic lower extremity amputation: Records of hospitalizations in the DAD indicating surgery for amputation of the lower extremity, without a concomitant diagnosis of cancer, trauma or other non-vascular reasons for amputation.

Frequencies of each measure are reported both crude and standardized to the general population on age, sex, socioeconomic status and census division.

Pregnancies and delivery outcomes among women with diabetes were to be analyzed as well. However, there were no deliveries recorded between April 1, 2007 and March 31, 2008 among women in the Métis population.

FINDINGS

DEMOGRAPHIC CHARACTERISTICS OF THE POPULATIONS

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		13,173	73,605
Age (median)		43	33
Sex	Female	46%	50%
	Male	54%	50%
Region	Southern Ontario	52%	61%
	Northern Ontario*	48%	39%

* Northern Ontario includes Algoma District, Cochrane District, the City of Greater Sudbury, Kenora District, Manitoulin District, Muskoka District, Nipissing District, Parry Sound District, Rainy River District, Sudbury District, Thunder Bay District and Timiskaming District.

The Métis Nation of Ontario citizenship registry included in this analysis represents about 18% of the total Métis population of Ontario, based on self-report in the 2006 Census by Statistics Canada. Those people included in the citizenship registry are older, more likely to be male and more likely to live in Northern Ontario than the overall Métis population of Ontario.

Table 2 : Demographic characteristics of the Métis Nation of Ontario citizenship registry versus the rest of the general population of Ontario.

Characteristic		Métis Nation of Ontario Citizenship Registry	General population
Number of persons		13,173	14,391,351
Age (median)		43	38
Sex (%)	Female	46	50
	Male	54	50
Socioeconomic status (%)	Poorest	22	21
	2	20	20
	3	21	20
	4	19	20
	Richest	18	20
Local Health Integrated Network (LHIN) (%)			
	Erie St. Clair	2.5	5.0
	South West	3.7	7.0
	Waterloo Wellington	2.4	5.4
	Hamilton Niagara Haldimand Brant	5.4	10.4
	Central West	1.4	6.3
	Mississauga Halton	1.7	8.7
	Toronto Central	2.4	9.7
	Central	2.2	13.2
	Central East	5.1	11.7
	South East	2.8	3.7
	Champlain	5.7	9.6
	North Simcoe Muskoka	17.7	3.2
	North East	30.9	4.3
	North West	16.0	1.9

The Métis population included in this study is older and poorer than the general Ontario population. It also includes more males and is more concentrated in northern Ontario than the general population.

EPIDEMIOLOGY OF DIABETES

Table 3 : Prevalence of diabetes per 100 people, as of April 1, 2007.

Prevalence	Métis	General population	p-value
Crude rate	8.92	6.45	<0.0001
Standardized rate *	8.13	6.45	<0.0001

* Standardized for age and sex

The crude prevalence of diabetes is nearly 40% higher in the Métis population than in the general Ontario population. After standardizing on age and sex, some of this difference is reduced, but the standardized prevalence in the Métis population remains higher than that in the general population.

Table 4 : Age/sex stratified crude prevalence of diabetes per 100 people, as of April 1, 2007.

Prevalence	Métis	General population
Males		
0 to 34 years	1.10	0.67
35 to 49 years	5.91	4.38
50 to 64 years	17.30	13.84
65 to 74 years	30.29	25.01
75+ years	37.43	25.98
Overall	**9.82**	**6.75**
Females		
0 to 34 years	1.93	0.81
35 to 49 years	5.19	4.09
50 to 64 years	11.88	10.84
65 to 74 years	27.07	19.64
75+ years	28.19	21.41
Overall	**7.88**	**6.15**

The prevalence of diabetes in the Métis population is higher than that of the general population in both sexes and in all age groups.

Table 5 : Annual incidence of diabetes per 100 people, between April 1, 2006 and March 31, 2007.

Incidence	Métis	General population	p-value
Crude rate	0.96	0.66	<0.0001
Standardized rate*	0.82	0.66	0.04

* Standardized for age and sex

The crude annual incidence of diabetes is 45% higher in the Métis population than in the general Ontario population. After standardizing on age and sex, some of this difference is reduced, but the standardized incidence in the Métis population remains higher than that in the general population.

Table 6 : Age/sex stratified crude annual incidence of diabetes per 100 people, between April 1, 2006 and March 31, 2007.

Incidence	Métis	General population
Males		
0 to 34 years	0.14	0.09
35 to 49 years	0.90	0.68
50 to 64 years	2.20	1.75
65 to 74 years	2.76	2.57
75+ years	2.56	2.08
Overall	**1.04**	**0.70**
Females		
0 to 34 years	0.34	0.11
35 to 49 years	0.52	0.54
50 to 64 years	1.99	1.35
65 to 74 years	2.51	2.03
75+ years	0	1.78
Overall	**0.88**	**0.62**

The incidence of diabetes in the Métis population is higher than that of the general population in both sexes and in most age groups.

PROCESSES OF DIABETES CARE

Table 7 : Distribution of primary care visits by people with diabetes, between April 1, 2007 and March 31, 2008.

Number of primary care visits	Métis	General population	p-value
None	7.9	11.0	<0.0001
1	8.9	6.6	
2 to 4	33.1	27.6	
5 or more	50.1	54.8	

Approximately 50% of Métis population with diabetes had five or more primary care visits, compared to 55% of the general population. However, fewer Métis people with diabetes had no primary care visits.

Table 8 : Diabetes specialist care visits per 100 people with diabetes, between April 1, 2007 and March 31, 2008.

Specialist care visits	Métis	General population	p-value
Crude rate	15.0	18.3	0.004

Métis people with diabetes were 18% less likely to have care from diabetes specialists than people in the general population with diabetes.

Table 9 : Eye care visits per 100 people with diabetes, between April 1, 2007 and March 31, 2008.

Eye care visits	Métis	General population	p-value
Crude rate	49.5	48.4	0.5

There was no difference in eye care visits between Métis people with diabetes and the general population with diabetes. In both groups, fewer than half of people with diabetes had an examination from an ophthalmologist or optometrist.

Table 10 : Glucose-lowering regimens used by people aged ≥65 with diabetes, between April 1, 2007 and March 31, 2008.

Glucose-lowering regimen	Métis	General population	p-value
Insulin	16.9	12.7	
Oral glucose-lowering agents	49.1	49.1	0.03
Diet control only	34.0	38.2	

Métis people with diabetes aged ≥65 used more intensive glucose-lowering regimens than people with diabetes aged ≥65 in the general population, with a larger proportion using insulin and a smaller proportion using diet control only.

Table 11 : Receipt of medications per 100 people aged ≥65 with diabetes, between April 1, 2007 and March 31, 2008.

Medications	Métis	General population	p-value
Statins	66.8	62.6	0.09
Blood pressure medications	78.4	81.2	0.002
ACE inhibitors/ARBs	73.1	69.3	0.1

Métis people with diabetes aged ≥65 were less likely to receive a blood pressure medication than people with diabetes aged ≥65 in the general population. There was no statistically significant difference in the receipt of statins or of ACE inhibitors/angiotensin receptor blockers by people with diabetes aged ≥65 between the Métis population and the general population.

Table 12 : Self-monitoring of blood glucose per 100 people aged ≥65 with diabetes, between April 1, 2007 and March 31, 2008.

Self-monitoring of blood glucose	Métis	General population	p-value
Crude rate	64.4	54.3	<0.0001

Métis people with diabetes aged ≥65 were 19% more likely to do self-monitoring of blood glucose than people with diabetes aged ≥65 in the general population.

OUTCOMES OF DIABETES CARE

Table 13 : Hypo- or hyperglycemia per 100 people with diabetes, between April 1, 2007 and March 31, 2008.

Hypo- or hyperglycemia	Métis	General population	p-value
Crude rate	1.40	1.22	0.6
Standardized rate*	1.35	1.22	0.7

* Standardized for age, sex, socioeconomic status and place of residence

Although the rates appear different, there was no statistically significant difference in hypo- or hyperglycemia emergency department visits or hospitalizations between the Métis population with diabetes and the general population with diabetes.

Table 14 : Eye complications per 100 people with diabetes, between April 1, 2007 and March 31, 2008.

Eye complications	Métis	General population	p-value
Crude rate	0.96	1.39	0.2
Standardized rate*	1.02	1.39	0.2

* Standardized for age, sex, socioeconomic status and place of residence

Although the rates appear different, there was no statistically significant difference in eye complication rates between the Métis population with diabetes and the general population with diabetes.

Table 15 : Renal dialysis per 100 people with diabetes, between April 1, 2007 and March 31, 2008.

Renal dialysis	Métis	General population	p-value
Crude rate	0.87	0.57	0.2
Standardized rate*	0.90	0.57	0.2

* Standardized for age, sex, socioeconomic status and place of residence

Although the rates appear different, there was no statistically significant difference in renal dialysis between the Métis population with diabetes and the general population with diabetes.

Table 16 : Myocardial infarction per 100 people with diabetes, between April 1, 2007 and March 31, 2008.

Myocardial infarction	Métis	General population	p-value
Crude rate	1.75	0.73	<0.0001
Standardized rate*	1.36	0.73	0.04

* Standardized for age, sex, socioeconomic status and place of residence

Métis people with diabetes were 86% more likely to be hospitalized with acute myocardial infarction than people with diabetes in the general population.

Table 17 : Congestive heart failure per 100 people with diabetes, between April 1, 2007 and March 31, 2008.

Congestive heart failure	Métis	General population	p-value
Crude rate	1.40	1.14	0.4
Standardized rate*	1.35	1.14	0.5

* Standardized for age, sex, socioeconomic status and place of residence

Although the rates appear different, there was no statistically significant difference in congestive heart failure hospitalizations between the Métis population with diabetes and the general population with diabetes.

Table 18 : Coronary revascularization per 100 people with diabetes, between April 1, 2007 and March 31, 2008.

Coronary revascularization	Métis	General population	p-value
Crude rate	1.75	0.81	0.0004
Standardized rate*	1.30	0.81	0.1

* Standardized for age, sex, socioeconomic status and place of residence

The crude rate of coronary revascularization procedures was higher in the Métis population with diabetes than in the general population with diabetes. However, after standardization for age, sex, socioeconomic status and region, this difference was no longer statistically significant.

Table 19 : Stroke per 100 people with diabetes, between April 1, 2007 and March 31, 2008.

Stroke	Métis	General population	p-value
Crude rate	0.26	0.34	0.7
Standardized rate*	0.34	0.34	1.0

* Standardized for age, sex, socioeconomic status and place of residence

There was no statistically significant difference in stroke hospitalizations between the Métis population with diabetes and the general population with diabetes.

Table 20 : Non-traumatic lower extremity amputation per 100 people with diabetes, between April 1, 2007 and March 31, 2008.

Non-traumatic lower extremity amputation	Métis	General population	p-value
Crude rate	0.17	0.16	0.9
Standardized rate*	0.10	0.16	0.4

* Standardized for age, sex, socioeconomic status and place of residence

Although the rates appear different, there was no statistically significant difference in non-traumatic lower extremity amputations between the Métis population with diabetes and the general population with diabetes.

LIMITATIONS

Administrative data have been widely advocated for chronic disease surveillance because they represent an efficient means to obtain population-based measures of disease burden. However, they have a number of limitations. Diagnostic data in physicians' service claims are not audited for accuracy and while coding of hospital records is more rigorous, accuracy remains imperfect.

The Ontario Diabetes Database which was central to the current report has been validated against data abstracted from primary care charts for the general Ontario population and found to detect 86% of cases of diagnosed diabetes and to mislabel persons with diabetes less than 0.2% of the time. However, the validation was not carried out in a Métis population specifically and, if service use patterns differ, the validity may also differ. If detection rates are lower in the Métis population, then the excess burden of diabetes in that population is greater than that reflected in the current analysis. Among persons with diabetes, as many as 30% of cases have been reported to be undiagnosed and these persons will not be detected in the ODD, which only captures diagnosed diabetes.

Administrative data do not provide a comprehensive picture of health service delivery in all cases. Some of the identified information gaps include: exercise, diet, smoking cessation, and other lifestyle changes required to effectively control diabetes; provision of care by salaried physicians and other non-fee-for-service providers including non-physicians; drug utilization by persons under 65 years of age; and data on laboratory testing patterns and results.

Finally, the citizenship registry of the MNO is not representative of the entire Métis population in Ontario. Individuals who are not registered citizens may be quite different (in demographic, behavioural or clinical terms) than registered citizens, so generalizing these results to all Métis people in Ontario may not be appropriate. Métis people not part of the MNO citizenship registry were included in the general population of this study.

CONCLUSIONS

The age- and sex-standardized prevalence and incidence of diabetes was about 25% higher in the Métis population compared to the general Ontario population. Prevalence was 8.13% for the Métis versus 6.45% for the general population, whereas annual incidence was 0.82% for the Métis population and 0.66% for the general population. Prevalence and incidence were also higher in virtually all age- and sex-specific strata. This increased frequency of diabetes may be in part attributable to the slightly lower socioeconomic status of the Métis population compared to the general Ontario population. As a result, diabetes will place a disproportionate burden on the health of the Métis community.

People with diabetes in the Métis population were slightly less likely to have five or more primary care physician visits and were less likely to receive specialist care from endocrinologists or general internists. This may in part reflect the fact that the Métis population disproportionately live in northern Ontario where access to physicians and especially specialists is reduced compared to southern Ontario and where the population may travel to Winnipeg for specialist care, which would not be captured in the Ontario data. However, the Métis population was on more intensive glucose-lowering regimens and as such was more likely to do self-monitoring of blood glucose. The use of statins and of ACE inhibitors/angiotensin receptor blockers, two medication classes that reduce the risk of cardiovascular disease, were similar to the general population but the use of blood pressure lowering medication in general was slightly lower. To summarize, there were no consistent patterns suggesting disparities in processes of care for the Métis people with diabetes.

There were virtually no statistically significant differences in acute, chronic microvascular or chronic macrovascular complications of diabetes between the Métis population and the general population. The only exception was a significantly higher rate of acute myocardial infarction in the Métis population and a concomitant trend towards a higher rate of coronary revascularization procedures.

The increased burden of diabetes and the associated complication of acute myocardial infarction is an important health concern for the Métis people, although the results reassuringly show no other major disparities in processes or outcomes of care compared to the general population. Greater community awareness of the risk and the behavioural, lifestyle and pharmacologic interventions that can be used to reduce this risk are needed. Health policy decision makes, such as the Ministry of Health and Long-Term Care and the Local Health Integration Networks, should collaborate to address this burden and ensure that no disparities in health care access or utilization develop. Finally, representative organizations like the Métis Nation of Ontario and the Métis National Council can take a leadership role in promoting the health of their constituency.

ACKNOWLEDGEMENTS

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

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

Disclaimer:

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.

REFERENCES

1. Minore B, Katt M, Hill ME. Planning Without Facts: Ontario's Aboriginal Health Information Challenge. J of Agromedicine 2009; 14(2): 90-96.
2. Wilson K, Young TK. An overview of Aboriginal health research in the social sciences: Current trends and future directions. Int J Circumpolar Health, 2008; 67(2-3); 179-89.
3. Richmond C, Ross NA, Egeland GM. Social support and thriving health: A new approach to understanding the health of Indigenous Canadians. Am J Public Health 2007; 97(10):1827-33.
4. Waldram JB, Herring DA, Young TK. Self determination and health care. In: Aboriginal Health in Canada: Historical, Cultural, and Epidemiological Perspectives (2nd Ed). Toronto: University of Toronto Press, 2006: 228-58.
5. Adelson, N. The embodiment of inequity: Health disparities in Aboriginal Canada. Can J Public Health 2005; 96(Suppl 2): 45-61.
6. Young, TK. Review of research on Aboriginal populations in Canada: Relevance to their health needs. BMJ 2003; 327(7412): 419-22.
7. Jacobs P, Blanchard JF, James R C, Depew N. Excess costs of diabetes in the Aboriginal population of Manitoba, Canada. Can J Public Health 2000; 91(4): 298-301.
8. Newbold KB. Problems in search of solutions: Health and Canadian Aboriginals. J Community Health 1998; 23(1): 59-73.
9. Shah CP, Farkas CS. The health of Indians in Canadian cities: A challenge to the health care system. CMAJ 1985; 133(9): 859–63.
10. Harris SB, Gittelsohn J, Hanley A, Barnie A, Wolever TMS, Gao J, Logan A, Zinman B. The prevalence of NIDDM and associated risk factors in Native Canadians. Diabetes Care 1997; 20: 185-87.
11. Pioro MP, Dyck RF, Gillis DC. Diabetes prevalence rates among First Nations Adults on Saskatchewan reserves in 1990: Comparison by tribal grouping, geography and with non-First Nations people. Can J Public Health 1996; 87: 325-28.
12. Statistics Canada. 2006 Census. Aboriginal peoples of Canada: a demographic profile. Ottawa: Statistics Canada, 2008.
13. Métis Nation of Ontario. Literature Scan and Review: Métis Health and Healthcare, 2010.
14. Statistics Canada. Aboriginal Peoples Survey, 1991.
15. Statistics Canada. Aboriginal Peoples Survey, 2001. Well-being of the non-reserve Aboriginal Population. Catalogue no. 89-589-XIE.
16. Statistics Canada. Aboriginal Peoples Survey, 2006. An Overview of the Health of the Metis Population. Catalogue no. 89-637-x.
17. Health Canada. Analysis of the Métis Nation's Population Health Needs, 2005.
18. Métis Nation Saskatchewan. Métis Health News. 2009; 1(1): 1-4.
19. Bruce S. Prevalence and determinants of diabetes mellitus among the Métis of western Canada. Am J Human Biol 2000; 12(4): 542-51.
20. Bruce S. The impact of diabetes mellitus among the Métis of western Canada. Ethnicity & Health 2000; 5 (1): 47-57.
21. Bruce SG, Kliewer EV, Young TK, Mayer T, Wajda A. Diabetes among the Métis of Canada: Defining the population, estimating the disease. Can J Diabetes 2003; 27(4): 442-48.