

# DIABETES IN THE MÉTIS NATION OF ONTARIO

CLINICAL SIGNIFICANCE REPORT  
MARCH 2012

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## INTRODUCTION

The Métis are one of the three Aboriginal peoples in Canada recognized by the 1982 Constitution Act. The 2006 census identified approximately 400,000 people as Métis and this accounted for about one third of Canada's Aboriginal population (1). According to Health Canada, diabetes is a significant health concern in Aboriginal populations because Aboriginal ancestry itself is associated with increased risk of the disease (2). In addition, Aboriginal populations experience earlier onset of diabetes, greater severity at diagnosis, and higher rates of complications. These clinical parameters are coupled with a relative lack of accessible services and an increasing prevalence of risk factors (3). Compared to the First Nations, limited data exist to describe the epidemiology of diabetes and related healthcare utilization in the Métis population.

The Métis Nation of Ontario (MNO) is the sole body representing the Métis in the province. The MNO Citizenship Registry includes approximately 18,000 Métis, based on genealogical evidence. Funded by the Public Health Agency of Canada, the MNO collaborated with the Institute for Clinical Evaluative Sciences (ICES) to conduct a population-based study to assess the prevalence and health consequences of diabetes, as well as healthcare utilization, among the Métis in Ontario. In 2009–2010, 14,021 individuals listed in the MNO Citizenship Registry were successfully linked to the Ontario healthcare administrative databases available at the ICES. The descriptive epidemiology of diabetes and the processes and outcomes of diabetes care were analyzed and reported (4). This follow-up report aims to contextualize and interpret the findings of the ICES study on diabetes. The four objectives of this report are:

1. To compare the findings of the ICES study with statistics available for the general population and for other Aboriginal populations in Canada;
2. To explore factors that might contribute to the differences in the prevalence of diabetes between the Métis and the general population in Canada;
3. To discuss the potential consequences of the increased prevalence of diabetes in the Métis population; and
4. To provide insights into program development and future research.

## EPIDEMIOLOGY AND HEALTHCARE UTILIZATION RELATING TO DIABETES IN THE MÉTIS POPULATION

### DESCRIPTIVE EPIDEMIOLOGY

The ICES study documented that in 2007, 8.13% of the Métis listed in the MNO citizenship registry had diabetes, compared to 6.45% in the general population of Ontario. This corresponds to an approximately 25% higher prevalence among the Métis (4). In Manitoba, the prevalence of diabetes was considerably higher for the Métis than for the non-Aboriginal population. A population-based study conducted by the Manitoba Centre for Health Policy and the Manitoba Metis Federation in 2006 reported a prevalence of diabetes of 11.8% for the Métis and 8.8% for the general population (5). This represents a 34% higher prevalence. According to the Aboriginal Peoples Survey (APS) conducted in 2006, 7.5 % of Métis, 9.3% of non-reserve First Nations and 4.9% of Inuit people reported having diabetes, compared with 6.5% for the general Canadian population (1). Taken together, proportionally more Métis have diabetes than the general population at both the provincial and national levels. From a temporal perspective, self-reported diabetes is steadily increasing among the Métis in Canada, rising from 5.5% in 1991 (6-7) to 5.9% in 2001 (8) and to 7.5% in 2006 (1).

Based on self-reporting, the APS might have misclassified some individuals as having or not having diabetes because of underreporting or undiagnosed diabetes. Underreporting in a high-risk population faced with an underutilization of health services would mean the true magnitude of diabetes could be much greater than reported. In support of this notion, the Métis Nation Health Needs study conducted by Health Canada in 2005 suggested that the age-standardized prevalence of diabetes could be up to three times higher than the figures reported in the same study (9). In addition, it has been suggested that the true prevalence of diabetes could be two to three times higher than the number of diagnosed cases in Indigenous populations in the Canadian Arctic (10). Caution should also be taken when comparing prevalence figures for diabetes over time. The 1999 WHO criteria for diabetes lowered the cut-off value for fasting blood glucose from 7.8 mmol/l to 7.0 mmol/l (11). Lowering the diagnostic threshold would result in an increase in the number of diabetes diagnosed.

## **PROCESS OF DIABETES CARE**

The ICES study showed that Métis with diabetes were less likely to visit their primary care physicians five or more times in a year or to receive care from diabetes specialists, compared to the general population of Ontario (4). Similarly, Métis with or without diabetes reported in the 2006 APS that they were less likely to have consulted a family doctor, but were more likely to have consulted a nurse in the past year, than the non-Aboriginal population in Canada (12). While there was no significant difference in the number of eye-care visits made by Métis with diabetes and people with diabetes in Ontario's general population (4), in Manitoba, Métis with diabetes made significantly fewer eye-care visits than the non-Aboriginal people (5). With respect to glucose-lowering regimens, more Métis with diabetes used insulin than those with diabetes in Ontario's general population (4). Similar findings were reported on the use of insulin by Métis with diabetes in the 2006 APS (1). Métis with diabetes were less likely to receive medication to lower their blood pressure, but were more likely to self-monitor blood glucose, than people with diabetes in the general population in Ontario (4). No information on the use of blood pressure medication and self-monitoring of blood glucose in other Aboriginal populations was available for comparison.

For the Métis, location of residence may in part determine accessibility of primary-care physicians and specialists. Métis who live in urban areas may have more access to physicians than Métis in rural areas. As shown in the APS, nurses play an important role in the healthcare of the Métis. However, data on services provided by nurses and other healthcare providers were not captured in administrative databases, such as the data analyzed in the ICES study. While the ICES study reported on drug utilization only among Métis older than 65, the APS included Aboriginal peoples of all adult ages. Age has a potential impact on statistics relating to co-morbidity and the duration of diabetes, which themselves influence choices of medication. Therefore, it may not be appropriate to directly compare the findings on drug utilization in the ICES study with those in the APS.

## **OUTCOMES OF DIABETES CARE**

Data on the outcomes of diabetes care in the Métis population are scarce. The ICES study reported similar rates of hyperglycemia and hypoglycemia, and of microvascular and macrovascular complications, between Métis with diabetes and people with diabetes in the general population in Ontario. The only major difference in this area was that the Métis had significantly higher rates of myocardial infarction (4). In Manitoba, more Métis with diabetes undergo lower-limb amputations than those with diabetes in the general population (5). The onset and progression of diabetes-related complications are largely determined by metabolic control and the duration of diabetes. However, data from Ontario and Manitoba on these two important determinants were limited. This does not allow for a fair comparison between the two provinces on the rates of diabetes-related complications.

# FACTORS ASSOCIATED WITH DIFFERENT RATES OF DIABETES FOR MÉTIS AND NON-ABORIGINAL PEOPLE

## RESIDENTIAL LOCATION

In the 2006 APS, Métis were less likely to live in urban areas than non-Aboriginals (1). In Ontario, more Métis lived in isolated communities in the north of the province compared to the general population (4). Healthcare delivery may vary according to location of residence, as urban areas tend to provide greater access to healthcare providers and medical resources. Métis in urban areas were more inclined to rate the availability of doctor care as excellent than Métis in rural areas (1). Métis who had seen a doctor or a nurse in the previous year were over three times more likely to be diagnosed with diabetes than those who had not (12). Métis who make routine medical visits may possess different characteristics that increase their risk of diabetes. However, it is also possible that frequent visits to healthcare professionals affords greater opportunity for detection of diabetes, while limiting medical visits could delay diagnosis of the disease.

## SOCIOECONOMIC STATUS

In general, Métis were less likely to continue their education beyond high school and more likely to have lower personal incomes than non-Aboriginals (1). These social disadvantages could increase the odds of being diagnosed with diabetes. Métis with higher personal incomes (> \$60,000 per year) were less likely to be diagnosed with diabetes than those with incomes between \$30,000 and \$39,999. With respect to education level, the more post-secondary education an individual Métis received, the lower their chance of being diagnosed with diabetes (1). Higher income allows adequate access to necessities such as housing, transportation and food, whereas higher education levels are associated with increased awareness of the importance of a healthy lifestyle and of routine healthcare in preventing chronic diseases.

## LIFESTYLE PATTERNS

Obesity is an established risk factor for type 2 diabetes (13). In the 2006 APS, more Métis were classified as overweight or obese than non-Aboriginals. Not surprisingly, Métis who were overweight or obese based on their body mass index were more likely to be diagnosed with diabetes than those who were not (1). Smoking increases the risk of type 2 diabetes (14). Métis have a significantly higher proportion of daily smokers than non-Aboriginals. Métis who smoked daily had a slightly higher chance of being diagnosed with diabetes than non-Aboriginal smokers (1). Regular physical activity reduces the risk of diabetes (15). More Métis reported being physically active in their leisure time than non-Aboriginals (16). Métis men were more likely than men in the general population to be physically active at work (1). Being active, compared to being inactive, during leisure time is associated with an increased likelihood of reporting excellent or very good self-perceived general and mental health, but not with the presence of chronic diseases in Métis (16).

To a certain extent, disparities in health and healthcare utilization between the Métis and the general population are the result of socioeconomic deprivation. However, the likelihood of being diagnosed with diabetes is higher for Métis than for non-Aboriginals after taking into account socioeconomic status, lifestyle factors and access to healthcare (1). This suggests that other factors specific to the Métis population might modify the risk of diabetes. Much progress in research has been made on the genetics of type 2 diabetes in recent years, with a number of susceptibility genes identified in different populations from around the world (17). The G319S polymorphism in the hepatic nuclear factor-1 (HNF1A) gene was reported to be associated with type 2 diabetes in Aboriginal Canadian communities in north-western Ontario and north-eastern Manitoba (18). However, this is a "private" polymorphism that is not found in other Aboriginal or non-Aboriginal populations. To date, no specific genes related to the susceptibility of diabetes have been identified in the Métis population.

## POTENTIAL CONSEQUENCES OF INCREASED PREVALENCE OF DIABETES

Diabetes contributes to 6.8% of deaths worldwide (19). For Métis and Non-Status Indians in Canada, potential years of life lost are at about twice the level of non-Aboriginals. This premature mortality has been largely attributed to non-communicable diseases such as cardiovascular disease (20). Cardiovascular mortality accounts for about three-quarters of deaths in individuals with diabetes (21). Diabetes also contributes substantially to cardiovascular morbidity, increasing the risk of coronary heart disease by two to three times (22). In addition to macrovascular complications, diabetes increases the risk of microvascular diseases including nephropathy, retinopathy and neuropathy. Diabetic nephropathy is the leading cause of end-stage renal disease in Western countries (23). Diabetic retinopathy accounts for approximately 5% of the global prevalence of blindness (24). Diabetic patients with peripheral neuropathy have an increased risk of skin ulcers and infection following minor trauma to their feet, which can lead to lower extremity amputation (25). Data on diabetes-related complications in the Métis population are scarce. In the 1991 APS, Métis with diabetes in Manitoba, Saskatchewan and Alberta were approximately three times more likely to report having hypertension and cardiovascular disease, and about two times more likely to report having retinopathy, than those without diabetes (26). Recent data on the rates of diabetes-related complications are unavailable. Given the rising trends in diabetes over time, it is reasonable to suspect that the rates of microvascular and macrovascular complications would increase in parallel to the prevalence of diabetes in the Métis populations.

Diabetes imposes an enormous economic burden on society. In Canada, managing diabetes and its related complications cost approximately \$12.2 million in 2010, accounting for about 3.5% of public healthcare funding (27). The huge direct medical costs are paralleled by the indirect cost of lost productivity. In addition to the economic burden, the health-related quality of life experienced by individuals with diabetes is lowered not only by diabetes itself, but also by its co-morbidities (28).

## PREVENTION AND TREATMENT OF DIABETES

### DIABETES PREVENTION AND HEALTH PROMOTION

The increasing rates of diabetes and the high prevalence of risk factors associated with the disease among the Métis warrant routine medical care to identify modifiable risk factors such as obesity, physical inactivity and unhealthy eating habits. Pregravid care should aim at reducing obesity to prevent gestational diabetes (GDM) and macrosomia in offspring. All women should be encouraged to breastfeed. Women with GDM should modify their lifestyles to decrease the risk of developing subsequent diabetes. Individualized meal plan and exercise program for overweight women during pregnancy through delivery were shown to reduce excessive pregnancy weight gain with less weight retention postpartum (29).

According to the clinical practice guidelines set forth by the Canadian Diabetes Association (CDA), adults and children at risk of diabetes should have their fasting blood glucose tested every two years and should receive counselling on maintaining a healthy weight, balanced eating and physical activity to delay the onset of diabetes. Women with GDM should be screened for type 2 diabetes between 6 weeks and 6 months postpartum, and when planning for another pregnancy. In addition, individuals with pre-diabetes (i.e., impaired glucose tolerance or impaired fasting glucose) and those with polycystic ovarian syndrome should undergo oral glucose tolerance testing annually (30).

## TREATMENT OF DIABETES AND RELATED COMPLICATIONS

Management of diabetes should follow CDA clinical practice guidelines for the general population with the goals of achieving optimal control of hemoglobin A1c, blood pressure and blood lipids. Early detection of diabetes-related complications requires routine screening, including retinal photography for retinopathy, measurement of albuminuria and renal function for nephropathy, and assessment of loss of sensitivity to the 10-gram monofilament for neuropathy (30).

To be effective, community-based programs aimed at preventing the onset of diabetes and delaying the progression of its complications among the Métis should involve collaborations between Métis people, healthcare professionals, researchers and funding agencies. Such programs should build upon the values and perspectives of the Métis community and provide culturally appropriate interventions tailored to address a range of physical, mental, social and spiritual factors causally linked to the risk of diabetes (31).

## EXISTING DIABETES PROGRAMS FOR THE MÉTIS POPULATION

A number of diabetes programs are available for Aboriginal populations, including the Métis, through national or provincial healthcare funding. Examples of these programs include the following:

1. The Aboriginal Diabetes Initiative–Métis, Off-reserve Aboriginal and Urban Inuit Prevention and Promotion (ADI–MOAUIPP) program, administered by Health Canada, is designed to provide culturally appropriate primary diabetes prevention services and health promotion activities to increase awareness of diabetes and its complications. The Métis Nation of Ontario–Aboriginal Diabetes Education Projects (AB DEP) is funded by the Ontario Ministry of Health to organize workshops to educate Métis on the risk factors and complications of diabetes and to offer free foot care services (32).
2. The Southern Ontario Aboriginal Diabetes Initiative (SOADI) is part of the Aboriginal Healing and Wellness Strategy of the Ontario Ministry of Health. This initiative provides a diabetes program with specific features reflecting Aboriginal culture to educate on- and off-reserve Aboriginal communities in southern Ontario about diabetes prevention and management (31).
3. The southwest region of the Manitoba Metis Federation has developed the Diabetes-Discovering Our Options Program to raise awareness of diabetes and its risk factors and to promote a healthy lifestyle (33).

## IMPLICATIONS

### GENERALIZABILITY

The ICES study covered only Métis listed in the MNO citizenship registry, raising the issue of potential differences in socioeconomic status, such as location of residence, education level and personal income, between those who registered and those who did not. Therefore, the findings of the ICES study are unlikely to be generalizable to Métis not listed in the registry.

### PROGRAM DEVELOPMENT

The high prevalence of diabetes and the under-utilization of healthcare resources among the Métis in the MNO citizenship registry highlight the urgent need to develop culturally relevant programs to prevent diabetes and to manage its complications in this high-risk population. Ongoing partnerships between the MNO and the provincial government are important to ensure appropriate and adequate healthcare delivery to the Métis population.

Ideally, diabetes programs should be designed specifically for the Métis, characterized by an understanding of and respect for their distinctive culture, which itself may influence causal or preventive factors for diabetes. These

programs should seek local input to ensure that any interventions implemented are culturally appropriate and that any local environmental factors are assessed and addressed directly, such as improving food access and building environments to minimize barriers to healthy eating and physical activity. Evidence exists to suggest that neighbourhood resources that support healthy diets and physical activity are associated with a lower incidence of type 2 diabetes (34).

The Métis National Council has reported that for Métis living in Ontario, attending diabetes programs typically requires travelling long distances (31). Factors affecting the accessibility of diabetes programs include how far such programs are from the Métis populations and whether it is feasible for Métis people to travel to them. While recruiting healthcare professionals is an option, using mobile units to access remote areas and training Métis people to deliver education programs are viable alternatives. The ongoing Screening for Limb, I-Eye, Cardiovascular and Kidney (SLICK) program uses mobile vans to travel to First Nations communities in Alberta to provide both screening for diabetes-related complications and patient education at the community level. This program reported improvements in health indicators related to diabetes, likely resulting from early detection and prompt treatment (35). Lastly, innovative approaches such as e-mail or video-conferencing should also be explored to improve access to care.

## **FUTURE RESEARCH**

The ICES study described in detail the epidemiology of diabetes and the processes and outcomes of diabetes care among Métis included in the MNO citizenship registry. More surveillance activities are needed to monitor the temporal trends of diabetes and its related complications in this high-risk population. The APS and the ICES study were both cross-sectional in design. Longitudinal studies would facilitate investigations into how dietary, lifestyle, socioeconomic, clinical and metabolic factors relate to the development of diabetes and the progression of its complications. Information collected by longitudinal studies could be linked to administrative databases to provide a more comprehensive picture encompassing all aspects of health service delivery. This information could inform policy making and resource allocation with the ultimate goal of curbing the diabetes epidemic.



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