

## Chapter 11

# Diabetes and the Status Aboriginal Population in Alberta



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## DIABETES AND THE STATUS ABORIGINAL POPULATION IN ALBERTA

### KEY MESSAGES

- Diabetes is much more common among the Status Aboriginal population, as incidence and prevalence rates are about twice as high in both males and females compared to the general population.
- From 1995-2009, the rate of increase in incidence of diabetes for Status Aboriginal people was slower than for the general population (16% rate of increase compared to 65%, respectively).
- Among Status Aboriginal people, the prevalence of diagnosed diabetes is higher among females compared to males, while incidence rates are similar for both sexes.
- The mortality rate ratio (DM to no DM) was higher for the entire population compared to Status Aboriginals, except in the oldest age group.
- Use of hospital and emergency department services are 2 to 3 times higher for the Status Aboriginal population with diabetes compared the general population.

### BACKGROUND

For Canadian Aboriginal populations, initial contact with Europeans resulted in socially mediated stress from infectious diseases and starvation.<sup>(1)</sup> However, the past 100 years have brought about an epidemiological shift in prevailing health issues, giving way to chronic diseases, such as obesity, type 2 diabetes (DM), cancer and cardiovascular disease, experienced in an accelerated fashion over a few generations.<sup>(1,2)</sup> National estimates from the “1997 First Nations and Inuit Regional Health Survey” showed diabetes prevalence rates to be 8% and 13% for First Nations men and women, respectively,<sup>(3)</sup> or 3 to 5 times the national average. More recently, the “2002/2003 Regional Health Survey” suggested that the prevalence rate for DM among adults has increased to 20%.<sup>(4)</sup> National and provincial data is less commonly available for the Métis and non-Status Aboriginals and even less is known about the impact and burden of diabetes in these populations, although similar patterns appear to be emerging.<sup>(5,6)</sup>

Type 2 diabetes among Aboriginal people is also occurring at a much younger age compared to the general population, with prevalence rates of 1.1% reported in the 4-19-year-old age group in northeastern Manitoba.<sup>(7)</sup> Though a genetic predisposition to type 2 diabetes in Oji-Cree communities in Manitoba and Ontario has been found,<sup>(8)</sup> experts agree that the primary reasons for increased prevalence of diabetes and its complications are largely due to the changes in lifestyle brought about by colonization.<sup>(2,9)</sup>

The intent of this chapter is to compare the incidence and prevalence of diagnosed DM among Status Aboriginals and the general population of Alberta from 1995-2009. The chapter will also examine rates of diabetes in the under-20-year-old population, as well as mortality, health care utilization and analyses by Alberta health zone.

## **METHODS**

Cases of DM were identified using the Alberta Health and Wellness administrative databases by applying a modified version of the National Diabetes Surveillance System (NDSS) algorithm (see “Background and Methods” chapter). Status Aboriginal people were identified from the Alberta Health Care Insurance Plan Central Stakeholder Registry file and were defined as any individual residing in Alberta registered under the federal Indian Act. The Registry file was searched from June 1994-June 2009 and any individual in Alberta with a Status Aboriginal identifier (First Nations or Inuit) was classified as “Status Aboriginal” with all other individuals classified as the “general population.” Aboriginal people who were not registered, such as Aboriginals without Treaty status and Métis, were included in the general population comparison group. Status Aboriginal individuals were included whether they were living on or off reserve. There are approximately 100,000 Status Aboriginal people (62% on reserve)<sup>(10)</sup> and 70,000 Métis people living in Alberta.<sup>(11)</sup>

When calculating the prevalence of DM, the proportion of Status Aboriginal people who had DM was determined and compared to the proportion of the general population with DM at the same point in time. This was repeated annually from 1995-2009. An incident case of DM was defined as a person who met the NDSS criteria for diabetes with no diabetes claims in the prior 2 years. Incident rates were calculated for Status Aboriginal and the general population who developed DM in the years 1995-2009. All rates were age- and sex-adjusted to the Alberta population from the 2006 Canadian Census.

An independent analysis of prevalence and incidence of DM among the under-20-year-old Status Aboriginal population was conducted. Given that the numbers are very small among this population, only unadjusted crude data is provided.

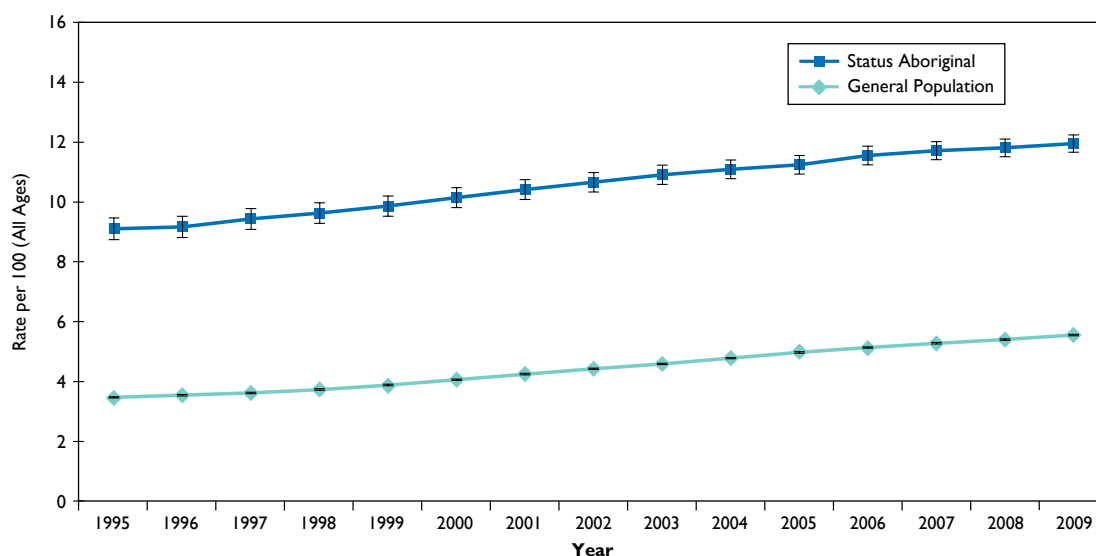
Mortality and health care utilization (general practitioner (GP) and specialist encounters, emergency department (ED) encounters and hospitalizations) data for the years 1995-2009 are also presented in this chapter, where rates are compared between the two populations (Status Aboriginal and the general population).

Data is presented by health zone for diabetes incidence and prevalence in the Status Aboriginal population, for both the total population and for the under-20-year-old population for 2009. Health care utilization (GP and specialist encounters, ED encounters and hospital days) was presented for Status Aboriginals with and without diabetes. The Status Aboriginal population with diabetes was also compared to the general population with diabetes for 2009.

## FINDINGS

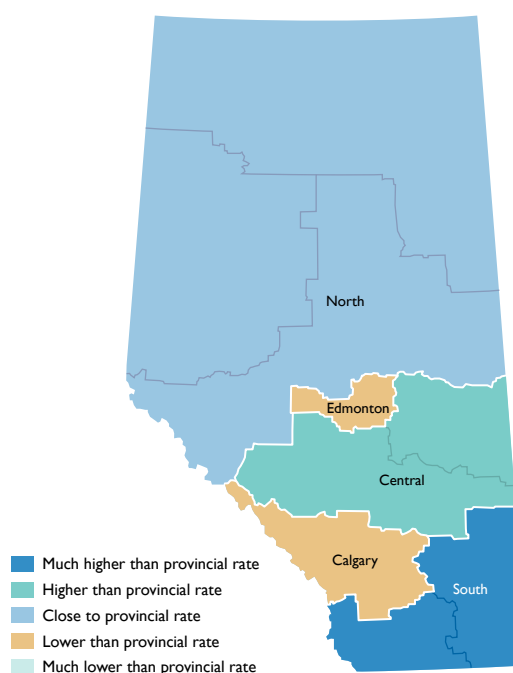
### Epidemiological Trends

Figure 11.1 **Age- and Sex-Adjusted Diabetes Prevalence Rates, among the Status Aboriginal and General Populations, 1995-2009**



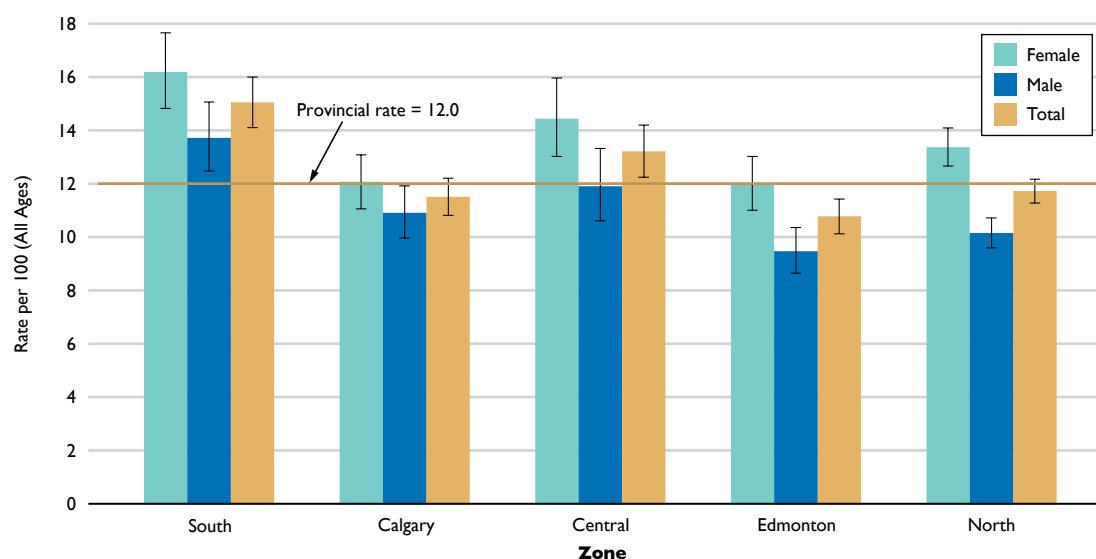
In 2009, the overall age- and sex-adjusted prevalence of DM in the Alberta Status Aboriginal population was 11.9%, increasing 31% over the past 15 years of observation (Figure 11.1). This is in contrast to the general population where prevalence has increased 60% over the same time period. The prevalence of diabetes was lower than the provincial rate for Status Aboriginals living in the Calgary and Edmonton zones, close to the provincial rate in the North zone, and was above the provincial rate in the Central and South zone (Figure 11.2). The prevalence was consistently higher in Status Aboriginal females compared to males in each of the health zones and was highest in females in the North, South and Central zones (Figure 11.3).

Figure 11.2 **Age-Adjusted Status Aboriginal Diabetes Prevalence Rates for All Ages, by Zone, 2009**



Adjusted prevalence and incidence rates of DM were roughly twice as high among the Status Aboriginal population compared to the general population (Figure 11.1 and 11.4). Since 2001, however, the incidence rate appears to have stabilized for the Status Aboriginal population in comparison to the general population, where incidence continues to increase. When comparing increases in incidence rates stratified by sex, male Status Aboriginal rates have been increasing faster than female Status Aboriginal rates (32 % versus 3 %). However, male and female general population incidence rates are increasing the fastest (71 % and 58 %) (Figure 11.5). Status Aboriginal females have higher incidence rates in all the zones, except in the North where Status Aboriginal males are higher (Figure 11.6).

**Figure 11.3 Age-Adjusted Diabetes Prevalence Rates for the Status Aboriginal Population, by Zone, 2009**



**Figure 11.4 Age- and Sex-Adjusted Diabetes Incidence Rates, among the Status Aboriginal and General Populations, 1995-2009**

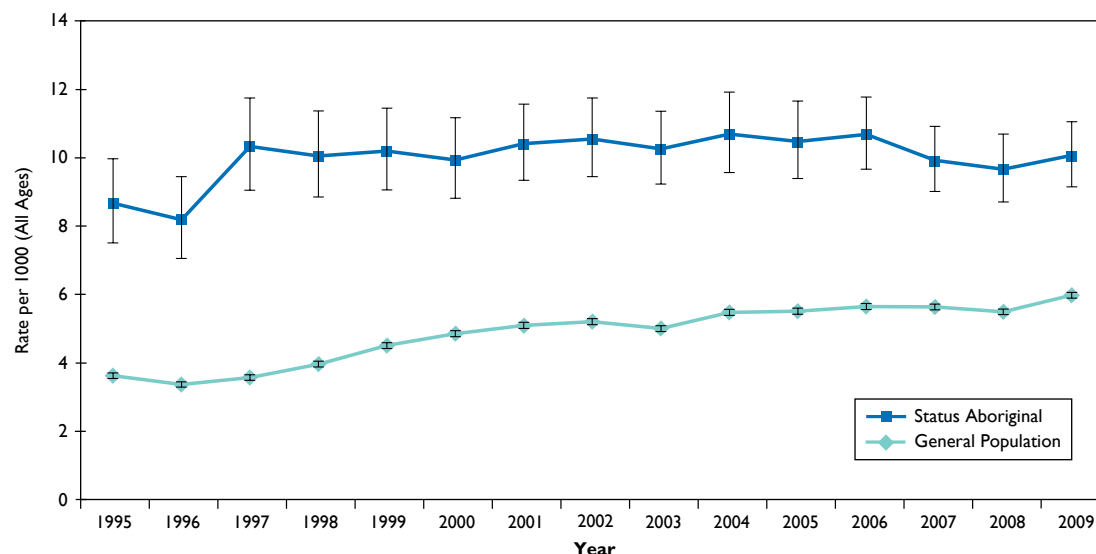


Figure 11.5 Age-Adjusted Diabetes Incidence Rates by Sex, among the Status Aboriginal and General Populations, 1995-2009

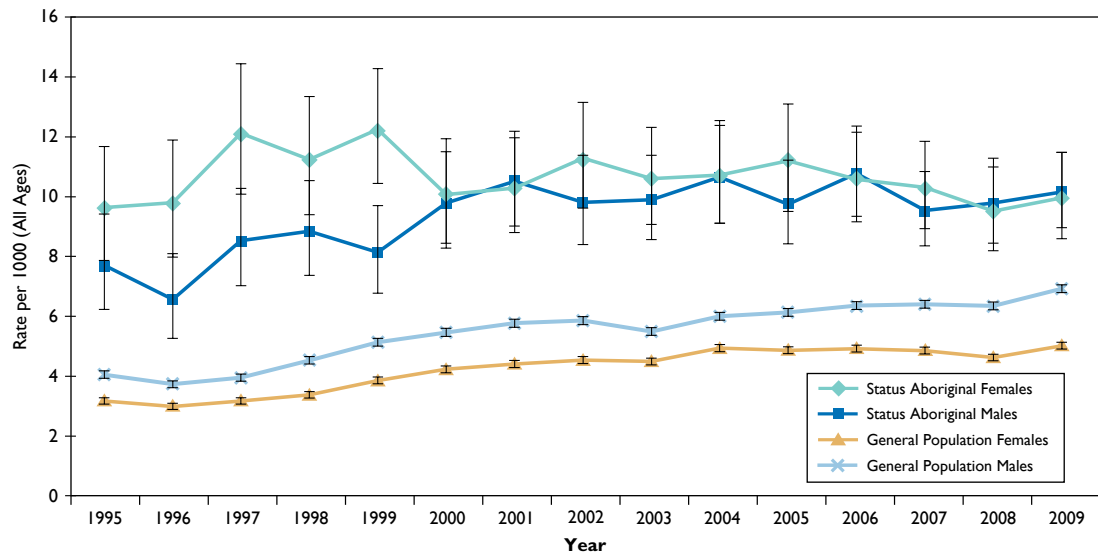
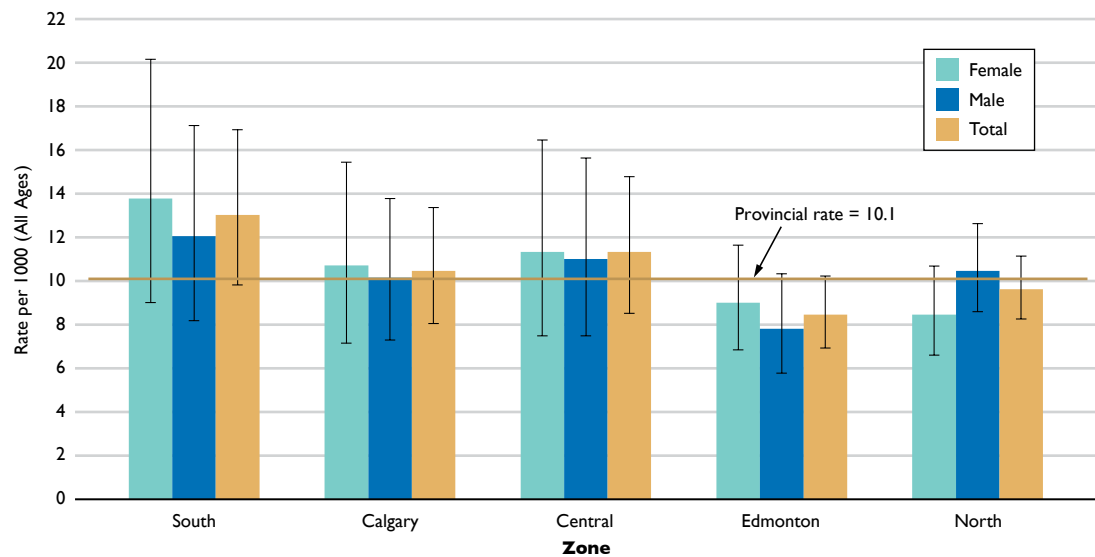
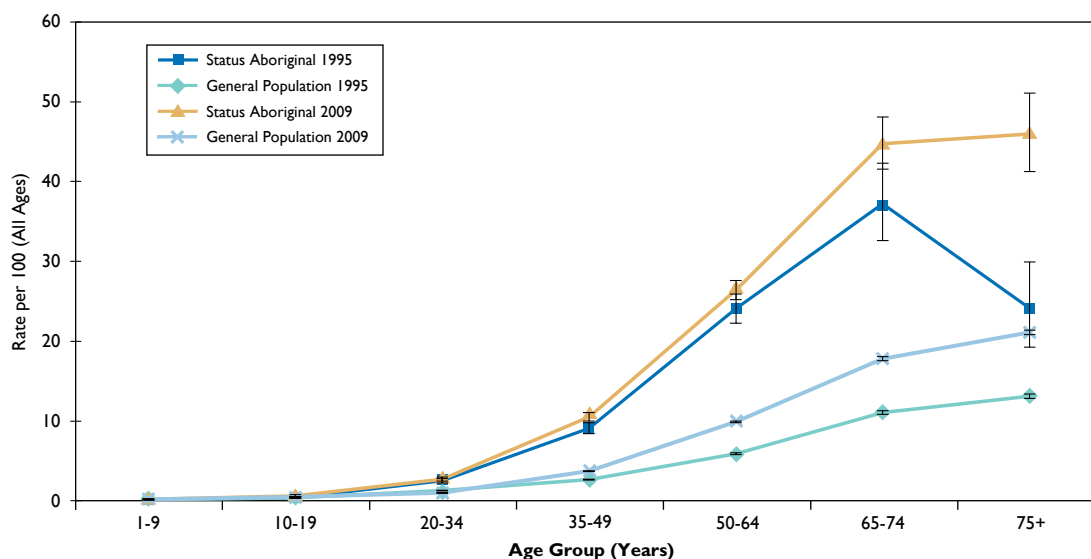


Figure 11.6 Age-Adjusted Diabetes Incidence Rates for the Status Aboriginal Population, by Zone, 2009



Diabetes prevalence among Status Aboriginal people and the general population increased in the older age groups for both males and females (Figure 11.7 and 11.8). The prevalence of DM is higher among Status Aboriginal females compared to males, but the opposite is true in the general population. The prevalence of diabetes in Status Aboriginals was highest in the South zone across all the age groups (Figure 11.9). The Central zone had the second-highest rate in the 20 and over age groups and the Edmonton zone had the lowest rates in the 20 to 64 year age groups.

**Figure 11.7 Age-Specific Diabetes Prevalence Rates, among the Female Status Aboriginal and General Populations, 1995 and 2009**



**Figure 11.8 Age-Specific Diabetes Prevalence Rates, among the Male Status Aboriginal and General Populations, 1995 and 2009**

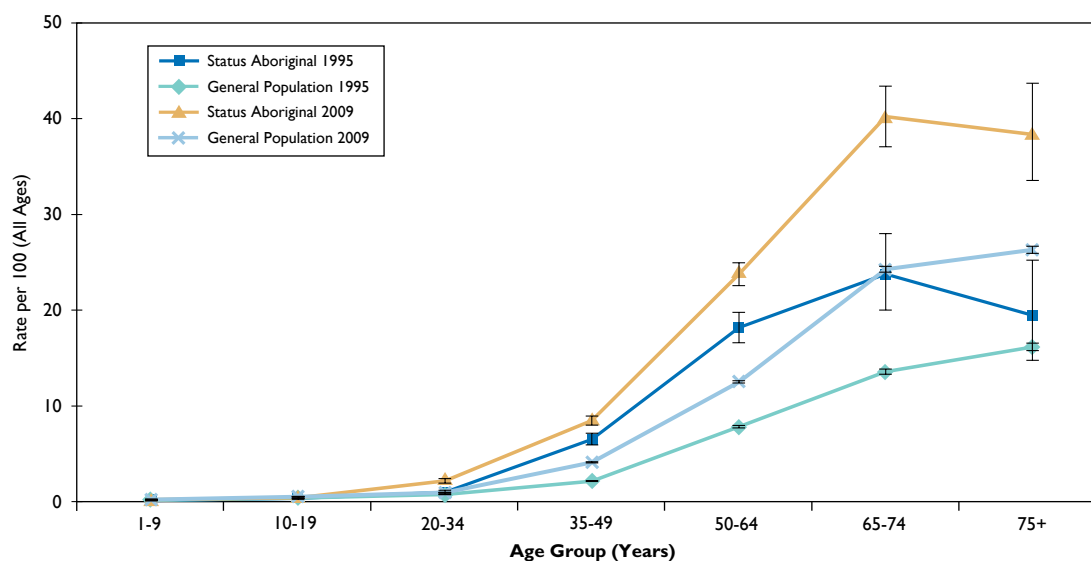
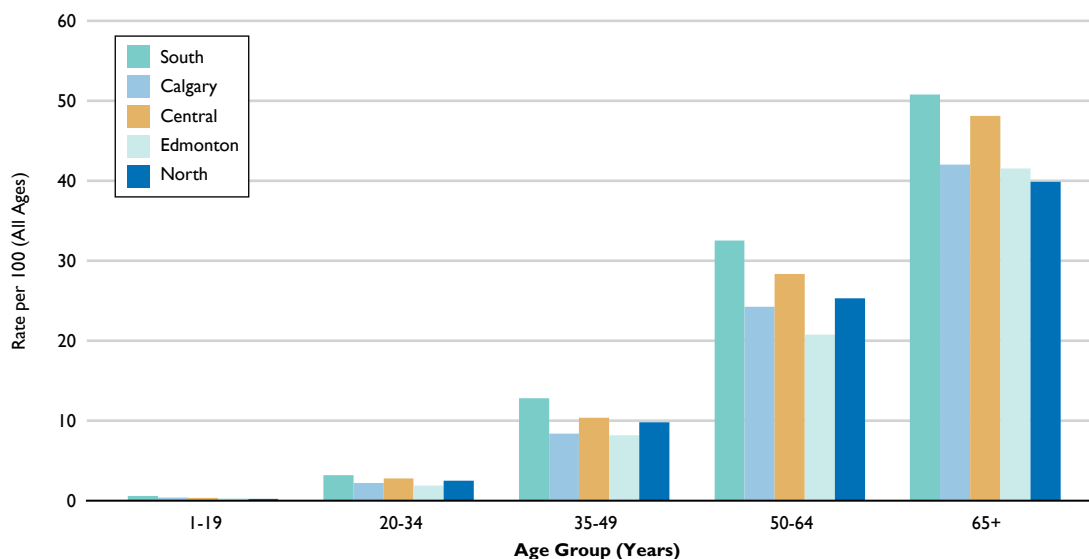




Figure 11.9 **Age-Specific Diabetes Prevalence Rates for the Status Aboriginal Population, by Zone, 2009**



Comparable age-specific results were apparent with respect to the incidence of DM among the Status Aboriginal population (Figure 11.10 and 11.11). The incidence of DM is also associated with increasing age, with rates being highest for Status Aboriginal males and females from 65-74 years of age. These age-specific incidence rates for the Status Aboriginal population should be interpreted with caution, especially in the oldest age categories, because of a small number of cases. Confidence intervals around the Status Aboriginal population point estimates were too large to include in these figures.

Figure 11.10 **Age-Specific Diabetes Incidence Rates, among the Female Status Aboriginal and General Populations, 1995 and 2009**

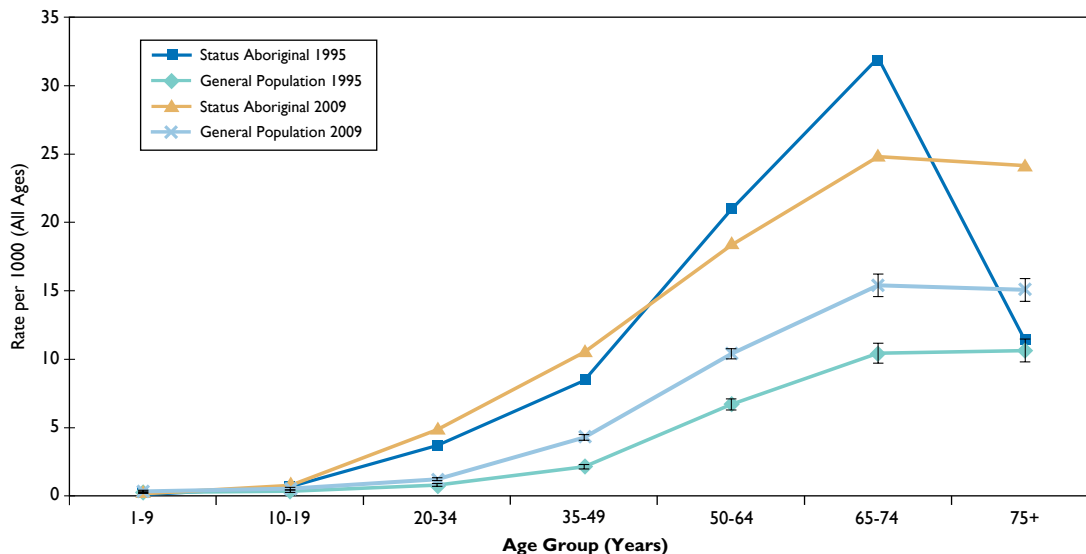
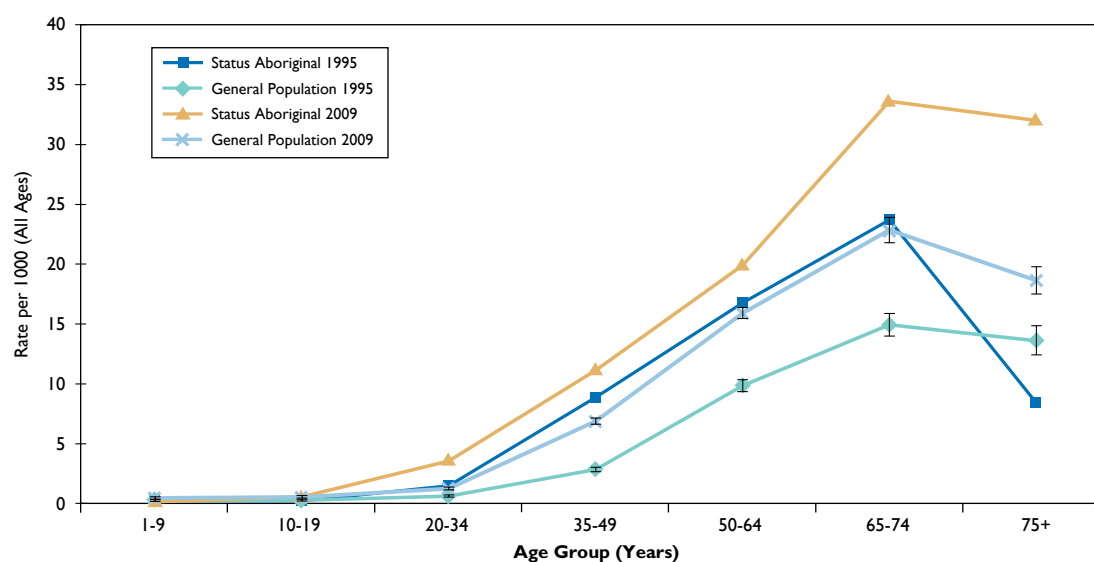


Figure 11.11 **Age-Specific Diabetes Incidence Rates, among the Male Status Aboriginal and General Populations, 1995 and 2009**



Trends in the under-20-year-old Status Aboriginal population were also generated. In Figure 11.12, we see that prevalence of diabetes in both the Status Aboriginal and general populations are increasing over the observation period. General population diabetes prevalence rates are consistently higher than Status Aboriginal rates across most years; however, the differences between the two populations are becoming smaller. Further, when the Status Aboriginal population is stratified by sex, we see that prevalence is highest among girls for the entire time period (Figure 11.13). This higher prevalence among girls is also seen in all the health zones except the North zone, where the boys are higher (Figure 11.14). The rates among girls were highest in the South and Calgary zones and lowest in the North zone. Differences between the Status Aboriginal and general populations are becoming smaller over time due to increasing diabetes incidence rates in the under-20-year-old Status Aboriginal population compared to the general population (Figure 11.15). Caution must be taken when interpreting these findings because the case counts are very small.

There was, in the Status Aboriginal under-20-year-old population, a trend of increasing crude diabetes prevalence and incidence rates over the 15-year time span from 1995-2009 (Figure 11.12 and 11.15). Again, caution is needed when interpreting these data due to the small number of cases and subsequent data variability.

Figure 11.12 **Crude Diabetes Prevalence Rates in the Under-20-Year-Old Population, among the Status Aboriginal and General Populations, 1995-2009**

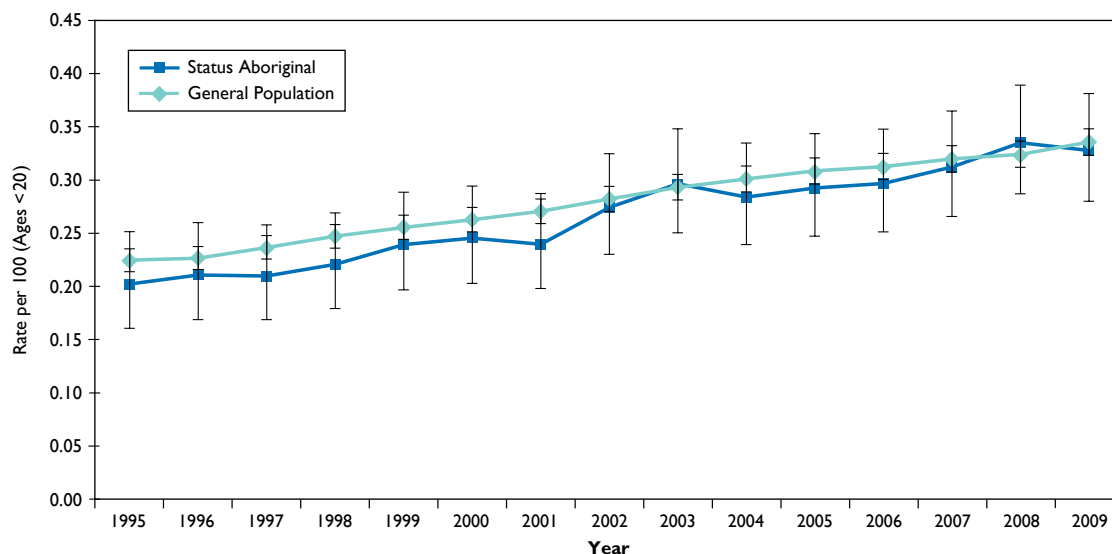
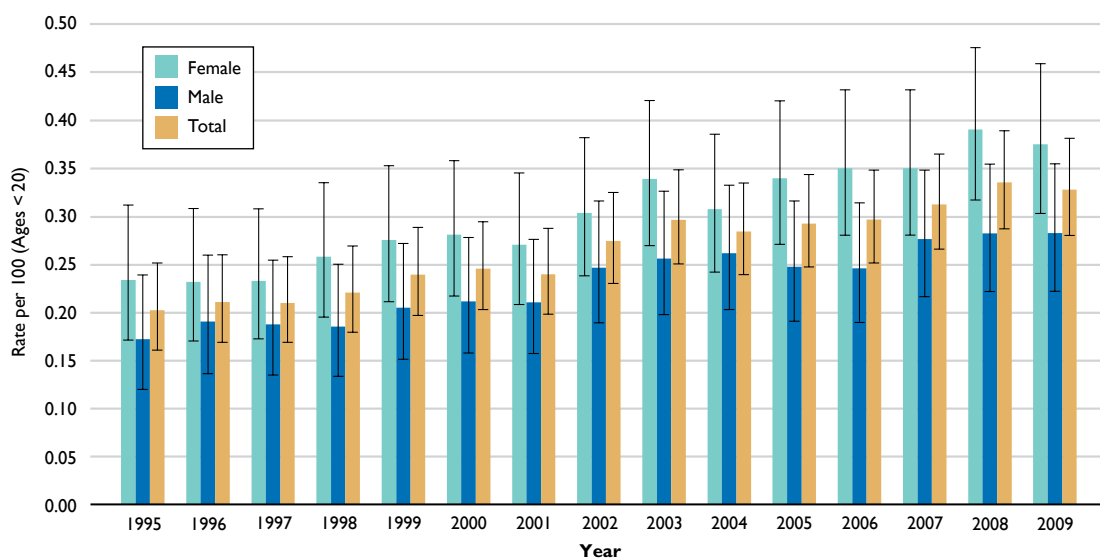
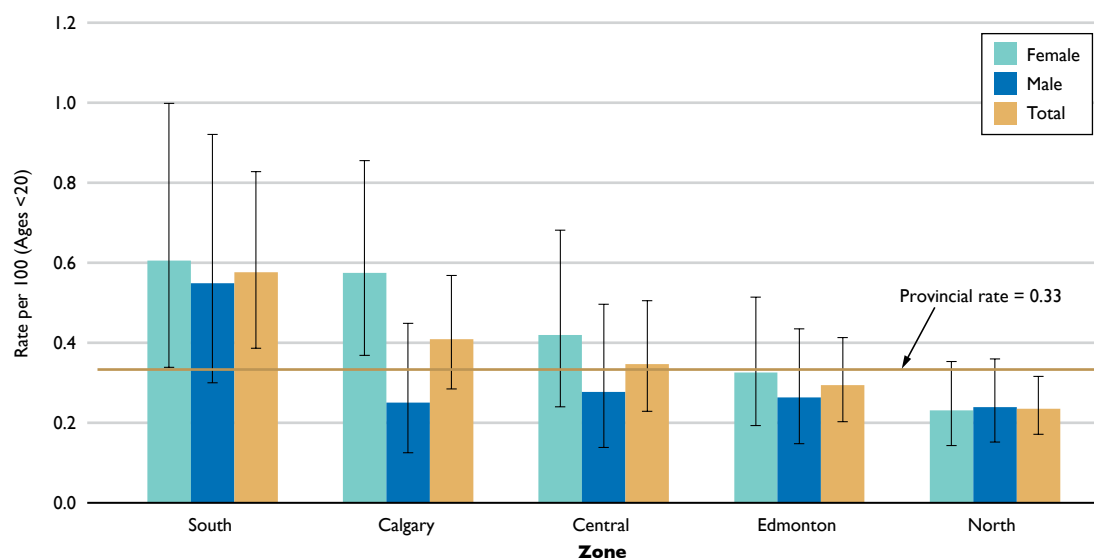


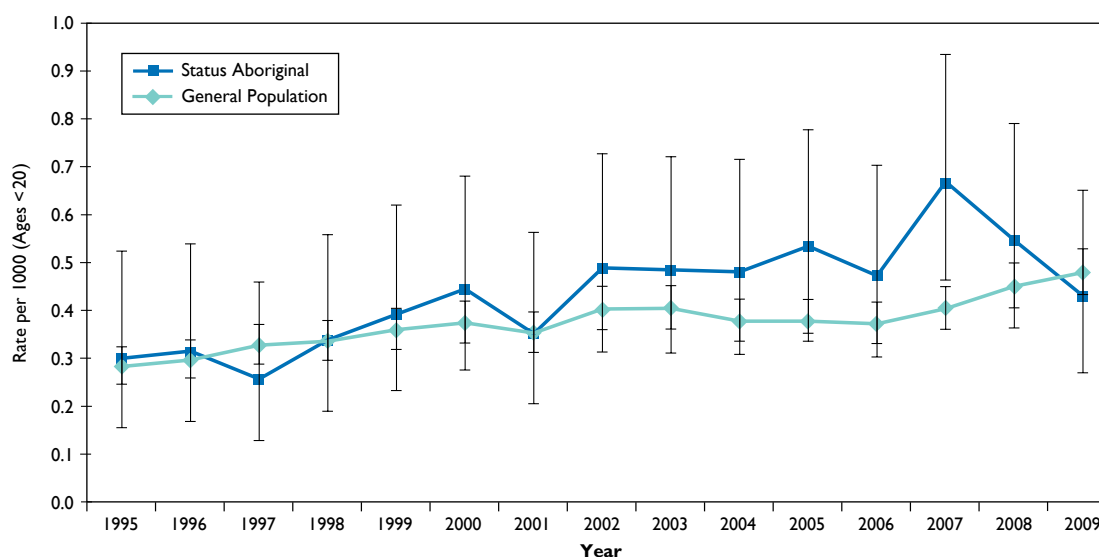
Figure 11.13 **Crude Diabetes Prevalence Rates in the Under-20-Year-Old Status Aboriginal Population, 1995-2009**



**Figure 11.14 Crude Status Aboriginal Diabetes Prevalence Rates in the Under-20-Year-Old Population, by Zone, 2009**

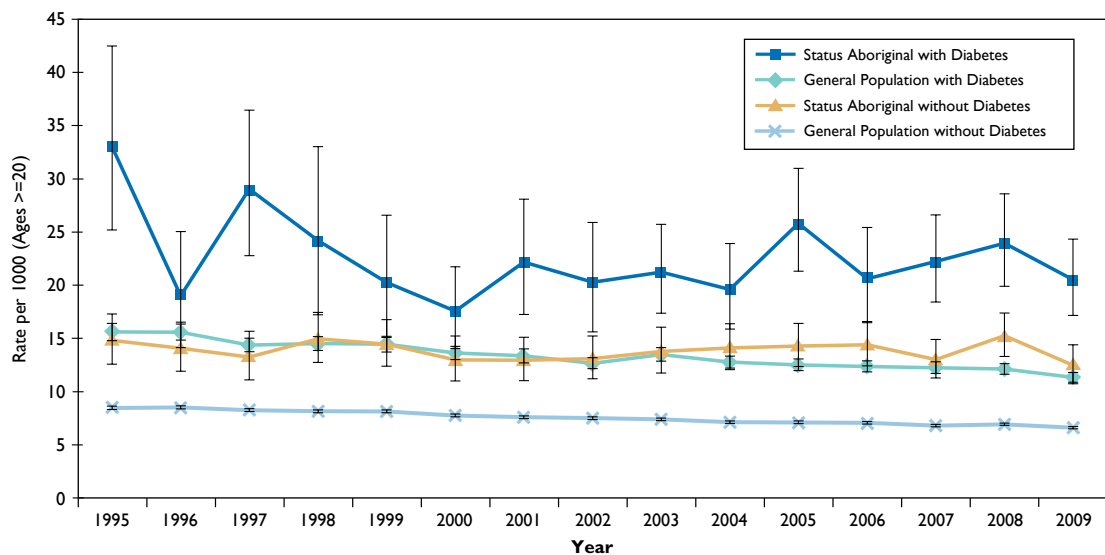


**Figure 11.15 Crude Diabetes Incidence Rates in the Under-20-Year-Old Population, among the Status Aboriginal and General Populations, 1995-2009**

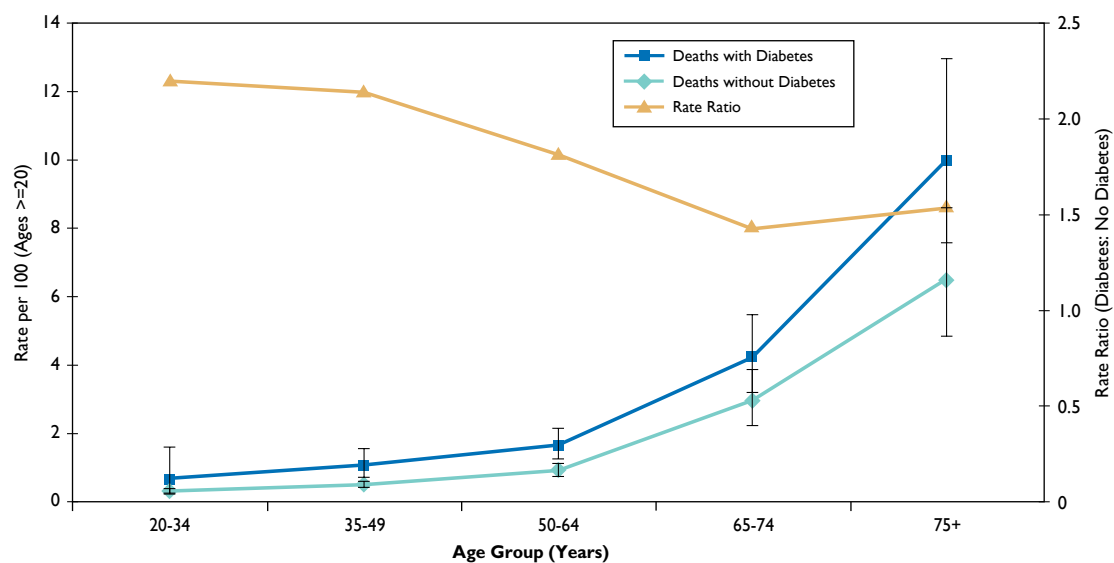


Mortality rates for the Status Aboriginal population are higher for those both with and without diabetes compared to mortality rates in the general population. In fact, the mortality rates of the Status Aboriginal population without diabetes were similar to the mortality rates of the general population with diabetes. This trend was consistent over time (1995-2009) (Figure 11.16). The largest drop in mortality rates occurred in the Status Aboriginal population with diabetes, where rates decreased 38% over the period of observation; however, the smallest drop in mortality rates occurred in the Status Aboriginal population without diabetes (16%). These rates must be interpreted with caution, however, due to the small number of cases. The general population had reductions in mortality rates in both their diabetes and non-diabetes populations (27% and 22% respectively). When observing age-specific mortality rates for both Status Aboriginals and the general population of Alberta in 2009, rates were consistently higher among those with diabetes compared to those without diabetes (Figure 11.17 and 11.18). The mortality rate ratio (DM to no DM) was higher for the entire population compared to Status Aboriginals for all age groups except for the 75+ year old group; however, the largest rate ratio occurred in the youngest age group in the entire population (3.0), while there was less variation in the rate ratio across all ages in the Status Aboriginal population (1.4 to 2.2).

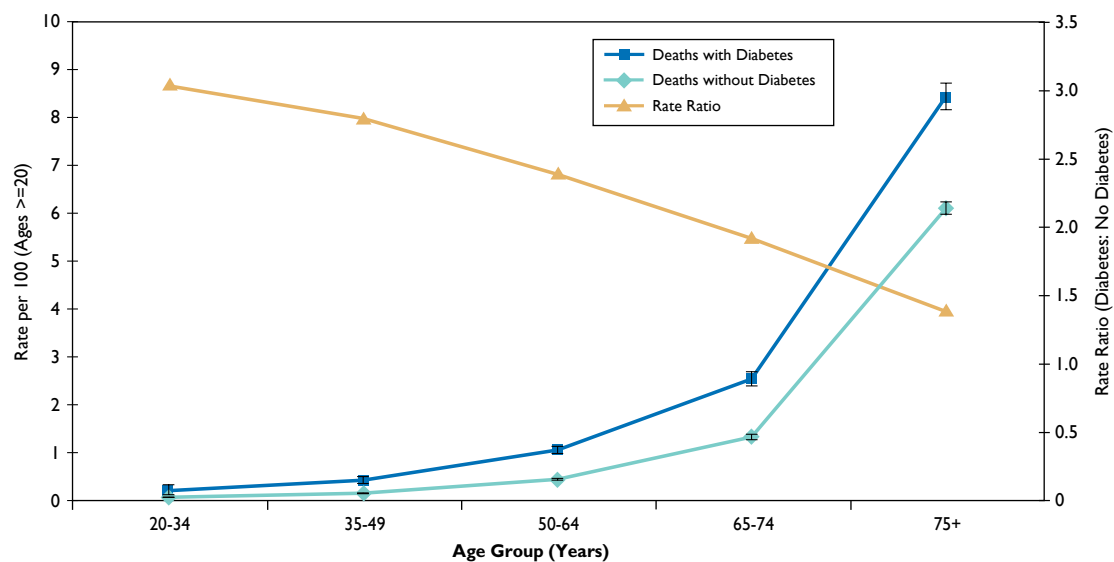
Figure 11.16 **Age- and Sex-Adjusted Mortality Rates, among the Status Aboriginal and General Populations, 1995-2009**



**Figure 11.17 Age-Specific Mortality Rates for the Status Aboriginal Population, 2009**



**Figure 11.18 Age-Specific Mortality Rates for the Entire Population (Status Aboriginal and General Population), 2009**



## Health Care Utilization

The average number of specialist encounters was slightly higher among the general population with diabetes in the youngest and oldest age groups, but overall quite similar across the middle age groups (Figure 11.19). A different pattern of health care utilization was observed with respect to GP visits. The Status Aboriginal population had more GP visits compared to the general population in each age group, especially in the younger age groups (Figure 11.20).

Figure 11.19 **Age-Specific Average Number of Specialist Visits for the Population with Diabetes, among the Status Aboriginal and General Populations, 2009**

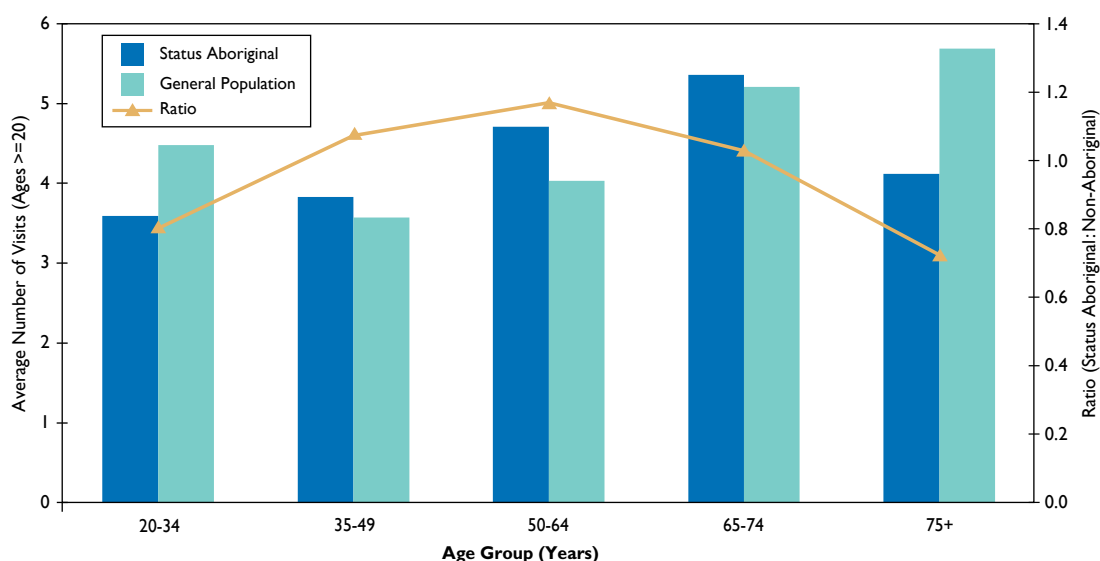
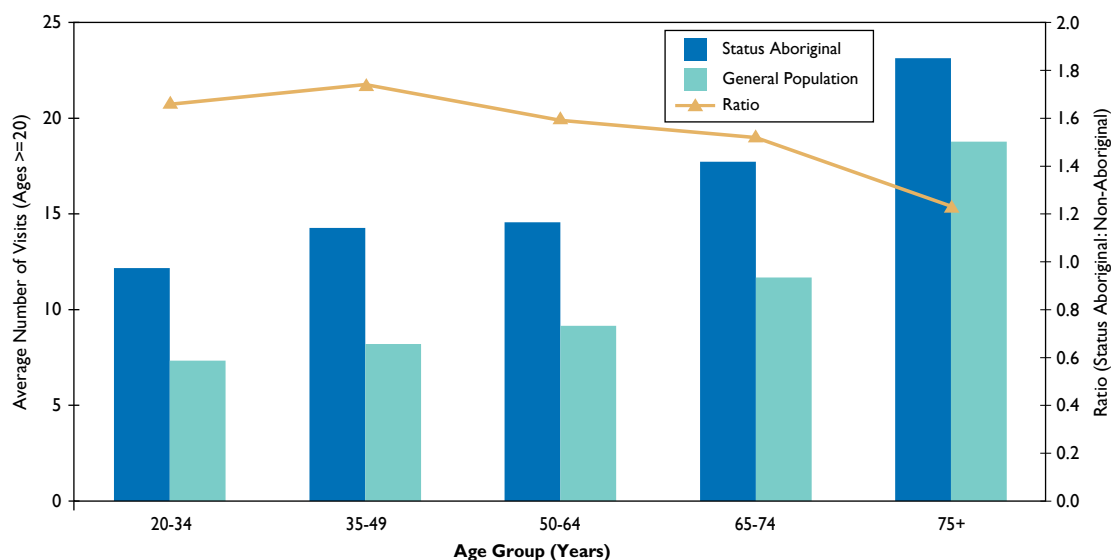


Figure 11.20 **Age-Specific Average Number of General Practitioner Visits for the Population with Diabetes, among the Status Aboriginal and General Populations, 2009**



When the data were examined by health zone, the Status Aboriginal population with diabetes had a higher number of visits to specialists compared to the general population in Calgary, Central and Edmonton zones, and a lower number of visits in the South and North zones (Figure 11.21). This is in contrast to the average number of GP visits where the Status Aboriginal population with diabetes had higher rates across all of the health zones (Figure 11.22). The average numbers of visits to specialists were higher in the Edmonton and Calgary zones and lowest in the North zone (Figure 11.21). The opposite was seen in the number of GP visits by Status Aboriginal people with diabetes, with the North, Central and South zones having a higher number of visits (Figure 11.22).

**Figure 11.21 Age-Adjusted Average Number of Specialist Visits for the Population with Diabetes, among the Status Aboriginal and General Populations, by Zone, 2009**

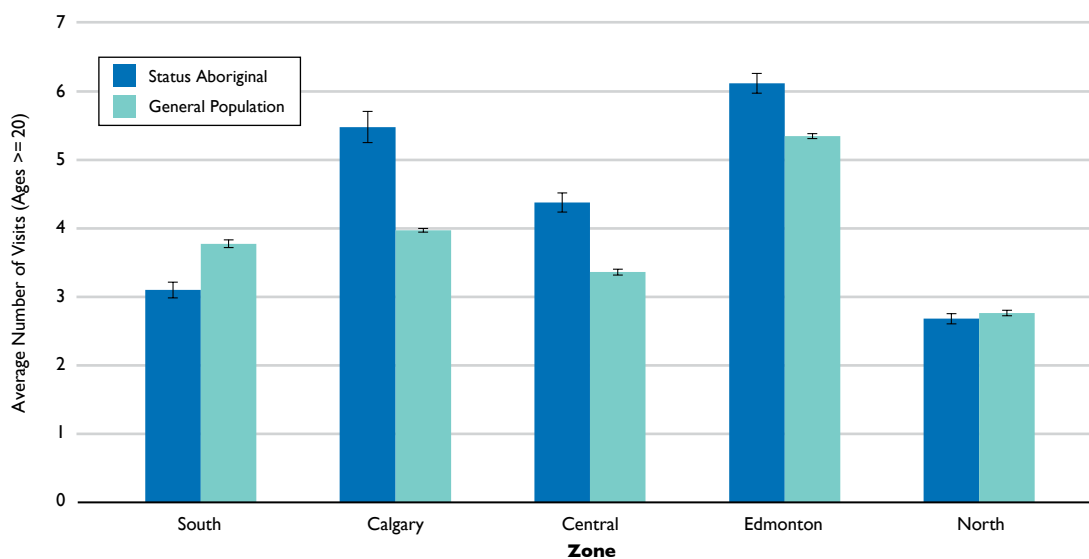
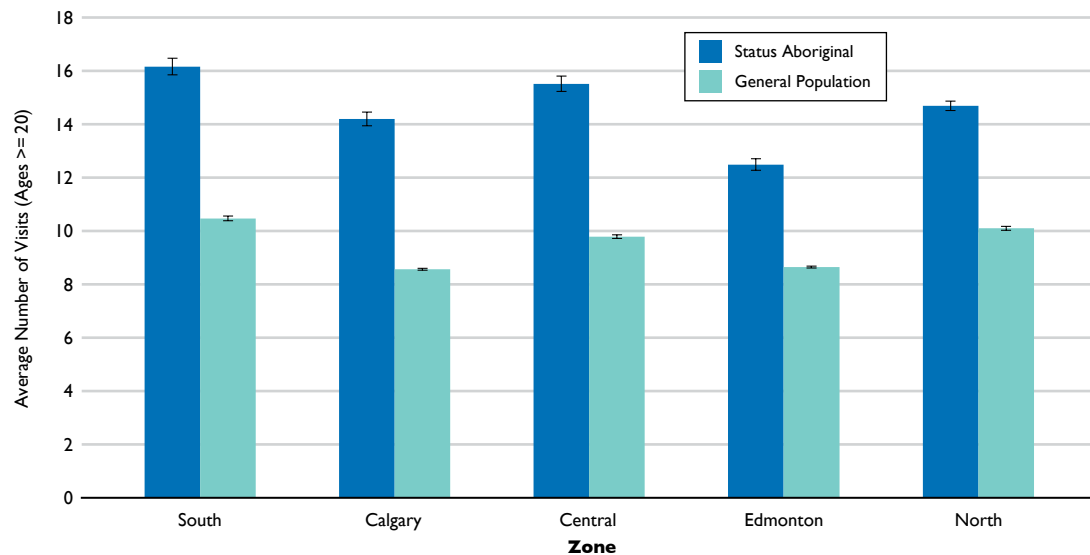


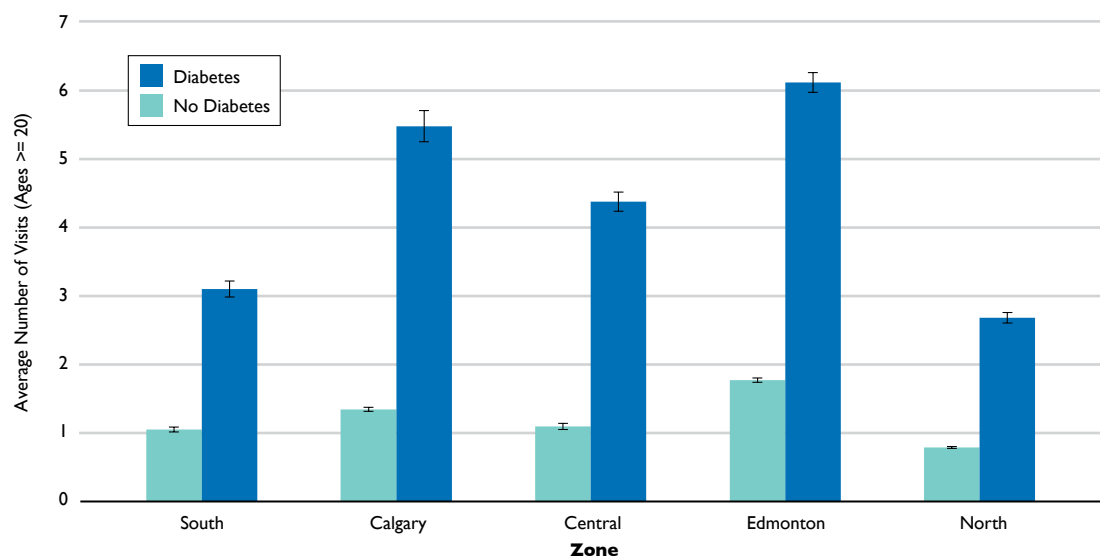


Figure 11.22 **Age-Adjusted Average Number of GP Visits for the Population with Diabetes, among the Status Aboriginal and General Populations, by Zone, 2009**

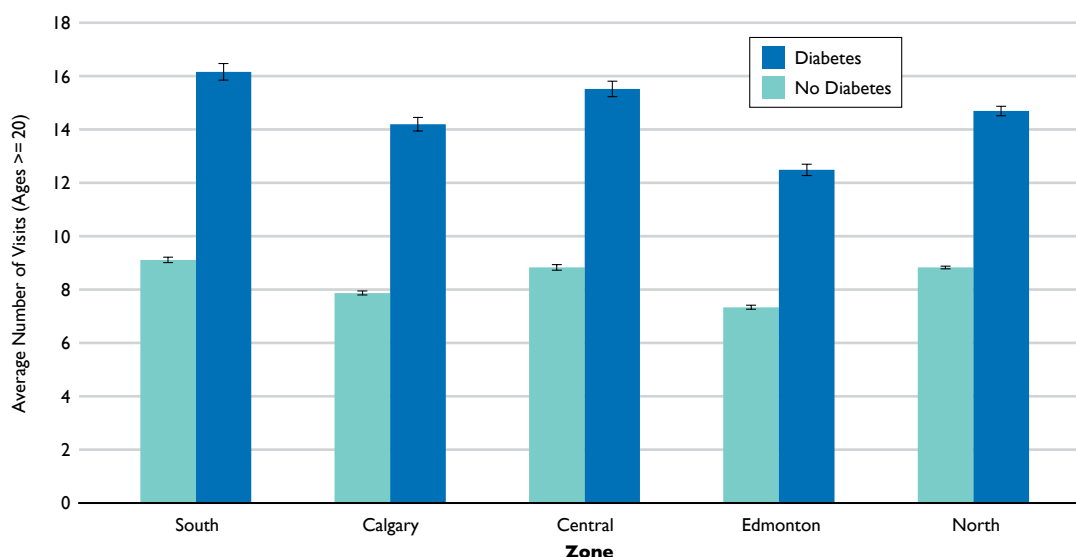


Similar to the general population, the Status Aboriginal population with diabetes had a higher number of specialist and GP visits than the Status Aboriginal population without diabetes (Figures 11.23 and 11.24). Status Aboriginal people with diabetes had more visits to a specialist in the Edmonton and Calgary zones compared to the non-metro zones of South, North and Central which had higher GP visits.

Figure 11.23 **Age-Adjusted Average Number of Specialist Visits for the Status Aboriginal Population, by Zone, 2009**

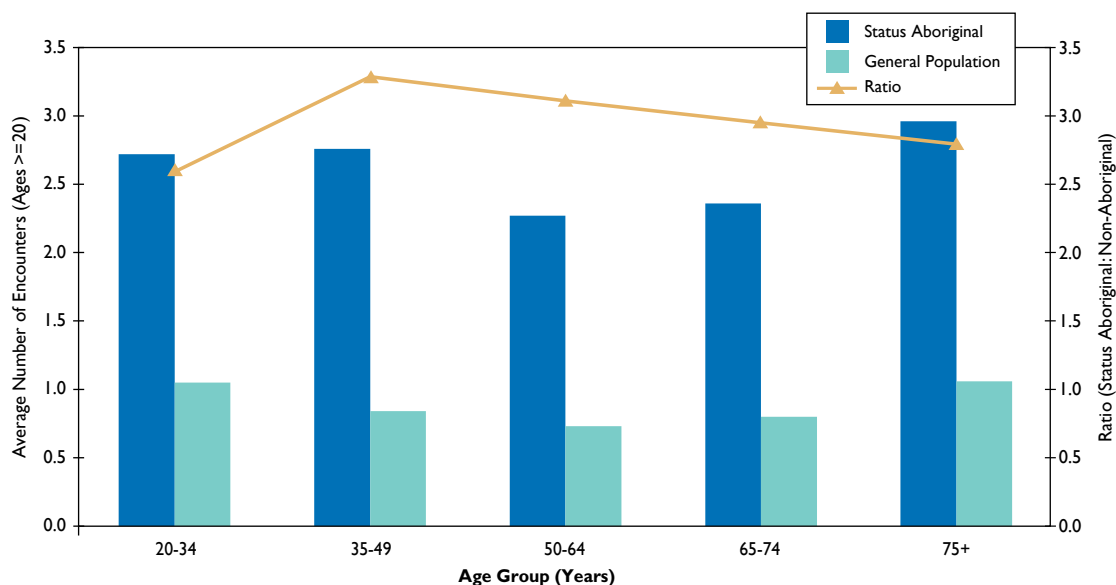


**Figure 11.24 Age-Adjusted Average Number of GP Visits for the Status Aboriginal Population, by Zone, 2009**



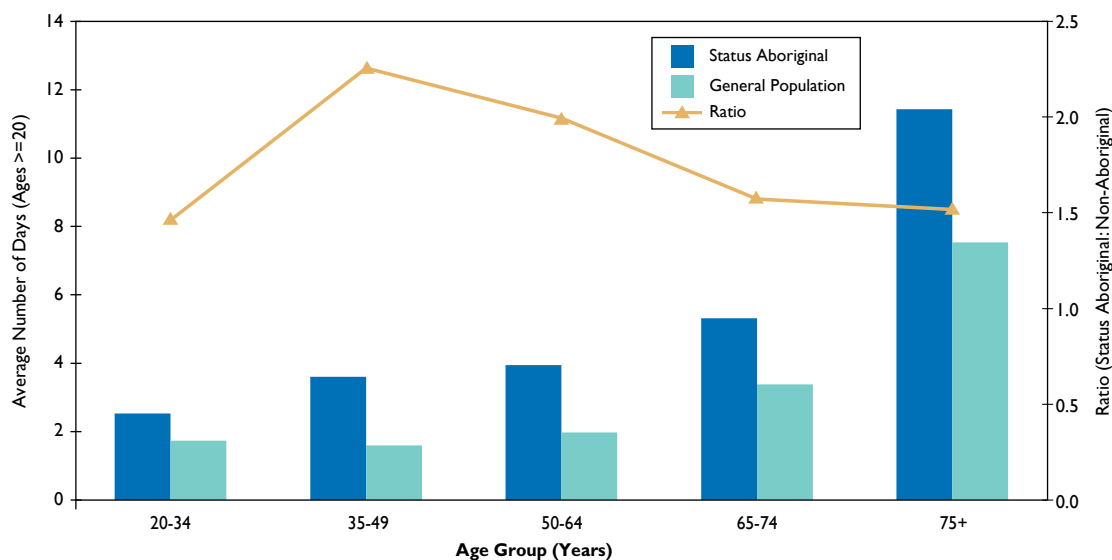
The largest difference in health care utilization was for emergency department (ED) encounters, where Status Aboriginal people with DM were 2.6 to 3.3 times more likely to visit an emergency room than their counterparts from the general population (Figure 11.25).

**Figure 11.25 Age-Specific Average Number of Emergency Department Encounters for the Population with Diabetes, among the Status Aboriginal and General Populations, 2009**



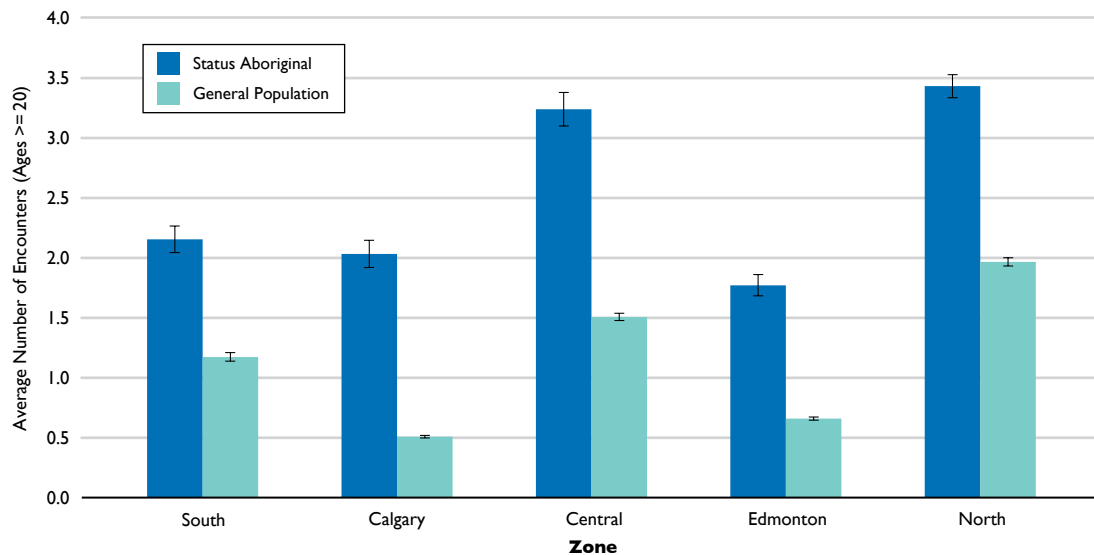
The Status Aboriginal diabetes population had more hospital days on average compared to the general diabetes population with the largest differences in the 35-49 year old and 50-64 year old age groups (Figure 11.26). The ratio between the Status Aboriginal and the general diabetes populations was the smallest at 1.5 in the youngest and oldest age groups.

Figure 11.26 **Age-Specific Average Number of Hospital Days for the Population with Diabetes, among the Status Aboriginal and General Populations, 2009**

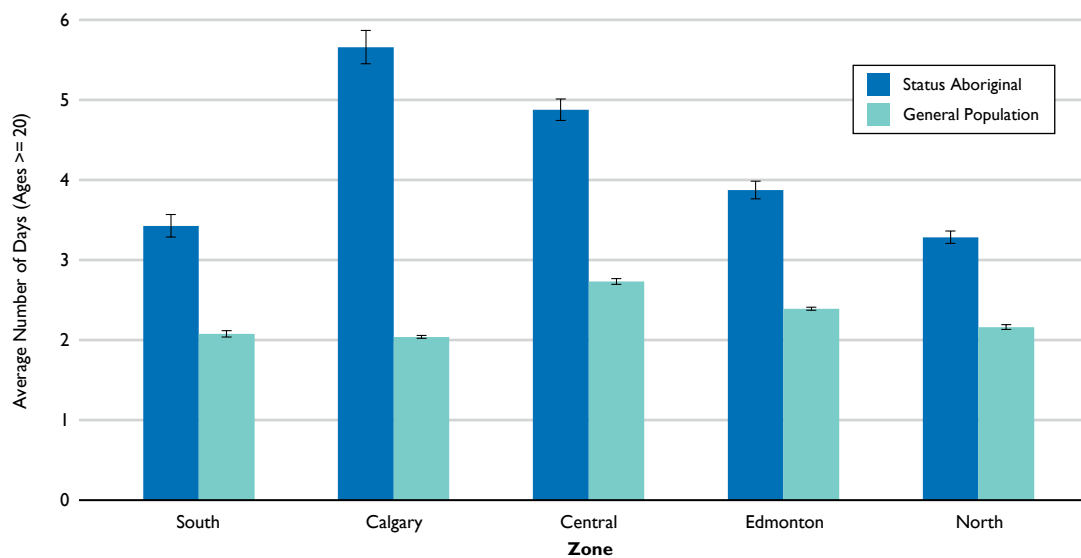


ED encounters and hospital days were more common in the Status Aboriginal population than in the general population, compared by health zone (Figures 11.27 and 11.28). Status Aboriginal people with diabetes were more likely to visit an ED compared to the general population with diabetes with encounters highest in the rural zones of Central and North (Figure 11.27). The pattern was different for days spent in hospital (Figure 11.28). Status Aboriginal people with diabetes from the Calgary and Central zones had the highest average number of hospital days. The fewest average number of hospital days were among those living in the South or North zones. Overall, Status Aboriginal with diabetes had 1.5 to 2.8 times the number of days in hospital compared to the general population with diabetes (Figure 11.28).

**Figure 11.27 Age-Adjusted Average Number of Emergency Department Encounters for the Population with Diabetes, among the Status Aboriginal and General Populations, by Zone, 2009**



**Figure 11.28 Age-Adjusted Average Number of Hospital Days for the Population with Diabetes, among the Status Aboriginal and General Populations, by Zone, 2009**



A Status Aboriginal person with diabetes was more likely to visit an ED compared to a Status Aboriginal person without diabetes with the highest number of encounters in the Central and North zones (Figure 11.29). In Status Aboriginals with diabetes, the highest average number of hospital days were in those living in Calgary zone; but in those without diabetes, the highest numbers were found in Edmonton zone (Figure 11.30). Calgary and Central zones had the highest average number of hospital days among Status Aboriginals with diabetes, and the North zone had the lowest.

Figure 11.29 **Age-Adjusted Average Number of Emergency Department Encounters for the Status Aboriginal Population, by Zone, 2009**

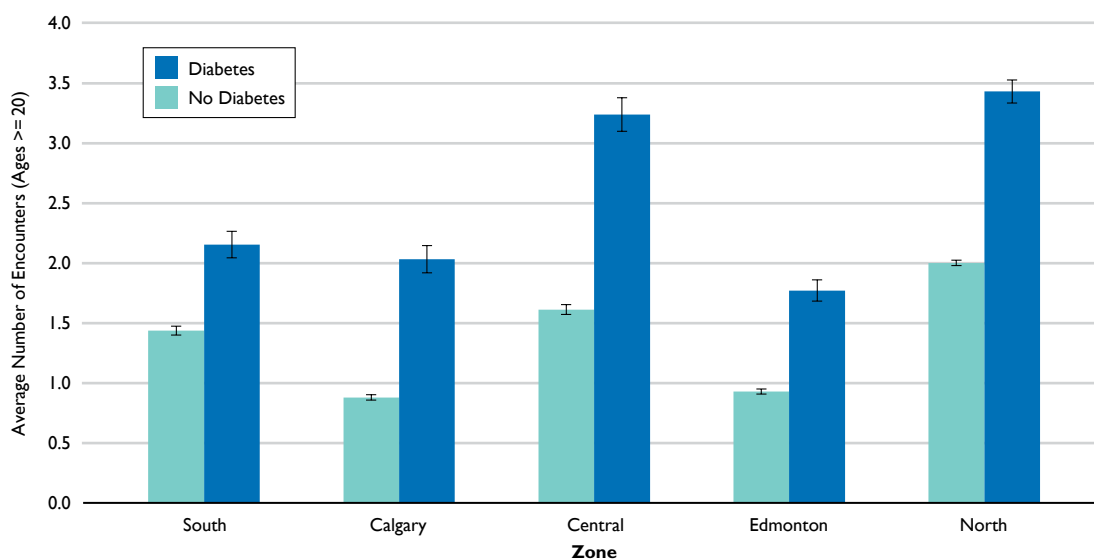
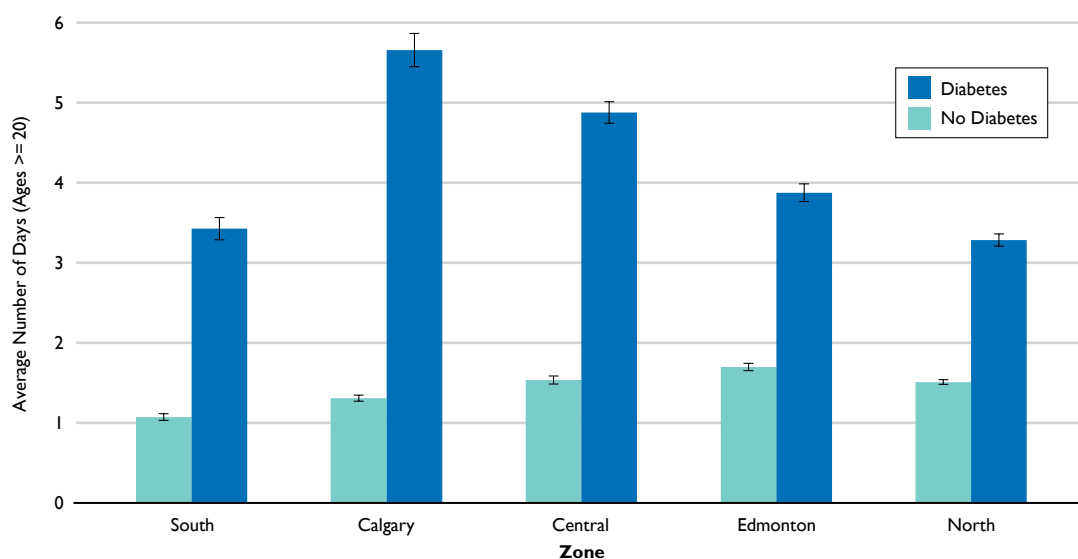


Figure 11.30 **Age-Adjusted Average Number of Hospital Days for the Status Aboriginal Population, by Zone, 2009**



## DISCUSSION

Consistent with national survey data and a few studies based on primary data collection in Canada (including the James Bay Cree of Quebec and the Sandy Lake Oji-Cree of Ontario),<sup>(5,7,12-15)</sup> incidence and prevalence rates of DM for Status Aboriginals are disproportionately higher than the general population in Alberta. However, the observed differences by ethnicity appear to be less in Alberta than those from other provinces where the NDSS definition was also applied using administrative data.<sup>(13,16,17)</sup> Furthermore, Status Aboriginals experience DM at an earlier age compared to the general population, a finding also supported by previous work in Canada.<sup>(2,7)</sup>

Our results suggest that the disproportionate increase of DM prevalence among Status Aboriginal people in Alberta may be reaching a plateau, as incidence increased at a slower rate over the past 15 years in Status Aboriginals compared to the general population.<sup>(18)</sup> This finding must be taken with caution, as amendments to the Indian Act in 1985 are potentially increasing the Status Aboriginal denominator (Bill C-31) and, conversely, some descendants of Status Aboriginal persons (who still have Aboriginal ancestry) are losing their Status through the “three generations” rule.<sup>(19)</sup> There is no data describing how much of a demographic change has occurred, making it impossible to discern the impact on the current DM rates. Alternatively, increased awareness and prevention of diabetes amongst the Status Aboriginal population in Alberta, through federally funded activities such as the Aboriginal Diabetes Initiative, SLICK,<sup>(20)</sup> and the provincially funded MDSi,<sup>(21)</sup> may have played a role in prevention and the subsequent slowed rise in DM rates among Status Aboriginal people.

The higher prevalence rates among Status Aboriginal females compared to males parallels previous reports.<sup>(2,3)</sup> These sex differences are contrary to the general Canadian population, where DM rates are slightly higher for males.<sup>(22)</sup> In the current analysis, however, incidence among Status Aboriginal males is rising at a higher rate compared to females, suggesting that the Status Aboriginal population is becoming more similar to the general population. Even so, young childbearing aged women had concerning DM prevalence rates, almost three times as high as the general population. It is probable that some Status Aboriginal women in these age groups had gestational diabetes, which puts them at risk of subsequent development of DM.<sup>(23,24)</sup>

The increasing prevalence and incidence in the under-20-year-old Status Aboriginal population is alarming and supports the suggestion that DM is occurring in younger age groups in Aboriginal communities.<sup>(5,25)</sup> According to the First Nations and Inuit Regional Health Survey, the majority (53 %) of those with DM in Aboriginal communities are 40 years of age and younger.<sup>(3)</sup> The continued rise of obesity in Aboriginal youth is likely the primary driving force of increasing type 2 diabetes rates in the younger population.<sup>(2)</sup>

Very little information is available with respect to mortality and DM among Canadian Aboriginal people. Our findings of higher mortality rates among Status Aboriginal people with DM is consistent with reports from British Columbia administrative vital statistics that showed Status Aboriginal males and females with DM had mortality rates 1.5 and 2.2 times higher than the general population with DM, respectively.<sup>(26)</sup> However, administrative data from Ontario showed mortality rates among First Nations people with DM decreased dramatically from 1994-1999, and, in fact, were lower than mortality rates of the non-First Nations population with DM in 1999.<sup>(13)</sup> Although there were marked improvements in mortality for Status Aboriginals with DM over time in the current analysis, overall rates were still significantly higher than the general population in 2009.

Consistent with a similar report on health care utilization in Alberta<sup>(27)</sup> and results from other provinces,<sup>(28,29)</sup> we found Status Aboriginal people with DM were much more likely to have more days in the hospital per year, and were more likely to visit a GP or ED than the general population with DM. This may be explained, in part, by findings that have shown Canadian Aboriginal people with DM experience related complications more frequently than other populations.<sup>(30-34)</sup> Although health care utilization is greater, it appears to be largely driven by use of acute care services. Thus, the quality of care and follow-up may, in fact, be suboptimal for many Status Aboriginal people with DM as cultural barriers, geographical barriers and physician/nursing retention/shortage problems in rural communities have been shown to compromise care.<sup>(1,6,35)</sup>

The DM incidence and prevalence rates among the Status Aboriginal population, based on DM defined from administrative data, are likely an underestimate for a variety of reasons. First, a limitation of this definition is the inability to detect undiagnosed diabetes, which is common in Canadian Aboriginal communities. The James Bay Cree and Sandy Lake Oji-Cree communities reported undiagnosed diabetes rates of 2.5% and 10.7%, respectively.<sup>(1,12)</sup> Second, many Aboriginal people are uncomfortable in the Western cultural medical environments, even when they do receive diagnostic services; therefore, they may not return for care. In addition, medical care in remote Aboriginal communities is often provided by nurse practitioners, including care for DM. Only claims for DM related visits submitted by physicians are included in the administrative data and contribute to the definition of DM used in this *Atlas*. Hence, estimates of DM are likely underestimated.

Similar with other provinces in Canada, rates of DM incidence and prevalence in Alberta are twice as high among Status Aboriginal people compared to the general population. However, this trend may be slower as DM incidence appears to be increasing at a slower rate among the Status Aboriginal population compared to the general population.

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