

Chapter 9

Diabetes and First Nations People in Alberta



Brenda R. Hemmelgarn

Ellen L. Toth

Malcolm King

Lynden Crowshoe

Kelli Ralph-Campbell

DIABETES AND FIRST NATIONS PEOPLE IN ALBERTA

KEY MESSAGES

- The incidence and prevalence of diabetes is more than twice as high among First Nations people, for both males and females, compared to non-First Nations people.
- The increased incidence and prevalence of diabetes for First Nations compared to non-First Nations has remained constant from 1995 to 2005.
- Among First Nations people, the incidence and prevalence of diabetes are higher among females compared to males.

BACKGROUND

The past century has witnessed an epidemiological shift in the diseases affecting Aboriginal populations. Infectious diseases and starvation have given way to chronic disease epidemics like obesity, type 2 diabetes and cardiovascular disease.⁽¹⁾ Limited data is available regarding the burden of diabetes mellitus (DM) among the Aboriginal population although national estimates from the First Nations and Inuit Regional Health Survey showed prevalence rates of diabetes to be 8% and 13% for First Nations men and women, respectively.⁽²⁾ The more recent 2002/2003 Regional Health Survey report indicates that the prevalence rates have increased to 20%.⁽³⁾

The onset of type 2 diabetes among Aboriginal people is also occurring at a much younger age with prevalence rates of 1.1% reported in the 4-19 year old age group in northeastern Manitoba.⁽⁴⁾ While a genetic predisposition to type 2 diabetes in Oji-Cree communities in Manitoba and Ontario has been found due to a mutation of the Hepatic Nucleocyte Factor 1 alpha gene,⁽⁵⁾ experts agree that the overwhelming reasons for increased prevalence of diabetes and its complications lie with the changes in lifestyle brought about by colonization.^(6,7)

The purpose of this report is to compare the incidence and prevalence of diagnosed DM among First Nations and non-First Nations people in Alberta between 1995 and 2005. This report does not include a sub-analysis of the Métis population as they cannot be identified from administrative data sources. Primary data collection in Métis people living on Settlements or in rural communities in Alberta, through the Mobile Diabetes Screening Initiative (MDSi), may permit such estimates in the future.⁽⁸⁾

METHODS

People with DM were identified using the Alberta Health and Wellness administrative databases by applying the NDSS algorithm (see Methods chapter). First Nations 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 and entitled to Treaty status. The Registry file was searched from June 1994 to June 2005 and any individual with a First Nations identifier (First Nations or Inuit) was classified as “First Nations” with all others classified as “non-First Nations”. Aboriginal people in Alberta who were not Registered First Nations, such as First Nations without Treaty status and Métis, were included in the non-First Nations comparison group. First Nations individuals were included whether they were living on or off reserve. In Alberta there are approximately 100,000 First Nations people (62% on reserve)⁽⁹⁾ and 70,000 Métis.⁽¹⁰⁾

For calculation of the prevalence of DM, the proportion of First Nations people who had DM was determined and compared to the proportion of non-First Nations people with DM at the same point in time. This was repeated annually for the years 1995 to 2005.

An incident case of DM was defined as a person who met the NDSS criteria for diabetes with no diabetes claims in the prior two years. Incident rates were calculated for First Nations and non-First Nations people who developed DM in the fiscal years 1995 to 2004.

All rates were age and sex-adjusted to the Alberta population aged 20 and over from the 2001 Canadian Census.

FINDINGS

The age and sex-adjusted prevalence and incidence of DM was approximately twice as high among the First Nations compared to the non-First Nations population (Figure 9.1 and Figure 9.2). These increased rates remained constant over the 10-year period from 1995 to 2005.

The prevalence of DM among First Nations people increased with older ages for both males and females (Figure 9.3 and Figure 9.4). The prevalence was also higher among First Nations females compared to First Nations males however the rate of increase in the prevalence over the 10-year period was more marked for the male population.

Figure 9.1 Age and Sex-Adjusted Prevalence Rates of Diabetes, First Nations and Non-First Nations People, 1995-2005

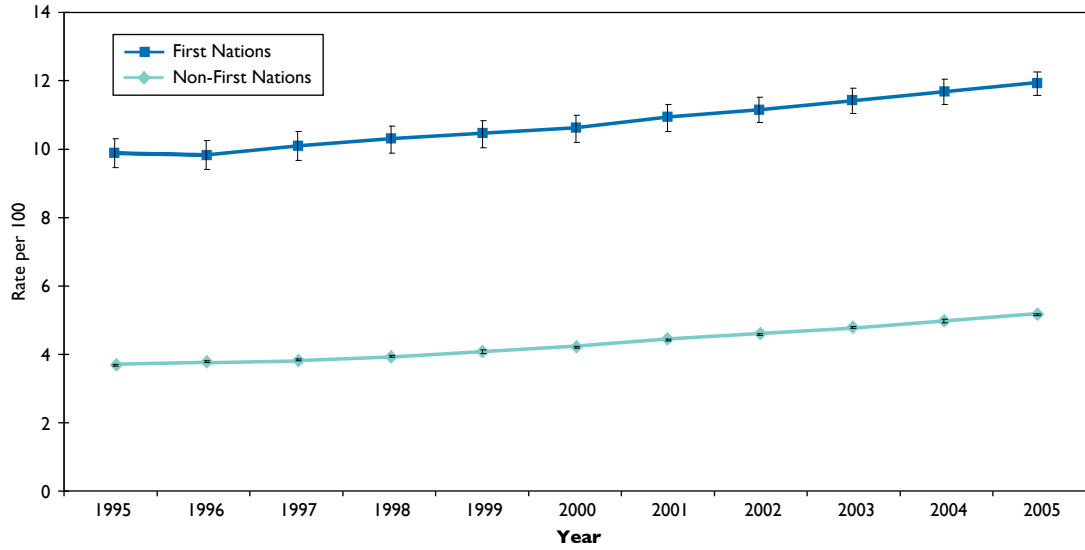


Figure 9.2 Age and Sex-Adjusted Incidence Rates of Diabetes, First Nations and Non-First Nations People, 1995-2004

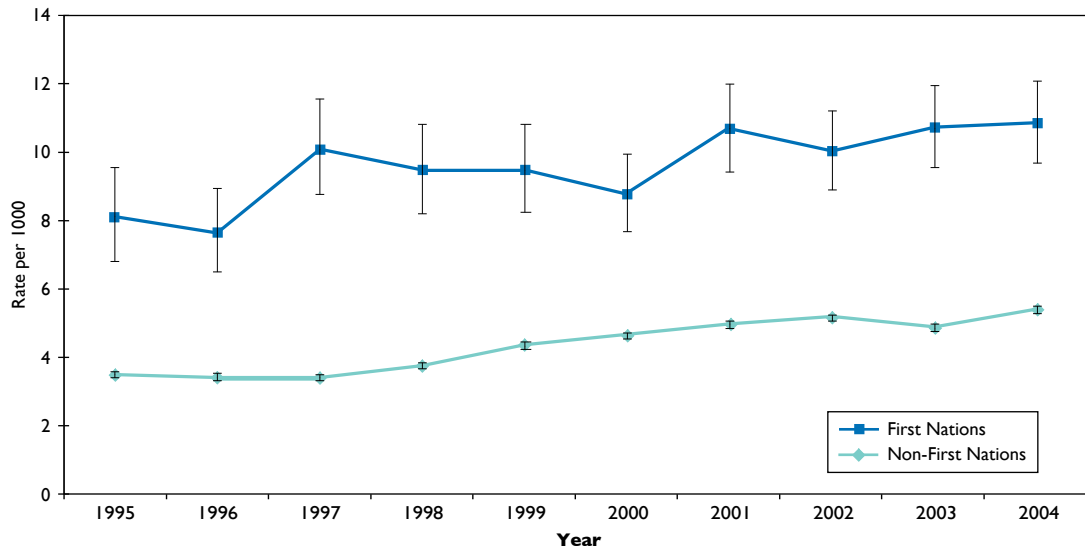


Figure 9.3 Age-Specific Diabetes Prevalence Rates of Female First Nations and Non-First Nations People, 1995 and 2005

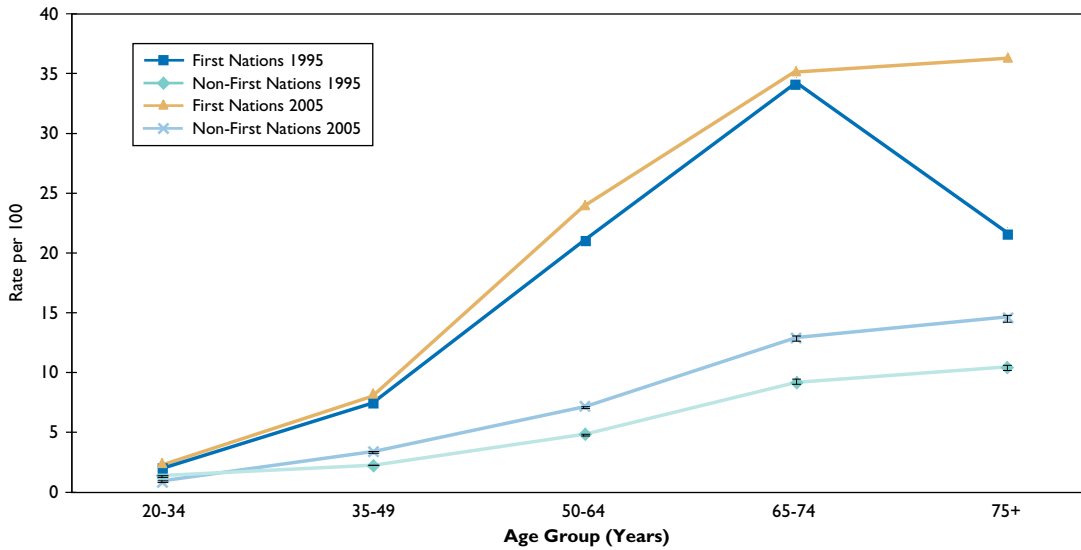
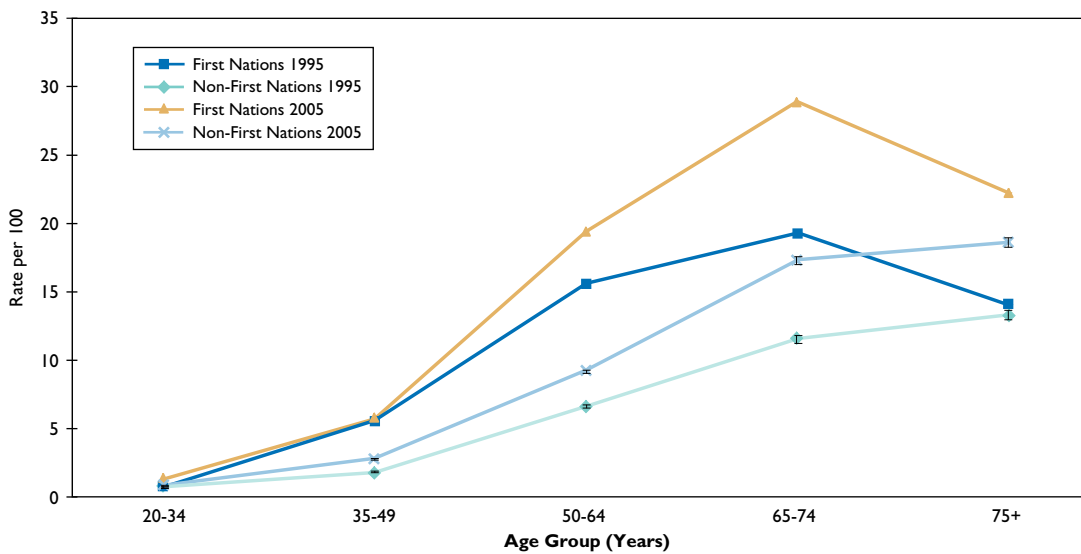


Figure 9.4 Age-Specific Diabetes Prevalence Rates of Male First Nations and Non-First Nations People, 1995 and 2005



Similar results are evident with respect to the incidence of DM among the First Nations population (Figure 9.5 and 9.6). The incidence of DM also increased with increasing age, with rates highest for First Nations females aged 50-74.

These age-specific prevalence and incidence rates for First Nations people should be interpreted with caution, especially in the oldest age categories, due to unreliable reporting of deaths and small number of cases. Please refer to the Appendix at the end of this chapter for further data including variability of the point estimates.

Figure 9.5 Age-Specific Diabetes Incidence Rates of Female First Nations and Non-First Nations People, 1995 and 2004

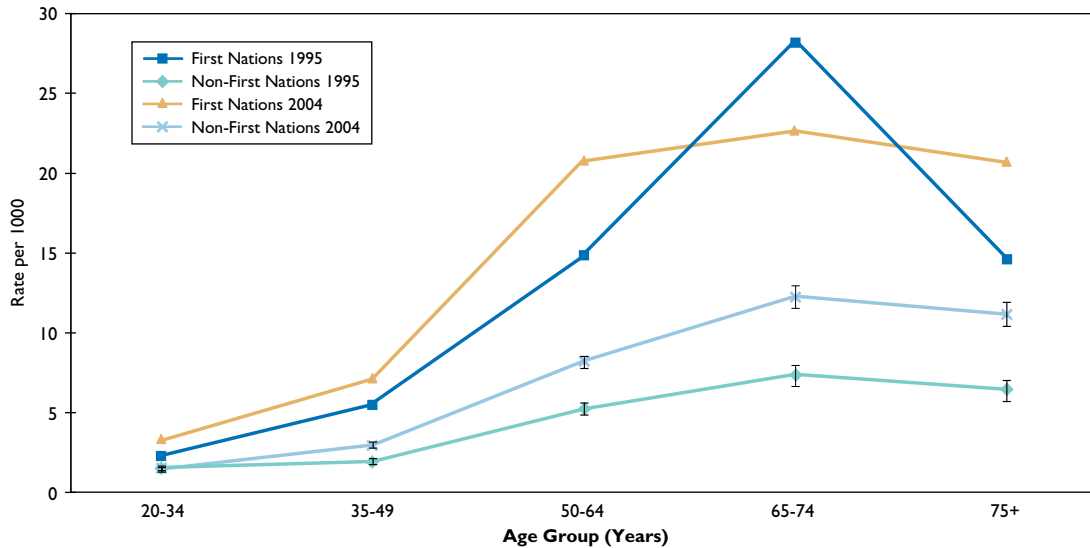
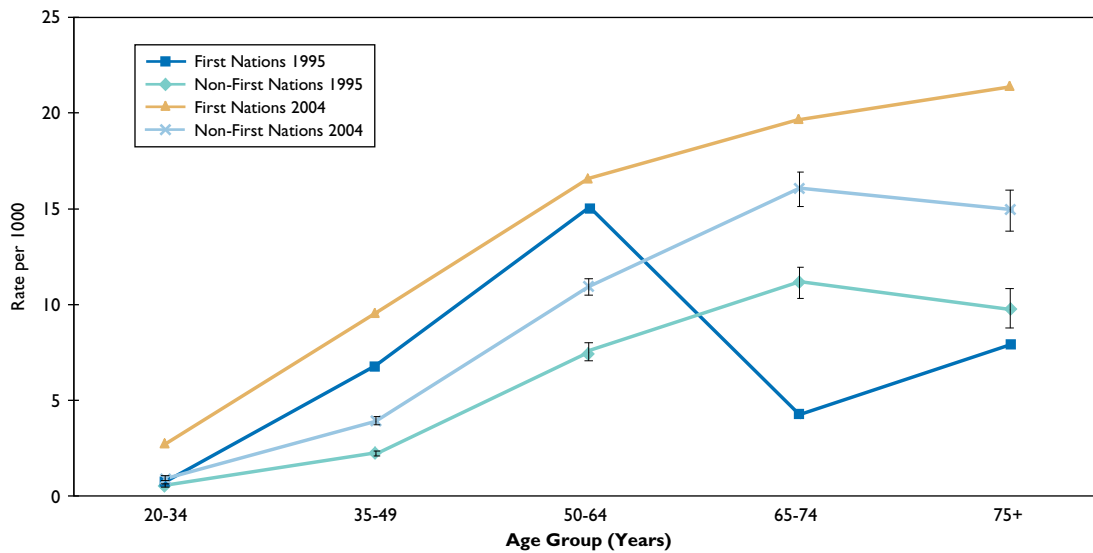
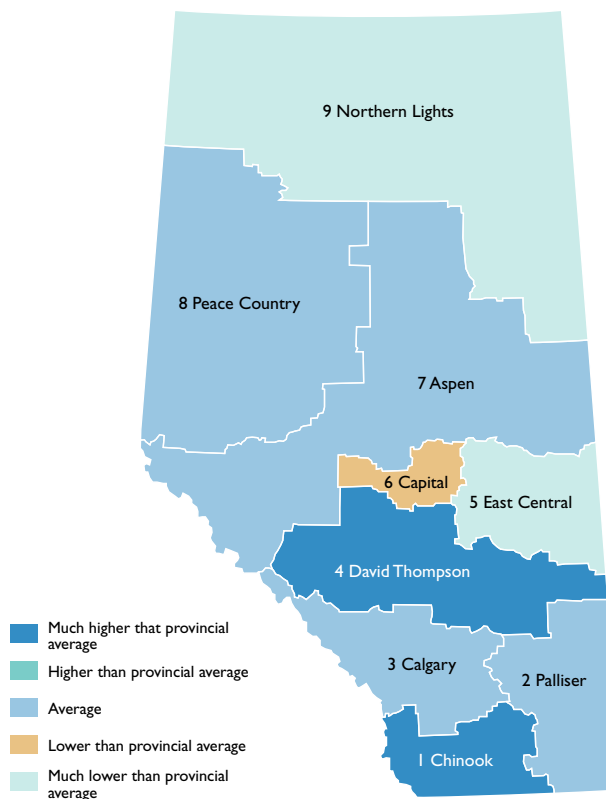


Figure 9.6 Age-Specific Diabetes Incidence Rates of Male First Nations and Non-First Nations People, 1995 and 2004



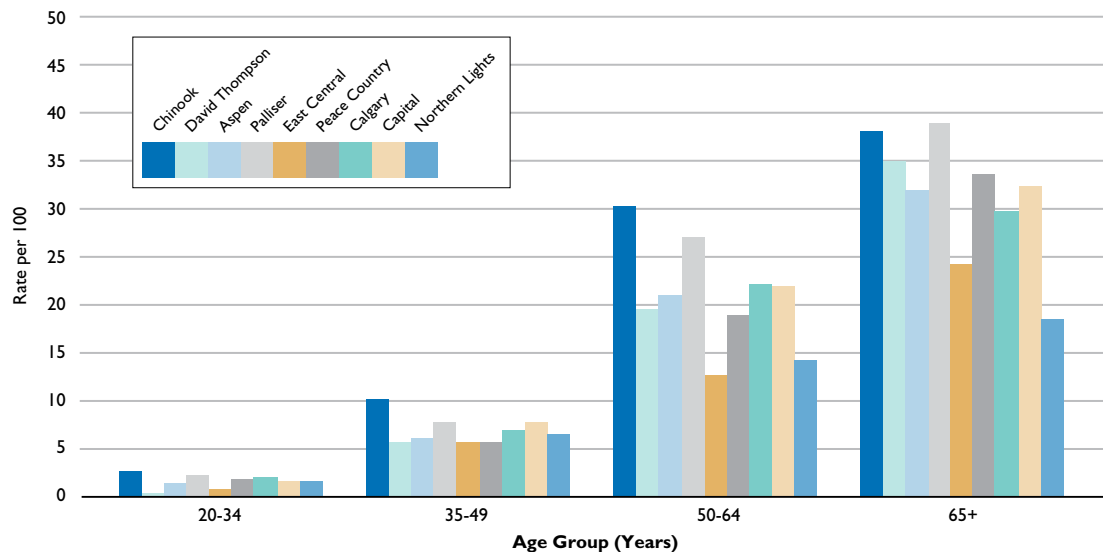
The age-adjusted DM prevalence across regions for First Nations individuals differs substantially from the regional picture of the entire Alberta population. In 2005, the overall age-adjusted First Nations prevalence rate for DM in Alberta was 11.9%. While the DM prevalence is the highest in the Northern Lights region when reporting on *all* Albertans (see Chapter 2, Epidemiological Trends), the opposite is true when *only* including First Nations individuals (Figure 9.7). There is a much lower DM prevalence in First Nations individuals living in the Northern Lights and East Central regions and a much higher DM prevalence among First Nations individuals living in the David Thompson and Chinook regions.

Figure 9.7 **Age-Adjusted First Nations Diabetes Prevalence Rates by Region, 2005**



To better understand this phenomenon, the age-specific DM prevalence among the First Nations population was calculated by region for 2005 (Figure 9.8). Consistent with the prevalence map in this chapter, age-specific prevalence rates of DM were highest in the Chinook Health Region and lowest in the Northern Lights Health Region.

Figure 9.8 Age-Specific Diabetes Prevalence Rates in First Nations by Region, 2005



DISCUSSION

The more than two-fold higher incidence and prevalence rates of DM for First Nations compared to non-First Nations people is consistent with national survey data and the small number of studies based on primary data collection in Canada.^(4,12-15) These results are also consistent with those reported in Ontario, where the NDSS definition was also applied using administrative data.⁽¹⁶⁾

It should be noted that the results presented here, based on DM defined from administrative data, are likely an underestimate of the true incidence and prevalence of DM among First Nations people for a variety of reasons. First, a limitation of this definition is the inability to detect undiagnosed diabetes, which is common in First Nations communities. The James Bay Cree (Quebec) and Sandy Lake Oji-Cree (Ontario) communities reported undiagnosed diabetes rates of 2.5% and 10.7% respectively.^(1,12) Second, First Nations people who live in rural and remote locations have geographic access to care barriers. As many First Nations people are uncomfortable in the Western cultural medical environments, even when they do receive diagnostic services, they may not return for care. In addition, medical care in remote First Nations communities is provided by nurse practitioners, including care for chronic diseases such as DM. Only claims for diabetes related visits submitted by physicians are included in the administrative data and contribute to the definition of DM used in this Atlas, therefore the estimates of DM provided here are likely underestimated.

As seen above, differences in delivery of health care explain in part the lower rates of DM seen in First Nations people in the Northern Lights region. However these lower rates in the north are also consistent with findings from the SLICK¹ program,⁽¹¹⁾ and other Northern cultures.^(14,15) Although speculative, this may be related to an urban proximity and latitudinal effect on acculturation and lifestyle.

It should also be pointed out that we are unable to report on mortality amongst the First Nations people, due to limitations of the administrative data. Normal management of the Stakeholder Registry includes the removal of deceased persons. During the 1990s, the approach used to identify and remove deceased First Nations people did not fully clear these individuals from the Registry. As a result, the number of deaths is artificially low and the total population is slightly inflated, resulting in biased (i.e., underestimated) mortality rates. While the current process for removing deaths appears to have improved, there are individuals who may have died a decade ago that continue to appear as alive in the databases, making it difficult to accurately estimate mortality in the First Nations population.

Our findings of higher prevalence rates among First Nations women compared to men are also consistent with prior reports. Some of this may be due to increased rates of undiagnosed diabetes in men who are less likely to seek medical care. Of concern, young childbearing aged women show prevalence rates of DM twice as high as non First Nations. In the Sioux Lookout Zone (Ontario) almost three-quarters of First Nations women with gestational diabetes developed type 2 diabetes within four years of their pregnancy, a rate of conversion approximately four times as high compared to other women in general.^(16,17) It is quite likely that some Alberta First Nations women captured here had gestational diabetes, which just reinforces the notion of “diabetes begetting diabetes”, consistent with the “hefty fetal phenotype” hypothesis, whereby the intrauterine milieu potentially programs future disease (in this case diabetes).⁽¹⁸⁾

In summary, consistent with other provinces in Canada, we observed rates of DM incidence and prevalence to be twice as high among First Nations people compared to non-First Nations people, a trend which has remained constant over the past 10 years. While the epidemic of DM among First Nations people requires interventions that target all age groups, these results would suggest that younger age groups, and women in particular, should be the focus of treatment and prevention efforts.

¹ Screening for Limbs, I-eyes, Cardiac and Kidneys, a Health Canada sponsored mobile outreach diabetes program in Alberta.

References

1. Harris SB, Gittelsohn J, Hanley A, Barnie A, Wolever TM, Gao J, et al. The prevalence of NIDDM and associated risk factors in native Canadians. *Diabetes Care* 20:185-187, 1997
2. National Steering Committee for the First Nations and Inuit Regional Health Survey: Final report. 1999. Available from: www.hc-sc.gc.ca/fnihb-dgspni/fnihb/aboriginalhealth/reports_summaries/regional_survey.pdf
3. First Nations Regional Longitudinal Health Survey (RHS) 2002/03. Results for adults, youth and children living in First Nations communities. First Nations Centre, National Aboriginal Health Organization, 2005. Available from: www.naho.ca/firstnations/english/documents/RHS2002-03TechnicalReport_001.pdf
4. Dean HJ, Mundy RL, Moffatt M. Non-insulin-dependent diabetes mellitus in Indian children in Manitoba. *Canadian Medical Association Journal* 147:52-57, 1992
5. Hegele RA, Cao H, Harris SB, Zinman B, Hanley AJ, Anderson CM. Gender, obesity, hepatic nuclear factor-1 α G319S and the age-of-onset of type 2 diabetes in Canadian Oji-Cree. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity* 24:1062-1064, 2000
6. Young TK, Reading J, Elias B, O'Neil JD. Type 2 diabetes mellitus in Canada's first nations: status of an epidemic in progress. *Canadian Medical Association Journal* 163(5):561-566, 2000
7. R.A. Hegele, L.C. Bartlett. Genetics, Environment and Type 2 Diabetes in the Oji-Cree Population of Northern Ontario. *Canadian Journal of Diabetes* 27(3):256-261, 2003.
8. Toth E, Cardinal K, Moyah D, Ralph-Campbell K. Partnerships to Address the Diabetes Epidemic in Aboriginal Communities in Alberta. *Canadian Journal of Diabetes* 29(4):415-419, 2005.
9. Historical Trends – Registered Indian Population Alberta Region 1982-2005. First Nations and Northern Statistics Section, data from Indian Registry, 1982-2005 as at December 31st – Indian and Northern Affairs Canada, 2006. Available from: www.ainc-inac.gc.ca/pr/sts/htrip/ht-ab_e.pdf
10. 2001 census – Analysis groups – Métis. Statistics Canada – Ministry of Industry, 2003. Available from: www12.statcan.ca/english/census01/products/analytic/companion/abor/pdf/96F0030XIE2001007.pdf
11. Virani S, Datta NK. The SLICK Project: Screening for Limb, I-Eye, Cardiovascular, and Kidney Complications of Diabetes Using Mobile Diabetes Clinics. An Alberta First Nations Project. 2004. Available from: www.hc-sc.gc.ca/hcs-sss/pubs/chipp-ppics/2004-slick/slick_appendix_e.html
12. Dannenbaum D, Verronneau M, Torrie J. Comprehensive computerized diabetes registry - Serving the Cree of Eeyou Istchee (eastern James Bay). *Canadian Family Physician* 45:364-370, 1999
13. Shar BR, Anand S, Zinman B, Duong-Hua M. Diabetes and First Nations People: In Hux JE, Booth GL, Slaughter PM, Laupacis A (eds). *Diabetes in Ontario: An ICES Practice Atlas*: Institute for Clinical Evaluative Sciences. 2003:13.2311-13.248.
14. Pollex RL, Khan HM, Connelly PW, Young TK, Hegele RA. The metabolic syndrome in Inuit. *Diabetes Care* 27:1517-1518, 2004
15. Young TK. Contributions to chronic disease prevention and control: studies among the Kivalliq Inuit since 1990. *International Journal of Circumpolar Health* 62:323-330, 2003
16. Mohamed N, Dooley J. Gestational diabetes and subsequent development of NIDDM in aboriginal women of northwestern Ontario. *International Journal of Circumpolar Health* 57 Suppl 1:355-358, 1998
17. Ben-Haroush A, Yogeve Y, Hod M. Epidemiology of gestational diabetes mellitus and its association with type 2 diabetes. *Diabetic Medicine* 21:103-113, 2003
18. Godfrey KM, Barker DJ. Fetal programming and adult health. *Public Health Nutrition* 4:611-624, 2001

APPENDIX

Prevalence Rates of Diabetes in First Nations and Non-First Nations, 1995 and 2005

First Nations - Rates (per 100)

	1995			2005		
	Rate	Lower CI	Upper CI	Rate	Lower CI	Upper CI
Women						
20-34	1.97	1.73	2.23	2.30	2.06	2.56
35-49	7.46	6.83	8.08	8.04	7.55	8.53
50-64	20.93	19.26	22.71	23.87	22.59	25.16
65-74	34.03	29.61	38.91	35.04	31.97	38.32
75+	21.51	16.89	27.01	36.18	31.28	41.63
Men						
20-34	0.57	0.44	0.73	1.18	1.01	1.37
35-49	5.44	4.89	6.03	5.54	5.13	5.95
50-64	15.58	14.15	17.12	19.42	18.21	20.63
65-74	19.19	15.83	23.06	28.91	26.12	31.92
75+	13.99	10.04	18.98	22.09	17.87	27.01
Overall						
Age/Sex Adjusted	9.90	9.47	10.34	11.93	11.57	12.28

Non-First Nations - Rates (per 100)

	1995			2005		
	Rate	Lower CI	Upper CI	Rate	Lower CI	Upper CI
Women						
20-34	1.38	1.34	1.42	0.98	0.95	1.02
35-49	2.29	2.24	2.34	3.41	3.35	3.47
50-64	4.81	4.70	4.92	7.11	7.01	7.21
65-74	9.25	9.04	9.46	12.91	12.67	13.14
75+	10.43	10.18	10.67	14.54	14.29	14.78
Men						
20-34	0.57	0.55	0.60	0.71	0.68	0.74
35-49	1.71	1.66	1.75	2.68	2.62	2.73
50-64	6.53	6.40	6.65	9.12	9.01	9.24
65-74	11.46	11.22	11.71	17.26	16.99	17.54
75+	13.23	12.89	13.58	18.58	18.24	18.92
Overall						
Age/Sex Adjusted	3.68	3.65	3.71	5.17	5.14	5.20

Incidence Rates of Diabetes in First Nations and Non-First Nations, 1995 and 2004

First Nations - Rates (per 1000)

Women	1995			2004		
	Rate	Lower CI	Upper CI	Rate	Lower CI	Upper CI
20-34	2.25	1.49	3.28	3.28	2.42	4.34
35-49	5.50	3.87	7.58	7.00	5.55	8.71
50-64	14.84	10.21	20.84	20.73	16.56	25.64
65-74	28.24	14.59	49.32	22.60	13.8	34.90
75+	14.60	3.98	37.38	20.65	8.30	42.54
Men	Rate	Lower CI	Upper CI	Rate	Lower CI	Upper CI
20-34	0.61	0.25	1.26	2.67	1.89	3.67
35-49	6.76	4.90	9.11	9.55	7.85	11.50
50-64	15.04	10.54	20.83	16.57	12.82	21.08
65-74	4.15	0.50	14.99	19.67	11.84	30.72
75+	7.87	0.95	28.44	21.41	8.61	44.11
Overall	Rate	Lower CI	Upper CI	Rate	Lower CI	Upper CI
Age/Sex Adjusted	8.10	6.82	9.55	10.84	9.68	12.09

Non-First Nations - Rates (per 1000)

Women	1995			2004		
	Rate	Lower CI	Upper CI	Rate	Lower CI	Upper CI
20-34	1.47	1.34	1.61	1.42	1.29	1.55
35-49	1.92	1.76	2.07	2.94	2.76	3.11
50-64	5.17	4.81	5.53	8.18	7.81	8.55
65-74	7.30	6.69	7.91	12.25	11.50	13.01
75+	6.40	5.77	7.07	11.12	10.38	11.86
Men	Rate	Lower CI	Upper CI	Rate	Lower CI	Upper CI
20-34	0.46	0.38	0.54	0.85	0.75	0.96
35-49	2.16	2.00	2.32	3.87	3.67	4.07
50-64	7.50	7.07	7.93	10.86	10.43	11.28
65-74	11.11	10.3	11.91	16.02	15.11	16.93
75+	9.73	8.75	10.79	14.89	13.82	15.97
Overall	Rate	Lower CI	Upper CI	Rate	Lower CI	Upper CI
Age/Sex Adjusted	3.50	3.41	3.60	5.38	5.28	5.48