Cree Diabetes Information System (CDIS) 2007 Annual Report

Prepared by: Elena Kuzmina, Pierre Lejeune, David Dannenbaum and Jill Torrie

Public Health Report Series 3 on Diabetes Cree Board of Health and Social Services of James Bay

Cree Diabetes Information System (CDIS) 2007 Annual Report

Elena Kuzmina	Research and Evaluation Program Officer
Pierre Lejeune	Epidemiological Program Officer
David Dannenbaum	Medical Adviser for Chronic Diseases
Jill Torrie	Director of the Specialized Services Team

Public Health Report Series 3 on Diabetes Cree Board of Health and Social Services of James Bay

January 2008

The cover picture shows participants in **Miyupimaatisiitaau 2002** – a 1400-km walk through the territory of liyiyiu Aschii in northern Quebec from Waswanipi to Whapmagoostui to create awareness about diabetes and about the strengths that liyiyiuch can call upon to stay healthy.

Elena Kuzmina, P.Dt., M.Sc. Research and Evaluation Program Officer Public Health Department of the Cree Territory of James Bay

Pierre Lejeune, B.Psy. Epidemiological Program Officer Public Health Department of the Cree Territory of James Bay

David Dannenbaum, MD, CCFP Medical Adviser for Chronic Diseases Public Health Department of the Cree Territory of James Bay

Jill Torrie, M.A. Director of the Specialized Services Team Public Health Department of the Cree Territory of James Bay

Reproduction is authorised for non-commercial purposes on condition the source is acknowledged.

To obtain a copy of this report, please contact: Public Health Department of the Cree Territory of James Bay Cree Board of Health and Social Services of James Bay

Fax: (514) 861-2681 or (819) 855-9031

Authors:

e-mail: cree.public.health@ssss.gouv.qc.ca

Series editor & coordinator:	Jill Torrie Public Health Department of the Cree Territory of James Bay torrie.jill@ssss.gouv.qc.ca
Cover design & final layout:	Katya Petrov katyapetrov@sympatico.ca
Photo:	Neil Diamond

© All rights reserved Cree Board of Health and Social Services of James Bay, Chisasibi, Quebec JOM 1E0, January 2008

ISSN: 1712-9249 Legal deposit: 1st trimester 2008 National Library of Canada, 2008 Bibliothèque Nationale du Québec, 2008

FOREWORD TO THE PUBLIC HEALTH REPORT SERIES

The Public Health Report Series includes reports prepared by the Department of Public Health of the Cree Territory of James Bay on major activities of the Department. At the present time, the series includes the following:

- Series I: annual reports of the Public Health Department (from 2002)
- Series 2: reports on immunisations and/or notifiable diseases (periodic)
- Series 3: annual diabetes update (from 1996) and annual diabetes report (from 2004)
- Series 4: report on the health status of the population (periodic)

Foreword to the Annual Diabetes Report

This annual diabetes report series is dedicated to the late Mavis Verronneau, an enthusiastic nurse and diabetes educator, who was the driving force behind the development of the CBHSSJB's diabetes information system. Mavis found her vocation as a diabetes educator and made a difference for many people in the region and in her clinics in Montreal. The region continues to benefit from her vision, and we remember her fondly and will not soon forget her great humour.

Since 1997, the Cree Board of Health and Social Services of James Bay has produced the Annual Diabetes Update in various popular and technical formats. This report, which presents the technical overview of the current state of diabetes in the region, will be of interest to health care workers, health researchers and planners.

The Update is an example of the integrated link between policy, clinical management and public health surveillance. The system began in 1996 as the "Diabetes Registry" following requests by the Chiefs and leaders of lyyu Aschi* to provide more information about this new and growing problem, and to meet the requests from clinical personnel for guidance with patient management. While our focus has always been on patient management, the existence of the system has enabled us to pull out the numbers and present the evolving profile of the situation. In turn this has generated special funding and resources for patient management. In 2004, the system was revamped resulting in an improved clinical management tool with new web-based software, organised under a new administrative structure and renamed the Cree Diabetes Information System, or CDIS for short. In early 2008, it was again transformed into a more user-friendly format for clinical staff.

Whatever it has been called, this system has been an important tool for planning and delivering services for people with diabetes in the region. It has also helped to focus attention on this growing medical priority by providing data about the situation. Since 1996, the CDIS has:

- Generated reports that have helped the population and the CBHSSJB to understand what is happening with the new "epidemic" of diabetes and supported diabetes prevention activities (see www.creepublichealth.org);
- Produced regularly updated, standardised procedures for the clinics delivering recommended care to people with diabetes;
- Provided the evidence about the situation that convinced the Ministry of Health and Social Services to release special, permanent financing for diabetes services in the region;
- Linked the system with administrative data of the Quebec health care system to understand the extent of complications suffered by people with diabetes and their pattern of using health care services outside the region (see the report of the pilot project by Gilles Légaré at www.inspq.qc.ca);
- Been periodically audited as part of the continuing evaluation of the performance of the system within the clinics;
- Linked the CBHSSJB with Aboriginal diabetes management and surveillance planning in Canada.

In 2007-8, we continued to improve the CDIS as an electronic patient file system. First, we linked the CDIS to laboratory data systems in Chisasibi and Chibougamau hospitals so that doctors and nurses could have up-to-date access to patients' laboratory results within the system. Second, we continued to improve the user-friendliness of the CDIS for health care workers so it now provides them with an easily accessible, visual, and comprehensive record of all patient tests. Now patients and health care workers can sit together and view and discuss the history of the patients' test results and management profiles.

In 2008-9, we will continue to implement the use of the CDIS in the clinics. Given the high staff turnover, we need to invent on-line training programmes so that all new employees will be able to understand our standards of practice for diabetes care and our approach to diabetes management. At the same time, we will begin to incorporate other chronic diseases into the system, starting with the management of high blood pressure.

Jill Torrie

Director of Specialised Services Public Health Department of the Cree Territory of James Bay

- * * *
- ii

I. Number of people diagnosed with diabetes

This report is based on data from the Cree Diabetes Information System (CDIS). Only Cree patients living in liviyiu Aschii who were diagnosed with type I or type 2 diabetes before July I, 2007 are included in this report. The diabetes prevalence was calculated using the mid-year (July 2007) Cree population based on the James Bay & Northern Québec Agreement beneficiary list we obtain through the Ministry of Health and Social Services of Québec.

As Table I demonstrates, a total of 1,583 Cree people are living with diabetes in liviyiu Aschii (July 1, 2007). Two of these individuals may have type I diabetes. Differentiating between type I and type 2 diabetes can be difficult; therefore, for the purposes of this report, all cases are considered as type 2. One in four (25.8%) individuals living with diabetes is under 40 years old and almost half of all Cree patients with diabetes (46.5%) were diagnosed before the age of 40.

Age group	liyiyiu Aschii				Coastal			Inland		
	F	М	Т	F	М	Т	F	М	Т	
10 to 19	*	*	7	*	*	*	*	-	*	
20 to 29	59	29	88	28	15	43	31	14	45	
30 to 39	176	138	314	84	68	152	92	70	162	
40 to 49	219	130	349	115	57	172	104	73	177	
50 to 59	213	143	356	123	71	194	90	72	162	
60 to 69	179	119	298	98	69	167	81	50	131	
70 & older	108	63	171	52	29	81	56	34	90	

Table 1.Number of people diagnosed with diabetes by region, gender and age group,
Cree population, liviyiu Aschii, July 1, 2007

Source: CDIS, July 1, 2007

* According to the guidelines for reporting small numbers, only the total number of people with diabetes in liviyiu Aschii is presented for the 10-19 years age group.

Age calculated as of July 1, 2007.

Table 2.Number of people diagnosed with diabetes by community,
Cree population, liyiyiu Aschii, July 1, 2007.

Community	Number of people with diabetes
Chisasibi	365
Eastmain	78
Mistissini	381
Nemaska	68
Oujé-Bougoumou	93
Waskaganish	191
Waswanipi	228
Wemindji	133
Whapmagoostui	46
liyiyiu Aschii	1,583

Source: CDIS, July 1, 2007

II. Diabetes prevalence

The overall crude diabetes prevalence is 19.1% in the population 20 years old and older (Table 3). In order to compare these numbers with the rest of Québec, we have to consider the fact that the age distribution of the Cree population as a whole is different from the Québec population. In particular, the Cree population is much younger than the general Québec population. To take this difference into account, we adjusted the diabetes prevalence in the Cree population according to the 2001 age distribution of Québec's population (our reference population) using the direct standardization method. According to the results, the age-standardized diabetes prevalence is 25.5% in the Cree population 20 years old and older. This number is much higher compared to the prevalence of 6.4% in other Québec residents (age-adjusted to the 2001 Québec population, 20 years old and older)¹. It is important to mention that the most recent data on diabetes prevalence in the rest of Québec is only available for 2003-2004.

Table 3. Crude and age-standardized diabetes prevalence, Cree population, 20 years old and older, liyiyiu Aschii (July 1, 2007) and the rest of Québec (2003-2004)

	M	F	Total
Crude prevalence (Cree)	15.3%	22. 9 %	19.1%
Age-adjusted prevalence (Cree)	20.3%	30.4%	25.5%
Age-adjusted prevalence Québec ¹	7.4%	5.6%	6.4%

Source: CDIS, July 1, 2007

MSSSQ, Québec population estimates based on Statistics Canada 2001 Census.

III. Gender distribution of diabetes prevalence

A gender comparison shows that diabetes continues to affect more Cree women 20 years old and older than Cree men (22.9% vs. 15.3%, respectively). The difference is statistically significant and corresponds to a rate ratio of 1.5, reflecting the fact that women have a diabetes prevalence rate 50% higher than that for men. This situation is similar to many other aboriginal populations, but not to the general Canadian population². For example, in the rest of Québec, men have a higher diabetes prevalence rate than women (female-male ratio of 0.8)¹. Although the exact cause of this difference is not known, it could be due to higher obesity prevalence in Cree women³, excessive weight gain by young Cree mothers during pregnancy⁴ and a high rate of gestational diabetes^{5,6}. It may also reflect a more aggressive screening for diabetes in women, particularly during pregnancy.

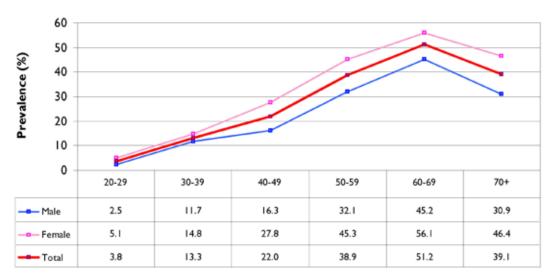
- * * *

MSSSQ, JBA beneficiary list, July 1, 2007

IV. Diabetes prevalence by age group and gender

Diabetes prevalence varies greatly by age, from 3.8% in the 20 to 29-year-old age group to 51.2% in the 60 to 69-year-old age group (Figure 1). For both genders, the diabetes prevalence steadily increases until 60-69 years, and the rapid increase in prevalence begins from the 40 to 49-year-old age group. The highest diabetes prevalence is in the 60 to 69-year-old age group: 45.2% in men and 56.1% in women. In the 20 to 29-year-old age group, the diabetes prevalence in Cree women is double the prevalence in men (Table 1). There is a slight decrease in the prevalence in both sexes after 70 years old. However, a higher mortality related to diabetes in this age group may partly explain this observation.

Figure 1. Age and sex-specific diabetes prevalence, Cree population, 20 years old and older, liyiyiu Aschii, July 1, 2007

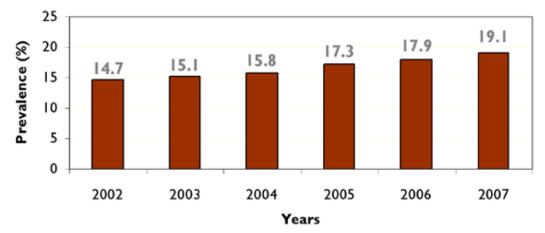


Source: CDIS, July 1, 2007

V. Diabetes prevalence over time

The proportion of Cree adults (20 years old and older) living with a diagnosis of diabetes has significantly increased, from 14.7% in 2002, to 19.1% in 2007 (Figure 2). Over this six-year period, the average increase of diabetes prevalence was 1.1% per year. This observed increase in diabetes prevalence over the years may reflect a combination of several factors: an increase in new diabetes cases diagnosed each year, better screening for diabetes, decreased mortality of patients with diabetes, and an improved registration process (better use of the registration forms) to include patients with diabetes on the CDIS.

Figure 2. Crude diabetes prevalence, Cree population 20 years old and over, liyiyiu Aschii, 2002-2007

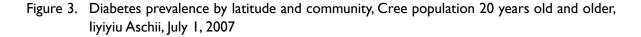


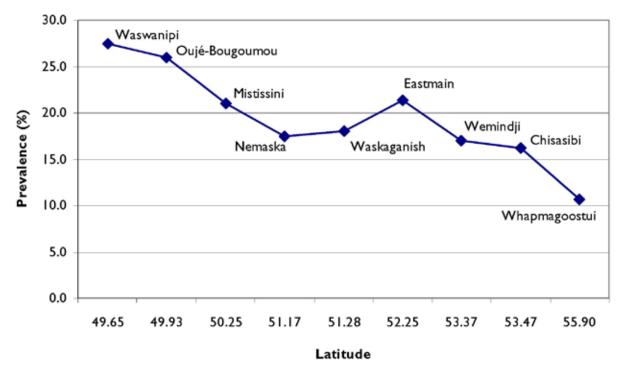
Source: CDIS, July 1, 2007

* * Note: The prevalence for the period 2002-2006 is based on the data from the previous annual diabetes reports. It is not uncommon to have cases reported to the CDIS that date back several years (i.e., diagnosed in 2004, but reported in 2007). These can underestimate the real increase over the years.

VI. Diabetes prevalence by region and community

The James Bay Cree territory is composed of nine communities. Four of them (Waswanipi, Oujé-Bougoumou, Mistissini and Nemaska) are located inland. The other five Cree communities (Waskaganish, Eastmain, Wemindji, Chisasibi and Whapmagoostui) are located on the coast of James Bay. A geographic difference and a north-south gradient in the diabetes prevalence in the Cree population were first reported by Brassard et al. in 1993⁷. Since 1998, the CDIS data have consistently confirmed the same pattern, which is still evident as Figure 3 shows. The diabetes prevalence varies greatly between the communities as Figure 4 demonstrates. The highest diabetes prevalence is reported in Waswanipi (27.5%) and Oujé-Bougoumou (26.0%), and the lowest in Whapmagoostui (10.7%). Overall, the Coastal communities have significantly lower diabetes prevalence compared to the Inland communities (16.6% vs. 22.7%, respectively). This confirms the findings of many other studies that have reported lower diabetes prevalence among the aboriginal populations in more isolated regions compared to the less isolated regions⁸. Although these findings require further investigation, a greater proximity to urban areas and increased access to fast-food facilities may play a role in the observed differences..





Source: CDIS, July 1, 2007

*

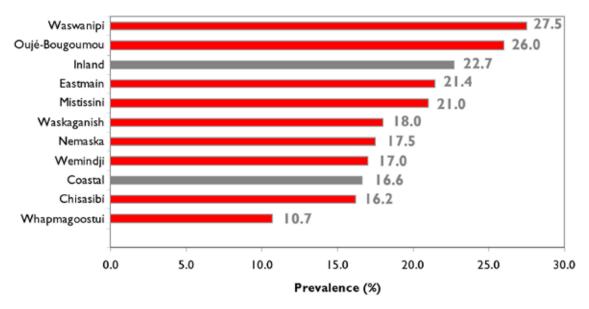


Figure 4. Diabetes prevalence by region and community, Cree population 20 years old and older, liyiyiu Aschii, July 1, 2007

Source: CDIS, July 1, 2007

VII. Age at diagnosis and duration of diabetes

The age at diagnosis and the duration of diabetes were calculated as of July 1, 2007. The average age at diagnosis for diabetes was 42 years compared to 48 years in 1989⁹. Almost half of Cree patients with diabetes (46.5%) were diagnosed before the age of 40. This observation is consistent with others who have reported a younger average age at diagnosis of diabetes in aboriginal populations compared to the general Canadian population². One third (33%) of all patients were diagnosed less than 5 years ago and two thirds (65%) have been diagnosed in the past 9 years (Table 4). The average duration a patient has been living with diabetes is 9 years.

Table 4. Duration of diabetes, Cree population, 20 years old and older, liviyiu Aschii, July 1, 2007

Duration of diabetes (years)	Number of patients	Percentage of all patients with diabetes		
0-4	533	33.7		
5-9	496	31.3		
10-14	251	15.9		
15-19	173	10.9		
20 or more	130	8.2		
Total	I,583	100.0		

Source: CDIS, July 1, 2007

* *

VIII. Diabetes cumulative incidence

I. INTRODUCTION

The incidence of a disease is defined as the number of new cases per 1,000 population that occur during a given period of time in a population at risk for developing the disease¹⁰. The central element in the definition of the incidence is the number of *new cases* per given period. The incidence has been calculated for 3 three-year periods (1998-2000; 2001-2003; 2004-2006) to control for high variability on a year-to-year basis. During each of these periods, all of the individuals aged 20+ in the population were considered at risk if they had not already been diagnosed with diabetes. To compare the incidence during the three time periods, we directly adjusted it for age and sex, using the 1998-2000 population as the standard population. When genders were compared, the cumulative incidence was adjusted for age. When we compared Coastal and Inland communities, the liviyiu Aschii population for the 1998-2000 period was used as the reference. The reference population for the denominator is based on the Cree beneficiaries list for years 1998 to 2000. The statistical significance of differences in incidence was tested by computing the related p-value. A p-value of less than .05 indicates a statistically significant difference.

2. Results

Incidence over time and by gender

Although the absolute number of new cases has increased by 21% between the first and last three-year period (Table 5), the cumulative incidence for the whole region has not changed significantly (Table 6). The incidence in the younger age groups increased, with stable or decreasing incidence of diabetes in the older age groups. However, this trend is significant only for the 20 to 29-year-old population. In 1998-2000, men represented 36% of new cases. This proportion rose to 45% in 2001-2003, and to 46% in 2003-2006 (Figure 5).

Periods	Age	Coastal			Inland			liyiyiu Aschii		
	groups	Μ	F	Т	М	F	Т	Μ	F	Т
1998-2000	20-29									15
	30-39	7	18	25	13	24	37	20	42	62
	40-49	12	31	43	10	20	30	22	51	73
	50-59	15	22	37	П	17	28	26	39	65
	60-69	13	17	30	5	10	15	18	27	45
	70+	5	6	11	7	10	17	12	16	28
	Total**	52	94	146	46	81	127	98	175	288
	· · · · · ·									
2001-2003	20-29			9			8	6	11	17
	30-39	22	29	51	14	20	34	36	49	8!
	40-49	18	26	44	10	25	35	28	51	79
	50-59	18	18	36	12	10	22	30	28	58
	60-69	15	17	32	11	7	18	26	24	50
	70+			10			5	10	5	15
	Total**	73	90	182	47	62	122	136	168	304
				1			1		1	1
2004-2006	20-29	9	16	25	7	15	22	16	31	47
	30-39	22	20	42	25	27	52	47	47	94
	40-49	14	29	43	26	22	48	40	51	9
	50-59	22	20	42	13	10	23	35	30	6!
	60-69	13	11	24	5	8	13	18	19	37
	70+			9			6	6	9	15
	Total**	80	96	185	76	82	164	162	187	349

Total number of new cases of diabetes per three-year period, by sex and age group, Table 5. liyiyiu Aschii, 1998-2006*

Source: CDIS, July 1, 2007

*When the number of a cell is less than 5, it is not reported and the related cells are also masked

** Totals may not match the sum of the columns since some cells are masked

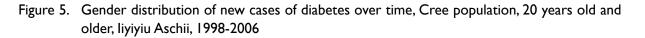
8

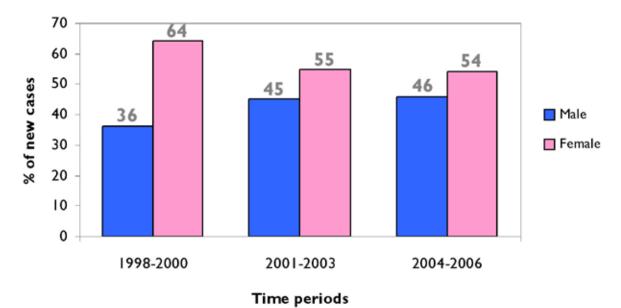
* * *

	1998-2000	2001-2003	2004-2006	
	I _I (95% CI)	I ₂ (95% CI)	I ₃ (95% CI)	
All	16.0 (14.2-17.9)	15.5 (13.7-17.3)	16.9 (15.0-18.7)	
Μ	10.9 (8.8-13.0)	3.5 (. - 5.8)	15.0 (12.5-17.5)	
F	21.4 (18.4-24.4)	17.6 (14.8-20.3)	18.8 (16.0-21.7)	
20-29	2.1 (1.0-3.2)	2.4 (1.3-3.6)	6.7 (4.8-8.6)	
30-39	12.3 (9.3-15.4)	15.2 (11.8-18.6)	15.2 (11.8-18.6)	
40-49	27.7 (21.4-34.0)	25.7 (19.7-31.8)	25.0 (19.0-30.9)	
50-59	43.2 (33.0-53.5)	35.9 (26.5-45.3)	38.0 (28.3-47.6)	
60-69	50.3 (35.9-64.6)	53.7 (38.9-68.4)	43.4 (30.0-56.7)	
70+	33.2 (21.1-45.3)	17.8 (8.9-26.8)	20.7 (11.1-30.4)	

Table 6.Cumulative incidence (per 1,000 population) over time, by gender and age group,
liyiyiu Aschii, 1998-2006

Source: CDIS, July 1, 2007





* * * *

9

Source: CDIS, July 1, 2007

Incidence by region and gender

Although there were slightly more new cases of diabetes in the Coastal communities in each of the three time periods (Table 5), the cumulative incidence was consistently significantly higher in the Inland communities (Table 7). However, when analyses were broken down by gender, this difference was not significant in 2001-2003.

Table 7.	Comparison in diabetes incidence between the Inland and Coastal communities over time,
	Cree population aged 20 years and older, liyiyiu Aschii, 1998-2006

	Inland (I _a)	Coastal (I _b)	I _a - I _b (95%CI)	I _a - I _b (%)	p-value
1998-2000					
All	21.2	13.1	8.2 (5.5-10.9)	63	<.001
Males	14.7	8.8	5.9 (2.8-9.0)	68	<.001
Females	28.2	17.6	10.5 (6.1-15.0)	60	<.001
			·	*	
2001-2003					
All	17.3	14.6	2.7 (0.1-5.3)	18	0.04
Males	14.6	13.0	1.6 (-1.8-5.3)	12	0.37
Females	20.1	16.2	3.8 (-0.1-7.8)	24	0.06
2004 2004					
2004-2006	21.2	144		47	
All	21.2	14.4	6.8 (4.1-9.5)	47	<.001
Males	18.1	13.0	5.1 (1.5-8.6)	39	0.006
Females	24.5	15.9	8.6 (4.4-12.8)	54	<.001

Source: CDIS, July 1, 2007

٠

- * * *

10

Conclusion

The overall crude diabetes prevalence in the Cree population 20 years old and older has increased from 14.7% in 2002, to 19.1% in 2007. In 2007, one in every five Cree adults over 20 was living with diabetes. The diabetes prevalence continues to be almost twice as high in women as in men. This observation deserves special attention, because women who have type 2 diabetes prior to and during their pregnancy are at a much higher risk of maternal and neonatal complications and their children are at a higher risk of obesity and diabetes later in life^{6,11}. As well, the age at diagnosis of diabetes has been getting younger and almost half of the Crees living with diabetes were diagnosed before they had reached 40 years. Furthermore, the fact that two thirds (65%) of all cases of diabetes were only diagnosed in the past 9 years, suggests that there will be a steadily increasing demand on clinical services and human resources in the near future.

Our data suggest a slight increase in the absolute number of new cases of diabetes diagnosed over the past 9 years, though the cumulative incidence (new cases/1,000 population) of diabetes remained relatively stable. Subgroup analysis did show a significant increase in the incidence in both young adults aged 20-29 years old and in all men in liyiyiu Aschii over the 6-year period. It is not surprising, if we consider the fact that the prevalence of obesity, one of the main risk factors for type 2 diabetes related to lifestyle, has dramatically increased in the Cree population over the past ten years². However, it is important to keep in mind that the true incidence of diabetes could be underestimated because of the current process for registering new diabetes cases into the CDIS.

Our report demonstrates that diabetes still remains one of the main public health problems in the Cree territory. This stresses the importance, not only of diabetes primary prevention programs targeting obesity and physical inactivity, but also the implementation of preventive clinical practices to decrease the number of new diabetes cases each year, and to prevent or delay diabetes-related complications in people already diagnosed with the disease. Note that this report discusses only the epidemiological aspect of diabetes in liviyiu Aschii. In the following 6 months, the results of the audit project (medical chart review) on the clinical management of diabetes in the nine Cree communities will be available. The upcoming report will help to identify areas requiring improvement in the clinical management of diabetes and the health care services in liviyiu Aschii.

> * *

References

* * *

- Institut national de santé publique du Québec. Portrait de santé du Québec et de ses régions 2006. Deuxième rapport national sur l'état de santé de la population du Québec. Available on line at: http://www.inspq.qc.ca
- 2. Health Canada. Diabetes in Canada. 2nd edition. Ottawa: Health Canada, 2002.
- 3. Bobet E. Eating habits, exercise and weight in liviyiu Aschii. Results from the 2003 Canadian Community Health Survey. CBHSSJB-INSPQ; May 2007.
- 4. Brennand E, Dannenbaum D, Willow N. Pregnancy outcomes of first nations women in relation to pregravid weight and pregnancy weight gain. *JOGC* 2005; 936-944.
- 5. Rodrigues S, Robinson E, Gray-Donald K. Prevalence of gestational diabetes mellitus among James Bay Cree women in northern Quebec. CMA 1999; 160(9):12931297.
- 6. Mohamed N, Dooley J. Gestational diabetes and subsequent development of NIDDM in aboriginal women of north-western Ontario. Int J Circumpolar 1998; 57 Suppl 1: 355-8.
- 7. Brassard P, Robinson E, Lavallée C. Prevalence of diabetes mellitus among the James Bay Cree of northern Quebec. *Can Med* Ass J 1993; 149(3):303-307.
- 8. Young TK, Emoke JES, Evers S, Wheatley B. Geographical distribution of diabetes among native population in Canada: A national survey". Soc Sci Med 1990; 31:129-39.
- Brossard P, Robinson E, Dumon C. Descriptive epidemiology of non-insulin-dependant diabetes mellitus in the James Bay Cree population of Quebec, Canada. Arct Med Res 1993; 52: 47-54.
- 10. Bernard PM, Lapointe C. Mesures statistiques en épidémiologie. Québec: Presses Universitaires du Québec. 1998.
- Dabelea D, Hanson RL, Lindsay RS et al. Intrauterine exposure to diabetes conveys risks for type 2 diabetes and obesity: A study of discordant sibships. *Diabetes* 2000; 49: 2208-2211.