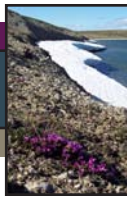


DIABETES IN NUNAVUT 1997-2002





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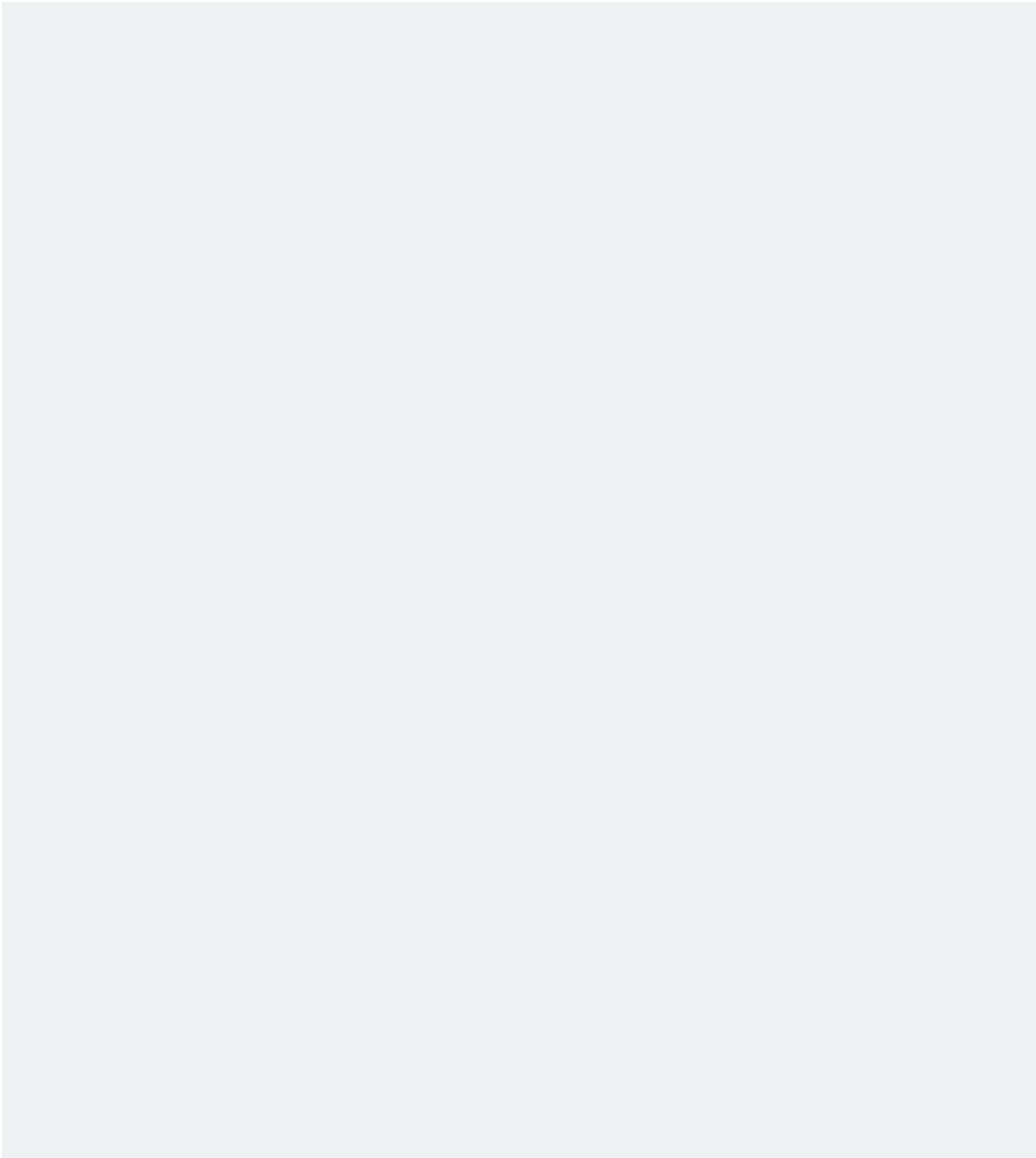
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Cover page: Purple Saxifrage on Amadjuak Lake, Baffin Island (Courtesy Jack Hicks)





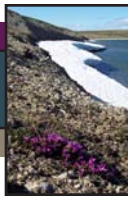
FOREWORD

Diabetes mellitus (DM) is a common chronic condition that can impose a heavy burden of illness and early mortality on people who are affected and complications from this disease can drive a substantial portion of medical resource utilization. In that context it becomes important to have accurate assessments on the prevalence of diabetes in the population to assist policy-makers and public health professionals who develop strategies for managing this condition.

The most effective way to determine prevalence of DM is still debatable but Blanchard et al, from Manitoba showed that health care administrative data can be used to estimate rates over time. The National Diabetes Surveillance System (NDSS) has adopted this methodology and is the method used for determining the Nunavut estimates reported here.

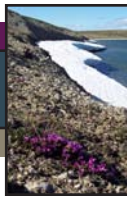
It appears that the prevalence rates of diabetes will most certainly continue to rise. That a large number of these new cases are in a relatively younger group than the rest of Canada implies that the health burden will become increasingly challenging to the Nunavut Health system. "Upstream" population based primary prevention programs targeted particularly at those under 40, need to be aggressively implemented to ensure that the incidence does not begin to increase.

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ACRONYMS

BMI	Body Mass Index
CHN	Community Health Nurse
CIHI	Canadian Institute for Health Information
CTUMS	Canadian Tobacco Use Monitoring Survey
DM	Diabetes Mellitus
GDM	Gestational Diabetes Mellitus
ICD-9	International Classification of Diseases, 9 th revision
IDDM	Insulin-Dependent Diabetes Mellitus
NDDM	Non Insulin-Dependent Diabetes Mellitus
NDSS	National Diabetes Surveillance System (Health Canada Program)
NPHS	National Population Health Survey



REPORT HIGHLIGHTS

- In year 2001-02, it is estimated that 1.72% of Nunavut population had Type 2 diabetes.
- Overall, the prevalence of diabetes in Nunavut was significantly higher in Non-Inuit (4.5%) than in Inuit (0.9%). Prevalence rate for Non-Inuit was about the same as that for Canada in general (4.8%).
- The annual incidence rate of diabetes (0.29%) remained stable over the period of 1997-2002 and on the average, 41 new diabetes cases were diagnosed each year in Nunavut.
- Overall, the occurrence of diabetes was relatively higher among males than females and this pattern was observed for all age categories.
- In Nunavut, the average annual incidence rate of diabetes was significantly higher in Non-Inuit population (0.78%) than the Inuit (0.14%).
- In 2001-2002, 65% of the Nunavummiut living with diabetes were between the age of 20 and 59 years which is significantly different than the national level where only 15% of Canadians in those age groups have diabetes.
- Overweight, obesity and physical inactivity are considered risk factors for the development of the diabetes. In 2000, 30.7% of residents of Nunavut were overweight and 23% were obese. Nearly 50% of Nunavut residents were physically inactive.
- Smoking, hypertension, and abnormal lipid metabolism are risk factors for the complications of diabetes. In 2003, over 65% Nunavummiut (age 15+ years) were smokers compared to 20% of Canadians. The proportion of Nunavut residents diagnosed with high blood pressure was 4.2% compared to 11% of Canadians in general.

Incidence of diabetes in Nunavut has been **relatively stable** from 1998 to 2002

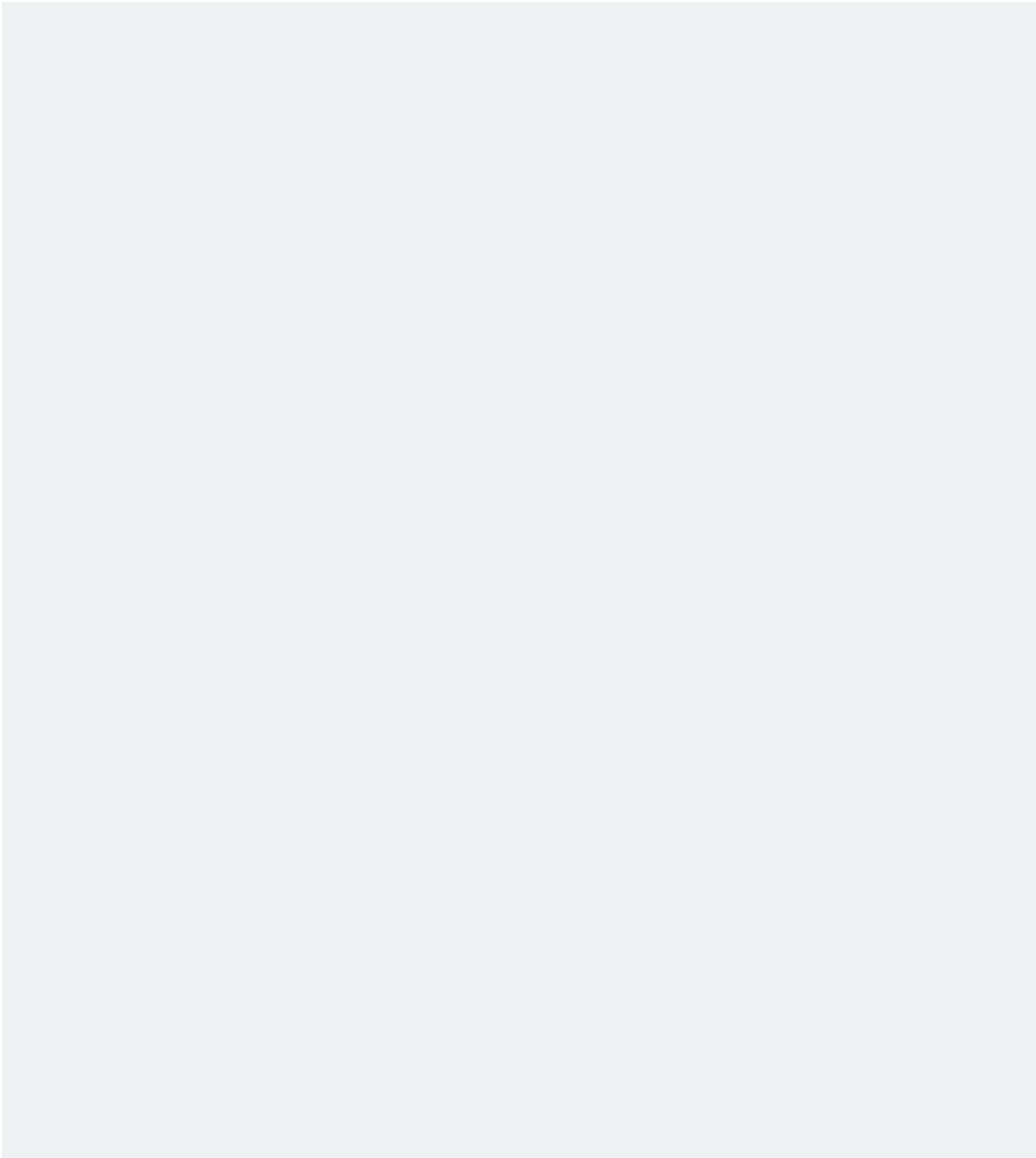




TABLE OF CONTENTS

Acknowledgements	I
Foreword	III
Acronyms	IV
Report Highlights	V
Introduction.....	1
Type 1 Diabetes.....	3
Type 2 Diabetes.....	3
Gestational Diabetes	3
Differences between Type 1 and Type 2 Diabetes.....	3
Diagnosis of Diabetes.....	4
Diabetes in Nunavut.....	5
Data Sources and processing	5
Analysis:	5
Case definition.....	5
Limitations of the Data:.....	6
Incidence of Diabetes in Nunavut.....	6
Prevalence of Diabetes in Nunavut	7
Prevalence by age and gender.....	8
Prevalence in Inuit and Non-Inuit	8
Prevalence by Community	10
Risks for Acquiring Diabetes.....	11
Overweight	11
Physical Inactivity	11
Risks for Complications of Diabetes	12
Smoking.....	12
Hypertension	12
Abnormal lipid metabolism	13
Future Considerations.....	14
Notes	15
References.....	16

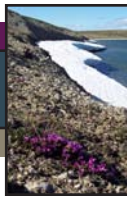


LIST OF FIGURES

Figure 1	Incidence of Diabetes (%) in Nunavut, Males & Females 1997-2002	6
Figure 2	Average Annual Incidence of Diabetes (%) by Age and Gender, in Nunavut, 1997-2002	7
Figure 3	Average Annual Incidence of Diabetes (%) for Inuit and Non-Inuit, Nunavut, 1997-2002	7
Figure 4	Prevalence of Diabetes (%) in Nunavut by Gender, 1997-2002	8
Figure 5	Percent Distribution of Diabetes in Nunavut by Age and Gender, 2001-2002	9
Figure 6	Prevalence of Diabetes (%) for Inuit and Non-Inuit, Nunavut, 2001-2002	9
Figure 7	Prevalence of Diabetes by Community of Residence in Nunavut, 2001-2002	10
Figure 8	Percent Obese in Canada and Nunavut 2000-2002	11
Figure 9	Physical Activity Levels in Nunavut 2000-2002	11
Figure 10	Percent of Smokers Age 15+ in Canada, 2003	12
Figure 11	Percent Distribution of Hypertension in Nunavut, 2001-2002	12
Figure 12	Percent Distribution of Disorders of Lipid Metabolism in Nunavut, 2001-2002	13

APPENDICES

Appendix A.	Nunavut Population Statistics, Census 2001 (Population by age and gender)	17
Appendix B.	Nunavut Population Statistics, Census 2001 (Population by Community of Residence)	17
Appendix C.	International Classification of Diseases (ICD-9) codes for Diabetes Mellitus	17
Appendix D.	Validation of Type 2 Diabetes Cases	18
Appendix E.	The Flow of Data through various stages of NDSS	19



INTRODUCTION

This report provides an overview of Type 2 Diabetes in Nunavut for the period of 1997- 2002 as well as some supplementary information on diabetes that may be of assistance to the population health program staff.

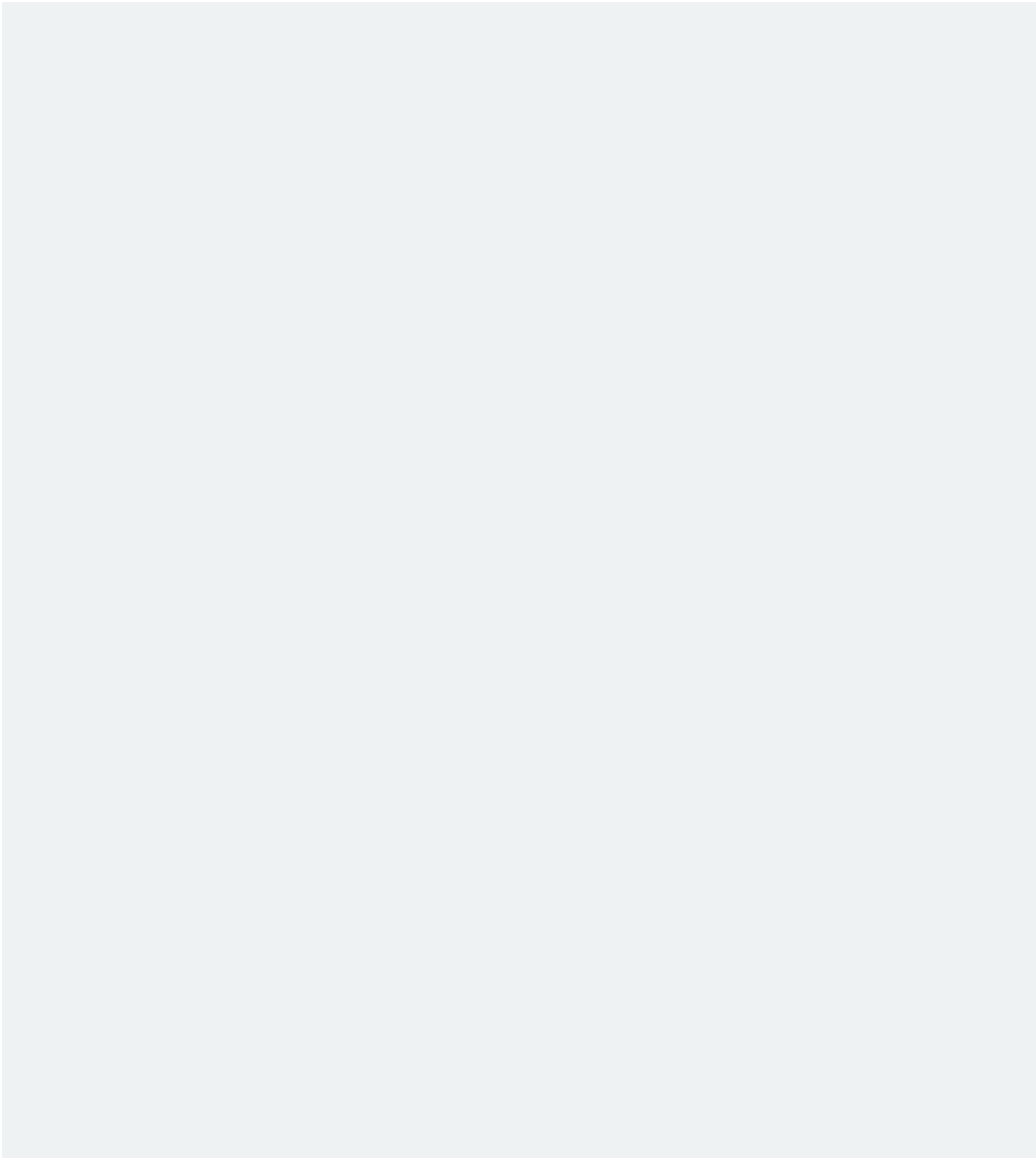
In the past various approaches, including sample surveys have been used in order to obtain population-based estimates of the incidence and prevalence of diabetes. For this report, we have used comprehensive administrative health data to create a population-based database of cases of clinically diagnosed diabetes. There are limitations to this approach as these data rely on the diagnostic reporting of many physicians and community health nurses and clinical precision cannot be assured. It is possible that different diagnostic criteria are being used across the territory.

We are quite confident that the diabetes cases reflected in this database are Type 2 diabetes based on some validation exercises done on the data for years 1995 to 2000. Very few cases have been reported in those who are under 20 years old and although those were confirmed as Type 2, all under 20-year olds were excluded to conform to comparable reporting within the NDSS.

In Nunavut, 70%¹ of primary care is provided by Community Health Nurses and they code differently for gestational and juvenile diabetes, however the practice may not have been consistent. Validation was possible because information on pregnancy is reported at the same time community health reporting. The validation process is described in Appendix D. No cases of juvenile diabetes were identified in this database. We have also taken into consideration the likelihood of our overestimation of incidence in the earlier years of the study and have excluded the first two years when reporting incidence rates.



¹Based on physician and Community submissions over seven years





DIABETES

Diabetes mellitus is a chronic disease that results if the body insufficiently produces and/or improperly uses insulin. Without enough insulin, the cells of the body cannot absorb sufficient glucose from the blood so blood glucose levels increase. If the glucose level in the blood remains high over a long period of time, this can result in long-term damage to organs, such as the kidneys, eyes, nerves, heart and blood vessels. Complications in these organs can lead to death. Diabetes mellitus occurs as several types: Type 1, Type 2 and gestational diabetes.

TYPE 1 DIABETES

Type 1 diabetes, also known as insulin-dependent diabetes mellitus (IDDM), typically occurs in childhood or early adolescence. In Type 1 diabetes, the immune system attacks the insulin-producing cells in the pancreas and destroys them. As a result, the pancreas then produces little or no insulin. Type 1 diabetes is believed to be caused by a combination of genetic factors and environmental stressors.¹

TYPE 2 DIABETES

Type 2 diabetes, also known as non insulin-dependent diabetes mellitus (NIDDM), is the most common form of diabetes that accounts for more than 90% of diagnosed diabetes and almost all undiagnosed diabetes.¹ Type 2 diabetes typically occurs after the age of 40 years and is found in a higher proportion of individuals who are considered overweight. Individuals with Type 2 diabetes are usually insulin resistant.

GESTATIONAL DIABETES

Gestational diabetes mellitus (GDM) occurs in some women during pregnancy. These women develop glucose intolerance that can be treated with diet and/or insulin. In most cases, it ends after birth.

DIFFERENCES BETWEEN TYPE 1 AND TYPE 2 DIABETES

Patient symptoms and Family history are more often used in differentiating the two types.

- Type 1 diabetes is most often diagnosed in children with a peak incidence during the pre-adolescence. Type 2 diabetes is more common in people over age 40, but it can occur at any age. There is an increase in this form of the disease among overweight youth.
- Untreated Type 1 diabetes is usually accompanied by weight loss, but with Type 2 diabetes there is more likely to be weight gain.
- Patients with Type 1 diabetes are insulin dependent, i.e. they will die without the hormone replacement, whereas those with Type 2 diabetes may require insulin to control the blood sugar but will not die in the short term without it, although they will develop the long-term complications that could ultimately be fatal.

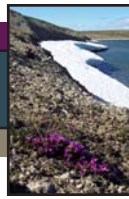


DIAGNOSIS OF DIABETES

In 1997, the new criteria for diagnosis and classification terminology were developed.³ All diabetes is diagnosed by one of three criteria:

- symptoms of diabetes (fatigue, excessive thirst, excessive urination and unexplained weight loss) plus a casual (any time during the day) plasma glucose value of ≥ 11.1 mmol/L, OR
- a fasting (no caloric intake for at least 8 hours) plasma glucose test (FPG) of ≥ 7.0 mmol/L. (In 1998, the criterion was lowered from 7.8 to 7.0; this likely resulted in an increase in the number of individuals with a diagnosis of the disease), OR
- A plasma glucose value in the 2-hour sample (2hPG) of the oral glucose tolerance test (OGTT) ≥ 11.1 mmol/L.

These criteria are now included in the 2003 Clinical Practice guidelines.² Note that these same guidelines preclude the use of glycosylated haemoglobin (A1C) in the diagnosis of diabetes due to the lack of standardization of the test.



DIABETES IN NUNAVUT

DATA SOURCES AND PROCESSING

This data primarily reflects Type 2 diabetes in Nunavut. Small samples in the pre-2000 years were reviewed as part of a validation exercise (Appendix D), to eliminate cases that were not Type 2. However, we cannot absolutely rule out that some cases of Type 1 or gestational diabetes were coded as Type 2.

Data on diabetes cases was obtained from the following four data sources:

- 1) Community Health Reporting Database. This is information on all patients seen in Community Health Centres by a nurse. In 24 out of 25 communities, there are no resident physicians and patients are seen by a Nurse Practitioner or Community Health Nurse.
- 2) Hospital database, which identifies all hospital billings for Nunavut residents
- 3) Physician database, which identifies physician billing for Nunavut residents.
- 4) Registration database that contains a listing of all insured persons within the territory, thus enabling the identification of all Nunavummiut.

ANALYSIS:

The analysis was performed as part of the National Diabetes Surveillance System (NDSS) and is primarily descriptive (see Appendix E for an overview and data processing flow). NDSS is an experimental model that attempts to compile a complete provincial/territorial profile of selected health indicators (in this case diabetes) using administrative databases. It aims to provide baseline data on rates of new and prevalent cases of diabetes. ICD-9 codes used for diabetes are provided in Appendix C.

CASE DEFINITION:

Individuals in the administrative database were defined as having clinically diagnosed diabetes if they had at least two separate physician or nurse practitioner claims for diabetes within two years of each other or at least one hospital separation record with a diagnosis of diabetes. NDSS uses the methodology initially developed by Blanchard et al. 1996.¹⁵



LIMITATIONS OF THE DATA:

Data is derived from administrative databases and depends on diabetes cases being recognized and diagnosed. The primary health care provider reports the actual diagnosis but the criteria for the assignment of a diabetes diagnosis may not be standard throughout the territory.

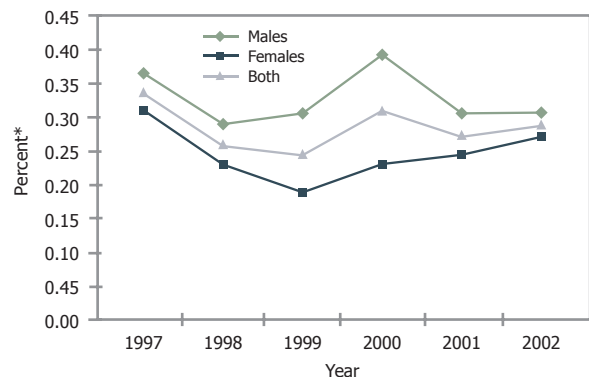
INCIDENCE OF DIABETES IN NUNAVUT

Information on Diabetes cases has been collected in the NDSS system since 1995 and the information for the first two years (1995 and 1996) was excluded because it was not possible to distinguish between prevalent and new cases in those start up years.

Incidence rate of diabetes is the number of **newly diagnosed cases** per population at risk for the disease during a specific period. It is the rate at which new events occur in a population and is a measure of the disease propagation. Appendix A and B contain the census 2001 population used as denominator.

The average annual incidence of Diabetes in Nunavut (1997 to 2002) was 0.29%.

Figure 1.
Incidence of Diabetes (%) in Nunavut, Males & Females 1997-2002



* % of gender specific population.
Diabetes cases under 20 years old were excluded.

The **average annual incidence** of Diabetes in Nunavut (1997 to 2002) was **0.29%**.

The incidence of diabetes can be considered to be relatively stable from 1998 to 2002 (Figure 1) and any upward trend was not statistically significant ($p=0.72$). This is not unexpected in Nunavut since easy local access to "junk foods" and changes in eating behaviours are a relatively recent event (within the past ten years).

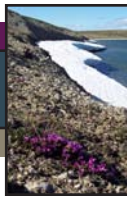


Figure 2.
Average Annual Incidence of Diabetes (%) by Age and Gender in Nunavut, 1997-2002

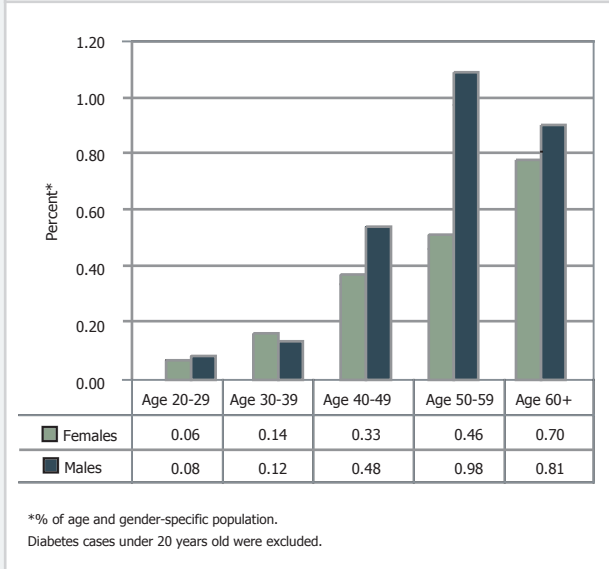
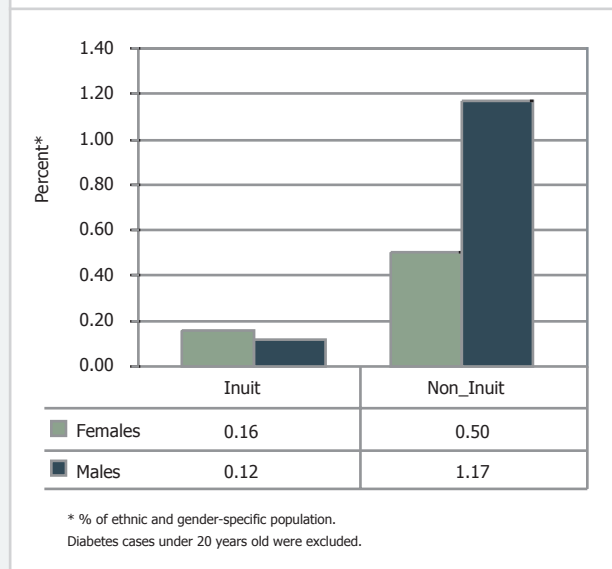


Figure 2 shows the average number of new cases in the six-year period. Most of the new cases of diabetes in Nunavut are under 60. After age 40 there are significantly more males than females getting diabetes.

In Nunavut, the average annual incidence rate (Figure 3) differs significantly between Inuit and non-Inuit with higher rates in the Non-Inuit. Also of note is the difference by gender in the Non-Inuit population, with more males getting diabetes than females.

Incidence of diabetes was **higher in Non-Inuit** population (0.78%) than Inuit (0.14%)

Figure 3.
Average Annual Incidence of Diabetes (%) for Inuit and Non-Inuit, Nunavut, 1997-2002





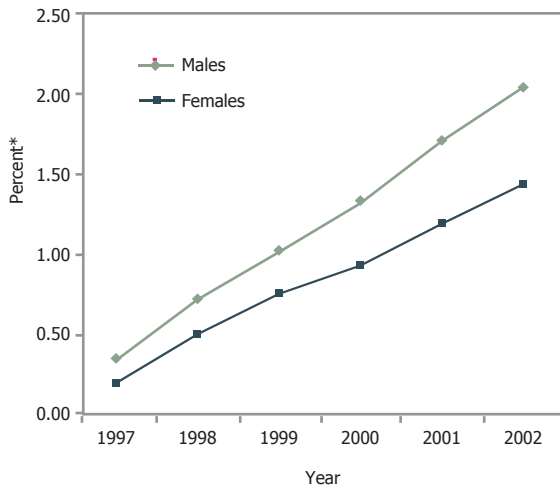
PREVALENCE OF DIABETES IN NUNAVUT

Prevalence of diabetes is the number of individuals in the population with the disease at a specific point in time. Prevalence gives an idea of the burden of disease at a given time and is widely used in public health monitoring and planning.

The prevalence of diabetes in Nunavut during the fiscal year 2001-02 was 1.72%.

The **prevalence of diabetes** in Nunavut during the fiscal year 2001-02 was **1.72%**.

Figure 4.
Prevalence of Diabetes (%) in Nunavut by Gender, 1997-2002



* % of gender-specific population.
Diabetes cases under 20 years old were excluded.

The annual period prevalence was calculated by adding all new incident cases occurring in one year to all the incident cases from previous years, excluding those who died or moved out of the Territory prior to the beginning of the year.

The prevalence of diabetes (Figure 4) will increase every year, as long as the number of incident cases of diabetes keep increasing with a very few number of deaths due to diabetes.

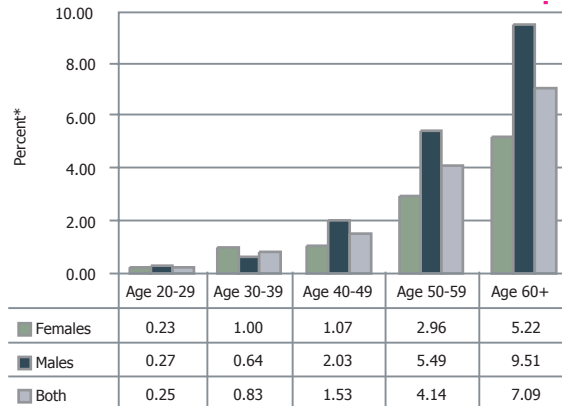


PREVALENCE BY AGE AND GENDER

We have examined the prevalent cases of diabetes in the last fiscal year of the study 2001-2002. Figure 5 shows the prevalence in the 2001-02 fiscal year by age and gender. The age distribution of the cases in Nunavut is interesting because a very large proportion, 49%, of the cases are under 60 whereas NDSS reported the majority 83% of Diabetes cases in the general Canadian population to be over 60 years old.¹

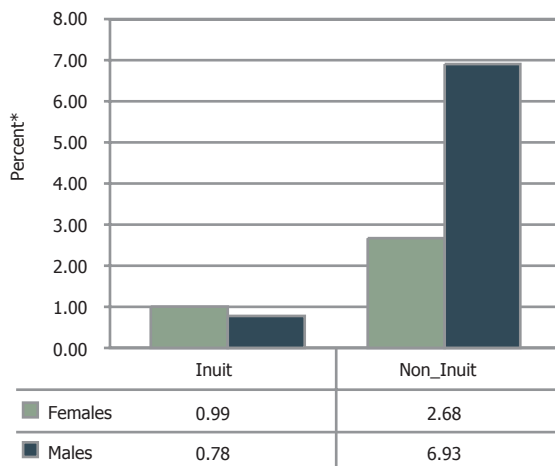
83% of Canadians with diabetes are **over** 60 years old, in Nunavut, 49% are **under** 60 years old.

Figure 5.
Percent Distribution of Diabetes in Nunavut by Age and Gender, 2001-2002 (Cases=244)



*% of age and gender-specific population.
Diabetes cases under 20 years old were excluded.

Figure 6.
Prevalence of Diabetes (%) for Inuit and Non-Inuit, Nunavut, 2001-2002



* % of ethnic and gender-specific population.
Diabetes cases under 20 years old were excluded.

PREVALENCE IN INUIT AND NON-INUIT

Figure 6 shows that in the Inuit most of the cases are female. Although different from Canadians in general (where the majority of the cases are male), this is similar to that reported for other first nations.⁴

More Inuit females have diabetes than Inuit males

More Inuit females have diabetes than Inuit males



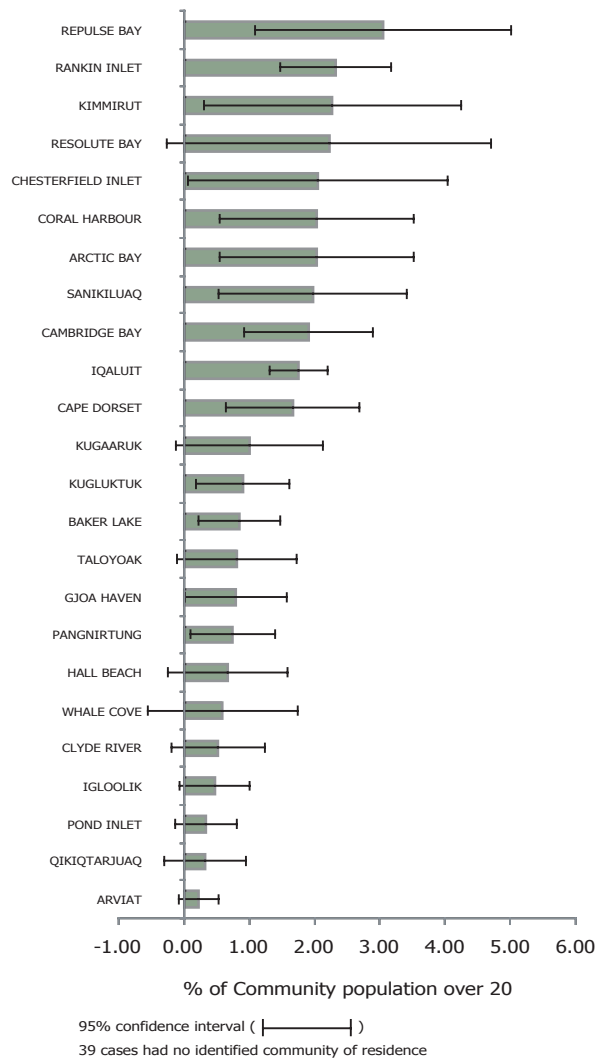
Prevalence of diabetes in Nunavut **is higher in non-Inuit (4.5%)** than in Inuit (0.9%)

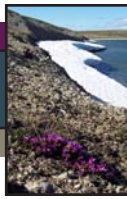
Overall, the prevalence of diabetes in Nunavut is significantly higher in non-Inuit (4.5%) than in Inuit (0.9%). Prevalence rates for the non-Inuit in Nunavut are similar to those reported by the NDSS for Canadians in general. (4.8%)¹, but the rates in Inuit are lower.

PREVALENCE BY COMMUNITY

Figure 7 shows the distribution of diabetes cases in Nunavut by community. The rates are shown as a percent of the respective community population that is over 20. The 95% confidence interval (CI) bar shows the range within which the true value will fall 95% of the time. When comparing rates between communities, if the CI bars overlap, then the difference between the two rates is not considered to be statistically significant.

Figure 7. **Prevalence of Diabetes by Community of Residence in Nunavut, 2001-2002**



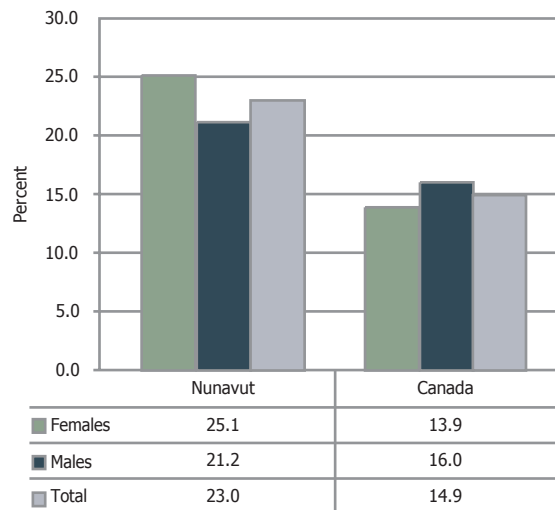


RISKS FOR ACQUIRING DIABETES

OVERWEIGHT

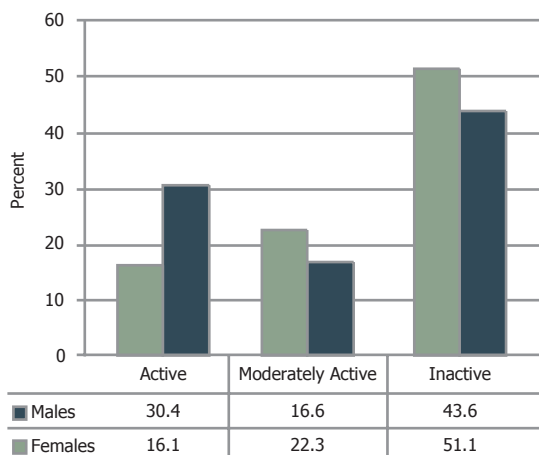
Diabetes is more common in individuals who are overweight. The risk of developing Type 2 diabetes increases with the amount of excess weight, the duration of the obesity, and the central deposition of fat.^{5, 6} 30.7% of Nunavut residents are overweight and 23% are obese. A similar number of Canadians are overweight, but fewer are considered obese.⁷

Figure 8.
Percent Obese in Canada and Nunavut
2000-2001



Source: Canadian Community Health Survey-Cycle 1.1, 2000;ISQ

Figure 9.
Physical Activity Levels in Nunavut
2000-2001

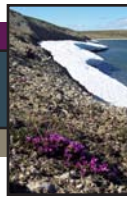


Source: Canadian Community Health Survey-Cycle 1.1, 2000;ISQ
No Response for 9.4% of males and 10.5% of females surveyed.

PHYSICAL INACTIVITY

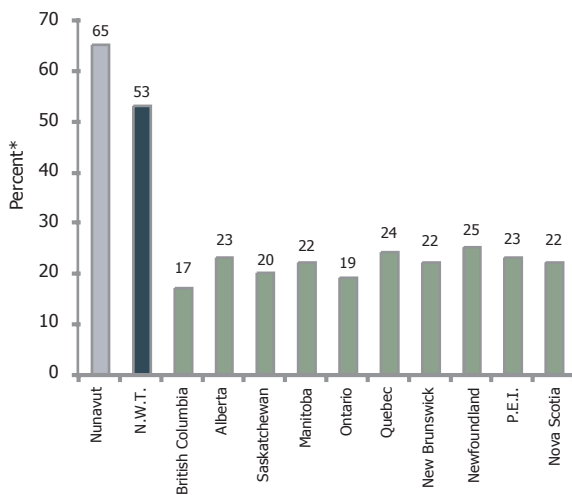
Physical inactivity leads to a higher risk for the development of diabetes. The NPHS estimates energy expenditure during leisure time. Individuals who expended 1.5 kilocalories/kg or less every day were classified as physically inactive.⁸

In 2000-01, nearly half of Nunavut residents were inactive, and less than one quarter reported an active lifestyle.⁷



RISKS FOR COMPLICATIONS OF DIABETES

Figure 10.
Percent of Smokers Age 15+ in Canada, 2003



* Data was collected for individuals 18-49 years old in NWT and no data was reported for Yukon.
Source: Canadian Council for Tobacco Control, National Survey on Tobacco Control, June 2003.

Diabetes has many complications for which there are a number of risk factors, such as cigarette smoking, abnormal lipid levels, and high blood pressure.⁹

SMOKING

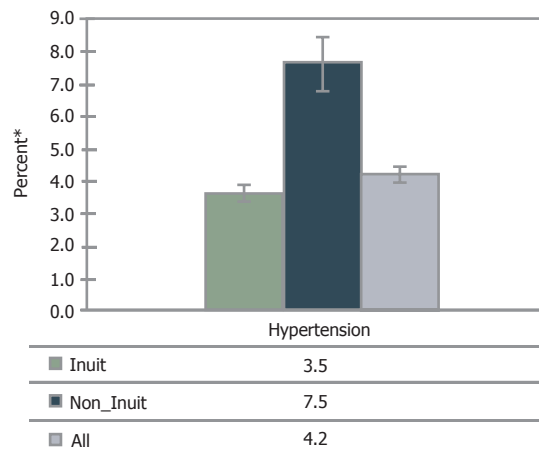
Cigarette smoking is a risk factor for the complications of diabetes. Nunavut has the highest rate of smoking in Canada. According to June 2003 survey conducted by the Canadian Council for Tobacco Control (Figure 10), 65% of Nunavut population (age 15+) smoked daily compared to 20% of Canadians.

HYPERTENSION

Overall, the prevalence of Hypertension (see note 1) in Nunavut was 4.2% which is lower than the national rate (11%) reported in 1998/99.¹⁰

Hypertension rates are **lower in Nunavut** than the rest of Canada

Figure 11.
Percent Distribution of Hypertension in Nunavut, 2001-2002



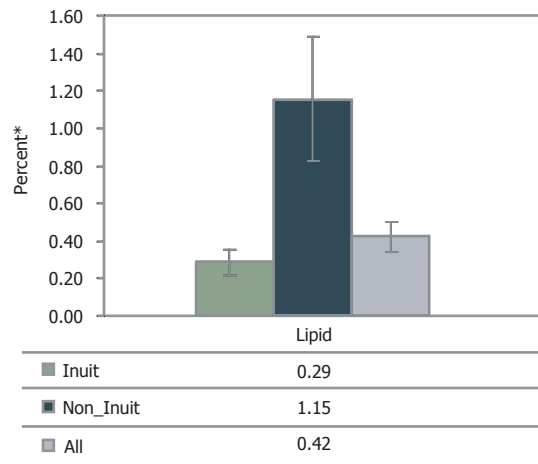
* % of ethnic-specific population.
95% confidence interval (I—II).



ABNORMAL LIPID METABOLISM

Disorders of lipid metabolism (see note 2) are less common in Inuit than non-Inuit in Nunavut. Control of these risk factors for diabetes complications forms an essential part of a comprehensive diabetes control program. Since high blood pressure is associated with obesity and physical inactivity, maintaining a healthy weight and remaining physically active will also protect against the complications of diabetes.^{11, 12}

Figure 12.
Percent Distribution of Disorders of Lipid Metabolism in Nunavut, 2001-2002



* % of ethnic-specific population.
95% confidence interval (I—|).



FUTURE CONSIDERATIONS

This report describes the prevalence of Diabetes in Nunavut. The database is created from recorded visits to a health facility between 1995 and 2002. The limitation of this method is that the number of cases may be underestimated because it is dependant on diagnosis. The American Diabetes Association reported that 29%¹³ of all diabetes cases tend to be undiagnosed and it would be helpful to assess to what extent DM is undiagnosed in Nunavut.

These results are suggestive of a number of future research priorities. The low prevalence of DM in this remote northern territory suggests that some protective factor exists. Research is required to determine whether this is due to greater adherence to traditional lifestyle practices such as hunting, fishing and consumption of raw wild game, or genetic factors.

There is a need to establish population-specific norms for measures like BMI and health officials could use this information to identify future screening needs for all age groups, especially with reports of obesity among children.

It is important to establish a process to monitor the quality and delivery of care practices for diabetes patients in Nunavut. Programs that monitor control of blood sugar and high blood pressure in diabetics can support prevention of complications in diabetics.

**NOTES:**

1. Case definition for hypertension used:
If a record had at least 1 of the ICD-9 codes in the range of 401 and 405.9 during the fiscal year April 1st 2001 through March 31st 2002.
2. Case definition for disorders of lipid metabolism used:
If a record had at least 1 of the ICD-9 codes in the range of 272 and 272.8 during the fiscal year April 1st 2001 through March 31st 2002.



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APPENDIX A

Nunavut Population Statistics, Census 2001 (Population by age and gender)

Age	Inuit		Non Inuit	
	Females	Males	Females	Males
00 - 09	3210	3045	260	205
10 - 19	2780	2620	165	155
20 - 29	1755	1830	385	390
30 - 39	1615	1665	580	365
40 - 49	895	925	505	355
50 - 59	600	595	345	225
60 - 69	360	330	70	35
70 - 79	165	95	15	5
80+	55	40	5	10
Total	11435	11145	2330	1745

Source: Nunavut Bureau of Statistics.

APPENDIX B

Nunavut Population Statistics, Census 2001 (Population by Community of Residence)

City	Population (age 20-)
Arctic Bay	345
Arviat	895
Baker Lake	820
Cambridge Bay	735
Cape Dorset	600
Chesterfield Inlet	195
Clyde River	385
Coral Harbour	345
Gjoa Haven	500
Hall Beach	300
Igloolik	635
Iqaluit	3310
Kimmirut	220
Kugaaruk	300
Kugluktuk	665
Nanisivik	70
Pangnirtung	670
Pond Inlet	585
Qikiqtarjuaq	310
Rankin Inlet	1205
Repulse Bay	295
Resolute Bay	135
Sanikiluaq	355
Taloyoak	370
Whale Cove	170

Source: Nunavut Bureau of Statistics.

APPENDIX C

International Classification of Diseases (ICD-9) codes for Diabetes Mellitus

ICD-9-CM*	Description
250.0	Diabetes mellitus without mention of complication
250.1	Diabetes with ketoacidosis
250.2	Diabetes with hyperosmolar coma
250.3	Diabetes with other coma
250.4	Diabetes with renal manifestations
250.5	Diabetes with ophthalmic manifestations
250.6	Diabetes with neurological manifestations
250.7	Diabetes with peripheral circulatory disorders
250.8	Diabetes with other specified manifestations
250.9	Diabetes with unspecified complication

* International Classification of Diseases, 9th Edition, Clinical Modification.



APPENDIX D

VALIDATION OF TYPE 2 DIABETES CASES

All records with ICD-9 code of 250 (Type 2 diabetes) for fiscal year 1995-96 to 1998-99 were crossed checked against the community health records for the public health codes (P01.01 to P01.08) for pregnancy. These would represent the Gestational Diabetes Mellitus (GDM) mistakenly coded as Type 2 diabetes. Note: The community health records represent 82% of people seen and does not include those who saw a physician as first line of care.

Results:

No cases of Type 2 diabetes in the database were identified as being pregnant at the same time. A separate analysis of the community health database did show some cases of GMD correctly coded as 648.0.

APPENDIX E

AN OVERVIEW OF THE NATIONAL DIABETES SURVEILLANCE SYSTEM AND DATA PROCESSING AT PROVINCIAL/TERRITORIAL LEVEL

The National Diabetes Surveillance System (NDSS) is an initiative of the Chronic Disease Surveillance Unit of Health Canada. The major goal of NDSS is to provide a nationally standardized database on diabetes across national/regional levels in support of public health activities.¹⁶ The system derives information relating to diabetes by using existing provincial/territorial administrative databases. The flow of data processing is illustrated on the following page.



Flow of Data through various stages of NDSS

