

**RESPONDING TO THE  
CHALLENGE OF  
DIABETES IN CANADA**

**First Report of the  
National Diabetes Surveillance System (NDSS)  
2003**

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GlaxoSmithKline Inc. The full list of participants as well as persons currently involved in NDSS committees are listed in this report or its appendices. We thank all current and past members of NDSS for their contributions.

## EXECUTIVE SUMMARY

Diabetes is a serious and growing public health problem in Canada, particularly in Aboriginal populations. The morbidity and mortality associated with diabetes are increased considerably by complications such as heart disease and stroke, blindness, kidney disease, nerve disease and amputations.

To date, there has been a lack of ongoing, systematic, validated Canadian analysis for basic prevalence and other diabetes information. The National Diabetes Surveillance System (NDSS) is the mechanism developed to provide improved data about diabetes. It is a network of regionally distributed diabetes surveillance systems that compile administrative health care data relating to diabetes, and send aggregate anonymous data to Health Canada for national analyses.

This is the first report comprehensively describing NDSS. It covers:

- ▼ the original concept of using health care administrative databases to track disease burden in a population;
- ▼ studies that have demonstrated the feasibility and validity of the concept;
- ▼ activities directed towards assessing and improving provincial/territorial capacity to participate in NDSS;
- ▼ strengths and limitations of the NDSS approach;
- ▼ structure and governance;
- ▼ a special focus on Aboriginal populations;
- ▼ methods of data capture;
- ▼ prevalence and mortality data; and
- ▼ future plans, including validation of a diagnostic algorithm for diabetes in people under 20 years of age.

Highlights of NDSS data include the following:

- ▼ prevalence of diabetes among adult Canadians in 1999/2000 was 5.1%;
- ▼ 1,196,370 adult Canadians were living with diagnosed diabetes in 1999/2000;
- ▼ Canadian adults with diabetes are twice as likely to die prematurely compared with adults without diabetes; and
- ▼ 41,483 adult Canadians with diabetes died in 1999/2000.

NDSS represents the first time that a coordinated, national use of administrative data for public health surveillance purposes has been undertaken. NDSS can measure prevalence, incidence and outcomes over time for both the nation as a whole and for specific regions. Also for the first time, NDSS can compare health services use and other health outcomes of people with and without diabetes. With these features, NDSS is also a prototype of enhanced capacity and infrastructure to support surveillance for other diseases that can be tracked through the health care system.

Canada was in a unique position to develop this type of surveillance system, given its publicly funded health insurance generating person-specific administrative data. NDSS use of multiple databases offers information on diabetes that is far superior to what would be possible using one source alone. The resultant rich source of data can

be used not only for surveillance but also for examining many policy and research questions.

Perhaps most importantly, NDSS was the catalyst for exciting partnerships with various jurisdictions across Canada cooperating to achieve the shared goal of reducing the burden of diabetes.

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## ACRONYMS

<b>APLSF</b>	Annual Person Level Summary File
<b>BMI</b>	Body Mass Index
<b>CABG</b>	Coronary Artery Bypass Grafting
<b>CCHS</b>	Canadian Community Health Survey (Statistics Canada)
<b>CDA</b>	Canadian Diabetes Association
<b>CDS</b>	Canadian Diabetes Strategy
<b>CIHI</b>	Canadian Institute for Health Information
<b>CIHR</b>	Canadian Institutes for Health Research
<b>DCC</b>	Diabetes Council of Canada
<b>DM</b>	Diabetes Mellitus
<b>EHR</b>	Electronic Health Record
<b>F/P/T</b>	Federal/provincial/territorial (governments)
<b>FNIHB</b>	First Nations and Inuit Health Branch
<b>FTE</b>	Full-time Equivalents
<b>FY</b>	Fiscal Year
<b>HISP</b>	Health Infostructure Support Program
<b>ICD-9</b>	International Statistical Classification of Diseases and Related Health Problems (v. 9)

<b>ICES</b>	Institute for Clinical Evaluative Sciences
<b>IDDM</b>	Insulin Dependent Diabetes Mellitus
<b>INMD</b>	Institute of Nutrition, Metabolism and Diabetes
<b>MOU</b>	Memorandum of Understanding
<b>NDSS</b>	National Diabetes Surveillance System
<b>NIDDM</b>	Non-Insulin Dependent Diabetes Mellitus
<b>NWT</b>	Northwest Territories
<b>O&amp;M</b>	Operating and Maintenance Financial Mechanism (Health Canada)
<b>P/T</b>	Provincial/territorial governments
<b>PIRC</b>	Performance Indicator Report Committee
<b>PPHB</b>	Population and Public Health Branch
<b>PTCA</b>	Percutaneous Transluminal Coronary Angioplasty
<b>RCMP</b>	Royal Canadian Mounted Police
<b>RFA</b>	Request for Applications
<b>RIW</b>	Resource Intensity Weight
<b>SAS®</b>	Statistical Analysis Software

## INTRODUCTION

Diabetes is a serious, chronic, systemic disease characterized by the body's inability to sufficiently produce and/or use insulin – a hormone produced by the pancreas that assists with the conversion of glucose (sugar) into energy. Without insulin, blood sugar levels rise to dangerous levels, interfering with the proper nourishment of body cells.

The burden of illness associated with diabetes is increased by the fact that people with diabetes are at greater risk of other diseases than people without diabetes. This risk is strongly related to high blood sugar and the duration of diabetes. Chronic high levels of blood glucose can lead to heart disease and stroke, retinopathy (the leading cause of adult blindness in Canada), kidney disease, amputations, nerve disease (including erectile dysfunction) and other complications.

Diabetes has been diagnosed in over one million Canadians. Projections based on our aging population indicate that the burden of diabetes and its complications will increase considerably.

The Government of Canada recognizes that diabetes is a complex health problem and a national challenge. In 1999 it pledged \$115 million over five years to the development of a **Canadian Diabetes Strategy (CDS)** to enable Canadians to benefit more fully from the considerable resources and expertise available across the country.

The CDS allows the Government of Canada to move forward in three areas of vital importance:

- ▼ The development of a health promotion-disease prevention strategy for the entire population.
- ▼ The provision of care, treatment and prevention for First Nations people on reserve and for those in Inuit communities.
- ▼ The improvement of national and regional data about diabetes and its complications.

The present report describes progress made towards meeting the need for information that will assist Canada to respond in an organized and integrated way to the challenge of diabetes. In particular, this report describes the National Diabetes Surveillance System (NDSS) – a network of regionally distributed diabetes surveillance systems. The network was developed, implemented and coordinated through collaboration among governments, industry and several non-government agencies and Aboriginal groups committed to reducing the burden of diabetes in Canada.

In 1999, the first *Diabetes in Canada* report highlighted the need for better data, in particular, data on the prevalence and incidence of diabetes, its complications, the use of health services, and the effectiveness of prevention and control initiatives. NDSS represents a major milestone in achieving this.

This report is the first in a series designed to describe NDSS. As such, it delves into the background and history of the project more than will future reports. It also presents data that serve to indicate the types of information that are currently available or will be forthcoming from NDSS.

# THE CHALLENGE OF DIABETES

## Diabetes as a Personal Challenge

Diabetes affects people of all ages. **Type 1 diabetes** (formerly referred to as insulin-dependent diabetes mellitus or IDDM) usually begins during the first two decades of life.

In type 1 diabetes, the immune system destroys the insulin-producing cells of the pancreas. Although the process is poorly understood, a combination of genetic factors and environmental stressors, such as viruses, is believed to be the trigger.

Type 1 diabetes requires treatment with insulin throughout the rest of life and is associated with a high incidence of complications. Type 1 diabetes usually results in a reduction in quality of life and a shortened lifespan.

**Type 2 diabetes** (formerly referred to as non-insulin-dependent diabetes mellitus or NIDDM) occurs most often in obese individuals over the age of 40. In contrast to people with type 1 diabetes, who do not produce enough insulin, some people with type 2 diabetes are “insulin resistant” and are not able to use the available insulin to control blood sugar.

Type 2 diabetes may be controlled by weight loss, exercise and medication taken orally. However, for some people with type 2 diabetes, daily insulin injections may be required. Life expectancy is also reduced in people with type 2 diabetes.

A third type of diabetes – **gestational diabetes** – occurs during pregnancy and usually resolves after delivery. Gestational diabetes can result in an increased incidence of very large babies and pre-eclampsia (toxemia of pregnancy).

Gestational diabetes is a strong risk factor for type 2 diabetes later in life.

Better information about risk factors for diabetes, complication rates, quality and expectation of life, and the efficacy of prevention and care approaches could contribute greatly to the outlook for Canadians with diabetes.

## Diabetes as a National Challenge

In 2000 in Canada, diabetes was estimated to affect about 5% of the population aged 20 years and over. The direct treatment costs for people with diabetes have been estimated at \$400 million annually for hospital care and prescription drugs. In addition, there are costs for treating complications and for physician care, costs borne by patients, and indirect costs such as premature death, disability, and care-giving.

Canada has previously estimated the burden of diabetes by using mortality data, hospital data, self-report surveys or American data. These provide underestimates for various reasons, including missed diabetes-related hospitalizations and deaths, variable response rates to surveys, participation and self-report bias, the unreliability

of self-report, and relatively small samples in surveys. The appropriateness of extrapolating estimates from American data is also limited by the differing age structure and ethnic backgrounds of the Canadian and American populations.

### **Diabetes as a Particular Challenge for Aboriginal People in Canada**

Aboriginal people, especially First Nations, began speaking of a diabetes epidemic in the 1980s. Since then, Canadian research has confirmed the high and increasing prevalence of diabetes in these populations.

Other features of diabetes in First Nations groups are earlier age at onset of type 2 diabetes, greater severity at diagnosis and higher complication rates.

This burden of disease is associated with unique challenges in prevention and care. Information is urgently needed to help tailor prevention, diagnosis and treatment to the circumstances of Aboriginal populations in Canada.

# THE NATIONAL DIABETES SURVEILLANCE SYSTEM (NDSS) – A RESPONSE TO THE CHALLENGE

Although diabetes has attracted the attention and efforts of various organizations and levels of government, it is apparent that the magnitude of the problem demands a comprehensive and collaborative strategy for control. In 1996 a number of physicians, diabetes educators, non-government organizations, epidemiologists and researchers concerned about the lack of ongoing systematic information surrounding this major public health problem proposed a national surveillance system for diabetes.

Can information systems designed primarily as tools for budgeting and billing be used to provide disease-specific information that will benefit all Canadians?  
YES!

Following the 1996 discussions, the Diabetes Council of Canada (DCC), a coalition of diabetes-related non-governmental organizations, Aboriginal groups and federal agencies, championed a national surveillance effort as one of its initiatives. The National Diabetes Surveillance System (NDSS) Steering Committee was formed in 1997 and began developing the concept of a surveillance system that would maximize the potential value of administrative data to support diabetes surveillance.

## The Original Concept

The concept for NDSS was based on initial contributions from Young et al.<sup>1</sup> and Blanchard et al.<sup>2,3</sup> It was also a response to the National Forum on Health, which encouraged the use of existing provincial/territorial administrative databases in support of public health activities in Canada.<sup>4</sup>

Underlying the NDSS concept is the assumption that the clinical path of diabetes from detection to the treatment and management of complications theoretically makes it possible to track the diabetes burden through various client interactions (physician visits, hospitalizations, etc.) within the provincial and territorial health care systems.

Tracking is possible because data are captured routinely in the provision of publicly funded, insured health services in the various jurisdictions and are stored in three major provincial/territorial administrative databases – physician claims files, hospital files, and health insurance registries.

## Feasibility

In 1999, a pilot project conducted in the three Prairie provinces (Alberta, Saskatchewan, and Manitoba) demonstrated the feasibility of the NDSS approach to data collection and the development of inter-government agreements for surveillance using provincial administrative data.<sup>5</sup> The project was funded by the Government of Alberta and Health Canada's Health Infrastructure Support Program (HISP), with significant in-kind contributions from Manitoba and Saskatchewan.

The project extended an existing diabetes surveillance system operating in Manitoba to Saskatchewan and Alberta and identified a method for reconciling variations in the three provincial health information systems so that the same core body of software could be used in all three provinces.

The initial project anticipated the transfer of person-level data to a central database held within Health Canada. However, this model was abandoned after review of provincial legislation regarding the privacy of personal health data. In its stead, a model was developed for the creation of person-specific databases of health information that would remain within each participating province/territory and an aggregate, anonymous data set that each province and territory would transmit to Health Canada.

The surveillance system developed through this project provided estimates of the incidence and prevalence of diabetes for each year of data provided by the provinces/territories. It also demonstrated that event rates for approximately 40 complications of diabetes as well as health services use can be generated for both the population with diabetes and the population without.

### Disease Surveillance for Public Health

Public health surveillance has been defined as "the **ongoing, systematic** collection, **analysis**, and **interpretation** of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know. . ."<sup>6</sup>

Disease surveillance collects information in order to define the magnitude of the problem, to portray its natural history, to identify populations at particular risk, to monitor changes in disease frequency and risk factors, to evaluate the impact of disease control approaches, to generate hypotheses and stimulate research, and to aid planning.

Many of the techniques and methods of disease surveillance have been developed in relation to both infectious and chronic diseases. Cancer surveillance, in particular, has spurred the development of methods for case ascertainment (cancer registration), projections and record linkage.

One of the challenges of disease surveillance is to balance the need for information against the right to privacy. Methods developed to date have demonstrated that responsible surveillance using personal information is possible without sacrificing privacy.

The surveillance model can provide ongoing, systematic collection and analysis of public health data, suitable for dissemination to the public, for health planning and for use by health professionals.



## The NDSS Model

NDSS represents the first time that coordinated national use of administrative data for public health surveillance purposes has been undertaken. Thus, NDSS has moved into largely uncharted waters at both the provincial/ territorial and federal levels.

The balancing of practical considerations and epidemiological methods is at the heart of the NDSS design, which departs from other national health information systems in several important ways:

- ▼ The provinces and territories, Aboriginal groups and Health Canada are equal partners, with Health Canada's Centre for Chronic Disease Prevention and Control assuming a central coordinating role.
- ▼ Capacity in data capture and analysis is developed within the provinces and territories.
- ▼ NDSS is a network of regionally distributed diabetes surveillance systems rather than a central repository.
- ▼ Health data related to individuals are held exclusively within the domain of the provinces and territories, and no personal health data are transferred outside a province or territory.
- ▼ Aggregate anonymous data are transmitted to a central location.
- ▼ Long-term, ongoing data collection enables longitudinal analyses.
- ▼ Provinces, territories and Aboriginal groups have an important role in organizing administrative data and in interpreting the results of analyses.

Although these features compound the difficulty of start-up and implementation, they help build regional capacity to enable provinces, territories and Aboriginal groups to use their own data to answer questions unique to their needs. This is a strong incentive to buy-in, helping to ensure the long-term survival of NDSS.

### NDSS Goals

- ▼ A national standardized database for diabetes surveillance, with long-term monitoring for diabetes-related complications through the integration of new and existing databases
- ▼ Ongoing surveillance of diabetes and its complications in each province and territory, and in the Aboriginal community
- ▼ Dissemination of national comparative information to assist in effective prevention and treatment strategies by public health departments, Aboriginal communities, non-governmental organizations and private industry
- ▼ A basis for evaluating economic/cost-related issues regarding the care, management and treatment of diabetes in Canada

### Capacity-Building

The capacity to participate in NDSS was identified as a challenge, requiring some of the most resource-intensive activities. A capacity assessment was conducted in each province and territory to identify capacity inequities. Appendix A contains a description of the domains assessed. Solutions to inequities included placement of officers in jurisdictions, placement of hardware and software, systems development, and upgrading and integration of databases.

These solutions have not yet resulted in uniform capacity across the country; several jurisdictions still require significant amounts of work to move forward. However, this has not slowed the overall progress because stakeholders have agreed to the practice of “providing data as ready rather than waiting for the picture to be complete.” By early 2003, eight provinces and three territories had supplied data to NDSS: Yukon Territory, Northwest Territories and Nunavut, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Nova Scotia and Prince Edward Island. The other provinces, New Brunswick and Newfoundland and Labrador, are in the process of building their infrastructure and capacity in order to participate. Capacity also needs to be addressed for participation of Aboriginal groups.

At the provincial/territorial level, NDSS has built capacity for and interest in both diabetes surveillance in particular and chronic disease surveillance in general. Most provinces and territories have enhanced the surveillance capacity demonstrated by NDSS. A summary of their activities in these areas is contained in Appendix B.

## Strengths and Limitations

Administrative databases have been proposed as sources of population surveillance of diabetes,<sup>1-3</sup> and are held to be accurate, timely and a cost-effective source of surveillance data. The opportunity to use them for disease surveillance is a strong advantage both economically and strategically over having to collect new data. Nevertheless, because administrative databases exist primarily for purposes other than disease surveillance, they may not be ideal in some respects.

Administrative data cover the entire population, can be obtained without directly contacting individuals, are not subject to recall bias, and are

### NDSS Basic Principles

**Consistency** - A core set of variables is collected in every province/territory on an ongoing systematic basis.

**Flexibility** - Additional data can be collected within individual provinces or territories in accordance with their unique needs (e.g. data from prescribed drug use).

**Quality** - Data are validated and the collection means are modified to ensure ongoing data integrity across the country.

**Cost-effectiveness** - NDSS uses existing data sources.

**Accessibility** - Data are available to the general public under conditions agreed to by the Steering Committee, in accordance with prevailing policies and regulations regarding federal, provincial, territorial, and Aboriginal data.

**Confidentiality** - Personal identifiers are removed, and only aggregate data are shared.

**Responsiveness** - Current information is disseminated to public and private stakeholders, thus enabling a prompt response to changing trends in diabetes.

largely computerized. Publicly funded health insurance in Canada is not dependent on income and covers almost the entire Canadian population. Funding exceptions are people under federal jurisdiction (e.g. in the military, in the RCMP, and in federal correctional facilities); however, they still have access to provincial/territorial health services and their records of service use are included in the regional administrative data. Medical services outside the publicly funded system are not included; these

### Attributes of the NDSS System

- ▼ Distinct roles and responsibilities for provinces and territories, the federal government, Aboriginal groups, and other parties
- ▼ A shared data dictionary for coordinating and comparing the administrative databases across provinces and territories
- ▼ Three domains of measurement: descriptive epidemiology, complications and co-morbidities, and health services utilization
- ▼ A discrete set of outcomes related to health services and health status that can generally be implemented across most provinces and territories
- ▼ Ability to produce annual person-specific summarizations of health services and health status information for surveillance purposes
- ▼ The option of using various case definitions
- ▼ A series of aggregate datasets that reflect the major domains of measurement and measured outcomes, and a strategy for sharing data with parties outside the provinces or territories where the person-specific data are held
- ▼ Software to run the system
- ▼ The ability to conduct longitudinal analyses

services are of limited availability in Canada, and most are not regarded as medically necessary.

Disadvantages in using administrative databases include the absence of detailed clinical information and information on determinants of health; duplication of information resulting from hospital transfers and people accessing services in more than one jurisdiction; and current inability to differentiate among the three types of diabetes. Also, administrative data include information only on those who use health services; for people with diabetes, only those with a diagnosis from a health professional are included.

The requirement that Health Canada use only anonymous aggregate data for national analyses may, at first, appear to be a serious constraint. However, because the aggregate data transferred to Health Canada can be customized to analysis needs, the model is not limiting. Furthermore, as discussed later, data access guidelines allow researchers to enter into agreements with provinces, territories, and Aboriginal groups for use of their data in *bona fide* research.

NDSS represents the first time that a coordinated national use of administrative data for public health surveillance purposes has been undertaken.

## STRUCTURE AND GOVERNANCE

The NDSS governance structure (Figure 1) includes a multi-stakeholder Steering Committee, several working groups, Aboriginal community groups, national coordination and technical support based at Health Canada, and technical staff within each province and territory.

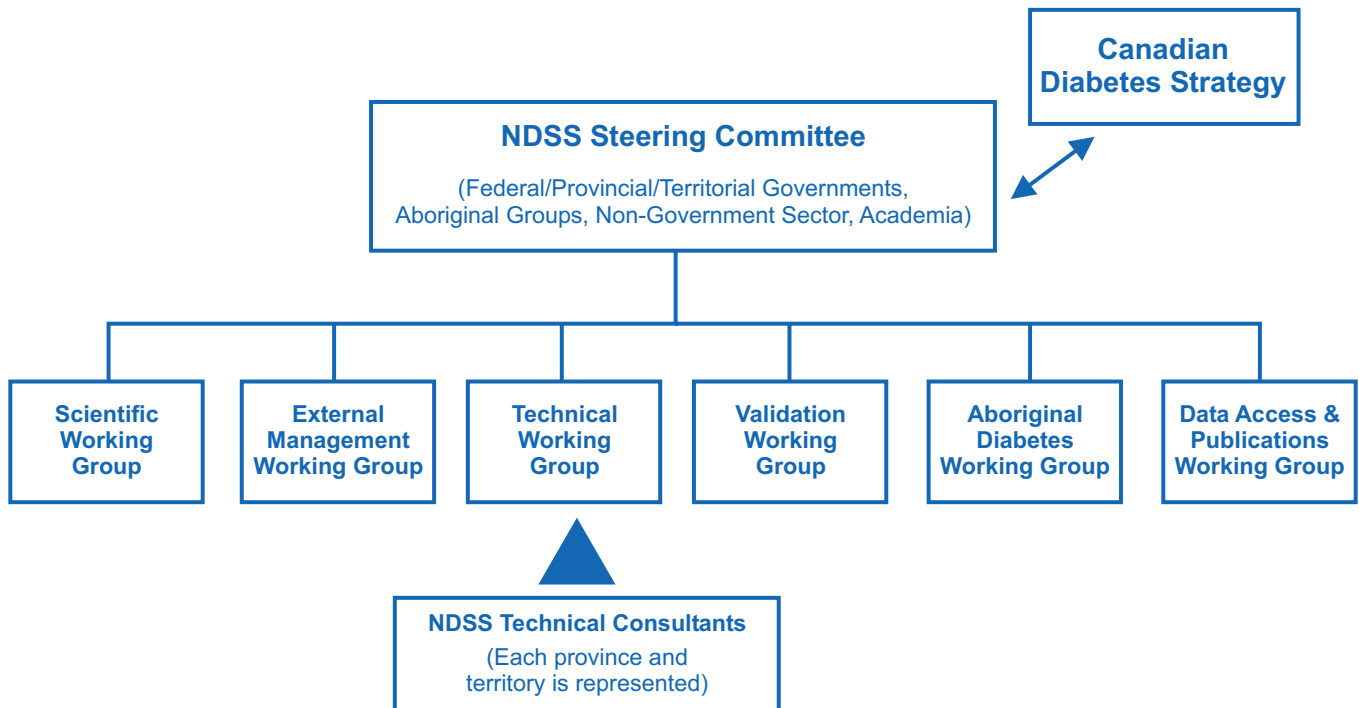
### Steering Committee

The Steering Committee (Table 1) is the main decision-making body of NDSS. The Steering Committee reviews all NDSS activities, including recommendations by working groups, and

coordinates the publication and dissemination of information products directly resulting from NDSS activities. This body also acts as gatekeeper for NDSS national data, determining under what conditions NDSS-related data are to be made available to partners and third parties, with appropriate input and direction from data originators and custodians.

Any private-sector sponsors of NDSS may have observer status on the Steering Committee but do not have voting rights.

**Figure 1.**  
**NDSS Governance Structure**



**Table 1.**  
**Steering Committee Membership**  
(See Appendix C for names of members)

### **Provincial/Territorial Governments**

Yukon  
Northwest Territories  
Nunavut  
British Columbia  
Alberta  
Saskatchewan  
Manitoba  
Ontario  
Quebec  
New Brunswick  
Prince Edward Island  
Nova Scotia  
Newfoundland and Labrador

### **Non-Government Organizations**

Canadian Diabetes Association  
Canadian Institute for Health Information  
Canadian Institutes of Health Research  
Diabetes Council of Canada

### **Aboriginal Groups**

Assembly of First Nations  
Congress of Aboriginal Peoples  
Inuit Tapiriit Kanatami  
Métis National Council  
National Aboriginal Diabetes Association

### **Federal Government**

Health Canada – Centre for Chronic  
Disease Prevention and Control  
Health Canada – First Nations & Inuit Health  
Branch  
Statistics Canada

### **Academics/Clinicians (2)**

*Note: GlaxoSmithKline Inc. is a pioneering sponsor of NDSS and has observer status on the NDSS Steering Committee*

## **Working Groups**

Six working groups meet independently as needed and report to the NDSS Steering Committee. Working group activities and responsibilities are presented in Table 2 and current members are listed in Appendix D.

## **Partnerships**

Partnerships are central to the NDSS, which has set a number of precedents in this area. Agreements are in place with some Aboriginal groups, the Canadian Institutes of Health Research, Health Canada, and the provinces and territories.

During 2000 to 2002, Health Canada and each of the 10 provinces and 3 territories signed Memoranda of Understanding (MOUs), which set forth the terms for administering federal funding for NDSS under the direction of the Steering Committee and through Health Canada's Operating and Maintenance (O&M) financial mechanism. The form of the MOUs is contained in Appendix E.

Three-way partnership activities among Aboriginal groups (First Nation, Métis, Inuit or other Aboriginal people in rural and/or urban locations), Health Canada and the respective provincial or territorial health ministry began in 2001. So far, MOUs have been signed in two regions – all First Nations in British Columbia and those in one area of Quebec.

**Table 2.**  
**Working Groups and Areas of Responsibility**

---

**External Management Working Group**

- ▼ guides interactions with key external stakeholders
- ▼ oversees efforts to obtain non-federal funding
- ▼ manages all other aspects of public relations
- ▼ developed agreements between governments for data activities
- ▼ developed a duality of interest policy
- ▼ developed guidelines for fundraising and sponsorship

**Data Access and Publications Working Group**

- ▼ develops policies around conditions of NDSS data access, ownership, and publication
- ▼ develops an annual publishing plan

**Aboriginal Diabetes Working Group**

- ▼ promotes the development of the Aboriginal component of NDSS
- ▼ provides technical leadership
- ▼ provides guidance in relation to Aboriginal data ownership, access, and privacy
- ▼ guides the development of a Memorandum of Understanding (MOU) between Aboriginal partners, respective provinces/territories and Health Canada

**Validation Working Group**

- ▼ advises the NDSS Steering Committee on standardization of the surveillance case definition
- ▼ determines which variables are to be collected
- ▼ decides on methods to be used for database validation

**Scientific Working Group**

- ▼ provides support and advice to the Steering Committee on research initiatives/approaches to improving diabetes surveillance and analysis of NDSS data
- ▼ focuses on the state of knowledge of diabetes

**Technical Working Group**

- ▼ focuses on the methods and algorithms for data development and programming
- ▼ is responsible for the evolution of the NDSS software
- ▼ translates into practice the scientific ideas proposed by the validation and scientific groups
- ▼ fosters innovations for generating improved data products

**Technical Consultants**

- ▼ responsible for the implementation of the NDSS software and hardware
  - ▼ documents the unique characteristics of the provincial/territorial databases
-



## Responsibilities

### *Health Canada*

Under the MOUs, Health Canada, through its Centre for Chronic Disease Prevention and Control, agrees to provide the resources needed to coordinate NDSS activities nationally. These include, but are not limited to, monitoring of national NDSS-related staff, infrastructure support of national NDSS-related personnel, participation on committees and working groups as appropriate, coordination of standardized data extraction and linkage, and establishment and maintenance of the central database of aggregate data from the provincial/ territorial/Aboriginal partners. Coordination also involves liaising with the various working groups, providing secretariat support, and promoting a coordinated work plan. In addition, Health Canada liaises with non-governmental partners with regard to private-sector funding for activities approved by the Steering Committee.

### *Provinces and territories*

As signatories to the Memorandum of Understanding, all 13 provinces and territories are responsible for administering NDSS activities in their area, notably the maintenance of required software and the transfer of aggregate data to Health Canada. Provinces and territories also monitor regionally located NDSS-related personnel, provide infrastructure support for regional NDSS-related personnel, and participate on committees and working groups as appropriate. Provinces and territories are responsible for submitting resource allocation information for each year to the Steering Committee.

### *Aboriginal groups*

The Aboriginal partners in NDSS have several roles. Initially, Aboriginal partners facilitate identification of their members in NDSS datasets prepared by the provinces and territories. Subsequently, Aboriginal partners contribute knowledge about and network within their membership to support data interpretation, use of appropriate communication styles, and dissemination. Aboriginal partners also anticipate a leadership role in applying NDSS findings to plan, implement, and evaluate diabetes strategies and to develop policy.

## Guidelines

Appendix F presents guidelines relating to three areas – duality of interest; fundraising and sponsorship; and data access and publication. Highlights from each area are presented below.

### *Duality of interest*

Within the context of membership on the Steering Committee, a situation involving duality of interest may arise in two ways: first, if a member has the opportunity to influence the business decisions of the Steering Committee in a way that could lead to personal financial gain for the member or his/her family; and second, if a member's interests are opposed to the interests of the Steering Committee.

Disclosure of duality of interest is an agenda item for all meetings, and such disclosures are recorded in the minutes. A member shall not vote on, approve or recommend approval of a transaction or contract with which he or she is associated. Therefore, members with a conflict of interest are required to absent themselves from the meeting during discussion of any items pertaining to the conflict.

### ***Fund-raising and sponsorship***

A unique aspect of NDSS is the opportunity for private-sector sponsorship. One of the roles of the Canadian Diabetes Association (CDA), a non-governmental founding partner, was the mobilization of private sector sponsorship, most notably that of GlaxoSmithKline Inc. in 1999.

Principles for fund-raising have been established to ensure an open and transparent process. Private sponsors have no influence on the decisions and activities of NDSS, and cannot directly benefit from public knowledge generated by NDSS. Eligible sponsors are required to provide long-term commitment and to have an appropriate fit between NDSS and corporate business priorities.

### ***Data access and publication***

This policy outlines the procedures believed necessary to process research requests efficiently while ensuring both consideration of the public interest and full compliance with legislation. The policy covers data collected, linked and/or analyzed with the assistance of NDSS resources. Data and data products that can be accessed are unpublished aggregate data that reside at Health Canada, person-level data that reside at provincial and territorial sites, and NDSS programming codes.

The guidelines for data access cover:

- ▼ guiding principles (e.g. that the provinces, territories, and Aboriginal groups must be in agreement with any and all uses of their respective data);
- ▼ uses of data and products;
- ▼ ethical review for access;
- ▼ requirements to request access;
- ▼ disclosure (i.e. before release, reports containing any data requested through NDSS, or reports generated using NDSS data will be reviewed);
- ▼ protection of privacy and confidentiality; and
- ▼ destruction.



## FOCUS ON ABORIGINAL POPULATIONS

The prevalence of diabetes in some First Nations populations is three to five times the national rate. Rates are even higher in some First Nations language groups, and there is a north-south gradient, with people in the south having higher diabetes rates than those in isolated northern communities.<sup>7-9</sup>

Rates of diabetes in other Aboriginal groups vary.<sup>9-11</sup> In the 1991 Aboriginal Peoples' Survey, self-reported diabetes prevalence was 5.5% among Métis and 1.9% among Inuit.<sup>10</sup>

In some Aboriginal populations, the prevalence rate of diabetes is three to five times the national rate.

Diabetes also develops at an earlier age among First Nations people and, in recent years, type 2 diabetes has been diagnosed in children.<sup>12</sup> Almost one-third of First Nations women with diabetes report first being given the diagnosis during pregnancy.<sup>7</sup>

Factors that pose a risk to Aboriginal populations are both heredity and lifestyle. The relatively recent shift from traditional diets high in animal protein to “modern urban diets” high in carbohydrates, combined with decreased physical activity, result in high levels of obesity that compound pre-existing risks for diabetes.

NDSS contains an “Aboriginal component” intended to address some of the unique information concerns of these populations. NDSS has endorsed the need to have Aboriginal people involved in its development.

### Identifying Aboriginal Data

To identify records as belonging to an Aboriginal group, data routinely collected and managed by the province or territory are linked to the Aboriginal group's membership information in the province or territory. A temporary “identifier” is attached to selected records to allow extraction of Aboriginal-specific data. Routine NDSS calculations and data aggregation are then applied, and approved aggregate data files are submitted to Health Canada for national reporting.

A more complex and outstanding issue is how to identify and then create diabetes surveillance data for the urban Aboriginal population that includes non-status Indians.

### Basic Principles

After review of the proposed NDSS model in 1999, Aboriginal representatives' questions about using personal health information led to the development of principles specific to their interests. These principles define aspects of the partnership arrangement and augment the basic NDSS principles. In particular, they address the need to identify and then minimize possible risks associated with the introduction of nominal membership lists into NDSS processes. Specifically, the Aboriginal partners require the following:

- ▼ **Consent** - An Aboriginal organization with legitimate authority to represent a unique group of Aboriginal people would provide consent before any work begins in diabetes surveillance.

- ▼ **Confidentiality** - The province or territory would not release Aboriginal data without the Aboriginal partner's approval.
- ▼ **Privacy** - Aboriginal groups would have enforceable assurances that the privacy of their membership lists and that of members is protected when their information is used to identify Aboriginal people within pre-existing NDSS datasets.
- ▼ **Data Storage** - Aboriginal partners would specify where, for how long, and under what conditions data storage occurs, if at all.
- ▼ **Ownership and Control** - Aboriginal groups would hold principal ownership of NDSS non-nominal, person-level data and would specify when and under what conditions others may have access to the data. Aggregate data would be released for national reporting, and access by others would be controlled by the MOU and existing NDSS policy.

## Partnerships

The proposed collaboration involves three-way partnerships among Aboriginal groups, provinces/territories and Health Canada. The process for forming these partnerships is influenced by the priorities of all three parties and by each Aboriginal group's unique political and social history that defines inter-governmental relations. Rarely does either the history or current relations facilitate discussion.<sup>13</sup>

Staff shortages and constraints can interfere with moving the recognized problem of diabetes into the active phase of a decision-maker's agenda. Also, Aboriginal leaders are often fully focused on more urgent political or social threats and must follow the established protocol for communicating issues to membership and gaining their support in new initiatives. Yet, despite these difficulties, concerns are being allayed and partnerships are forming.

Progress includes development of two MOUs. One MOU in Quebec involves the Cree Board of Health and Social Services of James Bay; the other MOU in British Columbia involves the First Nations Chiefs' Health Committee, First Nations Summit. In these regions, there was a pre-existing infrastructure and a data-sharing process ready to accommodate the opportunity to carry out diabetes surveillance. Other First Nations, Métis and Inuit groups are considering or are involved in developing MOUs to participate in diabetes surveillance. Though this work will take time, the models for an MOU in British Columbia and Quebec will assist this process.

## METHODS OF DATA CAPTURE

NDSS uses person-specific administrative databases organized originally to support payment of claims under publicly funded health insurance. In Canada, publicly funded health insurance is mainly the responsibility of the provinces and territories and covers almost the entire population.

NDSS uses three types of databases, which exist in all provinces and territories and can provide data by fiscal year: the physician claims file, the hospital file, and the health insurance registry. These databases are linked by a unique lifetime identifier that is usually an encryption of the personal health insurance number.

In each province and territory, the files are restricted to residents to avoid duplicate counting of people, since tracking individuals who live in one jurisdiction but obtain much of their care in another or who migrate back and forth between provinces is problematic. NDSS does not yet use other data sources, such as prescription drug use databases, that are either not consistent or not available across the country.

The provincial/territorial physician claims file and the hospital file supply numerator data; the health insurance registry supplies denominators and socio-demographic characteristics.

### Physician Claims File

Physicians' services performed in hospital, office or clinic are captured in the physician claims file. With few exceptions, each physician claim contains only one diagnosis, coded using ICD-9.<sup>14</sup> Some provinces allow up to three diagnostic codes per claim. NDSS uses only the

first code for consistency. This may result in systematic under-reporting but generates comparable data for describing trends.

The physician claims file is central to the diabetes case-ascertainment algorithm and to algorithms being developed for estimating complications and health services use. Information in the claims file about payments for services may also be useful as algorithms are developed to refine estimates of the economic burden of diabetes.

**Table 3.**  
**Percentage (%) of Physicians Paid**  
**only on a Fee-For-Service Basis**

Province	Fiscal Year	
	1995/96 <sup>15</sup>	1999/00 <sup>16</sup>
British Columbia	92	79
Alberta*	98	98
Saskatchewan	84	82
Manitoba*	47	40
Ontario*	94	93
Quebec	62	61
New Brunswick	52	58
Prince Edward Island*	92	63
Nova Scotia*	74	62
Newfoundland and Labrador	73	46

\* *shadow billing*

A limitation of the claims file is that physicians not paid on a fee-for-service basis are not always required to submit medical claims. Table 3 shows the distribution by province of physicians

paid only on a fee-for-service basis. Other payment schemes include salary, contract, capitation, and partial fee-for-service. Alternative payment of physicians is more frequent for some specialties, in remote areas, and for some primary health care centres. However, in some jurisdictions physicians under alternative payment schemes are still expected to remit service information, otherwise known as “shadow billing”.

## Hospital File

Information about each hospital visit or stay is collected at discharge using an abstracting form. Diagnoses are coded using ICD-9 or ICD-9-CM. All jurisdictions except Quebec currently submit discharge abstract data to the Canadian Institute for Health Information, where data quality edits are conducted<sup>17</sup> and the data are compiled into the Discharge Abstract Database (DAD). Quebec uses a similar process for data quality checks.

The diagnostic information is used in the diabetes case ascertainment algorithm (although fewer than 2% of cases have only a hospital diagnosis<sup>18,19</sup>). Although there may be several diagnostic codes for a single admission, only the first three are used because of data limitations in some provinces and territories. Also, records relating to day surgery are excluded because some provinces do not include these procedures in their hospital discharge files.

## Health Insurance Registry

The registry contains a record for each person entitled to coverage under the provincial/territorial health insurance scheme. NDSS abstracts sex, date of birth (to calculate age)

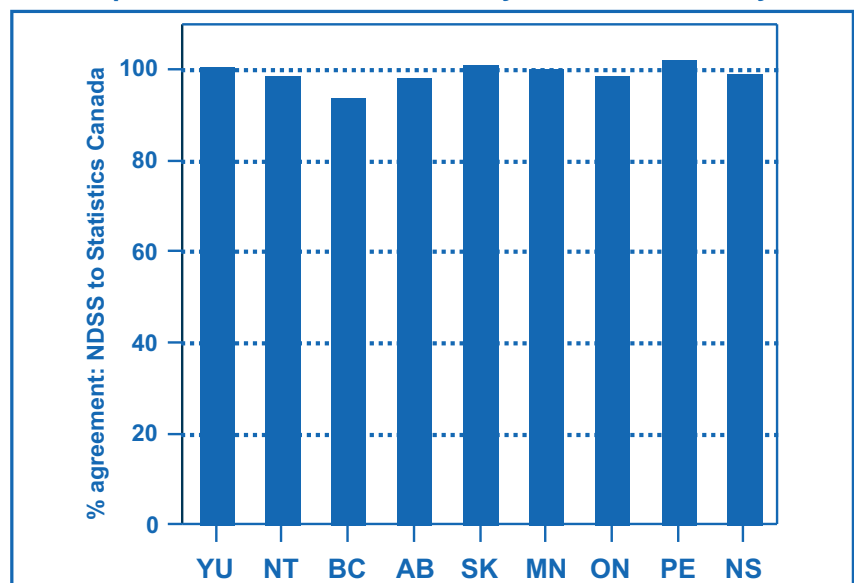
and geographic code from this file (even though the information may also exist in the other files).

The registry is also used to determine whether people using hospital or medical services are residents. Hospital records or records of physicians’ services with health insurance numbers not in the registry file for that year are excluded from further processing.

The registry file supplies denominators for rate calculations. Therefore, assessments of the registry’s accuracy for this purpose are needed. In particular, how closely this file represents the population depends upon its being regularly updated with deaths and migrations.

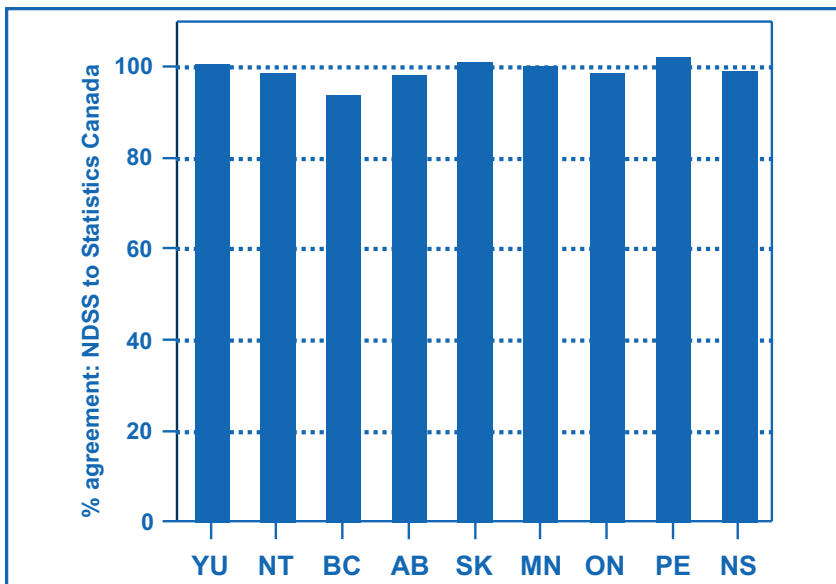
Generally, the date of death, or information allowing its estimation, is recorded in the registry. Comparisons of provincial/territorial death counts with counts from Statistics Canada (Figure 2 and Appendix G) have demonstrated that, for most jurisdictions, the registry is updated with death information. Some problems have been identified with updates in British Columbia.

**Figure 2.**  
**Comparison of NDSS with Statistics Canada Deaths, April 1995 to March 1999, by Province/Territory**



Comparisons of the mid-year population counts available from the registries with mid-year estimates available from Statistics Canada (Figure 3 and Appendix G) have demonstrated that, for most jurisdictions, registry updating provides population counts within 1% of the Statistics Canada estimates.

**Figure 3.**  
**Comparison of NDSS with Statistics Canada Population Counts, July 1997/98/99, by Province/Territory**



Problems identified in British Columbia are associated with the premium system used there. Some duplicate counting of residents occurred in Ontario, but the numbers were within 4% of Statistics Canada estimates. Quebec's registration file was used only for people with diabetes. Therefore, for this report, Quebec has used estimates from l'Institut de la Statistique du Québec rather than the registry population as the denominator. In Nunavut, death data were not yet available for this report. All other provinces and territories were able to use the registry as a denominator, thereby more accurately reflecting the population that generated the case counts obtained from the physicians' services claims and hospital files.

Annual population counts are consistently higher than the mid-year counts, by 4% for the provinces and 8% for the territories (Appendix G), reflecting the difference between counting people and counting person-years; the sum of person-years will approximate the mid-year population count, but a count of people will include those who reside in a province or territory for any portion of a year. This effect is most evident in the 40-55 age group (because of migration) and in the 80+ age group (because of deaths).

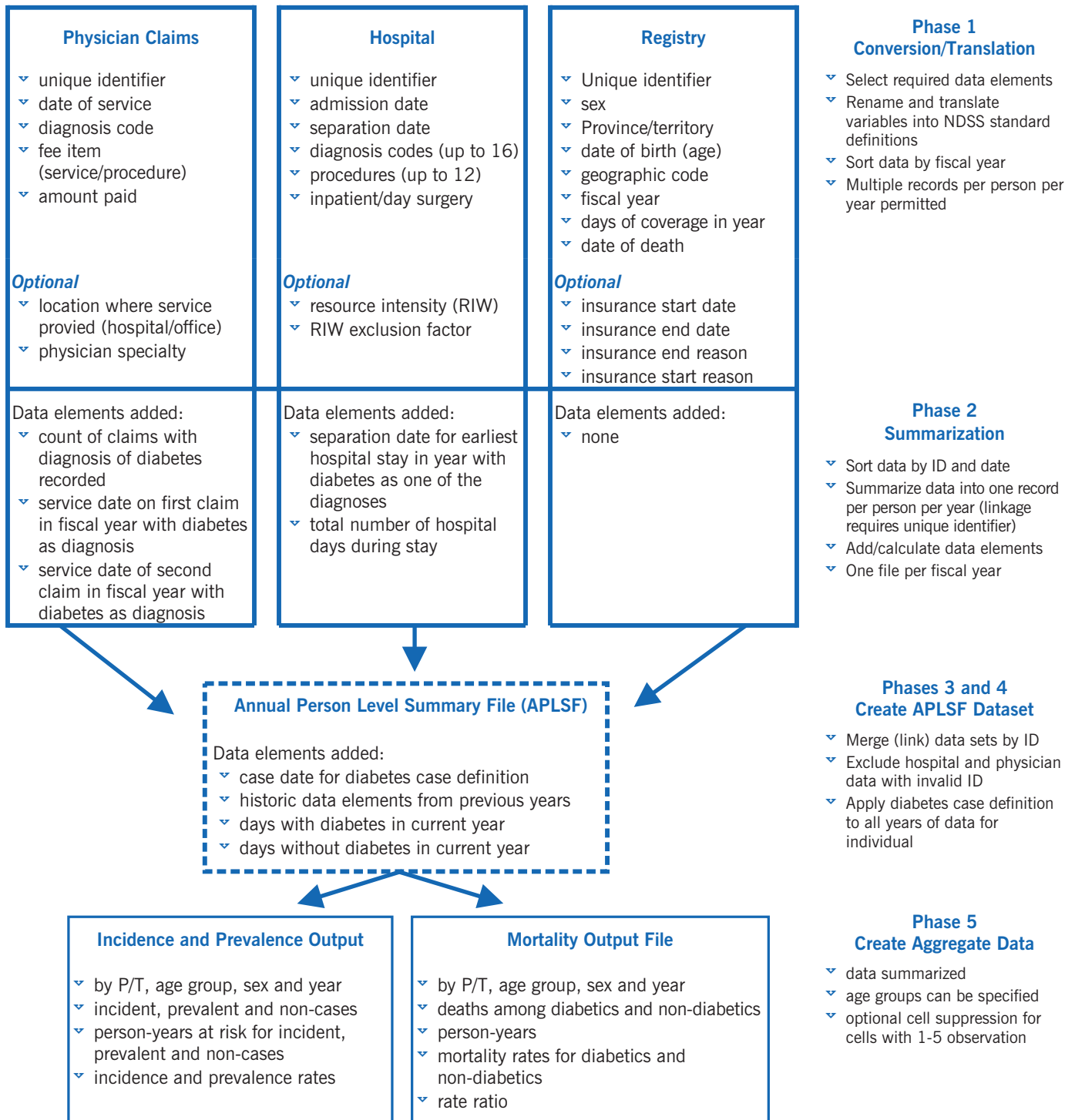
### Data Processing at the Provincial/Territorial Level

Data processing at the provincial/territorial level, for which programs using SAS® (Cary, NC) software have been developed, involves five discrete phases, illustrated in Figure 4 and summarized below:

- ▼ Select required data elements and translate provincial/territorial data element names/ types/codes into the NDSS standard.
- ▼ Summarize each data source into one record per person per year based on selected criteria.
- ▼ Merge the registry, hospital and physicians claims data, matching the unique identifier.
- ▼ Apply the diabetes case definition.
- ▼ Summarize the data by age group and sex and apply the appropriate calculations.

The first phase is customized to each jurisdiction, but all the remaining tasks are identical across all provinces and territories.

**Figure 4.**  
**Data and Process Flow Diagram**





The first phase, using a copy of the provincial/territorial file, is to reduce the number of variables retained in the file and to translate variable names from provincial/territorial-specific coding standards to a shared diabetes data dictionary. The remaining data processing steps (see Figure 4) summarize individual transaction data into an annual summary, build the annual person-level summary file (APLSF) and generate aggregate datasets.

A separate APLSF is constructed for each year. The APLSF is composed of a single record summary for each person in the registry file regardless of diabetes status or whether insured services were used in the year. The record summary documents the year's medical and hospital information for each person, including evidence needed to determine whether the case definition was triggered. As NDSS develops, complications and health services use will be included in this file.

The APLSF retains personal health identifiers (or encrypted variants), allowing longitudinal tracking of individuals over time and, with appropriate consents, linkages to other datasets.

In a final step, additional variables are added to the file, reflecting (where they exist) selected data from the individual's record in the APLSF file for previous years; this is of particular importance in determining whether a specific diagnosis is new or pre-existing.

Because the APLSF holds data on individuals as well as information such as dates of diagnosis, birth and death, the file is regarded as personal health data under the authority of existing legislation and policy directives within each province and territory. This makes the APLSF file inappropriate to distribute outside the province or territory.

The provinces and territories provide data aggregated by age group and sex to the national office of NDSS (Health Canada). Data are suppressed where the number of individuals represented in a cell is smaller than five. The data are provided in a SAS® dataset, which is described in Table 4. Definitions for the variables in the APLSF dataset are provided in Appendix H.

The APLSF provides considerable flexibility in how aggregate datasets might be created. For example, age groupings can be arbitrarily defined to suit analytic need, provided that the analytic need is not inconsistent with the need to ensure the confidentiality of personal health data.

### **Data Processing at the National Level**

The aggregate datasets provided by the provinces and territories to Health Canada are the primary surveillance products arising from NDSS. As these products are not personal health data under the definitions of existing provincial policies or legislation, they are suitable for distribution and dissemination.

The national calculations are the responsibility of the national office. To adjust for the effects of differing age distribution on the rates, the provincial/territorial data are standardized by specific age group to the 1991 Canadian Census population (Appendix I).

**Table 4.**  
**Contents of the Canadian Aggregate Datafile**

Category	Data Element Description	Data Element Name
Demographic variables	∨ Province or Territory . . . . .	PT
	∨ Fiscal year of Data. . . . .	YEAR
	∨ Sex. . . . .	SEX
	∨ Age Group . . . . .	AGEGRP
People with a diagnosis of diabetes in current year	∨ Incident Cases: number of people with DM diagnosis in the current year . . . . .	INCASE
	∨ Person-years of observation after DM diagnosis in current year . . . . .	INPYODM
	∨ Person-years of observation before DM diagnosis in current year . . . . .	INPYONDM
	∨ Incidence Rate . . . . .	IR
People with a diagnosis of diabetes prior to current year	∨ Prevalent Cases: number of people with DM diagnosis prior to current year . . . . .	PREVCASE
	∨ Prevalent Person-years. . . . .	PREVYRS
Prevalence (period) for current year	∨ Period Prevalence Proportion. . . . .	PR
People not given a diagnosis of diabetes	∨ Number of people not given a diagnosis of DM . . . . .	NONCASE
	∨ Person-years Observed without diabetes . . . . .	NONDMYRS
Mortality among people with diagnosis of diabetes	∨ Number of deaths among prevalent diabetes cases . . . . .	N1
	∨ Person-years of observation for people with a diagnosis of diabetes who died. . . . .	D1
	∨ Death rate for people with diabetes . . . . .	R11
Mortality among people without a diagnosis of diabetes	∨ Number of deaths among people not given a diagnosis of diabetes . . . . .	N2
	∨ Person-years of observation for people not given a diagnosis of diabetes who died . . . . .	D2
	∨ Death rate for people without diabetes . . . . .	Rn1
Mortality comparison	∨ Death rate with diabetes/death rate without diabetes (R11/Rn1) . . . . .	RR



## Definitions and Calculations

### Diabetes case

The case definition currently used in NDSS requires that an individual have the following:

- ▼ one hospitalization with an ICD-9 code of 250 (diabetes mellitus), selected from the first three diagnostic codes on the hospital files, **or**
- ▼ two medical claims with an ICD-9 code of 250 within 730 days, selected from the first diagnostic code.

The case date is currently defined as the earliest date at which the case definition is met.

### Age

Age is calculated as age as of the end of the fiscal year. The age groups for national use are decades between 20 and 49 (20-29, etc.) and 5-year age groups thereafter (50-54, etc.) to age group 85+.

### Prevalence

Prevalence is the probability that an individual within a population will have diabetes during the year.

In the NDSS, diabetes prevalence is calculated as follows:

- ▼ (total number of people with a diabetes case date prior to March 31 of the current fiscal year) ÷
- ▼ (total population count for the current fiscal year).

The denominator uses the count for the entire year rather than the mid-year estimate, thereby including people who migrate or die during the year, since they are included in the numerator.

In Quebec, however, the denominator is the census-based population estimate provided by the ministère de la Santé et des Services sociaux du Québec and calculated by the Institut de la statistique du Québec.

### Mortality

The mortality rate refers to the force of diabetes mortality for the total population. This measure can refer either to deaths **due** to diabetes or to deaths of people **with** diabetes. Within NDSS, the mortality rate is calculated separately for people with diabetes and those without diabetes. Cause of death is not available, and therefore any mortality analyses are based on ALL causes of death and not just deaths due to diabetes.

In NDSS the mortality rate among people with diabetes is calculated as follows:

- ▼ (total number of deaths among people with diabetes during the current fiscal year) ÷
- ▼ (total number of people with diabetes during the current fiscal year).

The mortality rate among people without diabetes is calculated as follows:

- ▼ (total number of deaths among people without diabetes during the current fiscal year) ÷
- ▼ (total number of people without diabetes during the current fiscal year).

The mortality rate ratio is calculated as follows:

- ▼ (death rate among people with diabetes) ÷
- ▼ (death rate among people without diabetes).

In Quebec, the number of deaths among people without diabetes is derived from the Fichier des décès (vital statistics, deaths), from which the number of deaths among people with diabetes is subtracted. The denominator for the rate among

people with diabetes is the difference between census-based population estimates and the number of people with diabetes.

## Data Validation

Since much of the administrative data used by NDSS was designed for billing purposes (particularly physicians' services) rather than for disease surveillance, the diagnoses captured require validation. Such validation is ongoing and takes several forms. Accuracy of the case-definition algorithm is evaluated against a gold standard that allows calculation of measures of specificity and sensitivity, and then these measures are examined in various ways:

- ▼ across jurisdictions
- ▼ against various gold standards
- ▼ over time
- ▼ for incident versus prevalent cases
- ▼ for special populations
- ▼ for designated complications
- ▼ for health services use

Validation work has substantiated the use of the NDSS algorithm for prevalence and mortality calculations using five to seven years of data for adults.

The case definition within NDSS is flexible enough to incorporate improvements in the algorithm suggested by the validation process.

Validation of the NDSS algorithm began with publications in 1991 and 1996 and is still ongoing. Currently, nine of the 13 jurisdictions are participating in validation studies. Recently, the NDSS and the CIHR Institute of Nutrition, Metabolism and Diabetes jointly funded

population health and validation research on diabetes.

Various gold standards have been used, including records from diabetes education<sup>3</sup> and care<sup>19</sup> programs, the National Population Health Survey,<sup>20-22</sup> a provincial health survey,<sup>19</sup> a provincial diabetes registry<sup>18</sup> and medical charts.<sup>23</sup> Other studies, currently under way are using prescription records for insulin and oral hypoglycemic medication, and clinical data.

So far, validation work has indicated that

- ▼ self-reported survey data should not be used as a gold standard, since they underestimate the true disease burden in the population;<sup>21,22</sup>
- ▼ new cases and prevalent cases are difficult to differentiate in the early years,<sup>2</sup> and at least five years of data are needed before stable estimates can be obtained;<sup>6,18</sup>
- ▼ the increase in prevalence among females seen during the child-bearing years may be the result of miscoding of gestational diabetes;
- ▼ **sensitivity** measures have been 69%,<sup>19</sup> 85%<sup>18,23</sup> and over 95%,<sup>3</sup> depending upon the gold standard used and the jurisdiction where the study was conducted;
- ▼ **specificity** has been over 95% and has varied less than sensitivity;<sup>18,19,23</sup>
- ▼ **positive predictive value** has been 78% and 80% in two studies of adults,<sup>18,23</sup> but has been found to be low in children;<sup>24</sup>
- ▼ **sensitivity, specificity and predictive value** may be stable for five to seven years of data for adults, but they fall as more years of data are included and prevalent cases over-accumulate.<sup>18</sup>

The validation studies and definitions are described in greater detail in Appendix J.

## FACTS AND FIGURES

The following represents the first comprehensive compilation and public dissemination of data by NDSS. The data presented below are derived from the data collection period starting in 1995/1996. The first two years constituted the run-in period required by the case definition. Therefore, the earliest data presented here are for the fiscal year 1997/1998, and the most recent year of data available for this report is 1999/2000.

The information represents eight provinces and three territories, accounting for over 95% of the Canadian population. Data from New Brunswick and Newfoundland and Labrador are not included in this report.

In 1999/2000, 5.1% of Canadian adults were living with diagnosed diabetes.

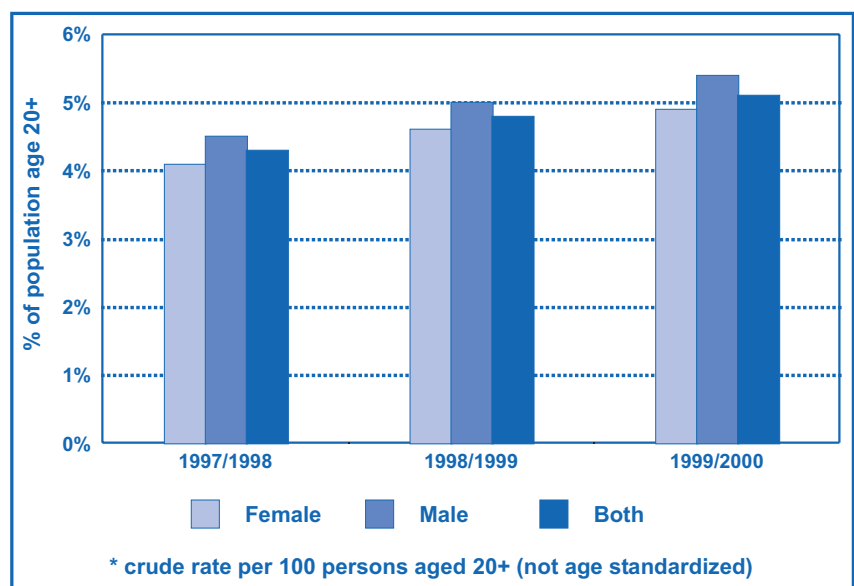
The data include both type 1 and type 2 diabetes, as ICD-9 (code 250) does not differentiate between the two. However, since the data are restricted to people aged 20 years and over, they largely represent type 2 diabetes. Although gestational diabetes has its own ICD-9 code (648.0), it is often miscoded as type 1/type 2 and therefore some cases of gestational diabetes are included in these tabulations.

### Prevalence

In 1999/2000, 5.1% of Canadians (1,196,370) aged 20 and over were living with diagnosed diabetes (Figure 5). This rate is higher than the self-reported rate of diabetes among people aged 20 and over found by the National Population Health Survey in 1998/99 (3.9%),<sup>25</sup> or even the self-reported rate found by the more recent Canadian Community Health Survey 2000/01 (4.7%).<sup>25</sup> This is consistent with validation studies<sup>21,22</sup> showing that self-report survey data underestimate the true disease burden in the population.

NDSS prevalence estimates represent diagnosed diabetes among health services users. Prevalence may be underestimated by 30% as a result of subclinical, undiagnosed diabetes.<sup>26</sup>

**Figure 5.**  
Prevalence\* of Diabetes in Canada by Fiscal Year and Sex



**Prevalence over time**

Figure 5 suggests increasing prevalence. This increase is expected for a chronic condition such as diabetes that has a lengthy disease duration. However, at this early stage of diabetes surveillance, the observed increase in prevalence is due, in part, to detection of cases diagnosed before the start of observation (1995/1996). Future NDSS reports will be based on more than five years' of data, allowing a clearer distinction between prevalent (existing) and incident (new) cases.

**Prevalence by sex**

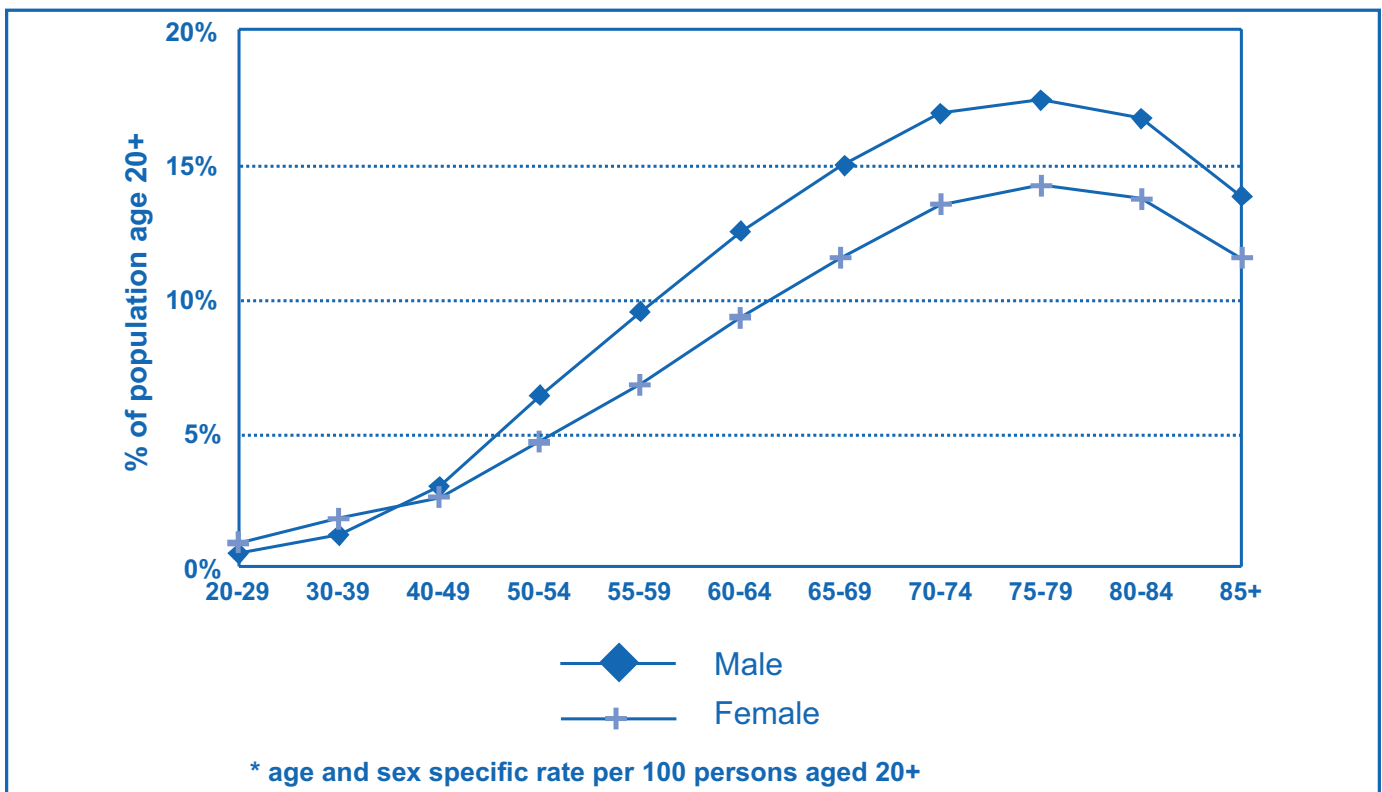
Figure 5 also demonstrates that diabetes is more common among Canadian men aged 20 and older (5.4%) than among women (4.9%). An exception to the male pre-ponderance occurs in

the child-bearing years (20-39), where cases of gestational diabetes may be miscoded as type 1/type 2 diabetes (Figure 6).

**Prevalence by age group**

For both sexes, prevalence increases with age, peaking in the 75-79 age group at 15.5% (17.4% among males and 14.2% among females) (Figure 6). People aged 65 and over account for almost 50% of diabetes cases but represent only about 15% of the population aged 20 and over. The slight decrease in prevalence in the oldest age groups (80+) may be the result of mortality associated with diabetes or an artefact of limiting the number of conditions coded per visit; increased co-morbidity at older ages increases the likelihood that conditions other than diabetes will be recorded.

**Figure 6.**  
**Prevalence\* of Diabetes in Canada, 1999/2000, by Age and Sex**



### Prevalence by region

Table 5 presents age-standardized prevalence rates by fiscal year, province/territory and sex for people aged 20 years and older. Detailed prevalence data by age, sex, jurisdiction and fiscal year are found in Appendix K. Figure 7 compares the provinces and territories using age-sex standardized rates and 95% confidence intervals.

For the majority of jurisdictions, age-sex adjusted prevalence ranges from 4.0% to 5.5%. Apparent differences among the provinces should be interpreted with caution because of the effects of different populations, different data collection procedures, and variations in the likelihood of diagnosis. For example, Manitoba's higher rate may reflect the fact that Aboriginal people represent a relatively high proportion of its population (13%)<sup>27</sup> and that diabetes prevalence among Aboriginals is 3 to 5 times higher than the national rate.<sup>7</sup> This emphasizes the need to

identify specific populations at high risk of diabetes, such as Aboriginal groups.

Differences between provinces and territories may not result from differences in the level of diabetes in the population. For example, the territories have the highest proportion of Aboriginal peoples (22% in the Yukon, 46% in the Northwest Territories and 81% in Nunavut)<sup>27</sup> but the lowest prevalence rates. This may be because of the inability of some administrative data to capture diabetes diagnoses outside the fee-for-service payment system. To investigate this, Nunavut is conducting a pilot project that includes addition of community health nurse data to NDSS, and other validation projects are underway (Appendix J).

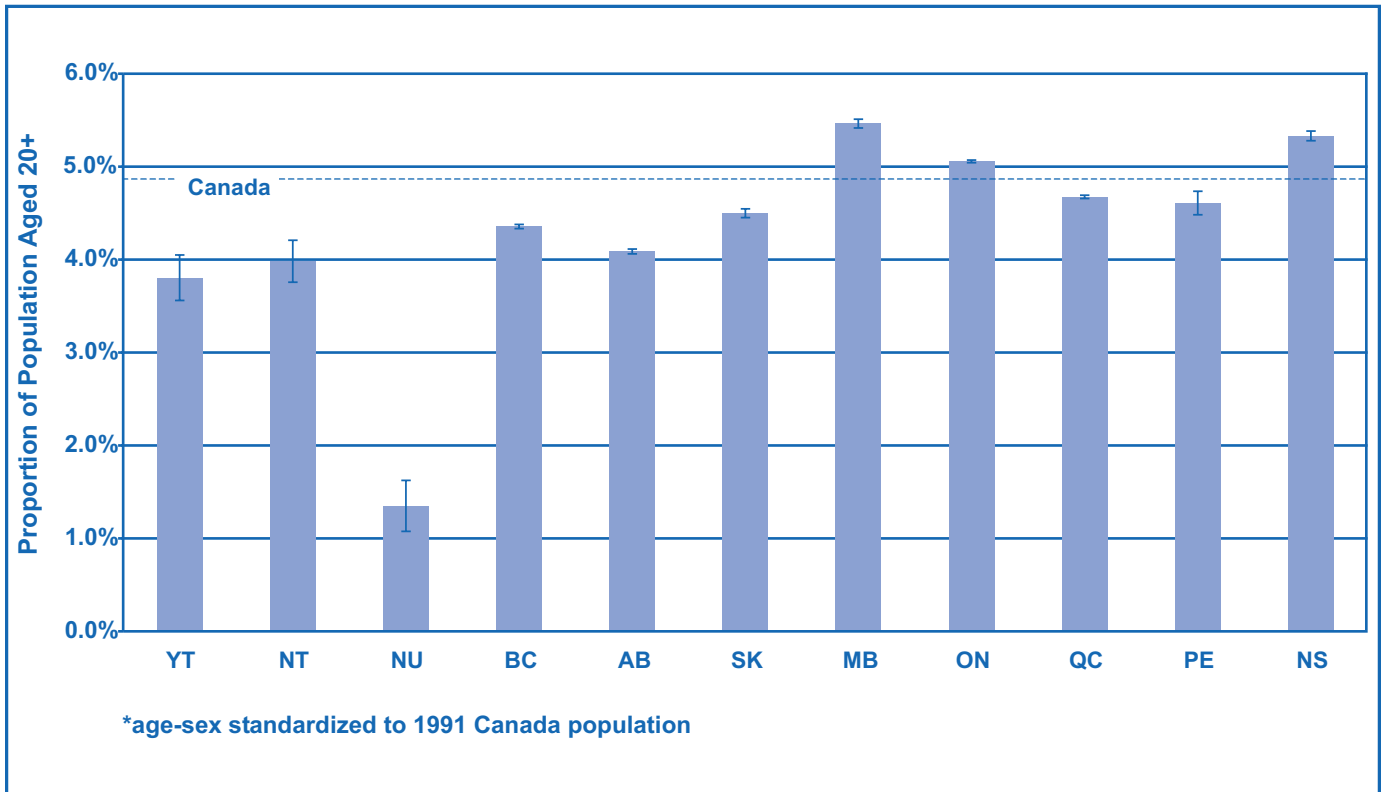
Finally, differences between provinces and territories may reflect differences in the likelihood of diagnosis. For example, the three provinces with the highest prevalence (Manitoba, Nova Scotia and Ontario) also have the most established diabetes programs.<sup>28</sup>

**Table 5.**  
**Prevalence\* of Diabetes in Canada, by Fiscal Year, Province/Territory and Sex**

	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
Yukon	3.1	3.2	3.6	3.4	3.9	3.8
Northwest Territories	3.4	3.1	3.7	3.5	3.9	4.0
British Columbia	3.4	4.1	3.8	4.5	4.0	4.8
Alberta	3.2	3.8	3.6	4.2	3.8	4.5
Saskatchewan	3.7	4.4	4.0	4.8	4.1	5.0
Manitoba	4.4	4.8	4.9	5.3	5.3	5.8
Ontario	3.9	4.7	4.3	5.1	4.7	5.5
Quebec	3.8	4.6	4.1	5.0	4.3	5.2
Prince Edward Island	3.4	4.4	4.0	5.1	4.1	5.2
Nova Scotia	4.4	5.2	4.8	5.6	4.9	5.8
<b>CANADA</b>	<b>3.8</b>	<b>4.5</b>	<b>4.1</b>	<b>4.9</b>	<b>4.4</b>	<b>5.2</b>

\* Rate per 100 people aged 20+, age standardized to 1991 Canadian population

**Figure 7.**  
**Prevalence\* of Diabetes in Canada by Province/Territory, 1999/2000**



Since one of the goals of NDSS is comparable information on diabetes, the impact of these issues is being more closely examined. In the future, we expect to have a better understanding of differences in systems that may affect the data collection and, ultimately, regional comparisons.

**Mortality**

In 1999/2000, the death rate among Canadian adults with diabetes was 1,393 per 100,000 (age-sex standardized to the 1991 Canadian population). This includes deaths due to external injuries or other causes that may not be directly related to diabetes. This all-cause mortality of 41,483 Canadians aged 20 years and over with diabetes is 6.5 times the 1999 mortality count of

6,131 Canadians aged 20 and older whose leading cause of death was listed as diabetes.<sup>29</sup>

The all-cause mortality rate seems to support past calculations estimating that the number of diabetes-related deaths is over five times the number of deaths with diabetes coded as the underlying cause.<sup>30</sup> Studies have demonstrated that only 28% of death certificates with any mention of diabetes were coded with diabetes as the underlying cause of death<sup>31,32</sup> and that diabetes was not mentioned at all for 41% of people with diabetes who died.<sup>31</sup>

Canadian adults with diabetes are twice as likely to die prematurely, compared to persons without diabetes.

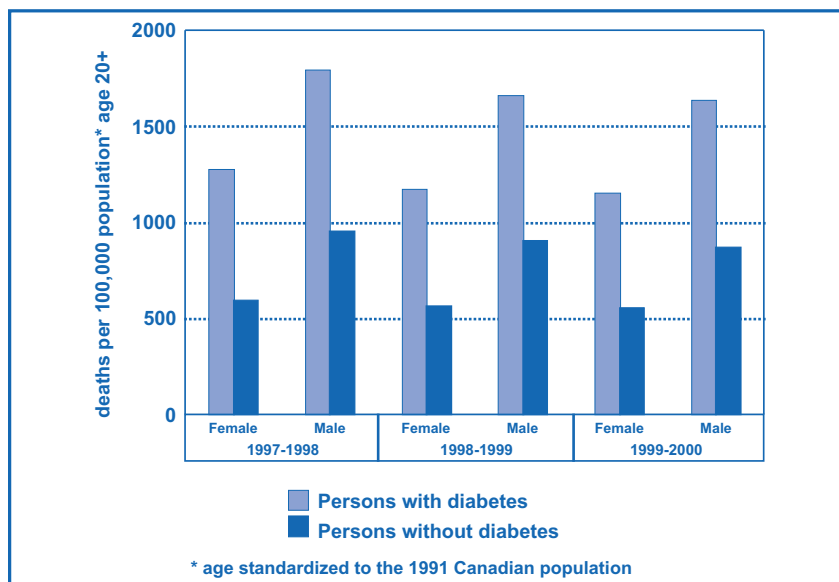
### Mortality over time

Figure 8 shows the age-standardized death rates by fiscal year. In all years, the death rate is significantly higher among those with diabetes than those without for both sexes. While the death counts are increasing, the mortality among people with diabetes relative to those without is stable over time (see Appendix L for mortality rate ratios).

### Mortality by sex

Across all three fiscal years, male mortality is consistently higher than female mortality among both people with diabetes and those without. However, mortality among people with diabetes relative to those without is slightly higher for women (mortality rate ratio 2.11) than for men (mortality rate ratio 1.87).

**Figure 8.**  
Canadian Mortality\* Rates by Fiscal Year,  
Sex and Diabetes Status



### Mortality by age group

Figure 9 shows that for all age groups the death rate for people with diabetes is higher than the death rate for those without. Figure 9 also shows the rate ratio, which compares mortality rates among people with and without diabetes. The rate ratio is higher in the younger age groups and gradually decreases for the older ones. This means that a 35-year-old Canadian with diabetes is 4 times more likely to die than a person without diabetes, whereas an 85-year-old Canadian with diabetes is 1.4 times more likely to die than a person without diabetes.

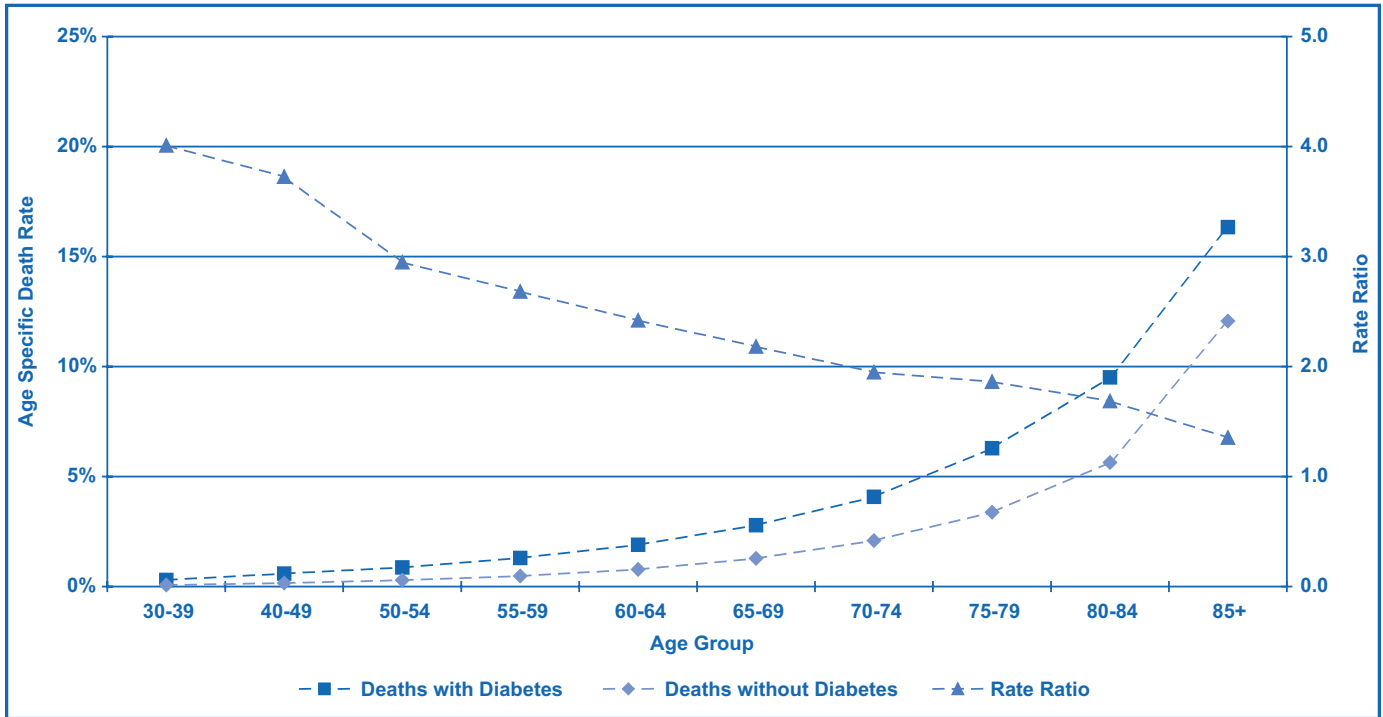
### Mortality by region

Canadian adults with diabetes are twice as likely to die prematurely as adults without diabetes. Figure 10 demonstrates that this age-sex standardized ratio is between 1.8 and 2.1 for the majority of jurisdictions. The three smallest jurisdictions (Prince Edward Island, the Northwest Territories and the Yukon territory) have a rate ratio less than 1.5. The smallest jurisdictions have zero death counts in many of the younger age categories, artificially reducing their age-standardized mortality rates.

Comparisons of mortality rates by region are influenced by many factors. Since people with diabetes are older than the general population, age-standardization makes the rates more comparable. The mortality rate ratio provides comparison of the mortality of people with diabetes relative to those without diabetes. Table 6 presents age-standardized



**Figure 9.**  
**Canadian Mortality Rates by Age and Diabetes Status, 1999/2000**

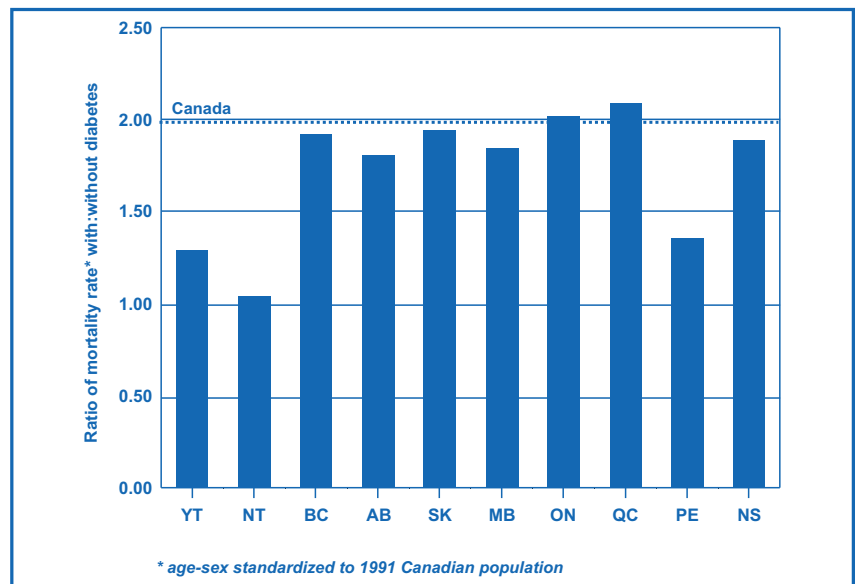


mortality rates by fiscal year, province/territory, sex and diabetes status. Detailed mortality data by age, sex, jurisdiction and fiscal year are found in Appendix L.

**National Impact**

NDSS data begin to paint a picture of the burden of diabetes in Canada. Diabetes is a large and growing health problem in Canada. Prevalence is increasing and is particularly high among older adults. The mortality associated with diabetes is considerable. The next NDSS report will contain incidence data that can be used to study risk factors for use in projection models.

**Figure 10.**  
**Comparison of Mortality\* for Canadians With and Without Diabetes, 1999/2000, by Province/Territory**





**Table 6.**  
**Canadian Mortality\* Rates by Diabetes Status, Fiscal Year, Province/Territory, and Sex**

		1997/1998		1998/1999		1999/2000	
		Female	Male	Female	Male	Female	Male
Yukon	Diabetes	1.69	1.45	0.99	0.71	0.91	1.37
	No diabetes	0.64	0.86	0.78	0.99	0.66	1.15
	Ratio	2.60	1.70	1.30	0.70	1.40	1.20
Northwest Territories	Diabetes	1.80	0.59	1.78	0.86	1.36	0.36
	No diabetes	1.01	1.64	1.39	1.66	0.76	1.08
	Ratio	1.80	0.40	1.30	0.50	1.80	0.30
British Columbia	Diabetes	1.11	1.59	0.97	1.47	0.96	1.39
	No diabetes	0.56	0.87	0.52	0.80	0.49	0.76
	Ratio	2.00	1.80	1.90	1.80	2.00	1.80
Alberta	Diabetes	1.19	1.52	1.10	1.43	1.06	1.47
	No diabetes	0.60	0.93	0.54	0.88	0.55	0.87
	Ratio	2.00	1.60	2.10	1.60	1.90	1.70
Saskatchewan	Diabetes	1.12	1.56	1.16	1.58	1.16	1.70
	No diabetes	0.59	0.94	0.56	0.96	0.56	0.93
	Ratio	1.90	1.70	2.00	1.70	2.10	1.80
Manitoba	Diabetes	1.30	1.48	1.17	1.81	1.18	1.59
	No diabetes	0.57	0.93	0.61	0.97	0.58	0.95
	Ratio	2.30	1.60	1.90	1.90	2.00	1.70
Ontario	Diabetes	1.23	1.74	1.15	1.58	1.10	1.56
	No diabetes	0.57	0.87	0.53	0.82	0.53	0.80
	Ratio	2.20	2.00	2.20	1.90	2.10	1.90
Quebec	Diabetes	1.53	2.27	1.37	2.02	1.36	2.01
	No diabetes	0.66	1.16	0.64	1.11	0.61	1.04
	Ratio	2.30	2.00	2.10	1.80	2.20	1.90
Prince Edward Island	Diabetes	0.71	0.88	0.73	1.30	0.84	1.27
	No diabetes	0.60	1.04	0.60	1.03	0.58	1.01
	Ratio	1.20	0.80	1.20	1.30	1.50	1.30
Nova Scotia	Diabetes	1.17	1.70	1.02	1.41	1.23	1.60
	No diabetes	0.65	1.07	0.58	0.97	0.58	0.94
	Ratio	1.80	1.60	1.70	1.40	2.10	1.70
Canada	Diabetes	1.28	1.79	1.17	1.66	1.15	1.64
	No diabetes	0.59	0.95	0.56	0.90	0.55	0.87
	Ratio	2.20	1.90	2.10	1.80	2.10	1.90

\*Rate per 100,000 people aged 20+, age standardized to the 1991 Canadian population

## ACCOMPLISHMENTS, PLANS AND POSSIBILITIES

The NDSS has accomplished a great deal in the four years since the Prairie Pilot Study demonstrated the feasibility of the concept of a coordinated, national use of administrative data for public health surveillance. In particular, NDSS has built a firm foundation and framework to support its ongoing development. Much of this early and necessary work has involved charting new territory in relation to federal-provincial-Aboriginal group agreements, capacity-building, data-sharing, governance and guidelines. Some of the fruits of these efforts have been realized in the production of the first national diabetes surveillance data. NDSS accomplishments are detailed in Table 7 and are summarized below in terms of what NDSS tells us, what it cannot tell us, and what it will tell us in the future.

### What NDSS Tells Us

In a relatively short period of time, NDSS has demonstrated, first and foremost, that data collected for administrative purposes can also be used to inform policy relating to a major public health problem in Canada. In particular, NDSS can measure prevalence, incidence and outcomes over time for both the nation as a whole and for specific regions. It can also compare health services use and other health problems of people with and without diabetes.

Second, NDSS has demonstrated that, despite regional differences, the various jurisdictions across Canada are able to cooperate to achieve the shared goal of reducing the burden of diabetes. In so doing, they have arrived at a set of common standards and definitions for diabetes that can be applied across the country.

Third, NDSS has developed a prototype of disease surveillance that can be applied to other diseases and conditions.

Fourth, the ability to examine trends (age-, sex- and region-specific) and to compare the health experience of people with and without diabetes means that NDSS data can also be used to examine many research questions.

Fifth, the suite of databases available to NDSS permits numerous cross-validation studies and provides a richer dataset than could be achieved with a single database.

Finally, NDSS demonstrates that Canada continues to be a world leader in the development of record-linkage and database methods.

### What NDSS Does Not Tell Us

The NDSS has some limitations, many of which may eventually be overcome. The one of most concern is the inability to distinguish among type 1, type 2 and gestational diabetes. Current work to distinguish gestational diabetes is promising.

A second limitation results from population mobility and the consequent difficulties of record duplication and losses to follow-up, both of which contribute to data inaccuracies. A partial solution to this problem may be periodic linkages of the provincial/territorial databases with the National Mortality Database for death clearance.

Third, information on risk factors for diabetes is currently very limited.

**Table 7.**  
**NDSS Accomplishments**

---

**Governance model**

- ▼ Established the necessary partnerships at federal, provincial and territorial levels
- ▼ Established a governance model for a distributed system
- ▼ Obtained buy-in from all provinces and territories, and some Aboriginal groups, with input also from academia and industry
- ▼ Established Health Canada's leadership role as a facilitator

**Capacity-building**

- ▼ Implemented a capacity-assessment exercise
- ▼ Devised and implemented solutions for capacity inequities among jurisdictions
- ▼ Initiated capacity-building at various levels, according to jurisdictional readiness
- ▼ Created technical consultant positions in all provinces and territories

**Data-sharing agreements**

- ▼ Reviewed each jurisdiction's legislative framework relating to participation in NDSS
- ▼ Developed and implemented a series of data-sharing MOUs accommodating each jurisdiction's privacy and confidentiality requirements
- ▼ Tested and verified a process for development of data-sharing agreements

**Dedicated resources**

- ▼ Obtained multi-year funding for system development
- ▼ Submitted detailed business plans and expenditures

**Duality of interest**

- ▼ Developed guidelines to ensure disclosure of conflict of interest, abstinence from action where necessary, and respect for confidentiality

**Sponsorship**

- ▼ Developed guidelines to provide an open and transparent process, restrict influence on decisions, and allow for diversity of funding

**Data validation**

- ▼ Adopted a standard case definition for diabetes
- ▼ Determined the core set of variables to be collected
- ▼ Began data validation (ongoing)
- ▼ Collaborated with the CIHR to fund validation projects using NDSS

**Data management**

- ▼ Identified data sources
- ▼ Obtained agreement on the structure and organization of the databases
- ▼ Developed provincial and territorial databases to permit necessary linkages
- ▼ Provided technical solutions for data paring to include the necessary variables/records only and for transferring data from existing hardware to the NDSS hardware/space
- ▼ Provided standard software for transforming data to NDSS format
- ▼ Produced a person-level summary file that is maintained by the provinces and territories

**Data access and publications**

- ▼ Determined data ownership
- ▼ Developed policies for data access and for NDSS database/information publication rights

**Reporting and dissemination**

- ▼ Provided provinces with data for provincial performance indicator reporting (PIRC)
  - ▼ Provided aggregate data for the 2002 *Diabetes in Canada* report
  - ▼ Produced the first NDSS report on diabetes prevalence and mortality
-

## What NDSS Will Tell Us in the Near Future

Current NDSS funding extends until the end of March 2004. The original vision and goals for NDSS identified several items that require additional time for completion.<sup>33</sup> Progress towards achieving these goals is discussed below.

### *Population coverage*

New Brunswick has recently provided data to NDSS, and Newfoundland and Labrador are also planning to provide data for the 2004 NDSS report. Ongoing work on the validation of a diagnostic algorithm for people under the age of 20 should be completed in 2003. With these developments, the 2004 NDSS report should contain data on all Canadians.

### *Incidence*

Incidence calculations have been defined, but require at least five years of data to allow time for the rates to stabilize. Incidence data will be included in the 2004 NDSS report.

### *Health services use*

The databases already in use for NDSS will support analysis of health services use by both people with and those without diabetes. This analysis can include physician visits, specialist visits and hospital use. The development of methods for applying costs to service use will permit refined estimates of the economic burden of diabetes. Days of hospital stay and number of services provided will be included in the 2004 NDSS report.

### *Complications*

One of the primary goals of NDSS is to develop the capacity for long-term monitoring of diabetes-related complications. The Prairie Pilot developed a stroke module that is ready for testing with NDSS software. The next priority of the Validation Working Group is the development of standard definitions for diabetes complications, and the identification and validation of data sources. The 2004 NDSS report will include estimates of diabetes-related cardiovascular disease, cerebrovascular disease, peripheral vascular disease, retinopathy and renal disease.

### *Aboriginal participation*

Data for the Aboriginal population in Canada are currently captured by NDSS but not identified. So far, two Aboriginal groups (one in Quebec and one in British Columbia) are working on identification of Aboriginal data. The 2004 NDSS report will include data for at least one First Nations group.

### *Dissemination*

National-level dissemination of some NDSS surveillance information has been achieved. Some jurisdictions (Ontario,<sup>34</sup> Quebec<sup>35</sup> and Prince Edward Island<sup>36</sup>) have taken initial steps towards meeting the objective of regional dissemination, and British Columbia, Alberta, and Nova Scotia plan to release data in 2003. Software updates are anticipated in 2003 to allow regional analyses.

## What NDSS May Tell Us in the Long Term

NDSS was designed with flexibility in mind to accommodate several additional surveillance “modules”. The phase of diabetes surveillance beyond March 2004 could include one or more of these modules.

### *Risk factors*

Information on determinants of diabetes, including modifiable risk factors, is required to build a complete surveillance picture for diabetes (see Table 8). Risk factor information is crucial to the development of effective prevention and control strategies, a fact reflected in the recent directive from the Conference of Deputy Ministers of Health for the establishment of a surveillance system for chronic disease risk factors.

Health Canada’s ***Canadian Diabetes Strategy*** (CDS) prevention group has identified activity level, body mass index (BMI) and dietary intake as three important risk factors on which to conduct surveillance.

Because this type of information is not available through the data sources currently available to NDSS, it will have to be obtained through surveys, with their attendant technical (data comparability, record linkage) and governance (access, privacy) requirements and costs.

### *Care indicators*

The CDS care group has recommended the incorporation of indicators for care into diabetes surveillance. Hence, a list of core clinical and self-care indicators is under development. Applied expertise will be required to formulate methods for distinguishing type 1, type 2 and gestational diabetes.

### *Diabetes education*

Diabetes education programs are an important resource for surveillance because of their potential to collect information on self-care, complications and disease progression and to direct interventions to improve diabetes management. However, directed research to provide an evidence base for specific interventions is a prerequisite to their incorporation into surveillance.

### *Other data sources*

The scope for expanded diabetes surveillance is outlined in Table 8. Integration of varied data sources expands the possibilities for analysis of surveillance data. For example, pre-clinical screening could include blood glucose data, which may be accessed from a laboratory results database.

### *Application to other chronic diseases*

Diabetes shares risk factors with other diseases and is both an outcome and a determinant of other conditions. Smoking, for example, is a risk factor for cancer, cardiovascular disease and respiratory disease as well as diabetes. These interactions, coupled with the realities of limited resources, make a compelling case for collaboration in chronic disease surveillance. The NDSS model is suited to other types of chronic disease surveillance where similar opportunities exist for tracking via client interactions with the health care system.

**Table 8.**  
**The Scope for Enhanced Diabetes Surveillance†**

<b>Determinants</b>	<b>Pre-clinical</b>	<b>Clinical</b>	<b>Outcome</b>
<b>DATA EXAMPLES:</b>	<b>DATA EXAMPLES:</b>	<b>DATA EXAMPLES:</b>	<b>DATA EXAMPLES:</b>
<p><b>genetics:</b> <i>prevalence of implicated genes</i></p> <p><b>risk behaviour:</b> <i>activity level</i> <i>body mass</i> <i>dietary intake</i> <i>smoking</i></p> <p><b>environment:</b></p> <p><b>socio-economic:</b> <i>income level</i> <i>education</i></p>	<p><b>screening:</b> <i>blood pressure</i> <i>blood glucose</i></p> <p><b>risk reduction:</b> <i>healthy diet</i> <i>physical activity rates</i></p>	<p><b>diagnosis:</b> <i>modes of diagnosis</i> <i>time to diagnosis</i> <i>laboratory testing</i></p> <p><b>treatment and procedures:</b> <i>surgery</i></p> <p><b>service use:</b> <i>hospitalization</i> <i>physician visits</i> <i>home care</i> <i>ambulatory care</i> <i>palliative care</i></p> <p><b>pharmaceutical:</b> <i>drug use</i> <i>complications and interactions</i></p>	<p><b>mortality:</b> <i>cause-specific deaths</i> <i>survival rates</i></p> <p><b>morbidity:</b> <i>complications</i> <i>degree of disability</i> <i>quality of life</i></p>
<b>DATA SOURCES*:</b>	<b>DATA SOURCES*:</b>	<b>DATA SOURCES*:</b>	<b>DATA SOURCES*:</b>
<p><i>surveys</i> <i>census</i> <i>workplace monitoring</i></p>	<p><i>screening databases</i> <i>surveys</i> <i>public health databases</i> <i>primary care physicians</i> <i>electronic health record (EHR)</i></p>	<p><i>hospital databases</i> <i>Discharge Abstract Database</i> <i>registry data</i> <i>provincial data repositories</i></p>	<p><i>vital statistics</i> <i>coroner's database</i> <i>multiple causes of death</i></p>

† Roy D. Adapted from *Chronic Disease Surveillance in Canada: A background paper*, June 2003.<sup>(37)</sup>

\*Some of the listed sources are potential and may not be available at this time.

## FINDING ANSWERS

- ▼ Almost half of Canadian adults are overweight. Since obesity is a risk factor for diabetes, how will this trend affect the incidence and prevalence of diabetes in Canada in years to come?
- ▼ Cardiovascular disease is the leading cause of death in Canada. What proportion of heart disease in Canada is associated with diabetes?
- ▼ Canada's population is aging. How will population trends affect the number of people in Canada with diabetes? What will it cost to care for them?
- ▼ To what degree have lifestyle changes contributed to the increased risk of diabetes in Aboriginal peoples relative to non-Aboriginals? After adjusting for differences in risk factors between Aboriginals and other Canadians, are Aboriginals more susceptible to diabetes?
- ▼ ongoing surveillance of diabetes and its complications in each province and territory, and in the Aboriginal population;
- ▼ dissemination of national comparative information, and
- ▼ a basis for the evaluation of economic/cost-related issues regarding the care, management and treatment of diabetes in Canada.

In accomplishing its mission, NDSS is also a prototype for other types of chronic disease surveillance. In an expanded NDSS model, data collected on diabetes include risk factors and complications. Those same data can also be analyzed and disseminated for the prevention and control of other conditions, such as cardiovascular, cerebrovascular and renal diseases.

Thus, the question posed at the beginning of this report – Can information systems designed primarily as tools for budgeting and billing, be used to provide disease-specific information that will benefit all Canadians? – has been answered. And this means that answers will be found for many more questions important to Canadians.

These are just a few of the many questions that must be answered in order to stem the rising tide of diabetes in Canada. Fortunately, with NDSS, Canada is well positioned to answer them.

A recognized world leader in record linkage and database methods, Canada is applying its considerable expertise to diabetes through NDSS. Since securing funding in 1999, NDSS is well on its way to meeting its four stated goals:

- ▼ a national standardized database for diabetes with long-term monitoring for diabetes-related complications through the integration of new and existing databases;



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## Appendix A

# NDSS CAPACITY ASSESSMENT FORM

This is a summary of the capacity assessment completed by the provinces and territories for NDSS funding allocations in 2000/01. Most jurisdictions provided answers to the series of questions.

The capacity assessment had five components:

- ▼ description of existing infrastructure
- ▼ description of availability of data variables included in NDSS data dictionary
- ▼ assessment of capacity to achieve NDSS core model activities
- ▼ outline of funding proposal 2000/01
- ▼ addendum describing funding criteria and guidance on computer hardware requirements

### Existing Infrastructure

**Data:** Where are the registry, hospital and physicians' claims data (or comparable data sources) currently stored? Is there documentation to describe the input data? Provide a subjective assessment of the quality of extant documentation. For what time periods do reliable data exist for the registry, physicians' and hospital files? Who is/are the key contact person(s) needed to facilitate technical access to the data? Name(s), title(s), phone number(s).

**Computing infrastructure:** Is SAS used within the Ministry? What mechanisms exist to transfer data "out" of this environment to a common platform for NDSS development? Tape? CD? Other?

**Computer/data security:** What, if any, legislation governs the collection and use of personal health data (please provide copies of statutes)?

Epidemiology and diabetes infrastructure in province/territory environment: Is there a provincial "office" for diabetes? Is there a provincial "office" for epidemiology?

**Provincial/territorial health system:** Is there a lifelong personal identifier in use within the jurisdiction? What year was it established? Does it cover all eligible individuals (e.g. other than RCMP, military, federal prisoners)? Are there subpopulations that are differentially less or more likely to be observed by core data sources?

**The databases:** Are there files that operationalize the three "core" databases described in the NDSS data model (Jan 2, 2000)?

**NDSS data environment:** Is there an existing, physically secure location in which the NDSS data might be housed?

## Availability of Variables Included in NDSS Data Dictionary<sup>1</sup>

### Registry File

ID	Personal identifier
Sex	M or F
Date of Birth	Are invalid dates allowed?
Year	For which data are applicable?
Postal Code	(in year) or other subprovincial geographic variable, such as regional health area
Insurance Start Date	(in year)
Insurance Start Code	1 In force on Jan 1 of year 2 Newly insured from Jan 1 of year 3 Other
Insurance End Date	(in year)
Insurance End Code	1 In force on Dec 31 of year 2 Death 3 Migration 4 Other

### Medical Claims File

ID	
Service Date	
Procedure Code	(please specify codes if available) Amputations, new hemodialysis, cataract surgery, new peritoneal dialysis, ongoing peritoneal dialysis, ongoing hemodialysis, lower-limb amputations, cardiovascular surgery (CABG, angio), laser photocoagulation, vascular reconstruction procedures (PTCA)
Diagnosis	ICD-9 3-digit
Fee Paid	
Physician ID*	
Physician Speciality*	(List specialties supported)
Location of Service*	1 Inpatient 2 Outpatient

<sup>1</sup> Variables with asterisks will be used in the initial release of the NDSS software, but if this variable is not available in a province or territory, the associated loss of functionality does affect the core goals and measures of NDSS.

## ***Hospital Discharge File***

---

ID  
 Date of Admission  
 Date of Discharge  
 Admission Type\* . . . . . e.g. urgent, elective, etc.  
 Discharge Type\* . . . . . Death, transfer, to community  
 Diagnosis 1 . . . . . ICD-9 5-digit  
 Diagnosis 2  
 Diagnosis 3  
 Procedure 1  
 Procedure 2  
 Procedure 3  
 Transfer in?\*  
 Transfer out?\*  
 Resource Intensity Weight\*  
 Case Mix Group\*

## **Capacity to Achieve NDSS Core Model in 2000-01**

**Feasibility of core activities** (1 = no anticipated problems - planned implementation, 2 = some problems anticipated, but implementation still likely, 3 = major problems anticipated, implementation uncertain, 4 = not proposed)

<b>Activity Description</b>	<b>Suggested Skill Set</b>
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### **A. Core Model Activities**

#### **Inputs**

Identify data source for physician claims, hospital and coverage files. Ideally, select a “run” of 5-7 years for which there are continuously available data, and a single data dictionary.	SAS/systems analysis
---	----------------------

#### **Process**

(A1.1) Transfer data from existing hardware to NDSS hardware/disk space.	SAS/systems analysis
(A1.2) Reduce data from (A1.1) to include only necessary variables and necessary records.	
(A1.3) Concurrent with (A1.2) or subsequent to (A1.2) transform data from (A1.2) to NDSS common input data dictionary.	
(A1.4) Read data from (A1.3) into SAS files.	
(A1.5) Transform data from (A1.4) to calendar years.	
(A1.6) Input data from (A1.5) into NDSS core software.	
(A1.7) Produce “working” person-level summary.	

Activity Description	Suggested Skill Set
<b>A. Core Model Activities</b> <i>(continued)</i>	
<b>Outputs</b>	
(A1.8) Prepare aggregate data files to estimate incidence, prevalence and mortality from (7).	Statistical analysis
(A1.9) Prepare aggregate data files to estimate rates for specified complications and health services utilization patterns in subpopulation with diabetes.	
(A1.10) Prepare aggregate data files to estimate rates for specified complications and health services utilization patterns in subpopulation without diabetes.	
(A1.11) Transfer aggregate datasets to Health Canada, as defined by FPT agreements.	SAS/systems analysis
(A1.12) Retain (A1.7) for diabetic populations. <sup>2</sup>	
(A1.13) Retain (A1.7) for non-diabetic populations. <sup>3</sup>	
(A1.14) Disseminate data products coordinated with NDSS Steering Committee on an annual basis.	Policy/ communication-related
<b>Policy-related</b>	
Document and apply for data access.	Policy
Define reporting relationships and related matters for NDSS personnel.	Epidemiological/ Policy/Administrative
Define target audiences for surveillance data.	Epidemiology/ Policy/ Administrative

<sup>2</sup> if possible; retention allows for analysis of diabetic populations for longitudinal analysis.

<sup>3</sup> if possible; retention allows for analysis of non-diabetic populations for longitudinal analysis.



Activity Description	Suggested Skill Set
<b>B. Expanded Model Activities</b>	
<b>Inputs</b>	
Integrate records for years not incorporated into Activity A.	SAS/systems analysis
<b>Process</b>	
(B2.1) Transfer data from existing hardware to NDSS hardware/disk space.	SAS/systems analysis
(B2.2) Reduce data from (B2.1) to include only necessary variables and necessary records.	
(B2.3) Concurrent with (B2.2) or subsequent to (B2.2) transform data from (B2.2) to NDSS common input data dictionary.	
(B2.4) Read data from (B2.3) into SAS files.	
(B2.5) Transform data from (B2.4) to calendar years.	
(B2.6) Input data from (B2.5) into NDSS core software.	
(B2.7) Produce “working” person-level summary.	
<b>Outputs</b>	
(B2.8) Prepare aggregate data files to estimate incidence, prevalence and mortality from (B2.7)	Statistical analysis
(B2.9) Prepare aggregate data files to estimate rates for specified complications and health services utilization patterns in subpopulation with diabetes.	
(B2.10) Prepare aggregate data files to estimate rates for specified complications and health services utilization patterns in subpopulation without diabetes.	
(B2.11) Transfer aggregate datasets to Health Canada, as defined by FPT agreements.	SAS/systems analysis
(B2.12) Retain (B2.7) for diabetic populations. <sup>4</sup>	
(B2.13) Retain (B2.7) for non-diabetic populations. <sup>5</sup>	
(B2.14) Disseminate data products coordinated with NDSS Steering Committee on an annual basis.	Policy/communication-related
<b>C. Alternative Model Activities</b>	
Description of alternative activities (where the NDSS Core Model is not feasible) (2-3 pages)	

<sup>4</sup> if possible; retention allows for analysis of diabetic populations for longitudinal analysis.

<sup>5</sup> if possible; retention allows for analysis of non-diabetic populations longitudinal analysis.

## **Funding Proposal 2000/01 Based on Capacity Assessment**

### ***Rationale***

- ▼ Describe obstacles to carrying out NDSS core activities in your province/territory in 2000-01.
- ▼ Attach previous three sections of capacity assessment.

### ***Main goals for 2000-2001***

- ▼ Summary of main activities and milestones.

### ***Data/information products***

- ▼ Items achievable before the end of the initial funding period 2000-2001: incidence, prevalence, mortality (with and without diabetes), complications (with and without diabetes; specify conditions), health services utilization (with and without diabetes; specify measures).

### ***Work plan***

- ▼ For each activity listed within Activity Modules A, B, and/or C, indicate schedule with approximate time frame.

### ***Human resource requirements***

- ▼ For each activity listed within Activity Modules A, B, and/or C, list staff members, anticipated full-time equivalent (FTE) allocation, skill set and annual FTE salary, assuming 20% benefits. Summarize the number of people (the number of total FTEs is expected to range between 0.5 and 2 but may be distributed across the hiring of more than 2 people at less than full-time hours), skill set, pay rate (\$ per year plus % benefits), employment period (e.g. number of months), number of FTEs, cost (salary plus benefits).

### ***Computer hardware***

- ▼ Number of items and cost (attach quote) for each of the following: servers, hard disk space for existing devices, workstations, other

(see Addendum for guidelines)

## Addendum

### Funding Criteria

**Objective:** To build capacity in each province and territory for the standardized surveillance of diabetes and its complications and for the production of nationally comparative data, primarily through the use of administrative databases where possible.

#### *Initial funding period*

April 1, 2000, to March 30, 2001

#### *Criteria for funding allocations*

NDSS funding will be allocated only to activities that are directly related to the development of surveillance of diabetes and its complications, including policy-related activities.

- A. Core Model Activities:** Achievement of core functionality on an ongoing basis in all provinces and territories is the priority for federal funding in fiscal year (FY) 2000/2001. It is recognized that achieving this functionality involves both data-oriented tasks (such as assembling and manipulating data) and policy-related tasks (such as the development of surveillance policies, reporting structures).<sup>6</sup> It is the responsibility of the province or territory to prioritize data-oriented versus policy-related activities.

- B. Expanded Model Activities:** Where federal dollars are available and where ongoing functionality is established in a province or territory, the integration of records for years not incorporated into Activity A should be undertaken, if feasible.

- C. Alternative Model Activities:** Alternatives to the core model, where core functionality is not feasible in a province or territory, will be assessed and funded by the Steering Committee to the extent to which such alternatives allow the production of nationally comparative data.

If a province/territory has not yet fully completed Activity A but wishes to proceed to Activity B, it should provide a rationale to the Steering Committee as part of the proposal, explaining why the completion of a particular model is not feasible, needs to be postponed, or should be completed concurrently with some other stage.

Enhancements to the core model will not form part of this proposal, but proposals for enhancements can be submitted at this time and will be forwarded to the appropriate NDSS working group(s) for consideration.

<sup>6</sup> It is expected that the core model may evolve and be redefined by the NDSS Steering Committee over time (in subsequent funding periods) as provincial/territorial capacities improve.

### ***Suggested parameters for funding allocations***

Each province and territory should receive a base level of funding to maintain the ongoing capacity necessary to generate nationally comparative data. The suggested base level of funding is for a minimum of 0.5 FTEs per province or territory, and for hardware requirements commensurate with the information processing task in each province or territory.<sup>7</sup>

The total number of FTEs per province/territory is expected to be capped at 2 FTE's. Any recommendation over and above that amount will require substantial justification and will be dependent on allocations from the Steering Committee and funding availability.

The estimated pay rate per year for personnel with the relevant skill sets is approximately \$50,000 per year plus 20% benefits, as per the NDSS Business Plan.

### ***Submission guidelines***

Each province and territory may submit a proposal for NDSS funding for the initial NDSS funding period. Proposals should employ the template provided at the Winnipeg workshop.

### ***Deadlines***

Proposals are due on January 28th, 2000. Applications should be forwarded electronically to Rob James (NDSS Technical Director) and Sheila Chapman, Health Canada.

### ***Funding decisions***

Applications will be reviewed by the Secretariat in early February 2000, with final allocation decisions determined by the Steering Committee in early March 2000.

### **Special Projects (optional): Proposed Enhancements to the Core Model**

Outline the proposed enhancement(s), indicating how it (they) will complement core NDSS activities in the province/territory and whether there is an opportunity for a multi-jurisdictional collaboration now or in the future.

Note: These special projects will be circulated to the appropriate subcommittee/technical working group and considered separately from the funding stream for implementation of core NDSS functionality. An appropriate subcommittee/working group will request further details. Do NOT expect funding for special projects to be available on April 1, 2000/01.

Provide brief description of the project (include activities, methodology, outputs).

Provide resource request (specify how these resources will be used).

<sup>7</sup> Thus, provinces with larger populations are likely to legitimately require more computing hardware to store and manipulate their data files.

## Guidance on Computer Hardware Requirements

### Principles

- ▼ establish a “floor”, which is provided to all
- ▼ need clear growth pathway for all hardware
- ▼ will fund hardware differentially based on population size
- ▼ address questions about moving from test site in 2000/01 to operational site in subsequent years
- ▼ must fit within existing computer procurement rules (if any) in P/T

### Operating systems

- ▼ should run SAS version 8 eventually
- ▼ strongly prefer (not ranked): NT (SP 6; Windows 2000; UNIX)
- ▼ should support multi-processor hardware
- ▼ need ability to have multiple disk drives act as if one directory/drive

### Base model (not required, but strongly recommended)

- ▼ INTEL BX chipset motherboard, i.e. 100 Mhz FSB
- ▼ Pentium III CPU (supports 100 MHFSB)
- ▼ 100 Mhz RAM (PC-100) in 128 MB DIMMs

- ▼ RAM upgradable to 1 GIG (except for base systems)
- ▼ Wide-SCSI hard drives

### Security and communication

- ▼ Can data reside on work-station?
- ▼ Does data have to reside in secure room?
- ▼ What speed network do you maintain?

### Upgrading and performance

Tentative benchmark for performance:

- ▼ should be able to re-assemble Annual Person-level Summary Files (APLSF) for 10 years over one weekend, without attention
- ▼ should be able to obtain simple estimates from 1 APLSF within 1 hour, e.g. prevalence, mortality

If proposed capacity does not perform reasonably, P/T can apply back to NDSS Steering Committee to move up.

### Maintenance, backups, etc.

- ▼ get 3-year maintenance contract
- ▼ define a strategy for backing up data

## Appendix B

# REGIONAL ACTIVITY

Most provinces/territories have built upon the surveillance capacity demonstrated by NDSS. The relation between diabetes and other chronic diseases has stimulated interest in chronic disease surveillance in general.

### Yukon

- ▼ provided 1995/96 to 1999/00 data to Health Canada;
- ▼ investigating possible expansions of the core NDSS model to include other databases, such as the Diabetes Education Centre and the Seniors' Pharmacare Program;
- ▼ has partnership with the Chronic Disease Program, expansion of the NDSS model to include other co-morbidities, and increased capacity in epidemiology.

### Northwest Territories

- ▼ provided 1995/96 to 1999/00 data to Health Canada;
- ▼ discussions with NWT Dene Nation concerning Aboriginal data;
- ▼ developing a Northwest Territories diabetes registry in consultation with the three Diabetes Education Programs in Yellowknife, Inuvik and Hay River and with other stakeholders;
- ▼ developing a Northwest Territories diabetes strategy.

### Nunavut

- ▼ became a territory in 1999;
- ▼ completed data cleaning of health numbers introduced in 1999 confounded with the old Northwest Territories health number;
- ▼ completed a retrospective Nunavut population starting in 1995/96, using both Nunavut and Northwest Territories health numbers;
- ▼ implemented NDSS software on 1995/96 to 1999/00 data;
- ▼ preliminary review necessitated expansion of the NDSS model to incorporate community health nurse data, since these nurses provide primary care for approximately 60% of the population;
- ▼ completed data entry and formatting to the pre-1999 community health nurse data, and the paper records for 2000 and 2001;
- ▼ implementing expanded NDSS software.

### British Columbia

- ▼ provided 1995/96 to 1999/00 data to Health Canada;
- ▼ working with First Nations' Chiefs Health Committee to identify Status Indian population;
- ▼ provincial diabetes surveillance report expected later in 2003 that includes regional measures (incidence, prevalence, mortality) for 16 health service delivery areas,

Pharmacare utilization, cost analysis, and prevalence projections;

- ▼ investigating possible expansions of the core NDSS model to include other databases, such as Vital Statistics (deaths), Pharmanet (insulin and oral hypoglycemic use for population), and the provincial renal agency;
- ▼ partnership with Chronic Disease Management to provide chronic disease care measures for surveillance, and expansion of the NDSS model to include other chronic diseases such as hypertension, ischemic heart disease, congestive heart failure, renal disease, retinopathy, depression and asthma.

## Alberta

- ▼ one of the original partners in the Prairie Pilot;
- ▼ provided 1995/96 to 1999/00 data to Health Canada;
- ▼ provincial diabetes surveillance report expected later in 2003 that includes regional measures (prevalence, mortality) for nine health regions;
- ▼ possible expansion of the core NDSS model to include other databases, such as Vital Statistics (deaths) and CCHS;
- ▼ partnership with patient health management activities and expansion of the NDSS model to include other chronic diseases, such as heart disease, renal disease and retinopathy.

## Saskatchewan

- ▼ one of the original partners in the Prairie Pilot;
- ▼ provided 1995/96 to 1999/00 data to Health Canada;
- ▼ NDSS has also been used for ongoing diabetes program planning and evaluation at provincial and regional levels. NDSS will be incorporated into program planning and evaluation in primary care services;
- ▼ work under way to produce costs and burden of illness estimates for major causes of morbidity and mortality, expected later in 2003.

## Manitoba

- ▼ one of the original partners in the Prairie Pilot;
- ▼ provided 1995/96 to 1999/00 data to Health Canada;
- ▼ the NDSS model as initially developed in Manitoba was used to produce 11 regional diabetes profiles, including incidence, prevalence and major complications, as well as data to support the provincial diabetes strategy,<sup>8</sup> diabetes projections,<sup>9</sup> and a Métis health report;<sup>10</sup>
- ▼ provincial First Nations diabetes profile expected later in 2003 will be available at: [www.gov.mb.ca/health/publichealth/diabetes/index.html](http://www.gov.mb.ca/health/publichealth/diabetes/index.html)

8 *Diabetes: a Manitoba strategy*. 1998. Available at: [www.gov.mb.ca/health/documents](http://www.gov.mb.ca/health/documents)

9 *Epidemiologic projections of diabetes and its complications: "Forecasting the coming storm"*. 1999. Available at: [www.gov.mb.ca/health/documents](http://www.gov.mb.ca/health/documents)

10 *The health of Manitoba's Métis population and their utilization of medical services: a pilot study*. May 2002. Available at: [www.gov.mb.ca/health/documents](http://www.gov.mb.ca/health/documents)



- ▼ collaboration with medical experts in the areas of dialysis, peripheral arterial disease and eye disease resulted in case definitions for these complications.

## Ontario

- ▼ provided 1995/96 to 1999/00 data to Health Canada;
- ▼ a modified NDSS model was used by the Institute for Clinical Evaluative Sciences (ICES) to publish regional diabetes profiles;<sup>11</sup>
- ▼ NDSS has contributed toward increasing the profile of diabetes in Ontario, including diabetes research at ICES.

## Quebec

- ▼ provided 1995/96 to 1999/00 data to Health Canada;
- ▼ working with the Cree Board of Health and Social Services of James Bay on a diabetes surveillance project;
- ▼ the NDSS model was used in October 2002 to produce diabetes prevalence data by health region;<sup>12</sup>
- ▼ NDSS has served as a catalyst for other diabetes research;
- ▼ expanding model to include vital statistics and drug data from the Régie de l'assurance maladie du Québec.

## New Brunswick

- ▼ provided 1995/96 to 1999/00 data to Health Canada in May 2003;
- ▼ physician data did not include diagnostic codes used by other provinces. This required pre-liminary work to develop algorithms to search a text field for key words in English and French.

## Prince Edward Island

- ▼ provided 1995/96 to 1999/00 data to Health Canada;
- ▼ NDSS methodology was used to describe diabetes prevalence by health region within Prince Edward Island<sup>13</sup>;
- ▼ investigating possible expansion of the core NDSS model to include other databases, such as laboratory testing, diabetes program and CCHS;
- ▼ use of the NDSS model to evaluate Prince Edward Island's Strategy for Healthy Living, a collaborative effort to address common risk factors for chronic disease.

11 *Diabetes in Ontario: an ICES practice atlas*. 2003. Available at URL: [www.ICES.on.ca](http://www.ICES.on.ca)

12 Institut national de santé publique. *Prévalence du diabète au Québec et dans ses régions : premières estimations d'après les fichiers administratifs*. Octobre 2002. Brochure available on the INSPQ website: [www.inspq.qc.ca](http://www.inspq.qc.ca)

13 Van Til L. *Prince Edward Island Health indicators, provincial and regional*. Charlottetown: Document Publishing Centre, January 2003. Available at: [www.gov.pe.ca](http://www.gov.pe.ca)



## Nova Scotia

- ▼ provided 1995/96 to 1999/00 data to Health Canada;
- ▼ provincial diabetes surveillance report expected later in 2003 that includes regional measures (prevalence, mortality) for nine district health authorities as well as health care utilization (hospitalization rate, length of stay, and burden of disease). These reports will be posted on the web with secure access;
- ▼ investigating possible expansion of the core NDSS model to include other databases, such as the Diabetes Care Program and Reproductive Care Program;

- ▼ NDSS has served as a catalyst for other research activities such as the newly formed Maternal/Infant/ Diabetes Research Group, and validation of diabetes in people under the age of 20.

## Newfoundland and Labrador

- ▼ data not yet provided to Health Canada;
- ▼ partnership with the Department of Health and Community Services and the Newfoundland and Labrador Centre for Health Information;
- ▼ NDSS software currently being implemented using data from 1995/96 to 1999/00;
- ▼ quality of registry information and the potential use of census data are being evaluated.

## Appendix C

# NDSS STEERING COMMITTEE MEMBERSHIP 2003

**Chair: Linda Van Til, Prince Edward Island Department of Health and Social Services**

### Aboriginal Groups

Aboriginal Diabetes Working Group	Rhea Joseph
Congress of Aboriginal Peoples	Judy Chapman-Price
Health Secretariat - Assembly of First Nations	Anita Stevens
Inuit Tapiriit Kanatami	Onalee Randell
Métis National Council	Don Fiddler
National Aboriginal Diabetes Association	Catherine Cook

### Academics/Clinicians

McMaster University	Hertzel Gerstein
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### Federal Government

Health Canada - First Nations and Inuit Health Branch	Adam Probert
Health Canada - Population and Public Health Branch	Clarence Clottey, Yang Mao
Statistics Canada	Gary Catlin

### Non-Government Organizations

Canadian Diabetes Association	Donna Lillie
Canadian Institute for Health Information	Indra Pulcins
Canadian Institutes of Health Research - Institute of Nutrition, Metabolism & Diabetes	Diane T. Finegood

### Provinces/Territories

Yukon	Joy Kajiwara
Northwest Territories	John Morse
Nunavut	Sylvia Healey
British Columbia	Kim Reimer
Alberta	Larry Svenson
Saskatchewan	William Osei
Manitoba	Kelly McQuillen
Ontario	Joan Canavan
Quebec	Danielle St-Laurent
New Brunswick	Christofer Balram
Prince Edward Island	Linda Van Til
Nova Scotia	Peggy Dunbar
Newfoundland and Labrador	Faith Stratton

### Sponsor (*observer status*)

GlaxoSmithKline	Raymond Fox
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***Past Chairs include Wilson Rodger and Bernard Zinman.***

*Note: The report editor for the 2003 NDSS Report was Shirley Huchcroft.*



## Validation Working Group

**Chair:** *Valérie Émond, Institut national de santé publique du Québec*

Munaza Chaudhry, British Columbia Ministry of Health Planning  
Jane Griffith, Manitoba Health  
Jan Hux, Ontario - Institute for Clinical Evaluative Sciences  
William Osei, Saskatchewan Health  
Kim Reimer, British Columbia Ministry of Health Planning  
Mark Smith, Nova Scotia - Population Health Research Unit, Dalhousie University  
Larry Svenson, Alberta Health and Wellness  
Linda Van Til, Prince Edward Island Department of Health and Social Services  
Glenn Robbins, Health Canada  
Rebecca Stuart, Health Canada

**Past Chairs:** *Jamie Blanchard, Larry Svenson*

## Scientific Working Group

**Co-chairs:** *Diane T. Finegood, Canadian Institutes of Health Research, INMD*  
*Larry Svenson, Alberta Health and Wellness*

Gary Catlin, Statistics Canada  
Hertzel Gerstein, McMaster University  
Jan Hux, Ontario - Institute for Clinical Evaluative Sciences  
Jeffrey A. Johnson, University of Alberta  
William Osei, Saskatchewan Health  
Indra Pulcins, Canadian Institute for Health Information  
Daniel Tessier, Université de Sherbrooke  
Ellen L. Toth, University of Alberta  
Linda Van Til, Prince Edward Island Department of Health and Social Services  
Jean-François Yale, Université de McGill  
Chris Robinson, Health Canada

## Technical Working Group

**Chair:** *Glenn Robbins, Health Canada*

Munaza Chaudhry, British Columbia Ministry of Health Planning  
Valérie Émond, Institut national de santé publique du Québec  
Jane Griffith, Manitoba Health  
Jan Hux, Ontario - Institute for Clinical Evaluative Sciences  
Rob Ranger, Nova Scotia - Population Health Research Unit  
Deanna Rothwell, Ontario - Institute for Clinical Evaluative Sciences  
Mark Smith, Nova Scotia - Population Health Research Unit

Larry Svenson, Alberta Health and Wellness  
Linda Van Til, Prince Edward Island Department of Health and Social Services  
Asako Gomi, Health Canada  
Chris Waters, Health Canada

*Past Chair: Rob James*

## **Technical Consultants**

*Chair: Glenn Robbins, Health Canada*

Sherri Wright, Yukon Department Health and Social Services  
Joyce Bourne, Northwest Territories Department Health and Social Services  
Manon Asselin/Sylvia Healey, Nunavut Department Health and Social Services  
Munaza Chaudhry, British Columbia Ministry of Health Planning  
Ken Morrison, Alberta Health and Wellness  
Janice Hawkey, Saskatchewan Health  
André Wajda, Manitoba Health  
Alexander Kopp, Ontario -Institute for Clinical Evaluative Sciences  
Valérie Émond, Institut national de santé publique du Québec  
Heather MacLennan-Cormier/Jason Liu, New Brunswick Department of Health and Wellness  
Connie Cheverie, Prince Edward Island Department of Health and Social Services  
Rob Ranger/Jill Casey, Nova Scotia - Population Health Research Unit  
Kayla Gates/Don MacDonald, Newfoundland & Labrador Centre for Health Information  
Rhea Joseph, Aboriginal Diabetes Working Group

## Appendix E

# MEMORANDUM OF UNDERSTANDING (MOU)

### Between:

HER MAJESTY THE QUEEN in right of Canada, as represented by the Minister of Health (hereinafter referred to as “Health Canada”)

### And:

HER MAJESTY THE QUEEN in right of the Province/Territory of \_\_\_\_\_, as represented by the Minister of Health (hereinafter referred to as “X”)

## 1. General

### 1.1 Purpose of the Memorandum of Understanding

The purpose of this Memorandum of Understanding (MOU) is to confirm the participation and responsibilities of parties in the National Diabetes Surveillance System (hereinafter referred to as the “NDSS”), regarding the development of provincial, territorial and federal capacity for standardized diabetes surveillance using primarily administrative data.

### 1.2 Objectives of the Memorandum of Understanding

The main objectives of the MOU are to:

1.2.1 provide for the establishment of personnel support for the NDSS in “X” to carry out approved NDSS activities and to assist “X” in analyzing its own data.

1.2.2 obtain agreement in principle for the transfer of aggregate NDSS-related data from “X” to Health Canada, subject to a written amendment to this MOU.

1.2.3 set out the terms and conditions for NDSS-related activities and financial administration of this MOU.

### 1.3 Term of the Memorandum of Understanding

Subject to termination of this MOU, the term of this MOU shall be for a four-year period to commence on April 1, 2000, (the “Effective Date”) and end on March 31, 2004, or such other date agreed upon in writing by the parties.

## 2. Context

### Multi-Stakeholder Response to Lack of Diabetes Data

Diabetes has been recognized in recent years as a serious public health problem in this country. Diabetes prevention programs require a well-planned, organized and viable surveillance system. However, there is limited surveillance capacity for diabetes at all levels of public health in Canada, and to address this problem government and non-government sectors have collaborated on the development of the NDSS and participate on the NDSS Steering Committee to set policy and to direct activities.

The NDSS Steering Committee has representation from every province and territory, the non-governmental sector, Aboriginal groups, academia, Health Canada, Canadian Institute for Health Information, and Statistics Canada. This Steering Committee is the main decision-making body of the NDSS and acts as the data gate-keeper. The Steering Committee meets twice yearly. To assist the Steering Committee, a multi-sectoral Secretariat provides ongoing management of the NDSS. In addition, two subcommittees and three expert technical working groups are responsible for addressing key issues that have been identified by the NDSS Steering Committee.

Any private sector sponsors of the NDSS may have observer status on the Steering Committee but do not have voting rights.

### Funding for the NDSS

Health Canada funding for the NDSS is through the Canadian Diabetes Strategy (CDS) over a five-year period commencing in fiscal year 1999/2000, as approved by Federal Cabinet in November 1999 and Treasury Board in February 2000.

### NDSS: Development of Core Functionality in 2000/01

The main goals of the NDSS include the development and support in every province and territory and at the federal level of a core level of functionality with regard to standardized surveillance of diabetes. Another key goal of the NDSS, although outside the scope of this MOU, is the development and support for diabetes surveillance in the Aboriginal community.

The NDSS core data model relies on the utilization and record linkage of provincial and territorial health administrative data, beginning in the start-up year with linkage of health insurance coverage, physician claims, and hospitalization data sources to allow monitoring of diabetes incidence and prevalence, rates of diabetes complications, and levels of health care utilization in the population with diabetes compared with the population without diabetes. In the core NDSS model, person level data remain within provinces and territories, and only aggregate data on population groups will be sent to Health Canada for a national picture of the diabetes burden.

### Provincial and Territorial Capacity and Needs Assessments

In order to determine appropriate NDSS funding levels for fiscal year 2000/01, each province and territory completed an assessment of its capacity to accomplish core NDSS functionality within that time period. In some cases, a province or territory indicated that the core model was not possible in its jurisdiction in fiscal year 2000/01 and proposed “alternative” activities that would move them toward core functionality in subsequent years.

Provinces and territories also indicated in their submissions their personnel and technical resource needs in fiscal year 2000/01 to accomplish NDSS-related activities. These resource requests were assessed and in some cases revised by the NDSS Secretariat, and allocations were approved by the NDSS Steering Committee in March 2000.

This MOU pertains to approved funding allocations for NDSS personnel resources in “X”. Approved allocations for technical resources to each province and territory will be handled through a non-federal financing mechanism and source.

The understanding is that NDSS core surveillance activities conducted in fiscal year 2000/01 in a province or territory will be carried out on an annual basis and will form the main component of the ongoing functioning of the NDSS. In the case of provinces or territories that will be engaging in alternative activities in fiscal year 2000/01 because of particular challenges in those jurisdictions, the understanding is that they will be moving toward implementation of core NDSS functionality in subsequent years.

#### 4. Responsibilities of Parties

4.1 Health Canada agrees to pay to “X” on an annual basis an amount not to exceed the amount as indicated in Appendix A, subject to annual review and adjustment by the NDSS Steering Committee.

4.2 The payment is to be used to reimburse the cost of hiring or otherwise engaging personnel to accomplish NDSS-approved activities. Nothing in this agreement should be construed as establishing an employer/ employee relationship between Health Canada and any personnel hired pursuant to this agreement.

4.3 “X” is responsible for submitting resource allocation information for each subsequent year to the NDSS Steering Committee on or before December 31 of the current fiscal year. The NDSS Steering Committee will review and approve or adjust the resource allocation on or before January 31 of each year.

4.4 “X” agrees to provide in kind resources to the NDSS as needed. These resources are expected to include, but may not be limited to, the provision of data for NDSS activities, monitoring of NDSS-related personnel in “X”, infrastructure support of NDSS-related personnel, and participation on NDSS committees and working groups as appropriate.

4.5 Health Canada agrees to provide in kind resources as needed to nationally coordinate NDSS activities, to include (but may not be limited to) monitoring of national NDSS-related staff, infrastructure support of national NDSS-related personnel, and participation on NDSS committees and working groups as appropriate.

#### 5. Activities of Parties

5.1 “X” will engage in NDSS-approved activities as set out in Appendix B, subject to written amendments agreed to by both parties and the NDSS Steering Committee.

5.2 Health Canada will provide a national coordination function for the NDSS, including administering NDSS funding from federal sources on behalf of the NDSS Steering Committee.

5.3 Subject to a Provincial Privacy Impact Assessment being conducted where required and to the successful completion of activities set out in item 5.1 where these involve “core” NDSS activities,



5.3.1 “X” agrees in principle to transfer aggregate (non-person-level, de-identified) data to Health Canada, pending a written agreement between the parties specifying terms and conditions if required or under the auspices of related “X” policy and regulations, and

5.3.2 both parties agree that the proposed information to be transferred will not constitute personal health information under legislation that governs the collection, use and disclosure of personal health information.

5.4 Subject to the successful completion of activities set out in item 5.1, both parties agree in principle to coordinate the publication and dissemination of information products directly resulting from NDSS activities, pending oral or written agreement by both parties and the NDSS Steering Committee regarding the content and schedule of information publication and dissemination.

## 6. Administration of Agreement

6.1 Both parties will formally participate on the NDSS Steering Committee, and will meet and communicate on an as-needed basis to collaboratively direct and monitor the activities set out in this agreement.

## 7. Principles of Data Privacy, Access and Ownership

7.1 Data privacy standards as set out in all applicable provincial/territorial legislation and the federal *Privacy Act* will be respected.

7.2 It is the intention of the parties to uphold the principle of public access to health information to the fullest extent expedient consistent with applicable provincial and federal legislation regarding data privacy and ownership.

## 8. Intellectual Property

8.1 Any intellectual products such as NDSS standardized statistical programs and analysis tools given to “X” to fulfill the activities set out in Appendix B are to be considered in the public domain. The NDSS must be acknowledged in any publications arising from the use of these products.

8.2 Any innovations to the standardized NDSS intellectual products that are developed by “X” as well as any information products developed from data for which “X” is the custodian remain the property of “X”.

## 9. Financial Administration

9.1 The parties accept accountability for demonstrating good management practices in financial planning, expenditure control and reporting, according to generally accepted accounting practices.

9.2 Health Canada, on behalf of the NDSS Steering Committee, may commission audits of any or all NDSS-related financial records of “X” relating to the hiring of NDSS personnel to ensure that all NDSS funds are expended in accordance with the terms of this MOU.

9.3 Health Canada will make payments on a quarterly basis to “X” pursuant to activities described in Appendix B. The payment will be made upon receipt of an invoice and presentation of evidence of activities completed and of any personnel hired or otherwise engaged for NDSS activities.

9.4 Invoices should include a forecast showing any budget adjustments required for the remainder of the fiscal year.

9.5 In the case of an approved adjustment to Health Canada’s annual payment to “X”, Health Canada’s representative on the NDSS Steering Committee is responsible for informing the budget and planning units of financial and corporate services within Health Canada in a timely fashion of the approved adjustment in payment level.

## 10. Termination by Consent

The MOU may be terminated by the consent of either of the parties giving ninety (90) days’ notice in writing to the other party.

## 11. Termination for Cause

11.1 If “X” fails to perform the activities set out in Appendix B to the satisfaction of the NDSS Steering Committee, Health Canada may terminate in whole or in part this MOU, including Health Canada’s obligation to make additional payments of NDSS funds to the other party for the remainder of the MOU.

11.2 If Health Canada fails to pay the amount at the level set out in Appendix A or at the approved adjusted level pursuant to annual review by the NDSS Steering Committee, “X” may terminate in whole or in part this MOU, including “X”’s obligation to perform the activities set out in Appendix B.

## 12. Amendments

This MOU will only be amended, in writing, by mutual consent of both parties.

## 13. Conflict of Interest

13.1 No member of the House of Commons shall be admitted to any share or part of this Agreement or to any benefit to arise therefrom.

13.2 It is a term of this Agreement that no former public office holder who is not in compliance with the post-employment provisions of the Conflict of Interest and Post-Employment Code for Public Office Holders shall derive a direct benefit from this Agreement.

13.3 If the status of any party changes in any way that prejudices the project, such party shall promptly inform the other parties.

## 14. Funding Changes

If Health Canada will be reducing or terminating the funding under the MOU because of changes or reduction in Health Canada funding for the NDSS, Health Canada shall give notice in writing to "X" as early as possible. Health Canada will give "X" sixty (60) days' notice in writing before reducing or terminating the funding, whether the funding change is to occur during or at the beginning of a fiscal year. In case of such termination, Health Canada will pay "X" all outstanding amounts for activities performed under this agreement.

## 15. Notice

Any notice or other communication required to be given or made under this MOU shall be in writing and shall be deemed to be sufficiently given if sent by registered mail, or by telegram, or by facsimile, or by delivery in person, to the other party at the following address(es).

If to Health Canada:

NAME/TITLE/ORGANIZATION/ TEL/ FAX

If to "X":

NAME/TITLE/ORGANIZATION/ TEL/ FAX

**AGREED to this \_\_\_\_\_ day of \_\_\_\_\_, 2000**

**For Health Canada:**

Date \_\_\_\_\_

\_\_\_\_\_  
Signed on Behalf of Health Canada

Witness \_\_\_\_\_

**For "X":**

Date \_\_\_\_\_

\_\_\_\_\_  
Signed on Behalf of "X"

Witness \_\_\_\_\_

## Appendix F

# NDSS GUIDELINES

### Duality of Interest

*(Approved by NDSS Steering Committee  
October 2, 2000)*

The purpose of this policy is to assist the NDSS by providing duality of interest guidelines for members of the Steering Committee.

A duality of interest may arise in two situations: (1) when a member has the opportunity to influence the business decisions of the Steering Committee in a way that could lead to personal, financial gain for the member or his/her family; and (2) when a member's interests are contrary to the interests of the Steering Committee.

In order to avoid both the fact and the appearance of improper influence, a member should not vote on, approve or recommend approval of a transaction or contract with which the member is associated and should disclose any potential conflict prior to a vote or other action.

#### *General principles regarding duties of members*

- ▼ Members shall deliberate impartially on all issues placed before the Steering Committee.
- ▼ Members shall respect matters of a confidential nature and shall not provide unauthorized information on these matters to the media, the public or others.

#### *Disclosure of duality of interest*

- ▼ Disclosure of duality of interest shall be an agenda item for all meetings.

- ▼ A member shall, as soon as possible after the start of the meeting, disclose the nature of his/her duality of interest, and this shall be recorded in the minutes of the meeting.

#### *Abstinance from action*

- ▼ Members who are deemed to have a financial conflict of interest position with reference to any item under discussion should absent themselves from the meeting during the period when such discussion is taking place.
- ▼ On the Steering Committee, only a single representative of each province, territory and organization present shall vote on matters pertaining to contracts or transactions with that province, territory or organization.
- ▼ On NDSS subcommittees or working groups, on which not all jurisdictions may be represented equitably, members shall abstain from voting on contractual/transactional matters pertaining to their own province, territory or organization.

#### *Compliance*

- ▼ After a member has disclosed the nature of a potential financial conflict of interest at the start of the meeting, the existence of a conflict of interest will be determined by a majority vote of the Steering Committee members present, on a case-by-case basis.
- ▼ The Chairperson is responsible for ensuring that all members comply with this policy.

- ▼ These principles shall be binding on all members of the Steering Committee, its subcommittees and working groups.

### Definitions

- ▼ “Steering Committee” is to be interpreted as the National Diabetes Surveillance System Steering Committee.
- ▼ “Member” is to be interpreted as the designated representatives on the National Diabetes Surveillance System Steering Committee. A member may contribute funding to the National Diabetes Surveillance system and has voting privileges.

### Fund-Raising and Sponsorship

*(approved by NDSS Steering Committee October 2, 2000)*

The purpose of this policy is to assist the NDSS by providing principles for fund-raising and eligibility criteria for NDSS sponsors, and by defining potential benefits to sponsors, including a protocol for sponsors as observers at general sessions of the Steering Committee.

#### Principles for fund-raising

- ▼ There must be an open and transparent process for the solicitation of funds whereby all likely funders of the NDSS are informed of the opportunity to become a funder, and any benefits accruing to the sponsors are public knowledge and agreed to by the Steering Committee.
- ▼ There should be a diversity of funding sources so that one funder does not have undue control over the stability of NDSS funds.

- ▼ Private funders should not interfere or be promised influence regarding decisions and activities of the Steering Committee.
- ▼ The Steering Committee should be informed of the willingness of a private company to become a sponsor of the NDSS.
- ▼ Draft funding agreements with potential sponsors should be circulated to the Steering Committee for approval prior to signing.
- ▼ The Steering Committee must approve the acceptance of funding from any specified private source.

#### Eligibility criteria for sponsors

All prospective sponsors will be rated on the following:

**Interest:** NDSS fits with corporate business and/or funding priorities

**Capacity:** Declares the ability to contribute significant dollars to this initiative either philanthropically or otherwise

All the following criteria must be met by a potential sponsor:

- ▼ There must be a long-term financial commitment ( > 1 year) to the NDSS.
- ▼ It must be a substantial financial contribution ( > \$100,000 per year) to the NDSS.
- ▼ There must be no outstanding commercial matters before an organization or the Steering Committee, which, in the opinion of the Steering Committee, gives the appearance of, if not the fact of, conflict of interest.
- ▼ The potential sponsor must accept the “no influence” stipulation in the affairs of the Steering Committee.

- ▼ There should be no inconsistency/ incompatibility between the goals and objectives of the NDSS and the goals/products of the potential sponsor.

### **Potential benefits to sponsors**

- ▼ Observer status at Steering Committee meetings, in-camera sessions excluded
- ▼ Name acknowledgement on NDSS products
- ▼ Advance release of publicly distributed reports

### **Protocol for sponsors as observers at Steering Committee meetings**

- ▼ Sponsors may attend Steering Committee meetings as observers and may only speak by invitation of the Chair.
- ▼ Sponsors do not have voting authority at Steering Committee meetings.
- ▼ Sponsors may not attend in-camera sessions of the Steering Committee.
- ▼ The Steering Committee should send sponsors reports on an agreed-upon schedule regarding NDSS project accomplishments.
- ▼ Sponsors may be identified as such on NDSS products.
- ▼ As corporations wish to provide financial support to the NDSS, their relation with the Steering Committee as observers at Steering Committee meetings will be reviewed on a case-by-case basis.

### **Definitions**

- ▼ “Steering Committee” is to be interpreted as the NDSS Steering Committee.
- ▼ “Member” is to be interpreted as the designated representatives on the NDSS

Steering Committee. A member may contribute funding to the NDSS and has voting privileges.

- ▼ “Sponsor” is to be interpreted as a private financial contributor to the NDSS. A sponsor is not a designated member of the Steering Committee, does not have voting privileges, and may not attend in-camera sessions of the Steering Committee.
- ▼ “Confidential” is to be interpreted as material that is so designated at a meeting, such as funding proposals, data results, business strategies, pricing information, financial data, research protocols and intellectual property.
- ▼ “No influence” is to be interpreted as not interfering with or having influence over decisions and activities of the Steering Committee.

### **Data Access and Publications**

*(approved by NDSS Steering Committee November 27, 2002)*

The purpose of this policy is to promote the credibility, usefulness and accountability of the NDSS by defining principles around which data and products may be accessed from NDSS, how data or products may be obtained, and the publication thereof. This policy outlines the procedures believed necessary to process research requests efficiently while ensuring both consideration of the public interest and full compliance with legislation.

This policy covers data that have been collected, linked and/or analyzed with the assistance of NDSS resources. The audiences anticipated as users of NDSS data are (although this does not preclude others from requesting access, if warranted) as follows:

- ▼ parties engaged in predetermined NDSS projects, outcomes or activities;
- ▼ parties engaged in independent research;
- ▼ other audiences such as media, other government organizations, and diabetes-related stakeholders, including non-governmental organizations and health care professionals, and the general public.

#### **Nature of data and products that can be accessed:**

- ▼ unpublished NDSS aggregate data kept by Health Canada;
- ▼ person-level data kept at provincial and territorial sites (data from one specific site may be requested directly from the jurisdiction responsible for the data; this policy aims at coordinating multi-site requests); and
- ▼ NDSS programming codes.

#### **Guiding principles**

- ▼ Provinces and territories must be in agreement with any and all uses (including collection, linkage, analysis, access, and publication) of their respective provincial and territorial data within NDSS.
- ▼ This policy must comply with provincial, territorial and federal legislation and policies regarding data access and protection of privacy, and comply with existing Memoranda of Understanding. Access to and dissemination of data from provincial/territorial NDSS data files must comply with provincial/territorial legislation and policy, and access to and dissemination of Health Canada NDSS data files must comply with federal legislation and policy.

- ▼ Terms defining access to the NDSS data relating to Aboriginal peoples on a national level will be determined by the Aboriginal Diabetes Working Group.
- ▼ In accordance with the Memorandum of Understanding, any use of data that identify specific Aboriginal groups must have prior approval of the signatories to the Memorandum of Understanding. Special instances outside the MOU will be considered on a case-by-case basis.
- ▼ Person-level data will remain within the custody of the provincial/territorial NDSS datafile.
- ▼ All parties recognize that nothing herein interferes with provincial and territorial legislated obligations to manage public health reporting in each jurisdiction or Health Canada obligations as they relate to First Nations.
- ▼ NDSS statistics must be based on comparable data derived from different provincial/ territorial data sets, must reflect consistent approaches to data collection and must lead to valid and reliable interpretations. Should data not be completely comparable, provinces and territories will be requested to provide technical notes, which will be forwarded with any data requests and noted in publications. The Technical Working Group will determine whether or not the data are comparable.

#### **Uses of NDSS data and products accessed**

Data are provided for the exclusive purpose as stated in a proposal and may not be used for any other purpose without the explicit written approval, in advance, of the NDSS Data Access and Publications Subcommittee. Authorized



users are prohibited from using NDSS data or products in the pursuit of any commercial or income-generating venture. Any breach of the agreed upon terms may affect subsequent access to data maintained by the NDSS. Also, other legal remedies are not precluded by any such action. The NDSS data and products thereof (e.g. computer software, analytical tools) remain in the public domain. Sharing of data with third parties is prohibited without specific permission.

### ***Ethical review for access***

NDSS data should be used for scientifically sound, high-quality analyses, to support academic, policy, health economic or business research. Proposals for research using NDSS data must demonstrate acceptable rationale, analytical methods, and security/confidentiality safeguards. All NDSS investigator-initiated projects requesting unpublished data must receive ethical approval from an ethics board that complies with the “Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans” before data are released.

### ***Requirements to request access***

- ▼ Proposals to access NDSS data held at a provincial or territorial site will be submitted for review to the relevant provincial or territorial body with custody of the data. Where applicable, proposals to access Aboriginal data for a specific province or territory will be submitted for review to the Aboriginal partner as identified in the MOU. Provincial and/or territorial approval is required before data will be released, and sign off will occur within the jurisdiction. Aboriginal partner approval is required according to the conditions agreed by all parties.
- ▼ Proposals to access NDSS aggregate data held by Health Canada will be submitted for

review to Health Canada. Third party access will be reviewed on a case-by-case basis. The NDSS will be permitted to carry out on-site visits and other inspections to ensure compliance with the conditions of access. All requests will be logged at Health Canada.

- ▼ Requests to access NDSS programming code will be logged at Health Canada to ensure that sharing parties have the most current version of the code. The NDSS programming code is in the public domain and may be shared with requesting parties with appropriate access to the technology used.

All requests for data must be submitted in writing to the secretary of the Data Access and Publication Subcommittee and include the following:

- ▼ the party requesting the data;
- ▼ the purpose of the project;
- ▼ the benefits of the project;
- ▼ the list of data being requested;
- ▼ the analysis to be performed;
- ▼ the nature and intent of any data linkages;
- ▼ any publications expected to result from data analysis and where and when they will be distributed;
- ▼ the means by which the client will ensure the security of the data;
- ▼ a description of how and when the data will be disposed of or returned;
- ▼ the names and titles of all individuals who will have access to the data;
- ▼ the complete document package submitted for ethical review;
- ▼ the results of any ethical committee review of the project; and



- ▼ the source(s) of funding for the request and proposed analysis.

When a prospective user approaches the NDSS to request access to data, the NDSS should forward to the researchers a package containing a research application. Requests are to be accompanied by a signed Non-Disclosure Agreement stating that the researcher agrees to comply with NDSS policies respecting use and disclosure of the data:

- ▼ to use the data only for the stated purpose;
- ▼ to make no attempt to link or otherwise identify a data subject other than as divulged;
- ▼ to maintain the data's electronic and/or physical security and dispose of the data as specified;
- ▼ to not disclose the data to others;
- ▼ to provide two advance copies of any publication or report to the NDSS Steering Committee for review and comments. The copies will be kept confidential. This is intended to ensure that data are being interpreted accurately;
- ▼ to acknowledge NDSS as the data source in any publication or report and to state that the interpretation and conclusions contained in the publications or report do not necessarily represent those of the NDSS, Health Canada, or any province or territory;
- ▼ to provide a copy of the final publication or report to the NDSS.

All requests will be received and reviewed by the area responsible for the data (i.e. Health Canada, province/territory) in accordance with the NDSS principles, policies and procedures for data disclosure. The secretary of the Data Access and Publication Subcommittee (also an employee of

Health Canada) will be co-ordinating the process and collecting the necessary authorizations from each jurisdiction.

Decisions regarding NDSS unpublished aggregate data will be made by the Data Access and Publications Subcommittee and are subject to the endorsement and approval of the NDSS Steering Committee.

### **Disclosure**

Before release, reports containing any data requested through the NDSS, or reports generated using NDSS data, will be reviewed. The Data Access and Publication Subcommittee's review will ensure that privacy standards are complied with and that the correct data are used and are not misrepresented. The Data Access and Publication Subcommittee will receive a copy of every report before publication, at the same time as the NDSS partners or the NDSS Steering Committee, according to the rules listed below.

### **Parties engaged in independent research:**

- ▼ The NDSS provides parties engaged in independent research a right to publish, assuring the parties that once the use of the data has been approved, no censure rights can be applied by NDSS partners and no publication can be suppressed because of differences of interpretation or political consequences. However, NDSS partners, specifically those whose data contributed to the research, may request a delay or specific process whereby they can review the manuscript to detect any error of fact. The interpretation and conclusions contained in the publications or report may not necessarily represent those of the NDSS, Health Canada, or any province or territory.

- ▼ Before being sent to publishers, manuscripts from parties engaged in independent research, peer-reviewed or not, should be sent to the Data Access and Publication Subcommittee, and the Subcommittee will send the manuscripts to provinces or territories whose data contributed to the research for review. NDSS partners and Data Access and Publication Subcommittee reviewers have two weeks upon receipt to make recommendations for changes.
- ▼ Peer-reviewed or non-peer-reviewed manuscripts must be sent to the Data Access and Publications Subcommittee once they are accepted for publication (for information purposes and to facilitate a coordinated approach to publication of NDSS data only, not to prevent publication).

When NDSS data are used for presentations and conference abstracts, the Data Access and Publication Subcommittee should be notified.

### ***Protection of privacy and confidentiality***

Privacy and confidentiality must be protected. Successful applicants must comply with the NDSS Privacy and Confidentiality Policy, which describes detailed measures for ensuring the protection of privacy and confidentiality of NDSS data. Measures to be used include, but are not limited to, checks for residual disclosure of individual identity prior to release of any reports or aggregate data, and ensuring that approval/release of any person-level data (for example, for research) is in accordance with the legislation, policies and processes of the individual organizations at the provincial and territorial level where the data reside. It is a provincial and territorial role to ensure adequate security arrangements for all person-level data.

### ***Destruction***

Data files may be provided for a five-year time period, following which the original data set and any copies thereof must be destroyed at the completion of the project or according to the signed agreement destruction date or negotiated data expiry date.

### ***Penalties***

Those who violate conditions for disclosure or who misrepresent the nature of the data supplied to them will be subject to sanctions, which may include

- ▼ a written complaint to the sponsoring organization;
- ▼ rebuttal in the journal;
- ▼ refusal of future access to data for the researcher and/or the institution he/she represents;
- ▼ seizure of any data released by NDSS; and/or
- ▼ legal action.

### ***Publication***

- ▼ The NDSS Steering Committee will endeavour to publish on an annual basis a report with core epidemiological measures from aggregate NDSS data at the Health Canada site.
- ▼ The NDSS Steering Committee retains authority to approve publication of NDSS information by Health Canada.
- ▼ The NDSS Steering Committee permits Health Canada to release a public-use NDSS aggregate data file on its website after approval of the content of the data file by the Steering Committee and Aboriginal Diabetes Working Group.

- ▼ The National Diabetes Surveillance System must be credited as a contributor in any publications arising from NDSS data at provincial, territorial or Health Canada sites or any other organization using NDSS data, and a disclaimer added that the interpretation and conclusions contained in the publications or report do not necessarily represent those of the NDSS, Health Canada, or any province or territory.
- ▼ Diabetes-related stakeholders not already represented on the NDSS Steering Committee will be first in line for obtaining copies of public-release annual NDSS reports, starting with the member organizations of the Diabetes Council of Canada.
- ▼ The Data Access and Publications Subcommittee is responsible for submitting its publication plans (schedule and proposed content) to the Steering Committee for approval each year. In addition, the Subcommittee will work to coordinate similar publications from provinces and territories, as feasible and desired.
- ▼ Provinces and territories will continue to publish their own diabetes data at times dictated by provincial/territorial requirements.
- ▼ The prospective user of data held by Health Canada may be required to sign an “Agreement to Proceed with Data Preparation” form, which briefly outlines the search activity and the estimated costs, for which the user agrees to reimburse Health Canada. For data at the provincial/territorial level, an individual province/territory may have its own agreement that the prospective user may be required to sign.

### *Evaluation*

- ▼ The NDSS Steering Committee will evaluate the activities covered by this Data Access and Publications Subcommittee as one component of the overall evaluation of the NDSS. The Steering Committee will also determine whether and to what extent the general guiding principles of the NDSS have been followed; namely the principles of consistency, flexibility, quality, cost-effectiveness, accessibility, privacy and confidentiality, and responsiveness. Measures to be used for this evaluation are to be determined and may include consistency in reporting on the same population/area from different NDSS sites, flexibility in the range of themes addressed in special reports, quality of research from NDSS aggregate data, the impact of cost-recovery fees, rates of successful requests for NDSS aggregate data and information, absence of confidentiality leaks, and assessment of whether the NDSS is having an impact on research activity and is responding (e.g. in its special reports and enhanced analyses) to questions raised by research.
- ▼ The Access and Data Publication Working Group should review this policy every two years.

### *Cost-recovery*

- ▼ Cost-recovery fees for NDSS publications and for the provision of unpublished NDSS information or data files can be set at levels to be determined by the governments where the NDSS data are kept. Health Canada will have copies of aggregate data already held at respective provincial/ territorial sites and will therefore never charge a province or territory for a copy of its own data.

## Appendix G

# COMPARISON OF NDSS AND STATISTICS CANADA COUNTS OF DEATH AND POPULATION

### Death Counts

Province/Territory	Death Counts* and Ratio (%)	1995/1996	1996/1997	1997/1998	1998/1999
Yukon	NDSS	149	145	119	130
	Statistics Canada	154	139	111	135
	<b>NDSS: Statistics Canada (%)</b>	<b>96.75</b>	<b>104.32</b>	<b>107.21</b>	<b>96.30</b>
Northwest Territories	NDSS	238	278	260	279
	Statistics Canada	234	290	255	287
	<b>NDSS: Statistics Canada (%)</b>	<b>101.71</b>	<b>95.86</b>	<b>101.96</b>	<b>97.21</b>
British Columbia	NDSS	24,971	26,329	26,423	25,171
	Statistics Canada	26,618	27,734	27,750	27,665
	<b>NDSS: Statistics Canada (%)</b>	<b>93.81</b>	<b>94.93</b>	<b>95.22</b>	<b>90.98</b>
Alberta	NDSS	15,789	16,371	16,637	15,921
	Statistics Canada	15,906	16,532	16,819	16,817
	<b>NDSS: Statistics Canada (%)</b>	<b>99.26</b>	<b>99.03</b>	<b>98.92</b>	<b>94.67</b>
Saskatchewan	NDSS	8,581	8,896	8,797	8,892
	Statistics Canada	8,475	8,845	8,789	8,893
	<b>NDSS: Statistics Canada (%)</b>	<b>101.25</b>	<b>100.58</b>	<b>100.09</b>	<b>99.99</b>
Manitoba	NDSS	9,587	9,686	9,190	9,805
	Statistics Canada	9,555	9,672	9,569	9,834
	<b>NDSS: Statistics Canada (%)</b>	<b>100.33</b>	<b>100.14</b>	<b>96.04</b>	<b>99.71</b>
Ontario	NDSS	77,446	79,297	78,216	76,114
	Statistics Canada	77,977	79,868	80,292	80,027
	<b>NDSS: Statistics Canada (%)</b>	<b>99.32</b>	<b>99.29</b>	<b>97.41</b>	<b>95.11</b>
Prince Edward Island	NDSS	1,171	1,295	1,115	1,127
	Statistics Canada	1,172	1,248	1,076	1,125
	<b>NDSS: Statistics Canada (%)</b>	<b>99.91</b>	<b>103.77</b>	<b>103.62</b>	<b>100.18</b>
Nova Scotia	NDSS	8,040	7,655	7,943	7,410
	Statistics Canada	7,743	7,850	8,124	7,739
	<b>NDSS: Statistics Canada (%)</b>	<b>103.84</b>	<b>97.52</b>	<b>97.77</b>	<b>95.75</b>

\*counts of deaths due to any cause, people aged 20+

## Population Counts

Province/Territory	Population Counts (Ages 20+) and Estimates			
	1997/1998	1998/1999	1999/2000	
Yukon	NDSS annual count	24,320	23,846	23,514
	NDSS July count	22,432	21,867	21,602
	<b>Statistics Canada July estimate</b>	<b>22,549</b>	<b>22,141</b>	<b>21,896</b>
Northwest Territories	NDSS annual count	29,593	29,381	28,837
	NDSS July count	27,449	27,209	26,778
	<b>Statistics Canada July estimate</b>	<b>26,918</b>	<b>26,579</b>	<b>26,600</b>
British Columbia	NDSS annual count	2,947,363	2,970,243	2,996,666
	NDSS July count	2,518,893	2,568,320	2,588,334
	<b>Statistics Canada July estimate</b>	<b>2,941,849</b>	<b>2,980,366</b>	<b>3,016,521</b>
Alberta	NDSS annual count	2,074,952	2,130,058	2,172,836
	NDSS July count	2,025,470	2,076,741	2,124,241
	<b>Statistics Canada July estimate</b>	<b>2,004,598</b>	<b>2,062,669</b>	<b>2,110,691</b>
Saskatchewan	NDSS annual count	738,042	745,309	752,753
	NDSS July count	711,309	718,880	726,971
	<b>Statistics Canada July estimate</b>	<b>712,441</b>	<b>717,473</b>	<b>721,810</b>
Manitoba	NDSS annual count	847,294	848,247	852,112
	NDSS July count	818,002	818,203	822,341
	<b>Statistics Canada July estimate</b>	<b>812,180</b>	<b>815,330</b>	<b>820,391</b>
Ontario	NDSS annual count	8,778,947	8,937,507	9,130,308
	NDSS July count	8,509,463	8,683,060	8,872,165
	<b>Statistics Canada July estimate</b>	<b>8,250,541</b>	<b>8,369,816</b>	<b>8,491,836</b>
Prince Edward Island	NDSS annual count	105,044	104,340	105,019
	NDSS July count	99,669	100,323	101,094
	<b>Statistics Canada July estimate</b>	<b>97,837</b>	<b>98,436</b>	<b>99,602</b>
Nova Scotia	NDSS annual count	716,220	722,403	731,016
	NDSS July count	692,053	698,270	707,022
	<b>Statistics Canada July estimate</b>	<b>691,021</b>	<b>695,177</b>	<b>700,854</b>

## Appendix H

## ANNUAL PERSON-LEVEL SUMMARY FILE (APLSF) DATA ELEMENTS

Category	Description	Name
<b>Demographic</b>		
	Age as of March 31 of fiscal year Calculated using the date of birth and year ending date	AGE
	Personal lifetime identifier Identifier that is unique to that person for perpetuity	ID
	Municipality or other geographic descriptor as defined by the province or territory (optional)	MUN
	Province or territory	PT
	Sex	SEX
	Fiscal year to which data apply	YEAR
<b>Exposure</b>		
	Person-days of observation with diabetes in current year	DM_PDO
	Person-days of observation without diabetes in current year	DM_PDON
	Person-days of observation Total number of days person was eligible for health insurance in the province/ territory within the current year	PDO
<b>Diabetes Case Ascertainment Information</b>		
	Hospital discharge date where diabetes was recorded among the first three diagnosis codes	D_DH3D
	Date of first diabetes diagnosis from physician data in current fiscal year	D_DMD1
	Date of second diabetes diagnosis from physician data in current fiscal year	D_DMD2
	Date of first diabetes diagnosis from physician data in previous fiscal year	DM_DMD1
<b>Case Date</b>		
	Perpetual diabetes case date	DM_CASE
<b>Complication/Co-morbidity Data</b>		
	<i>(NOTE: Other co-morbid conditions will be added as the case definitions are defined.)</i> Date of death	DOD
<b>Health Services Use</b>		
	<i>(NOTE: Other health services measures will be added as definitions are defined)</i> Treatment days – number of days admitted to hospital (not included in current data)	TDAYS
<b>History</b>		
	Count of medical diagnoses in current year	D_CMD
	Multi-year count of physician diagnosis of diabetes	DM_CMD
	Year first observing ID/earliest NDSS year person was observed within NDSS, within province/territory	FIRSTYR
	The fiscal year in which the person was given a diagnosis of diabetes within the NDSS	DM_YRCCS

Note: Health Canada can provide access to a dummy file for researchers interested in testing SAS code.

## Appendix I

## CANADIAN STANDARD POPULATION ESTIMATES — JULY 1, 1991

Sex	Age Group	Population	Population Over Age 20	Proportion Over Age 20
Both	00-09	3,906,391		
	10-19	3,839,205		
	20-29	4,638,691	4,638,691	0.22767
	30-39	4,943,161	4,943,161	0.24262
	40-49	3,813,044	3,813,044	0.18715
	50-54	1,339,902	1,339,902	0.06576
	55-59	1,238,441	1,238,441	0.06078
	60-64	1,190,217	1,190,217	0.05842
	65-69	1,084,588	1,084,588	0.05323
	70-74	834,024	834,024	0.04093
	75-79	622,221	622,221	0.03054
	80-84	382,303	382,303	0.01876
	85+	287,877	287,877	0.01413
	Total	28,120,065	20,374,469	
Female	00-09	1,910,164		
	10-19	1,873,125		
	20-29	2,276,239	2,276,239	0.11172
	30-39	2,467,295	2,467,295	0.1211
	40-49	1,897,274	1,897,274	0.09312
	50-54	670,271	670,271	0.0329
	55-59	620,986	620,986	0.03048
	60-64	613,550	613,550	0.03011
	65-69	588,370	588,370	0.02888
	70-74	469,865	469,865	0.02306
	75-79	365,286	365,286	0.01793
	80-84	237,631	237,631	0.01166
	85+	198,419	198,419	0.00974
	Total	14,188,475	10,405,186	
Male	00-09	2,006,773		
	10-19	1,976,734		
	20-29	2,343,775	2,343,775	0.11503
	30-39	2,480,546	2,480,546	0.12175
	40-49	1,917,714	1,917,714	0.09412
	50-54	676,641	676,641	0.03321
	55-59	617,879	617,879	0.03033
	60-64	580,323	580,323	0.02848
	65-69	497,485	497,485	0.02442
	70-74	362,500	362,500	0.01779
	75-79	252,779	252,779	0.01241
	80-84	139,408	139,408	0.00684
	85+	85,869	85,869	0.00421
	Total	13,938,426	9,954,919	



## Appendix J

# VALIDATION WORK

Diagnostic information provided by administrative data is limited on the basis of a single interaction with the health care system. NDSS uses a more elaborate algorithm that is based on multiple interactions between the person with diabetes and physicians and hospitals. Consequently, NDSS requires an articulated case definition and ongoing validation of that definition. NDSS validation uses a systematic approach, with different aspects of validation conducted in at least two provinces/territories to demonstrate potential differences by jurisdiction.

▼ **NDSS algorithm:** a person is identified as having diabetes with one hospital or two physician visits within two years coded with a diagnosis of diabetes mellitus.

▼ **Sensitivity:** the proportion of people who truly have diabetes who are identified by the NDSS algorithm.

▼ **Specificity:** the proportion of people who truly do not have diabetes who are classified as such by the NDSS algorithm.

▼ **Positive Predictive Value:** the probability that a person identified by the NDSS algorithm as having diabetes truly does have diabetes. This is influenced by sensitivity, specificity, and prevalence.

## Gold Standards and Jurisdictions

The case definition currently used by NDSS is based on developmental work in Manitoba that produced sensitivity of over 95% (specificity could not be assessed) using the gold standard of the Diabetes Education Resource<sup>1</sup>. Initial validation work in Alberta<sup>2</sup> and Ontario<sup>3</sup> used the National Population Health Survey<sup>4</sup> as the gold standard. Both studies concluded that self-reported survey data could not be used as a gold standard, since they underestimate the true disease burden in the population.

Other completed validation projects have substantiated the use of the NDSS algorithm. Studies in Nova Scotia,<sup>5</sup> Ontario<sup>6</sup> and Prince Edward Island<sup>7</sup> produced sensitivity measures ranging from 69% in Nova Scotia to 83% and 86% in Prince Edward Island and Ontario respectively. The gold standards were a combination of the provincial health survey and the Diabetes Care Program Registry in Nova Scotia, the diabetes registry in Prince Edward Island, and medical charts in Ontario.

In the same three studies, specificity measures varied much less, at 99% in Nova Scotia and Prince Edward Island and 97% in Ontario. Positive predictive value was 80% in Ontario and 78% in Prince Edward Island.

Validation work is ongoing in other jurisdictions. In British Columbia, the gold standard is the number of prescriptions for insulin and oral hypoglycemic medication; in the Yukon it is use of the Diabetes Education Centres, and in Quebec the use of clinical data.



## Validity Over Time

The Prince Edward Island study found sensitivity, specificity and predictive value to be stable for five to seven years of data for people aged 25 and over, and for a series of sequential five-year data windows.<sup>7</sup> With the use of 10 or more years of administrative data, specificity and positive predictive value decreased as prevalent cases over-accumulated. Alternative algorithms are under investigation in Nova Scotia to incorporate the concept of cumulative probability of diabetes.

## Incidence Versus Prevalence

New cases and prevalent cases are difficult to differentiate in the early years.<sup>8</sup> Several studies found at least five years of data are required before stable estimates of incidence can be obtained.<sup>7,9</sup> Therefore incidence rates are not included in the first NDSS report.

## Special Populations

Validation has not yet been completed for people under the age of 20 years. Initial investigation of several algorithms for type 1 diabetes has produced positive predictive values of less than 40%.<sup>10</sup> Prince Edward Island and Ontario are also investigating several algorithms for detecting diabetes among people under age 20, using the Prince Edward Island Diabetes Registry and hospital chart abstracts respectively.

Initial work in British Columbia and Ontario suggests that the increase in female prevalence seen during the child-bearing years may be the result of miscoding of gestational diabetes. One project funded by the Canadian Institutes of Health Research (CIHR) is validation of an algorithm for removal of gestational diabetes using chart abstracts from maternity hospitals.

This project will also provide validation for individuals under non fee-for-service arrangements, using electronic patient records and drug claims data. Validation work in Aboriginal communities will include use of the Sandy Lake diabetes community screening database and Northern Diabetes Health Network database.

## Complications

The complications of diabetes are also under investigation, with an initial focus on co-morbidities of cardiovascular disease, cerebrovascular disease, peripheral vascular disease, including lower limb amputations, retinopathy and dialysis. Projects are under way in Ontario,<sup>11</sup> Quebec, Manitoba, and the Yukon. One of the CIHR-funded projects will describe the distribution of co-morbid conditions and Charlson's co-morbidity index<sup>12</sup> among inpatients using the national Hospital Morbidity Data maintained at the Canadian Institute for Health Information (CIHI) and the Person-Oriented Information Database maintained at Statistics Canada. The effect of co-morbid conditions on hospital stay, hospital readmission, and hospital mortality will be assessed. The distribution of co-morbid conditions in the general Canadian population will be described using the 1996/97 National Population Health Survey.

## Health Service Use

Work is also planned for health service use. The need for accurate identification of people with and without diabetes will become increasingly important as NDSS looks toward the management of diabetes.

## New Initiatives with CIHR

Recently, the NDSS and the CIHR Institute of Nutrition, Metabolism and Diabetes collaborated in funding health services and population health research on diabetes. Each partner contributed \$250,000 for a total of \$500,000 in funding available. A Request for Applications (RFA) was called in April 2002. Eligible research areas were data validation (diabetes case definition, case definitions for complications related to diabetes, and community-based screening) and health services and population health research (quality of life, access to diabetes-related health care services, economic analysis of the burden of diabetes).

Seven applications were peer-reviewed by a six-person committee of Canadians and Americans chaired by Dr. Sam Sheps from the University of British Columbia. Two projects were funded, and reports are expected by January 2005:

- ▼ **Validation of administrative data algorithms for diabetes surveillance in special populations** (\$92,024) by J. Hux, G. Booth, A. Hanley, T. To, D. Daneman, H. Lee, D. Feig
- ▼ **Evaluation of co-morbidities and complications in relation to hospital outcomes for diabetes among Canadian inpatients and general Canadian populations** (\$192,940) by Y. Chen, R. Sigal

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## Appendix K

## PREVALENCE

## Age-specific Prevalence by Fiscal Year, Sex and Province/Territory

## Canada

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29</b>	<b>0.7</b>	<b>0.4</b>	<b>0.8</b>	<b>0.5</b>	<b>0.9</b>	<b>0.5</b>
Prevalence (%)						
▽ People with diabetes	14,820	9,041	16,454	9,806	17,494	10,562
▽ Annual population count	1,997,477	2,024,463	1,994,491	2,023,346	1,997,640	2,029,248
<b>30-39</b>	<b>1.4</b>	<b>1.0</b>	<b>1.6</b>	<b>1.1</b>	<b>1.8</b>	<b>1.2</b>
Prevalence (%)						
▽ People with diabetes	35,149	24,272	40,626	26,876	45,406	28,683
▽ Annual population count	2,528,645	2,544,838	2,499,595	2,515,198	2,471,874	2,490,412
<b>40-49</b>	<b>2.2</b>	<b>2.6</b>	<b>2.4</b>	<b>2.9</b>	<b>2.6</b>	<b>3.0</b>
Prevalence (%)						
▽ People with diabetes	49,607	60,160	56,787	67,338	62,695	72,785
▽ Annual population count	2,289,110	2,289,206	2,348,501	2,349,403	2,410,680	2,412,997
<b>50-54</b>	<b>4.1</b>	<b>5.7</b>	<b>4.5</b>	<b>6.2</b>	<b>4.7</b>	<b>6.4</b>
Prevalence (%)						
▽ People with diabetes	36,708	50,825	42,145	58,092	46,566	63,598
▽ Annual population count	894,409	898,957	939,131	939,131	985,939	987,280
<b>55-59</b>	<b>6.0</b>	<b>8.3</b>	<b>6.5</b>	<b>9.0</b>	<b>6.8</b>	<b>9.5</b>
Prevalence (%)						
▽ People with diabetes	41,374	56,480	46,626	64,048	50,981	70,751
▽ Annual population count	690,681	684,001	720,363	714,799	750,683	746,490
<b>60-64</b>	<b>8.1</b>	<b>10.7</b>	<b>8.9</b>	<b>11.9</b>	<b>9.3</b>	<b>12.5</b>
Prevalence (%)						
▽ People with diabetes	48,840	62,265	54,002	69,613	57,623	74,906
▽ Annual population count	600,281	579,751	608,538	586,737	619,702	597,864
<b>65-69</b>	<b>10.2</b>	<b>12.9</b>	<b>11.0</b>	<b>14.1</b>	<b>11.5</b>	<b>14.9</b>
Prevalence (%)						
▽ People with diabetes	58,906	69,132	63,593	75,923	66,893	80,829
▽ Annual population count	579,798	535,662	579,565	539,503	579,176	540,838
<b>70-74</b>	<b>11.7</b>	<b>14.5</b>	<b>12.7</b>	<b>15.9</b>	<b>13.5</b>	<b>16.9</b>
Prevalence (%)						
▽ People with diabetes	61,870	62,869	67,535	69,956	71,814	75,972
▽ Annual population count	530,424	433,241	532,012	441,247	533,607	449,917
<b>75-79</b>	<b>12.1</b>	<b>14.8</b>	<b>13.2</b>	<b>16.3</b>	<b>14.2</b>	<b>17.4</b>
Prevalence (%)						
▽ People with diabetes	52,132	45,497	59,504	52,428	65,349	57,856
▽ Annual population count	432,184	306,934	449,659	321,181	461,785	331,731
<b>80-84</b>	<b>11.6</b>	<b>14.0</b>	<b>12.8</b>	<b>15.4</b>	<b>13.7</b>	<b>16.7</b>
Prevalence (%)						
▽ People with diabetes	34,280	25,275	38,247	28,064	42,119	31,260
▽ Annual population count	295,571	180,014	299,326	182,152	307,457	187,627
<b>85+</b>	<b>9.5</b>	<b>11.5</b>	<b>10.6</b>	<b>12.8</b>	<b>11.5</b>	<b>13.8</b>
Prevalence (%)						
▽ People with diabetes	26,337	14,213	30,647	16,685	35,044	18,956
▽ Annual population count	276,946	123,232	290,099	130,019	305,043	137,462
<b>Total*</b>	<b>4.1</b>	<b>4.5</b>	<b>4.6</b>	<b>5.0</b>	<b>4.9</b>	<b>5.4</b>
Prevalence (%)						
▽ People with diabetes	460,023	480,029	516,166	538,829	561,984	586,158
▽ Annual population count	11,115,526	10,600,299	11,261,280	10,745,676	11,423,586	10,911,866
<b>Canadian Total</b>	<b>479,346</b>	<b>500,193</b>	<b>537,848</b>	<b>561,463</b>	<b>585,590</b>	<b>610,780</b>

\* for participating jurisdictions

\*\* estimated using NDSS prevalence and adjusting for 4.2% of Canadian population in New Brunswick and Newfoundland and Labrador (2001 census)

## Age-specific Prevalence by Fiscal Year and Sex

### Yukon Territory

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.9</b>	<b>0.4</b>	<b>1.2</b>	<b>0.5</b>	<b>1.1</b>	<b>0.6</b>
▽ People with diabetes	23	9	28	12	25	12
▽ Annual population count	2,495	2,468	2,384	2,263	2,292	2,117
<b>30-39 Prevalence (%)</b>	<b>1.0</b>	<b>0.6</b>	<b>1.3</b>	<b>0.7</b>	<b>1.4</b>	<b>0.7</b>
▽ People with diabetes	34	21	41	20	44	21
▽ Annual population count	3,347	3,292	3,198	3,056	3,060	2,830
<b>40-49 Prevalence (%)</b>	<b>1.7</b>	<b>1.5</b>	<b>1.9</b>	<b>1.7</b>	<b>1.9</b>	<b>1.7</b>
▽ People with diabetes	52	51	59	58	60	54
▽ Annual population count	3,062	3,386	3,110	3,318	3,134	3,267
<b>50-54 Prevalence (%)</b>	<b>3.9</b>	<b>4.9</b>	<b>4.5</b>	<b>5.0</b>	<b>4.6</b>	<b>5.2</b>
▽ People with diabetes	38	62	47	65	51	67
▽ Annual population count	985	1,273	1,036	1,295	1,111	1,299
<b>55-59 Prevalence (%)</b>	<b>4.8</b>	<b>6.4</b>	<b>4.5</b>	<b>6.2</b>	<b>5.7</b>	<b>6.0</b>
▽ People with diabetes	28	52	28	53	37	55
▽ Annual population count	582	817	618	851	647	922
<b>60-64 Prevalence (%)</b>	<b>7.5</b>	<b>5.7</b>	<b>10.4</b>	<b>7.2</b>	<b>10.0</b>	<b>8.5</b>
▽ People with diabetes	31	30	43	39	42	48
▽ Annual population count	413	527	414	542	421	567
<b>65-69 Prevalence (%)</b>	<b>9.3</b>	<b>11.2</b>	<b>7.0</b>	<b>10.9</b>	<b>8.1</b>	<b>10.1</b>
▽ People with diabetes	28	47	21	46	26	43
▽ Annual population count	300	421	300	422	322	424
<b>70-74 Prevalence (%)</b>	<b>7.3</b>	<b>10.6</b>	<b>14.1</b>	<b>12.2</b>	<b>17.2</b>	<b>14.7</b>
▽ People with diabetes	14	25	27	33	35	43
▽ Annual population count	192	236	191	270	203	293
<b>75-79 Prevalence (%)</b>	<b>12.1</b>	<b>9.8</b>	<b>9.7</b>	<b>7.9</b>	<b>9.3</b>	<b>10.7</b>
▽ People with diabetes	17	13	15	11	14	16
▽ Annual population count	140	133	155	140	151	150
<b>80+ Prevalence (%)</b>	<b>6.1</b>	<b>9.7</b>	<b>7.6</b>	<b>10.6</b>	<b>9.4</b>	<b>14.6</b>
▽ People with diabetes	9	10	13	12	17	18
▽ Annual population count	148	103	170	113	181	123
<b>Total Prevalence (%)</b>	<b>2.3</b>	<b>2.5</b>	<b>2.8</b>	<b>2.8</b>	<b>3.0</b>	<b>3.1</b>
▽ People with diabetes	274	320	322	349	351	377
▽ Annual population count	11,664	12,656	11,576	12,270	11,522	11,992

## Age-specific Prevalence by Fiscal Year and Sex

### Northwest Territories

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.3</b>	<b>0.3</b>	<b>0.2</b>	<b>0.4</b>	<b>0.3</b>	<b>0.4</b>
▽ People with diabetes	12	11	9	14	10	14
▽ Annual population count	3,843	3,764	3,659	3,639	3,525	3,460
<b>30-39 Prevalence (%)</b>	<b>1.0</b>	<b>0.8</b>	<b>1.1</b>	<b>0.9</b>	<b>1.0</b>	<b>0.9</b>
▽ People with diabetes	42	38	46	39	42	38
▽ Annual population count	4,384	4,524	4,263	4,339	4,107	4,149
<b>40-49 Prevalence (%)</b>	<b>2.4</b>	<b>2.3</b>	<b>2.5</b>	<b>2.8</b>	<b>2.4</b>	<b>3.0</b>
▽ People with diabetes	75	80	80	104	77	108
▽ Annual population count	3,175	3,550	3,251	3,664	3,236	3,644
<b>50-54 Prevalence (%)</b>	<b>4.1</b>	<b>5.3</b>	<b>5.5</b>	<b>5.3</b>	<b>6.1</b>	<b>5.6</b>
▽ People with diabetes	39	68	55	70	66	78
▽ Annual population count	961	1,272	1,002	1,320	1,074	1,381
<b>55-59 Prevalence (%)</b>	<b>6.2</b>	<b>6.9</b>	<b>6.5</b>	<b>8.6</b>	<b>7.0</b>	<b>9.2</b>
▽ People with diabetes	40	54	43	71	46	76
▽ Annual population count	646	786	658	822	660	829
<b>60-64 Prevalence (%)</b>	<b>6.2</b>	<b>9.1</b>	<b>7.5</b>	<b>8.9</b>	<b>7.9</b>	<b>11.1</b>
▽ People with diabetes	25	47	32	47	34	57
▽ Annual population count	405	515	424	526	432	512
<b>65-69 Prevalence (%)</b>	<b>9.2</b>	<b>7.3</b>	<b>8.0</b>	<b>10.2</b>	<b>8.7</b>	<b>13.7</b>
▽ People with diabetes	27	28	25	39	28	54
▽ Annual population count	292	382	311	384	321	395
<b>70-74 Prevalence (%)</b>	<b>12.0</b>	<b>9.7</b>	<b>14.6</b>	<b>9.3</b>	<b>13.6</b>	<b>8.8</b>
▽ People with diabetes	26	23	31	24	29	23
▽ Annual population count	216	237	212	257	214	261
<b>75-79 Prevalence (%)</b>	<b>9.6</b>	<b>4.1</b>	<b>9.2</b>	<b>6.5</b>	<b>12.6</b>	<b>8.0</b>
▽ People with diabetes	13	6	14	9	20	11
▽ Annual population count	136	147	153	139	159	137
<b>80+ Prevalence (%)</b>	<b>11.7</b>	<b>4.3</b>	<b>11.4</b>	<b>4.8</b>	<b>11.7</b>	<b>6.2</b>
▽ People with diabetes	23	7	22	8	21	10
▽ Annual population count	197	161	193	165	179	162
<b>Total Prevalence (%)</b>	<b>2.3</b>	<b>2.4</b>	<b>2.5</b>	<b>2.8</b>	<b>2.7</b>	<b>3.1</b>
▽ People with diabetes	322	362	357	425	373	469
▽ Annual population count	14,255	15,338	14,126	15,255	13,907	14,930

## Age-specific Prevalence by Fiscal Year and Sex

### Nunavut

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.2</b>	<b>0.1</b>	<b>0.3</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>
∨ People with diabetes	5	4	8	5	7	7
∨ Annual population count	3,068	2,994	2,978	2,953	2,965	2,899
<b>30-39 Prevalence (%)</b>	<b>0.4</b>	<b>0.2</b>	<b>0.5</b>	<b>0.3</b>	<b>0.6</b>	<b>0.4</b>
∨ People with diabetes	12	6	13	9	17	12
∨ Annual population count	2,726	2,913	2,887	3,011	2,967	3,113
<b>40-49 Prevalence (%)</b>	<b>0.9</b>	<b>0.8</b>	<b>1.1</b>	<b>1.0</b>	<b>0.8</b>	<b>1.2</b>
∨ People with diabetes	14	16	17	20	13	25
∨ Annual population count	1,523	1,894	1,588	1,926	1,678	2,008
<b>50-54 Prevalence (%)</b>	<b>0.9</b>	<b>1.6</b>	<b>1.4</b>	<b>2.1</b>	<b>2.2</b>	<b>2.3</b>
∨ People with diabetes	5	11	8	16	14	18
∨ Annual population count	555	689	582	761	624	797
<b>55-59 Prevalence (%)</b>	<b>1.8</b>	<b>2.6</b>	<b>1.4</b>	<b>3.0</b>	<b>2.0</b>	<b>4.0</b>
∨ People with diabetes	7	12	6	15	9	21
∨ Annual population count	396	454	435	495	441	525
<b>60-64 Prevalence (%)</b>	<b>1.8</b>	<b>2.5</b>	<b>2.3</b>	<b>3.2</b>	<b>3.3</b>	<b>4.7</b>
∨ People with diabetes	5	8	7	11	11	18
∨ Annual population count	282	325	309	342	338	384
<b>65-69 Prevalence (%)</b>	<b>1.7</b>	<b>4.4</b>	<b>1.7</b>	<b>3.3</b>	<b>2.9</b>	<b>3.3</b>
∨ People with diabetes	3	8	3	7	6	8
∨ Annual population count	174	182	181	209	208	239
<b>70+ Prevalence (%)</b>	–	–	–	–	–	–
∨ People with diabetes	–	–	–	–	–	–
∨ Annual population count	207	261	236	293	266	318
<b>Total Prevalence (%)</b>	<b>0.6</b>	<b>0.7</b>	<b>0.8</b>	<b>0.9</b>	<b>0.9</b>	<b>1.1</b>
∨ People with diabetes	54	69	69	89	85	116
∨ Annual population count	8,931	9,712	9,196	9,990	9,487	10,283

## Age-specific Prevalence by Fiscal Year and Sex

### British Columbia

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.7</b>	<b>0.4</b>	<b>0.8</b>	<b>0.5</b>	<b>0.8</b>	<b>0.5</b>
∨ People with diabetes	1,933	1,133	2,132	1,173	2,182	1,187
∨ Annual population count	270,437	259,333	265,240	253,392	259,727	249,203
<b>30-39 Prevalence (%)</b>	<b>1.4</b>	<b>0.9</b>	<b>1.6</b>	<b>1.0</b>	<b>1.8</b>	<b>1.0</b>
∨ People with diabetes	4,699	2,922	5,412	3,200	6,000	3,302
∨ Annual population count	336,203	326,758	330,789	320,456	325,439	315,659
<b>40-49 Prevalence (%)</b>	<b>1.9</b>	<b>2.4</b>	<b>2.2</b>	<b>2.6</b>	<b>2.3</b>	<b>2.7</b>
∨ People with diabetes	6,187	7,653	7,126	8,502	7,779	8,974
∨ Annual population count	320,842	318,016	327,697	322,650	333,202	326,834
<b>50-54 Prevalence (%)</b>	<b>3.7</b>	<b>4.9</b>	<b>4.1</b>	<b>5.5</b>	<b>4.3</b>	<b>5.7</b>
∨ People with diabetes	4,572	6,195	5,307	7,183	5,827	7,857
∨ Annual population count	122,324	125,209	129,066	131,339	136,696	138,518
<b>55-59 Prevalence (%)</b>	<b>5.6</b>	<b>7.6</b>	<b>6.0</b>	<b>8.2</b>	<b>6.3</b>	<b>8.6</b>
∨ People with diabetes	5,213	7,194	5,837	8,096	6,368	8,877
∨ Annual population count	93,051	94,513	97,474	98,937	101,746	103,361
<b>60-64 Prevalence (%)</b>	<b>7.5</b>	<b>10.1</b>	<b>8.2</b>	<b>11.1</b>	<b>8.6</b>	<b>11.6</b>
∨ People with diabetes	5,965	8,037	6,671	8,998	7,102	9,601
∨ Annual population count	79,218	79,842	80,861	81,131	82,776	82,649
<b>65-69 Prevalence (%)</b>	<b>9.3</b>	<b>12.0</b>	<b>10.1</b>	<b>13.3</b>	<b>10.7</b>	<b>14.1</b>
∨ People with diabetes	7,073	9,026	7,701	10,065	8,108	10,675
∨ Annual population count	75,947	75,272	75,881	75,544	75,645	75,715
<b>70-74 Prevalence (%)</b>	<b>10.4</b>	<b>13.0</b>	<b>11.5</b>	<b>14.4</b>	<b>12.3</b>	<b>15.3</b>
∨ People with diabetes	7,421	8,041	8,164	9,033	8,693	9,794
∨ Annual population count	71,069	61,627	70,726	62,561	70,888	63,989
<b>75-79 Prevalence (%)</b>	<b>10.4</b>	<b>13.3</b>	<b>11.4</b>	<b>14.7</b>	<b>12.4</b>	<b>15.8</b>
∨ People with diabetes	6,402	6,196	7,310	7,180	8,050	7,831
∨ Annual population count	61,812	46,485	64,063	48,745	64,924	49,604
<b>80-84 Prevalence (%)</b>	<b>9.7</b>	<b>12.8</b>	<b>10.9</b>	<b>14.1</b>	<b>11.6</b>	<b>15.2</b>
∨ People with diabetes	4,133	3,631	4,695	4,013	5,129	4,487
∨ Annual population count	42,815	28,376	43,233	28,460	44,404	29,452
<b>85+ Prevalence (%)</b>	<b>7.8</b>	<b>10.5</b>	<b>8.6</b>	<b>11.6</b>	<b>9.4</b>	<b>12.7</b>
∨ People with diabetes	3,022	2,059	3,521	2,439	4,118	2,851
∨ Annual population count	38,534	19,680	40,953	21,045	43,743	22,492
<b>Total Prevalence (%)</b>	<b>3.7</b>	<b>4.3</b>	<b>4.2</b>	<b>4.8</b>	<b>4.5</b>	<b>5.2</b>
∨ People with diabetes	56,620	62,087	63,876	69,882	69,356	75,436
∨ Annual population count	1,512,252	1,435,111	1,525,983	1,444,260	1,539,190	1,457,476



## Age-specific Prevalence by Fiscal Year and Sex

### Alberta

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.7</b>	<b>0.4</b>	<b>0.7</b>	<b>0.4</b>	<b>0.7</b>	<b>0.5</b>
∨ People with diabetes	1,435	899	1,506	997	1,531	1,067
∨ Annual population count	211,313	214,861	217,036	221,584	219,957	224,898
<b>30-39 Prevalence (%)</b>	<b>1.3</b>	<b>0.8</b>	<b>1.5</b>	<b>0.9</b>	<b>1.6</b>	<b>1.0</b>
∨ People with diabetes	3,345	1,990	3,796	2,278	4,072	2,464
∨ Annual population count	255,273	254,359	253,954	253,221	251,360	250,403
<b>40-49 Prevalence (%)</b>	<b>1.9</b>	<b>2.2</b>	<b>2.1</b>	<b>2.4</b>	<b>2.3</b>	<b>2.5</b>
∨ People with diabetes	4,212	5,060	4,895	5,759	5,464	6,275
∨ Annual population count	224,025	232,598	233,818	242,682	242,758	251,586
<b>50-54 Prevalence (%)</b>	<b>3.5</b>	<b>4.8</b>	<b>3.8</b>	<b>5.3</b>	<b>4.1</b>	<b>5.5</b>
∨ People with diabetes	2,815	3,901	3,241	4,633	3,668	5,075
∨ Annual population count	79,535	81,890	84,473	86,827	89,716	92,439
<b>55-59 Prevalence (%)</b>	<b>5.2</b>	<b>7.1</b>	<b>5.7</b>	<b>7.7</b>	<b>5.9</b>	<b>8.3</b>
∨ People with diabetes	3,072	4,308	3,518	4,919	3,852	5,537
∨ Annual population count	59,178	60,619	62,129	63,743	65,020	66,879
<b>60-64 Prevalence (%)</b>	<b>6.9</b>	<b>9.1</b>	<b>7.4</b>	<b>10.2</b>	<b>7.9</b>	<b>10.8</b>
∨ People with diabetes	3,441	4,592	3,782	5,235	4,112	5,672
∨ Annual population count	50,135	50,528	51,347	51,384	52,368	52,511
<b>65-69 Prevalence (%)</b>	<b>8.7</b>	<b>10.9</b>	<b>9.5</b>	<b>12.0</b>	<b>9.8</b>	<b>12.7</b>
∨ People with diabetes	4,069	5,006	4,478	5,607	4,622	5,955
∨ Annual population count	46,741	45,919	47,037	46,586	47,349	46,915
<b>70-74 Prevalence (%)</b>	<b>9.8</b>	<b>12.6</b>	<b>10.8</b>	<b>13.7</b>	<b>11.4</b>	<b>14.5</b>
∨ People with diabetes	3,999	4,465	4,444	5,042	4,788	5,514
∨ Annual population count	40,647	35,539	41,314	36,798	41,923	38,057
<b>75-79 Prevalence (%)</b>	<b>10.0</b>	<b>12.8</b>	<b>11.1</b>	<b>14.2</b>	<b>11.8</b>	<b>15.4</b>
∨ People with diabetes	3,391	3,259	3,904	3,748	4,208	4,145
∨ Annual population count	34,051	25,392	35,198	26,371	35,524	26,890
<b>80-84 Prevalence (%)</b>	<b>9.7</b>	<b>12.4</b>	<b>10.5</b>	<b>13.8</b>	<b>11.3</b>	<b>14.7</b>
∨ People with diabetes	2,299	1,887	2,525	2,137	2,782	2,332
∨ Annual population count	23,631	15,181	24,030	15,534	24,651	15,816
<b>85+ Prevalence (%)</b>	<b>8.4</b>	<b>10.7</b>	<b>9.3</b>	<b>11.7</b>	<b>10.1</b>	<b>13.1</b>
∨ People with diabetes	1,878	1,182	2,194	1,334	2,454	1,517
∨ Annual population count	22,468	11,069	23,599	11,393	24,250	11,566
<b>Total Prevalence (%)</b>	<b>3.2</b>	<b>3.6</b>	<b>3.6</b>	<b>3.9</b>	<b>3.8</b>	<b>4.2</b>
∨ People with diabetes	33,956	36,549	38,283	41,689	41,553	45,553
∨ Annual population count	1,046,997	1,027,955	1,073,935	1,056,123	1,094,876	1,077,960

## Age-specific Prevalence by Fiscal Year and Sex

### Saskatchewan

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.7</b>	<b>0.5</b>	<b>0.8</b>	<b>0.5</b>	<b>0.8</b>	<b>0.5</b>
▽ People with diabetes	514	360	557	378	574	410
▽ Annual population count	70,067	73,352	70,732	74,573	71,723	75,634
<b>30-39 Prevalence (%)</b>	<b>1.3</b>	<b>1.0</b>	<b>1.5</b>	<b>1.2</b>	<b>1.6</b>	<b>1.3</b>
▽ People with diabetes	1,039	818	1,140	928	1,220	968
▽ Annual population count	78,278	78,569	76,710	77,495	74,991	75,994
<b>40-49 Prevalence (%)</b>	<b>2.5</b>	<b>2.7</b>	<b>2.7</b>	<b>3.0</b>	<b>2.8</b>	<b>3.0</b>
▽ People with diabetes	1,804	1,998	2,018	2,266	2,131	2,370
▽ Annual population count	71,597	74,458	73,739	76,556	75,911	78,590
<b>50-54 Prevalence (%)</b>	<b>4.5</b>	<b>5.7</b>	<b>4.8</b>	<b>6.2</b>	<b>4.8</b>	<b>6.3</b>
▽ People with diabetes	1,180	1,556	1,327	1,771	1,400	1,902
▽ Annual population count	26,197	27,120	27,554	28,410	28,969	29,979
<b>55-59 Prevalence (%)</b>	<b>6.2</b>	<b>8.0</b>	<b>6.6</b>	<b>8.8</b>	<b>6.9</b>	<b>9.0</b>
▽ People with diabetes	1,349	1,726	1,476	1,950	1,561	2,065
▽ Annual population count	21,720	21,592	22,220	22,283	22,670	22,912
<b>60-64 Prevalence (%)</b>	<b>7.6</b>	<b>10.3</b>	<b>8.4</b>	<b>11.2</b>	<b>8.7</b>	<b>11.4</b>
▽ People with diabetes	1,535	2,049	1,686	2,206	1,755	2,267
▽ Annual population count	20,287	19,904	20,105	19,733	20,200	19,802
<b>65-69 Prevalence (%)</b>	<b>8.8</b>	<b>12.0</b>	<b>9.4</b>	<b>13.1</b>	<b>9.9</b>	<b>13.5</b>
▽ People with diabetes	1,791	2,353	1,881	2,520	1,963	2,562
▽ Annual population count	20,321	19,558	20,074	19,267	19,781	18,971
<b>70-74 Prevalence (%)</b>	<b>10.8</b>	<b>13.6</b>	<b>11.5</b>	<b>14.8</b>	<b>11.8</b>	<b>15.5</b>
▽ People with diabetes	2,139	2,372	2,261	2,558	2,292	2,672
▽ Annual population count	19,855	17,394	19,720	17,310	19,403	17,234
<b>75-79 Prevalence (%)</b>	<b>10.9</b>	<b>14.6</b>	<b>12.0</b>	<b>16.1</b>	<b>12.5</b>	<b>16.6</b>
▽ People with diabetes	1,981	2,035	2,175	2,274	2,262	2,345
▽ Annual population count	18,168	13,926	18,089	14,108	18,070	14,148
<b>80-84 Prevalence (%)</b>	<b>10.9</b>	<b>14.2</b>	<b>11.7</b>	<b>15.2</b>	<b>12.0</b>	<b>16.3</b>
▽ People with diabetes	1,560	1,359	1,681	1,457	1,752	1,566
▽ Annual population count	14,298	9,579	14,353	9,606	14,599	9,596
<b>85+ Prevalence (%)</b>	<b>9.0</b>	<b>12.0</b>	<b>9.9</b>	<b>13.4</b>	<b>10.5</b>	<b>14.3</b>
▽ People with diabetes	1,278	906	1,475	1,039	1,627	1,152
▽ Annual population count	14,277	7,525	14,911	7,761	15,519	8,057
<b>Total Prevalence (%)</b>	<b>4.3</b>	<b>4.8</b>	<b>4.7</b>	<b>5.3</b>	<b>4.9</b>	<b>5.5</b>
▽ People with diabetes	16,170	17,532	17,677	19,347	18,537	20,279
▽ Annual population count	375,065	362,977	378,207	367,102	381,836	370,917

## Age-specific Prevalence by Fiscal Year and Sex

### Manitoba

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.9</b>	<b>0.6</b>	<b>1.0</b>	<b>0.6</b>	<b>1.1</b>	<b>0.7</b>
▽ People with diabetes	700	460	786	514	834	566
▽ Annual population count	80,186	82,008	79,363	80,620	78,756	80,164
<b>30-39 Prevalence (%)</b>	<b>1.8</b>	<b>1.4</b>	<b>2.1</b>	<b>1.5</b>	<b>2.3</b>	<b>1.7</b>
▽ People with diabetes	1,671	1,267	1,860	1,388	2,035	1,510
▽ Annual population count	92,502	93,839	90,320	91,553	88,651	89,507
<b>40-49 Prevalence (%)</b>	<b>3.2</b>	<b>3.3</b>	<b>3.6</b>	<b>3.7</b>	<b>3.9</b>	<b>3.8</b>
▽ People with diabetes	2,738	2,862	3,100	3,190	3,407	3,399
▽ Annual population count	85,419	85,772	86,488	86,854	87,865	88,498
<b>50-54 Prevalence (%)</b>	<b>5.9</b>	<b>6.7</b>	<b>6.5</b>	<b>7.4</b>	<b>6.8</b>	<b>8.0</b>
▽ People with diabetes	1,948	2,256	2,253	2,591	2,463	2,910
▽ Annual population count	33,130	33,561	34,737	34,971	36,482	36,334
<b>55-59 Prevalence (%)</b>	<b>7.7</b>	<b>8.8</b>	<b>8.3</b>	<b>9.7</b>	<b>8.9</b>	<b>10.5</b>
▽ People with diabetes	2,011	2,245	2,228	2,576	2,464	2,908
▽ Annual population count	26,057	25,639	26,831	26,585	27,616	27,757
<b>60-64 Prevalence (%)</b>	<b>9.7</b>	<b>11.6</b>	<b>10.5</b>	<b>12.7</b>	<b>11.3</b>	<b>13.5</b>
▽ People with diabetes	2,185	2,560	2,410	2,819	2,602	3,006
▽ Annual population count	22,564	22,087	22,847	22,217	23,011	22,319
<b>65-69 Prevalence (%)</b>	<b>11.0</b>	<b>13.0</b>	<b>12.2</b>	<b>14.5</b>	<b>13.0</b>	<b>15.9</b>
▽ People with diabetes	2,492	2,707	2,697	3,008	2,842	3,252
▽ Annual population count	22,634	20,801	22,137	20,690	21,818	20,474
<b>70-74 Prevalence (%)</b>	<b>11.9</b>	<b>14.4</b>	<b>13.0</b>	<b>15.6</b>	<b>13.8</b>	<b>16.9</b>
▽ People with diabetes	2,648	2,615	2,838	2,830	2,974	3,045
▽ Annual population count	22,316	18,151	21,835	18,103	21,477	18,068
<b>75-79 Prevalence (%)</b>	<b>11.6</b>	<b>13.6</b>	<b>12.7</b>	<b>15.5</b>	<b>14.1</b>	<b>16.7</b>
▽ People with diabetes	2,322	1,951	2,623	2,254	2,912	2,467
▽ Annual population count	20,065	14,305	20,590	14,524	20,647	14,742
<b>80-84 Prevalence (%)</b>	<b>10.9</b>	<b>12.6</b>	<b>11.9</b>	<b>14.0</b>	<b>13.2</b>	<b>15.2</b>
▽ People with diabetes	1,635	1,188	1,771	1,308	1,971	1,406
▽ Annual population count	14,956	9,401	14,907	9,326	14,931	9,252
<b>85+ Prevalence (%)</b>	<b>8.3</b>	<b>11.3</b>	<b>9.3</b>	<b>12.2</b>	<b>10.2</b>	<b>13.0</b>
▽ People with diabetes	1,235	793	1,430	896	1,649	992
▽ Annual population count	14,871	7,030	15,408	7,341	16,131	7,612
<b>Total Prevalence (%)</b>	<b>5.0</b>	<b>5.1</b>	<b>5.5</b>	<b>5.7</b>	<b>6.0</b>	<b>6.1</b>
▽ People with diabetes	21,585	20,904	23,996	23,374	26,153	25,461
▽ Annual population count	434,700	412,594	435,463	412,784	437,385	414,727

## Age-specific Prevalence by Fiscal Year and Sex

### Ontario

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.8</b>	<b>0.5</b>	<b>0.9</b>	<b>0.5</b>	<b>1.0</b>	<b>0.6</b>
▽ People with diabetes	6,431	3,919	7,271	4,333	7,976	4,789
▽ Annual population count	803,717	811,280	802,624	811,191	806,980	816,213
<b>30-39 Prevalence (%)</b>	<b>1.5</b>	<b>1.1</b>	<b>1.8</b>	<b>1.2</b>	<b>2.1</b>	<b>1.3</b>
▽ People with diabetes	15,877	11,268	18,740	12,635	21,587	13,813
▽ Annual population count	1,041,079	1,049,639	1,041,354	1,049,776	1,044,054	1,053,776
<b>40-49 Prevalence (%)</b>	<b>2.4</b>	<b>2.9</b>	<b>2.7</b>	<b>3.2</b>	<b>2.9</b>	<b>3.4</b>
▽ People with diabetes	21,542	26,387	25,003	29,703	28,382	33,165
▽ Annual population count	910,722	903,353	938,173	932,730	970,112	967,532
<b>50-54 Prevalence (%)</b>	<b>4.3</b>	<b>6.1</b>	<b>4.8</b>	<b>6.6</b>	<b>5.2</b>	<b>7.1</b>
▽ People with diabetes	15,547	21,778	17,999	25,064	20,567	28,135
▽ Annual population count	358,099	359,875	377,273	378,637	397,842	397,832
<b>55-59 Prevalence (%)</b>	<b>6.2</b>	<b>8.6</b>	<b>6.9</b>	<b>9.4</b>	<b>7.4</b>	<b>10.2</b>
▽ People with diabetes	17,370	23,717	19,863	27,038	22,142	30,381
▽ Annual population count	278,154	274,985	289,115	286,576	300,782	299,148
<b>60-64 Prevalence (%)</b>	<b>8.5</b>	<b>11.2</b>	<b>9.3</b>	<b>12.4</b>	<b>9.9</b>	<b>13.3</b>
▽ People with diabetes	20,783	26,464	23,115	29,635	25,167	32,416
▽ Annual population count	244,012	235,378	248,977	239,437	253,989	244,360
<b>65-69 Prevalence (%)</b>	<b>10.4</b>	<b>13.3</b>	<b>11.3</b>	<b>14.5</b>	<b>12.2</b>	<b>15.7</b>
▽ People with diabetes	24,455	29,009	26,639	31,799	28,741	34,616
▽ Annual population count	235,200	218,307	235,546	220,042	236,375	220,972
<b>70-74 Prevalence (%)</b>	<b>11.6</b>	<b>14.5</b>	<b>12.7</b>	<b>15.9</b>	<b>13.7</b>	<b>17.2</b>
▽ People with diabetes	25,494	26,243	27,828	29,282	30,182	32,353
▽ Annual population count	219,417	180,479	219,469	183,787	220,157	187,789
<b>75-79 Prevalence (%)</b>	<b>11.8</b>	<b>14.8</b>	<b>13.0</b>	<b>16.3</b>	<b>14.1</b>	<b>17.6</b>
▽ People with diabetes	20,650	18,710	24,053	21,837	26,969	24,581
▽ Annual population count	175,561	126,807	185,093	134,200	191,826	139,554
<b>80-84 Prevalence (%)</b>	<b>11.2</b>	<b>13.9</b>	<b>12.3</b>	<b>15.3</b>	<b>13.4</b>	<b>16.4</b>
▽ People with diabetes	12,990	10,042	14,468	11,153	16,338	12,567
▽ Annual population count	115,960	72,173	117,382	73,096	121,752	76,412
<b>85+ Prevalence (%)</b>	<b>9.1</b>	<b>11.1</b>	<b>10.1</b>	<b>12.4</b>	<b>11.1</b>	<b>13.2</b>
▽ People with diabetes	10,373	5,578	12,089	6,585	13,956	7,514
▽ Annual population count	114,589	50,161	119,715	53,314	125,895	56,956
<b>Total Prevalence (%)</b>	<b>4.3</b>	<b>4.7</b>	<b>4.7</b>	<b>5.3</b>	<b>5.2</b>	<b>5.7</b>
▽ People with diabetes	191,512	203,115	217,068	229,064	242,007	254,330
▽ Annual population count	4,496,510	4,282,437	4,574,721	4,362,786	4,669,764	4,460,544

## Age-specific Prevalence by Fiscal Year and Sex

### Quebec

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.7</b>	<b>0.4</b>	<b>0.7</b>	<b>0.4</b>	<b>0.8</b>	<b>0.4</b>
∨ People with diabetes	3,189	1,800	3,514	1,915	3,691	2,035
∨ Annual population count	475,195	497,742	474,044	497,579	475,725	499,548
<b>30-39 Prevalence (%)</b>	<b>1.2</b>	<b>0.8</b>	<b>1.4</b>	<b>0.8</b>	<b>1.5</b>	<b>0.9</b>
∨ People with diabetes	7,237	4,967	8,260	5,288	9,051	5,445
∨ Annual population count	622,102	643,339	605,247	625,992	587,489	609,707
<b>40-49 Prevalence (%)</b>	<b>1.9</b>	<b>2.3</b>	<b>2.0</b>	<b>2.5</b>	<b>2.1</b>	<b>2.6</b>
∨ People with diabetes	10,853	13,508	12,087	14,959	12,864	15,554
∨ Annual population count	582,749	582,294	593,300	594,166	603,472	604,835
<b>50-54 Prevalence (%)</b>	<b>3.7</b>	<b>5.4</b>	<b>4.0</b>	<b>5.8</b>	<b>4.1</b>	<b>5.9</b>
∨ People with diabetes	8,745	12,703	9,829	14,124	10,323	14,831
∨ Annual population count	237,477	233,163	246,411	241,913	254,727	250,252
<b>55-59 Prevalence (%)</b>	<b>5.6</b>	<b>8.2</b>	<b>5.9</b>	<b>8.8</b>	<b>6.0</b>	<b>9.1</b>
∨ People with diabetes	10,363	14,669	11,461	16,537	12,214	17,800
∨ Annual population count	184,089	178,038	192,971	186,877	201,947	195,242
<b>60-64 Prevalence (%)</b>	<b>7.9</b>	<b>10.7</b>	<b>8.6</b>	<b>11.8</b>	<b>8.8</b>	<b>12.3</b>
∨ People with diabetes	12,597	15,791	13,776	17,568	14,223	18,609
∨ Annual population count	160,168	148,175	159,959	148,314	162,379	151,241
<b>65-69 Prevalence (%)</b>	<b>10.5</b>	<b>13.4</b>	<b>11.1</b>	<b>14.4</b>	<b>11.4</b>	<b>14.9</b>
∨ People with diabetes	16,390	18,080	17,393	19,696	17,720	20,368
∨ Annual population count	156,747	135,102	156,639	136,432	155,663	136,432
<b>70-74 Prevalence (%)</b>	<b>12.8</b>	<b>15.9</b>	<b>13.7</b>	<b>17.2</b>	<b>14.2</b>	<b>18.0</b>
∨ People with diabetes	17,485	16,407	18,998	18,178	19,809	19,397
∨ Annual population count	136,795	103,446	138,577	105,847	139,496	107,751
<b>75-79 Prevalence (%)</b>	<b>14.3</b>	<b>16.7</b>	<b>15.4</b>	<b>18.3</b>	<b>16.1</b>	<b>19.1</b>
∨ People with diabetes	14,823	11,176	16,673	12,795	18,087	14,026
∨ Annual population count	103,934	66,912	107,952	70,050	112,331	73,472
<b>80-84 Prevalence (%)</b>	<b>14.1</b>	<b>15.9</b>	<b>15.5</b>	<b>17.4</b>	<b>16.4</b>	<b>19.0</b>
∨ People with diabetes	9,886	5,890	11,131	6,563	11,985	7,310
∨ Annual population count	70,256	36,929	71,659	37,733	72,900	38,509
<b>85+ Prevalence (%)</b>	<b>12.3</b>	<b>13.7</b>	<b>13.6</b>	<b>15.4</b>	<b>14.7</b>	<b>16.3</b>
∨ People with diabetes	7,246	3,005	8,414	3,569	9,558	4,000
∨ Annual population count	58,827	21,928	61,660	23,114	64,998	24,505
<b>Total Prevalence (%)</b>	<b>4.3</b>	<b>4.5</b>	<b>4.7</b>	<b>4.9</b>	<b>4.9</b>	<b>5.2</b>
∨ People with diabetes	118,814	117,996	131,536	131,192	139,525	139,375
∨ Annual population count	2,788,339	2,647,068	2,808,419	2,668,017	2,831,127	2,691,494

\* for participating jurisdictions

\*\* estimated using NDSS deaths and adjusting for 4.2% of Canadian population in New Brunswick and Newfoundland and Labrador (2001 census)

## Age-specific Prevalence by Fiscal Year and Sex

### Prince Edward Island

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.8</b>	<b>0.7</b>	<b>0.9</b>	<b>0.7</b>	<b>0.9</b>	<b>0.8</b>
▽ People with diabetes	77	74	86	77	87	77
▽ Annual population count	10,151	10,574	9,891	10,305	9,723	10,134
<b>30-39 Prevalence (%)</b>	<b>1.0</b>	<b>1.1</b>	<b>1.3</b>	<b>1.3</b>	<b>1.4</b>	<b>1.2</b>
▽ People with diabetes	119	125	145	144	155	133
▽ Annual population count	11,520	11,264	11,100	10,917	10,834	10,757
<b>40-49 Prevalence (%)</b>	<b>1.9</b>	<b>2.7</b>	<b>2.3</b>	<b>3.1</b>	<b>2.3</b>	<b>3.3</b>
▽ People with diabetes	204	287	250	330	252	356
▽ Annual population count	10,805	10,671	10,701	10,560	10,894	10,673
<b>50-54 Prevalence (%)</b>	<b>3.9</b>	<b>5.6</b>	<b>4.2</b>	<b>6.4</b>	<b>4.5</b>	<b>6.1</b>
▽ People with diabetes	172	247	193	293	218	296
▽ Annual population count	4,355	4,415	4,583	4,603	4,864	4,872
<b>55-59 Prevalence (%)</b>	<b>5.7</b>	<b>8.0</b>	<b>6.6</b>	<b>8.5</b>	<b>6.4</b>	<b>9.3</b>
▽ People with diabetes	185	261	225	291	228	325
▽ Annual population count	3,252	3,279	3,398	3,415	3,564	3,493
<b>60-64 Prevalence (%)</b>	<b>6.9</b>	<b>8.8</b>	<b>8.0</b>	<b>10.8</b>	<b>8.9</b>	<b>11.4</b>
▽ People with diabetes	200	250	234	311	264	342
▽ Annual population count	2,900	2,840	2,915	2,880	2,953	2,987
<b>65-69 Prevalence (%)</b>	<b>9.2</b>	<b>13.3</b>	<b>10.7</b>	<b>14.3</b>	<b>10.7</b>	<b>14.2</b>
▽ People with diabetes	243	338	284	364	288	367
▽ Annual population count	2,639	2,537	2,643	2,548	2,697	2,581
<b>70-74 Prevalence (%)</b>	<b>10.6</b>	<b>14.5</b>	<b>11.6</b>	<b>16.5</b>	<b>12.0</b>	<b>17.3</b>
▽ People with diabetes	256	296	281	344	291	361
▽ Annual population count	2,424	2,039	2,418	2,079	2,426	2,081
<b>75-79 Prevalence (%)</b>	<b>12.1</b>	<b>14.8</b>	<b>13.6</b>	<b>16.7</b>	<b>13.6</b>	<b>17.7</b>
▽ People with diabetes	281	236	310	264	299	288
▽ Annual population count	2,313	1,592	2,276	1,585	2,198	1,627
<b>80-84 Prevalence (%)</b>	<b>11.5</b>	<b>13.9</b>	<b>13.5</b>	<b>16.0</b>	<b>15.1</b>	<b>16.2</b>
▽ People with diabetes	203	147	238	168	271	165
▽ Annual population count	1,759	1,061	1,760	1,050	1,800	1,016
<b>85+ Prevalence (%)</b>	<b>9.2</b>	<b>9.2</b>	<b>9.5</b>	<b>11.5</b>	<b>10.2</b>	<b>13.6</b>
▽ People with diabetes	167	77	177	99	198	122
▽ Annual population count	1,817	837	1,854	859	1,948	897
<b>Total Prevalence (%)</b>	<b>3.9</b>	<b>4.6</b>	<b>4.5</b>	<b>5.3</b>	<b>4.7</b>	<b>5.5</b>
▽ People with diabetes	2,107	2,338	2,423	2,685	2,551	2,832
▽ Annual population count	53,935	51,109	53,539	50,801	53,901	51,118

## Age-specific Prevalence by Fiscal Year and Sex

### Nova Scotia

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29 Prevalence (%)</b>	<b>0.7</b>	<b>0.6</b>	<b>0.8</b>	<b>0.6</b>	<b>0.9</b>	<b>0.6</b>
▽ People with diabetes	501	372	557	388	577	398
▽ Annual population count	67,005	66,087	66,540	65,247	66,267	64,978
<b>30-39 Prevalence (%)</b>	<b>1.3</b>	<b>1.1</b>	<b>1.5</b>	<b>1.3</b>	<b>1.5</b>	<b>1.3</b>
▽ People with diabetes	1,074	850	1,173	947	1,183	977
▽ Annual population count	81,231	76,342	79,773	75,382	78,922	74,517
<b>40-49 Prevalence (%)</b>	<b>2.6</b>	<b>3.1</b>	<b>2.8</b>	<b>3.3</b>	<b>2.9</b>	<b>3.3</b>
▽ People with diabetes	1,926	2,258	2,152	2,447	2,266	2,505
▽ Annual population count	75,191	73,214	76,636	74,297	78,418	75,530
<b>50-54 Prevalence (%)</b>	<b>5.3</b>	<b>6.7</b>	<b>5.8</b>	<b>7.1</b>	<b>5.8</b>	<b>7.2</b>
▽ People with diabetes	1,647	2,048	1,886	2,282	1,969	2,429
▽ Annual population count	30,791	30,490	32,414	32,015	33,834	33,577
<b>55-59 Prevalence (%)</b>	<b>7.4</b>	<b>9.6</b>	<b>7.9</b>	<b>10.3</b>	<b>8.1</b>	<b>10.6</b>
▽ People with diabetes	1,736	2,242	1,941	2,502	2,060	2,706
▽ Annual population count	23,556	23,279	24,514	24,215	25,590	25,422
<b>60-64 Prevalence (%)</b>	<b>10.4</b>	<b>12.4</b>	<b>11.0</b>	<b>13.6</b>	<b>11.1</b>	<b>14.0</b>
▽ People with diabetes	2,073	2,437	2,246	2,744	2,311	2,870
▽ Annual population count	19,897	19,630	20,380	20,231	20,835	20,532
<b>65-69 Prevalence (%)</b>	<b>12.4</b>	<b>14.7</b>	<b>13.1</b>	<b>16.0</b>	<b>13.4</b>	<b>16.5</b>
▽ People with diabetes	2,335	2,530	2,471	2,772	2,549	2,929
▽ Annual population count	18,803	17,181	18,816	17,379	18,997	17,720
<b>70-74 Prevalence (%)</b>	<b>13.7</b>	<b>17.0</b>	<b>15.2</b>	<b>18.6</b>	<b>15.7</b>	<b>19.4</b>
▽ People with diabetes	2,386	2,380	2,658	2,630	2,715	2,767
▽ Annual population count	17,406	13,969	17,449	14,102	17,298	14,250
<b>75-79 Prevalence (%)</b>	<b>14.1</b>	<b>17.1</b>	<b>15.1</b>	<b>18.3</b>	<b>15.9</b>	<b>18.9</b>
▽ People with diabetes	2,252	1,913	2,427	2,053	2,528	2,143
▽ Annual population count	15,949	11,157	16,029	11,229	15,897	11,314
<b>80-84 Prevalence (%)</b>	<b>13.3</b>	<b>15.7</b>	<b>14.6</b>	<b>17.5</b>	<b>15.3</b>	<b>19.1</b>
▽ People with diabetes	1,553	1,119	1,713	1,252	1,862	1,407
▽ Annual population count	11,672	7,125	11,772	7,145	12,194	7,363
<b>85+ Prevalence (%)</b>	<b>9.9</b>	<b>12.5</b>	<b>11.3</b>	<b>14.2</b>	<b>11.9</b>	<b>15.3</b>
▽ People with diabetes	1,126	608	1,335	716	1,473	799
▽ Annual population count	11,377	4,868	11,792	5,046	12,339	5,222
<b>Total Prevalence (%)</b>	<b>5.0</b>	<b>5.5</b>	<b>5.5</b>	<b>6.0</b>	<b>5.6</b>	<b>6.3</b>
▽ People with diabetes	18,609	18,757	20,559	20,733	21,493	21,930
▽ Annual population count	372,878	343,342	376,115	346,288	380,591	350,425

## Appendix L

## MORTALITY

## Age-specific Mortality by Fiscal Year, Sex and Province/Territory

## Canada

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>20-29</b>						
<b>Diabetes</b>						
- deaths	26	25	20	18	20	25
- population count	14,815	9,037	16,446	9,801	17,487	10,555
<b>No diabetes</b>						
- deaths	618	1,727	541	1,627	560	1,595
- population count	1,979,594	2,012,432	1,975,067	2,010,592	1,977,188	2,015,794
<b>Mortality rate ratio</b>	<b>5.62</b>	<b>3.22</b>	<b>4.44</b>	<b>2.27</b>	<b>4.04</b>	<b>2.99</b>
<b>30-39</b>						
<b>Diabetes</b>						
- deaths	77	110	72	89	102	117
- population count	35,137	24,266	40,613	26,867	45,389	28,671
<b>No diabetes</b>						
- deaths	1,309	2,785	1,222	2,479	1,186	2,414
- population count	2,490,782	2,517,659	2,456,095	2,485,320	2,423,518	2,458,628
<b>Mortality rate ratio</b>	<b>4.17</b>	<b>4.10</b>	<b>3.56</b>	<b>3.32</b>	<b>4.59</b>	<b>4.16</b>
<b>40-49</b>						
<b>Diabetes</b>						
- deaths	238	413	247	464	283	515
- population count	49,593	60,144	56,770	67,318	62,682	72,760
<b>No diabetes</b>						
- deaths	2,856	4,563	2,814	4,196	2,902	4,505
- population count	2,237,994	2,227,168	2,290,143	2,280,159	2,346,320	2,338,229
<b>Mortality rate ratio</b>	<b>3.76</b>	<b>3.35</b>	<b>3.54</b>	<b>3.75</b>	<b>3.65</b>	<b>3.67</b>
<b>50-54</b>						
<b>Diabetes</b>						
- deaths	308	573	338	560	357	597
- population count	36,703	50,814	42,137	58,076	46,552	63,580
<b>No diabetes</b>						
- deaths	2,117	3,307	2,161	3,181	2,209	3,261
- population count	857,151	847,454	896,412	883,254	938,763	922,903
<b>Mortality rate ratio</b>	<b>3.40</b>	<b>2.89</b>	<b>3.33</b>	<b>2.68</b>	<b>3.26</b>	<b>2.66</b>
<b>55-59</b>						
<b>Diabetes</b>						
- deaths	486	949	528	899	548	1,031
- population count	41,367	56,468	46,620	64,033	50,972	70,730
<b>No diabetes</b>						
- deaths	2,584	4,110	2,600	3,920	2,661	3,987
- population count	648,918	627,079	673,308	650,271	699,270	675,235
<b>Mortality rate ratio</b>	<b>2.95</b>	<b>2.56</b>	<b>2.93</b>	<b>2.33</b>	<b>2.83</b>	<b>2.47</b>
<b>60-64</b>						
<b>Diabetes</b>						
- deaths	817	1,558	845	1,523	877	1,637
- population count	48,835	62,257	53,995	69,602	57,612	74,888
<b>No diabetes</b>						
- deaths	3,495	5,525	3,238	5,249	3,284	5,218
- population count	551,164	517,169	554,234	516,793	561,752	522,592
<b>Mortality rate ratio</b>	<b>2.64</b>	<b>2.34</b>	<b>2.68</b>	<b>2.15</b>	<b>2.60</b>	<b>2.19</b>
<b>65-69</b>						
<b>Diabetes</b>						
- deaths	1,461	2,474	1,423	2,645	1,515	2,608
- population count	58,903	69,124	63,590	75,916	66,887	80,821
<b>No diabetes</b>						
- deaths	5,264	8,605	4,885	7,994	4,798	7,632
- population count	520,721	466,356	515,794	463,378	512,081	459,778
<b>Mortality rate ratio</b>	<b>2.45</b>	<b>1.94</b>	<b>2.36</b>	<b>2.02</b>	<b>2.42</b>	<b>1.94</b>



## Canada (continued)

Age group	1997/1998		1998/1999		1999/2000	
	Female	Male	Female	Male	Female	Male
<b>70-74</b>						
<b>Diabetes</b>						
- deaths	2,379	3,382	2,303	3,624	2,340	3,688
- population count	61,868	62,867	67,530	69,954	71,808	75,969
<b>No diabetes</b>						
- deaths	7,481	11,049	7,227	10,470	7,166	10,326
- population count	468,469	370,250	464,381	371,160	461,677	373,804
<b>Mortality rate ratio</b>	<b>2.41</b>	<b>1.80</b>	<b>2.19</b>	<b>1.84</b>	<b>2.10</b>	<b>1.76</b>
<b>75-79</b>						
<b>Diabetes</b>						
- deaths	2,976	3,685	3,138	4,061	3,383	4,367
- population count	52,132	45,495	59,504	52,425	65,349	57,853
<b>No diabetes</b>						
- deaths	10,653	12,790	10,244	12,577	10,303	12,348
- population count	379,997	261,361	390,094	268,666	396,378	273,785
<b>Mortality rate ratio</b>	<b>2.04</b>	<b>1.66</b>	<b>2.01</b>	<b>1.65</b>	<b>1.99</b>	<b>1.67</b>
<b>80-84</b>						
<b>Diabetes</b>						
- deaths	3,045	3,117	3,286	3,310	3,420	3,556
- population count	34,279	25,275	38,245	28,063	42,117	31,259
<b>No diabetes</b>						
- deaths	13,095	12,724	12,482	12,218	12,332	11,450
- population count	261,256	154,702	261,043	154,046	265,298	156,320
<b>Mortality rate ratio</b>	<b>1.77</b>	<b>1.50</b>	<b>1.80</b>	<b>1.49</b>	<b>1.75</b>	<b>1.55</b>
<b>85+</b>						
<b>Diabetes</b>						
- deaths	4,459	2,826	4,892	3,245	5,364	3,461
- population count	26,337	14,213	30,647	16,685	35,044	18,956
<b>No diabetes</b>						
- deaths	30,729	16,691	30,287	16,604	30,270	16,618
- population count	250,580	108,997	259,416	113,307	269,955	118,473
<b>Mortality rate ratio</b>	<b>1.38</b>	<b>1.30</b>	<b>1.37</b>	<b>1.33</b>	<b>1.37</b>	<b>1.30</b>
<b>Total*</b>						
<b>Diabetes</b>						
- deaths	16,272	19,112	17,092	20,438	18,209	21,602
- population count	459,969	479,960	516,097	538,740	561,899	586,042
<b>No diabetes</b>						
- deaths	80,201	83,876	77,701	80,515	77,671	79,354
- population count	10,646,626	10,110,627	10,735,987	10,196,946	10,852,200	10,315,541
<b>Mortality rate ratio</b>	<b>4.70</b>	<b>4.80</b>	<b>4.58</b>	<b>4.80</b>	<b>4.53</b>	<b>4.79</b>
<b>Canadian Total</b>						
<b>Diabetes</b>						
- deaths**	<b>16,955</b>	<b>19,915</b>	<b>17,810</b>	<b>21,296</b>	<b>18,974</b>	<b>22,509</b>

## Age-specific Mortality by Fiscal Year and Sex

## Yukon Territory

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
20-64	<b>Diabetes</b>						
	- deaths	*	*	*	*	*	
	- population count	206	225	246	247	259	257
	<b>No diabetes</b>						
	- deaths	21	34	16	40	19	48
- population count	10,678	11,538	10,514	11,078	10,406	10,745	
	<b>Mortality rate ratio</b>		*		*		
65+	<b>Diabetes</b>						
	- deaths	11		*		12	
	- population count	474		520		548	
	<b>No diabetes</b>						
	- deaths	65		54		73	
- population count	17,931		17,640		17,456		
	<b>Mortality rate ratio</b>		6.4		5.24		
Total	<b>Diabetes</b>						
	- deaths	7	6	6	4	5	11
	- population count	274	320	322	349	351	377
	<b>No diabetes</b>						
	- deaths	39	62	46	69	42	88
- population count	11,390	12,336	11,254	11,921	11,171	11,615	
	<b>Mortality rate ratio</b>		7.46		3.73		
			4.56		1.98		
			3.79		3.85		

\* cell suppressed

## Age-specific Mortality by Fiscal Year and Sex

### Northwest Territories

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
20-64	<b>Diabetes</b>						
	- deaths	*	*	*	*	*	
	- population count	233	298	265	345	275	371
	<b>No diabetes</b>						
	- deaths	35	72	44	77	25	37
- population count	13,181	14,113	12,992	13,965	12,759	13,604	
	<b>Mortality rate ratio</b>		*	*	*	*	
65+	<b>Diabetes</b>						
	- deaths	9		11		*	
	- population count	563		651		704	
	<b>No diabetes</b>						
	- deaths	113		117		67	
- population count	20,329		20,313		20,036		
	<b>Mortality rate ratio</b>		<b>2.88</b>	<b>2.93</b>	*	*	
Total	<b>Diabetes</b>						
	- deaths	10	4	9	5	7	2
	- population count	322	362	357	425	373	469
	<b>No diabetes</b>						
	- deaths	70	130	93	137	52	79
- population count	13,933	14,976	13,769	14,830	13,534	14,461	
	<b>Mortality rate ratio</b>		<b>6.18</b>	<b>1.27</b>	<b>3.73</b>	<b>1.27</b>	
			<b>4.88</b>	<b>0.78</b>			

\* cell suppressed

## Age-specific Mortality by Fiscal Year and Sex

## British Columbia

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
20-29	<b>Diabetes</b>						
	- deaths	0	0	0	5	0	0
	- population count	1,933	1,133	2,132	1,173	2,182	1,187
	<b>No diabetes</b>						
	- deaths	91	310	66	188	61	166
- population count	268,504	258,200	263,108	252,219	257,545	248,016	
	<b>Mortality rate ratio</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5.72</b>	<b>0</b>	<b>0</b>
30-39	<b>Diabetes</b>						
	- deaths	8	16	8	7	10	9
	- population count	4,699	2,922	5,412	3,200	6,000	3,302
	<b>No diabetes</b>						
	- deaths	217	457	152	286	132	280
- population count	331,504	323,836	325,377	317,256	319,439	312,357	
	<b>Mortality rate ratio</b>	<b>2.6</b>	<b>3.88</b>	<b>3.16</b>	<b>2.43</b>	<b>4.03</b>	<b>3.04</b>
40-49	<b>Diabetes</b>						
	- deaths	24	45	20	35	27	57
	- population count	6,187	7,653	7,126	8,502	7,779	8,974
	<b>No diabetes</b>						
	- deaths	410	638	372	536	320	521
- population count	314,655	310,363	320,571	314,148	325,423	317,860	
	<b>Mortality rate ratio</b>	<b>2.98</b>	<b>2.86</b>	<b>2.42</b>	<b>2.41</b>	<b>3.53</b>	<b>3.88</b>
50-54	<b>Diabetes</b>						
	- deaths	36	64	32	56	35	53
	- population count	4,572	6,195	5,307	7,183	5,827	7,857
	<b>No diabetes</b>						
	- deaths	281	456	279	373	256	378
- population count	117,752	119,014	123,759	124,156	130,869	130,661	
	<b>Mortality rate ratio</b>	<b>3.3</b>	<b>2.7</b>	<b>2.67</b>	<b>2.6</b>	<b>3.07</b>	<b>2.33</b>
55-59	<b>Diabetes</b>						
	- deaths	54	112	52	94	49	107
	- population count	5,213	7,194	5,837	8,096	6,368	8,877
	<b>No diabetes</b>						
	- deaths	343	538	322	464	335	448
- population count	87,838	87,319	91,637	90,841	95,378	94,484	
	<b>Mortality rate ratio</b>	<b>2.65</b>	<b>2.53</b>	<b>2.54</b>	<b>2.27</b>	<b>2.19</b>	<b>2.54</b>
60-64	<b>Diabetes</b>						
	- deaths	89	167	86	153	81	178
	- population count	5,965	8,037	6,671	8,998	7,102	9,601
	<b>No diabetes</b>						
	- deaths	405	654	395	597	393	591
- population count	73,253	71,805	74,190	72,133	75,674	73,048	
	<b>Mortality rate ratio</b>	<b>2.7</b>	<b>2.28</b>	<b>2.42</b>	<b>2.05</b>	<b>2.2</b>	<b>2.29</b>
65-69	<b>Diabetes</b>						
	- deaths	140	279	145	301	143	286
	- population count	7,073	9,026	7,701	10,065	8,108	10,675
	<b>No diabetes</b>						
	- deaths	663	1,094	613	968	569	883
- population count	68,874	66,246	68,180	65,479	67,537	65,040	
	<b>Mortality rate ratio</b>	<b>2.06</b>	<b>1.87</b>	<b>2.09</b>	<b>2.02</b>	<b>2.09</b>	<b>1.97</b>

## British Columbia (continued)

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
70-74	<b>Diabetes</b>						
	- deaths	245	402	239	390	250	448
	- population count	7,421	8,041	8,164	9,033	8,693	9,794
	<b>No diabetes</b>						
	- deaths	931	1,436	921	1,306	854	1,249
- population count	63,648	53,586	62,562	53,528	62,195	54,195	
	<b>Mortality rate ratio</b>	<b>2.26</b>	<b>1.87</b>	<b>1.99</b>	<b>1.77</b>	<b>2.09</b>	<b>1.98</b>
75-79	<b>Diabetes</b>						
	- deaths	356	443	330	517	387	566
	- population count	6,402	6,196	7,310	7,180	8,050	7,831
	<b>No diabetes</b>						
	- deaths	1,450	1,679	1,361	1,700	1,353	1,598
- population count	55,410	40,289	56,753	41,565	56,874	41,773	
	<b>Mortality rate ratio</b>	<b>2.12</b>	<b>1.72</b>	<b>1.88</b>	<b>1.76</b>	<b>2.02</b>	<b>1.89</b>
80-84	<b>Diabetes</b>						
	- deaths	336	412	378	430	390	465
	- population count	4,133	3,631	4,695	4,013	5,129	4,487
	<b>No diabetes</b>						
	- deaths	1,849	1,761	1,617	1,722	1,655	1,671
- population count	38,682	24,745	38,538	24,447	39,275	24,965	
	<b>Mortality rate ratio</b>	<b>1.70</b>	<b>1.59</b>	<b>1.92</b>	<b>1.52</b>	<b>1.80</b>	<b>1.55</b>
85+	<b>Diabetes</b>						
	- deaths	489	388	505	449	595	482
	- population count	3,022	2,059	3,521	2,439	4,118	2,851
	<b>No diabetes</b>						
	- deaths	3,913	2,436	3,998	2,496	3,950	2,583
- population count	35,512	17,621	37,432	18,606	39,625	19,641	
	<b>Mortality rate ratio</b>	<b>1.47</b>	<b>1.36</b>	<b>1.34</b>	<b>1.37</b>	<b>1.45</b>	<b>1.29</b>
Total	<b>Diabetes</b>						
	- deaths	1,777	2,328	1,795	2,437	1,967	2,651
	- population count	56,620	62,087	63,876	69,882	69,356	75,436
	<b>No diabetes</b>						
	- deaths	10,553	11,459	10,096	10,636	9,878	10,368
- population count	1,455,632	1,373,024	1,462,107	1,374,378	1,469,834	1,382,040	
	<b>Mortality rate ratio</b>	<b>4.33</b>	<b>4.49</b>	<b>4.07</b>	<b>4.51</b>	<b>4.22</b>	<b>4.68</b>

## Age-specific Mortality by Fiscal Year and Sex

## Alberta

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
20-29	<b>Diabetes</b>						
	- deaths	0	0	0	0	0	
	- population count	1,435	899	1,506	997	1,531	1,067
	<b>No diabetes</b>						
	- deaths	80	201	76	197	68	193
	- population count	209,878	213,962	215,530	220,587	218,426	223,831
	<b>Mortality rate ratio</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
30-39	<b>Diabetes</b>						
	- deaths	12	6	10	7	8	12
	- population count	3,345	1,990	3,796	2,278	4,072	2,464
	<b>No diabetes</b>						
	- deaths	149	312	131	295	118	258
	- population count	251,928	252,369	250,158	250,943	247,288	247,939
	<b>Mortality rate ratio</b>	<b>6.07</b>	<b>2.44</b>	<b>5.03</b>	<b>2.61</b>	<b>4.12</b>	<b>4.68</b>
40-49	<b>Diabetes</b>						
	- deaths	21	32	26	48	25	42
	- population count	4,212	5,060	4,895	5,759	5,464	6,275
	<b>No diabetes</b>						
	- deaths	262	468	268	424	288	452
	- population count	219,813	227,538	228,923	236,923	237,294	245,311
	<b>Mortality rate ratio</b>	<b>4.18</b>	<b>3.07</b>	<b>4.54</b>	<b>4.66</b>	<b>3.77</b>	<b>3.63</b>
50-54	<b>Diabetes</b>						
	- deaths	15	29	21	41	34	34
	- population count	2,815	3,901	3,241	4,633	3,668	5,075
	<b>No diabetes</b>						
	- deaths	174	274	215	280	197	275
	- population count	76,720	77,989	81,232	82,194	86,048	87,364
	<b>Mortality rate ratio</b>	<b>2.35</b>	<b>2.12</b>	<b>2.45</b>	<b>2.6</b>	<b>4.05</b>	<b>2.13</b>
55-59	<b>Diabetes</b>						
	- deaths	34	62	34	44	38	59
	- population count	3,072	4,308	3,518	4,919	3,852	5,537
	<b>No diabetes</b>						
	- deaths	226	355	223	341	227	363
	- population count	56,106	56,311	58,611	58,824	61,168	61,342
	<b>Mortality rate ratio</b>	<b>2.75</b>	<b>2.28</b>	<b>2.54</b>	<b>1.54</b>	<b>2.66</b>	<b>1.80</b>
60-64	<b>Diabetes</b>						
	- deaths	60	113	57	89	61	119
	- population count	3,441	4,592	3,782	5,235	4,112	5,672
	<b>No diabetes</b>						
	- deaths	300	490	265	460	270	450
	- population count	46,694	45,936	47,565	46,149	48,256	46,839
	<b>Mortality rate ratio</b>	<b>2.71</b>	<b>2.31</b>	<b>2.71</b>	<b>1.71</b>	<b>2.65</b>	<b>2.18</b>
65-69	<b>Diabetes</b>						
	- deaths	92	157	82	178	99	168
	- population count	4,069	5,006	4,478	5,607	4,622	5,955
	<b>No diabetes</b>						
	- deaths	456	708	378	673	412	673
	- population count	42,672	40,913	42,559	40,979	42,727	40,960
	<b>Mortality rate ratio</b>	<b>2.12</b>	<b>1.81</b>	<b>2.06</b>	<b>1.93</b>	<b>2.22</b>	<b>1.72</b>

## Alberta (continued)

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
70-74	<b>Diabetes</b>						
	- deaths	140	182	148	233	133	216
	- population count	3,999	4,465	4,444	5,042	4,788	5,514
	<b>No diabetes</b>						
	- deaths	617	844	517	882	596	872
- population count	36,648	31,074	36,870	31,756	37,135	32,543	
	<b>Mortality rate ratio</b>	<b>2.08</b>	<b>1.50</b>	<b>2.38</b>	<b>1.66</b>	<b>1.73</b>	<b>1.46</b>
75-79	<b>Diabetes</b>						
	- deaths	187	238	201	248	192	314
	- population count	3,391	3,259	3,904	3,748	4,208	4,145
	<b>No diabetes</b>						
	- deaths	838	1,036	757	977	819	970
- population count	30,660	22,133	31,294	22,623	31,316	22,745	
	<b>Mortality rate ratio</b>	<b>2.02</b>	<b>1.56</b>	<b>2.13</b>	<b>1.53</b>	<b>1.74</b>	<b>1.78</b>
80-84	<b>Diabetes</b>						
	- deaths	182	210	184	209	205	256
	- population count	2,299	1,887	2,525	2,137	2,782	2,332
	<b>No diabetes</b>						
	- deaths	1,050	1,026	964	1,013	988	972
- population count	21,332	13,294	21,505	13,397	21,869	13,484	
	<b>Mortality rate ratio</b>	<b>1.61</b>	<b>1.44</b>	<b>1.63</b>	<b>1.29</b>	<b>1.63</b>	<b>1.52</b>
85+	<b>Diabetes</b>						
	- deaths	293	239	347	234	366	268
	- population count	1,878	1,182	2,194	1,334	2,454	1,517
	<b>No diabetes</b>						
	- deaths	2,501	1,588	2,400	1,472	2,464	1,499
- population count	20,590	9,887	21,405	10,059	21,796	10,049	
	<b>Mortality rate ratio</b>	<b>1.28</b>	<b>1.26</b>	<b>1.41</b>	<b>1.2</b>	<b>1.32</b>	<b>1.18</b>
Total	<b>Diabetes</b>						
	- deaths	1,036	1,268	1,110	1,331	1,161	1,488
	- population count	33,956	36,549	38,283	41,689	41,553	45,553
	<b>No diabetes</b>						
	- deaths	6,653	7,302	6,194	7,014	6,447	6,977
- population count	1,013,041	991,406	1,035,652	1,014,434	1,053,323	1,032,407	
	<b>Mortality rate ratio</b>	<b>4.65</b>	<b>4.71</b>	<b>4.85</b>	<b>4.62</b>	<b>4.56</b>	<b>4.83</b>

## Age-specific Mortality by Fiscal Year and Sex

## Saskatchewan

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
20-29	<b>Diabetes</b>						
	- deaths	0	0	0	0	0	
	- population count	514	360	557	378	574	410
	<b>No diabetes</b>						
	- deaths	35	68	25	90	33	77
- population count	69,553	72,992	70,175	74,195	71,149	75,224	
	<b>Mortality rate ratio</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
30-39	<b>Diabetes</b>						
	- deaths	0	0	0	0	0	
	- population count	1,039	818	1,140	928	1,220	968
	<b>No diabetes</b>						
	- deaths	52	115	52	88	52	100
- population count	77,239	77,751	75,570	76,567	73,771	75,026	
	<b>Mortality rate ratio</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
40-49	<b>Diabetes</b>						
	- deaths	6	16	10	15	14	16
	- population count	1,804	1,998	2,018	2,266	2,131	2,370
	<b>No diabetes</b>						
	- deaths	108	156	107	145	98	166
- population count	69,793	72,460	71,721	74,290	73,780	76,220	
	<b>Mortality rate ratio</b>	<b>2.15</b>	<b>3.72</b>	<b>3.32</b>	<b>3.39</b>	<b>4.95</b>	<b>3.1</b>
50-54	<b>Diabetes</b>						
	- deaths	13	16	9	22	14	32
	- population count	1,180	1,556	1,327	1,771	1,400	1,902
	<b>No diabetes</b>						
	- deaths	67	109	62	111	76	131
- population count	25,017	25,564	26,227	26,639	27,569	28,077	
	<b>Mortality rate ratio</b>	<b>4.11</b>	<b>2.41</b>	<b>2.87</b>	<b>2.98</b>	<b>3.63</b>	<b>3.61</b>
55-59	<b>Diabetes</b>						
	- deaths	14	30	28	31	23	34
	- population count	1,349	1,726	1,476	1,950	1,561	2,065
	<b>No diabetes</b>						
	- deaths	73	120	84	156	94	133
- population count	20,371	19,866	20,744	20,333	21,109	20,847	
	<b>Mortality rate ratio</b>	<b>2.9</b>	<b>2.88</b>	<b>4.68</b>	<b>2.07</b>	<b>3.31</b>	<b>2.58</b>
60-64	<b>Diabetes</b>						
	- deaths	30	52	31	50	28	59
	- population count	1,535	2,049	1,686	2,206	1,755	2,267
	<b>No diabetes</b>						
	- deaths	134	216	111	179	112	214
- population count	18,752	17,855	18,419	17,527	18,445	17,535	
	<b>Mortality rate ratio</b>	<b>2.73</b>	<b>2.1</b>	<b>3.05</b>	<b>2.22</b>	<b>2.63</b>	<b>2.13</b>
65-69	<b>Diabetes</b>						
	- deaths	48	92	49	90	53	98
	- population count	1,791	2,353	1,881	2,520	1,963	2,562
	<b>No diabetes</b>						
	- deaths	191	301	188	288	168	279
- population count	18,530	17,205	18,193	16,747	17,818	16,409	
	<b>Mortality rate ratio</b>	<b>2.60</b>	<b>2.23</b>	<b>2.52</b>	<b>2.08</b>	<b>2.86</b>	<b>2.25</b>



## Saskatchewan (continued)

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
70-74	<b>Diabetes</b>						
	- deaths	83	132	83	157	82	161
	- population count	2,139	2,372	2,261	2,558	2,292	2,672
	<b>No diabetes</b>						
	- deaths	262	432	282	435	256	410
- population count	17,716	15,022	17,459	14,752	17,111	14,562	
	<b>Mortality rate ratio</b>	<b>2.62</b>	<b>1.94</b>	<b>2.27</b>	<b>2.08</b>	<b>2.39</b>	<b>2.14</b>
75-79	<b>Diabetes</b>						
	- deaths	104	139	106	184	116	208
	- population count	1,981	2,035	2,175	2,274	2,262	2,345
	<b>No diabetes</b>						
	- deaths	464	583	378	609	406	541
- population count	16,187	11,891	15,914	11,834	15,808	11,803	
	<b>Mortality rate ratio</b>	<b>1.83</b>	<b>1.39</b>	<b>2.05</b>	<b>1.57</b>	<b>2</b>	<b>1.94</b>
80-84	<b>Diabetes</b>						
	- deaths	121	138	119	151	130	192
	- population count	1,560	1,359	1,681	1,457	1,752	1,566
	<b>No diabetes</b>						
	- deaths	575	629	531	638	557	576
- population count	12,738	8,220	12,672	8,149	12,847	8,030	
	<b>Mortality rate ratio</b>	<b>1.72</b>	<b>1.33</b>	<b>1.69</b>	<b>1.32</b>	<b>1.71</b>	<b>1.71</b>
85+	<b>Diabetes</b>						
	- deaths	185	163	236	194	238	210
	- population count	1,278	906	1,475	1,039	1,627	1,152
	<b>No diabetes</b>						
	- deaths	1,523	966	1,564	1,016	1,558	1,019
- population count	12,999	6,619	13,436	6,722	13,892	6,905	
	<b>Mortality rate ratio</b>	<b>1.24</b>	<b>1.23</b>	<b>1.37</b>	<b>1.24</b>	<b>1.3</b>	<b>1.24</b>
<b>Total</b>	<b>Diabetes</b>						
	- deaths	604	778	671	894	698	1,010
	- population count	16,170	17,532	17,677	19,347	18,537	20,279
	<b>No diabetes</b>						
	- deaths	3,484	3,695	3,384	3,755	3,410	3,646
- population count	358,895	345,445	360,530	347,755	363,299	350,638	
	<b>Mortality rate ratio</b>	<b>3.85</b>	<b>4.15</b>	<b>4.04</b>	<b>4.28</b>	<b>4.01</b>	<b>4.79</b>

## Age-specific Mortality by Fiscal Year and Sex

## Manitoba

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
20-29	<b>Diabetes</b>						
	- deaths	0	0	0	0	0	
	- population count	700	460	786	514	834	566
	<b>No diabetes</b>						
	- deaths	31	79	32	82	38	80
- population count	79,486	81,548	78,577	80,106	77,922	79,598	
	<b>Mortality rate ratio</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
30-39	<b>Diabetes</b>						
	- deaths	7	0	0	5	9	0
	- population count	1,671	1,267	1,860	1,388	2,035	1,510
	<b>No diabetes</b>						
	- deaths	52	102	61	104	64	93
- population count	90,831	92,572	88,460	90,165	86,616	87,997	
	<b>Mortality rate ratio</b>	<b>7.32</b>	<b>0</b>	<b>0</b>	<b>3.12</b>	<b>5.99</b>	<b>0</b>
40-49	<b>Diabetes</b>						
	- deaths	13	17	16	38	20	28
	- population count	2,738	2,862	3,100	3,190	3,407	3,399
	<b>No diabetes</b>						
	- deaths	106	161	92	147	119	198
- population count	82,681	82,910	83,388	83,664	84,458	85,099	
	<b>Mortality rate ratio</b>	<b>3.7</b>	<b>3.06</b>	<b>4.68</b>	<b>6.78</b>	<b>4.17</b>	<b>3.54</b>
50-54	<b>Diabetes</b>						
	- deaths	13	22	21	31	22	33
	- population count	1,948	2,256	2,253	2,591	2,463	2,910
	<b>No diabetes</b>						
	- deaths	76	117	85	109	101	133
- population count	31,182	31,305	32,484	32,380	34,019	33,424	
	<b>Mortality rate ratio</b>	<b>2.74</b>	<b>2.61</b>	<b>3.56</b>	<b>3.55</b>	<b>3.01</b>	<b>2.85</b>
55-59	<b>Diabetes</b>						
	- deaths	22	39	34	37	26	61
	- population count	2,011	2,245	2,228	2,576	2,464	2,908
	<b>No diabetes</b>						
	- deaths	96	158	120	160	111	156
- population count	24,046	23,394	24,603	24,009	25,152	24,849	
	<b>Mortality rate ratio</b>	<b>2.74</b>	<b>2.57</b>	<b>3.13</b>	<b>2.16</b>	<b>2.39</b>	<b>3.34</b>
60-64	<b>Diabetes</b>						
	- deaths	43	54	48	74	37	84
	- population count	2,185	2,560	2,410	2,819	2,602	3,006
	<b>No diabetes</b>						
	- deaths	123	196	154	256	142	192
- population count	20,379	19,527	20,437	19,398	20,409	19,313	
	<b>Mortality rate ratio</b>	<b>3.26</b>	<b>2.1</b>	<b>2.64</b>	<b>1.99</b>	<b>2.04</b>	<b>2.81</b>
65-69	<b>Diabetes</b>						
	- deaths	71	98	62	112	69	101
	- population count	2,492	2,707	2,697	3,008	2,842	3,252
	<b>No diabetes</b>						
	- deaths	200	332	205	325	189	361
- population count	20,142	18,094	19,440	17,682	18,976	17,222	
	<b>Mortality rate ratio</b>	<b>2.87</b>	<b>1.97</b>	<b>2.18</b>	<b>2.03</b>	<b>2.44</b>	<b>1.48</b>

## Manitoba (continued)

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
70-74	<b>Diabetes</b>						
	- deaths	106	117	114	148	84	164
	- population count	2,648	2,615	2,838	2,830	2,974	3,045
	<b>No diabetes</b>						
	- deaths	280	433	313	446	287	444
- population count	19,668	15,536	18,997	15,273	18,503	15,023	
	<b>Mortality rate ratio</b>	<b>2.81</b>	<b>1.61</b>	<b>2.44</b>	<b>1.79</b>	<b>1.82</b>	<b>1.82</b>
75-79	<b>Diabetes</b>						
	- deaths	123	139	152	183	162	177
	- population count	2,322	1,951	2,623	2,254	2,912	2,467
	<b>No diabetes</b>						
	- deaths	474	628	535	598	460	621
- population count	17,743	12,354	17,967	12,270	17,735	12,275	
	<b>Mortality rate ratio</b>	<b>1.98</b>	<b>1.4</b>	<b>1.95</b>	<b>1.67</b>	<b>2.14</b>	<b>1.42</b>
80-84	<b>Diabetes</b>						
	- deaths	140	141	142	167	152	146
	- population count	1,635	1,188	1,771	1,308	1,971	1,406
	<b>No diabetes</b>						
	- deaths	640	656	627	683	603	596
- population count	13,321	8,213	13,136	8,018	12,960	7,846	
	<b>Mortality rate ratio</b>	<b>1.78</b>	<b>1.49</b>	<b>1.68</b>	<b>1.5</b>	<b>1.66</b>	<b>1.37</b>
85+	<b>Diabetes</b>						
	- deaths	214	148	195	180	235	191
	- population count	1,235	793	1,430	896	1,649	992
	<b>No diabetes</b>						
	- deaths	1,591	916	1,706	995	1,623	968
- population count	13,636	6,237	13,978	6,445	14,482	6,620	
	<b>Mortality rate ratio</b>	<b>1.49</b>	<b>1.27</b>	<b>1.12</b>	<b>1.3</b>	<b>1.27</b>	<b>1.32</b>
<b>Total</b>	<b>Diabetes</b>						
	- deaths	752	775	784	975	816	985
	- population count	21,585	20,904	23,996	23,374	26,153	25,461
	<b>No diabetes</b>						
	- deaths	3,669	3,778	3,930	3,905	3,737	3,842
- population count	413,115	391,690	411,467	389,410	411,232	389,266	
	<b>Mortality rate ratio</b>	<b>3.92</b>	<b>3.84</b>	<b>3.42</b>	<b>4.16</b>	<b>3.43</b>	<b>3.92</b>

## Age-specific Mortality by Fiscal Year and Sex

## Ontario

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
20-29	<b>Diabetes</b>						
	- deaths	11	13	12	8	11	15
	- population count	6,431	3,919	7,271	4,333	7,976	4,789
	<b>No diabetes</b>						
	- deaths	188	485	169	481	170	473
- population count	797,286	807,361	795,353	806,858	799,004	811,424	
	<b>Mortality rate ratio</b>	<b>7.25</b>	<b>5.52</b>	<b>7.77</b>	<b>3.1</b>	<b>6.48</b>	<b>5.37</b>
30-39	<b>Diabetes</b>						
	- deaths	27	42	27	42	44	55
	- population count	15,877	11,268	18,740	12,635	21,587	13,813
	<b>No diabetes</b>						
	- deaths	443	934	440	841	427	819
- population count	1,025,202	1,038,371	1,022,614	1,037,141	1,022,467	1,039,963	
	<b>Mortality rate ratio</b>	<b>3.94</b>	<b>4.14</b>	<b>3.35</b>	<b>4.1</b>	<b>4.88</b>	<b>5.06</b>
40-49	<b>Diabetes</b>						
	- deaths	91	170	101	168	108	204
	- population count	21,542	26,387	25,003	29,703	28,382	33,165
	<b>No diabetes</b>						
	- deaths	1,014	1,579	1,001	1,386	1,012	1,536
- population count	889,180	876,966	913,170	903,027	941,730	934,367	
	<b>Mortality rate ratio</b>	<b>3.7</b>	<b>3.58</b>	<b>3.69</b>	<b>3.69</b>	<b>3.54</b>	<b>3.74</b>
50-54	<b>Diabetes</b>						
	- deaths	124	239	134	224	135	264
	- population count	15,547	21,778	17,999	25,064	20,567	28,135
	<b>No diabetes</b>						
	- deaths	806	1,177	773	1,118	896	1,212
- population count	342,552	338,097	359,274	353,573	377,275	369,697	
	<b>Mortality rate ratio</b>	<b>3.39</b>	<b>3.15</b>	<b>3.46</b>	<b>2.83</b>	<b>2.76</b>	<b>2.86</b>
55-59	<b>Diabetes</b>						
	- deaths	168	364	225	334	223	408
	- population count	17,370	23,717	19,863	27,038	22,142	30,381
	<b>No diabetes</b>						
	- deaths	972	1,475	946	1,376	1,004	1,463
- population count	260,784	251,268	269,252	259,538	278,640	268,767	
	<b>Mortality rate ratio</b>	<b>2.59</b>	<b>2.61</b>	<b>3.22</b>	<b>2.33</b>	<b>2.8</b>	<b>2.47</b>
60-64	<b>Diabetes</b>						
	- deaths	324	623	327	620	358	633
	- population count	20,783	26,464	23,115	29,635	25,167	32,416
	<b>No diabetes</b>						
	- deaths	1,369	2,046	1,242	1,946	1,282	1,940
- population count	223,229	208,914	225,862	209,802	228,822	211,944	
	<b>Mortality rate ratio</b>	<b>2.54</b>	<b>2.4</b>	<b>2.57</b>	<b>2.26</b>	<b>2.54</b>	<b>2.13</b>
65-69	<b>Diabetes</b>						
	- deaths	560	982	580	1,010	622	1,007
	- population count	24,455	29,009	26,639	31,799	28,741	34,616
	<b>No diabetes</b>						
	- deaths	2,018	3,175	1,879	2,950	1,890	2,809
- population count	210,745	189,298	208,907	188,243	207,634	186,356	
	<b>Mortality rate ratio</b>	<b>2.39</b>	<b>2.02</b>	<b>2.42</b>	<b>2.03</b>	<b>2.38</b>	<b>1.93</b>

## Ontario (continued)

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
70-74	<b>Diabetes</b>						
	- deaths	966	1,372	904	1,429	931	1,476
	- population count	25,494	26,243	27,828	29,282	30,182	32,353
	<b>No diabetes</b>						
	- deaths	3,027	4,316	2,779	4,039	2,878	4,017
- population count	193,923	154,236	191,641	154,505	189,975	155,436	
	<b>Mortality rate ratio</b>	<b>2.43</b>	<b>1.87</b>	<b>2.24</b>	<b>1.87</b>	<b>2.04</b>	<b>1.77</b>
75-79	<b>Diabetes</b>						
	- deaths	1,156	1,499	1,252	1,619	1,327	1,734
	- population count	20,650	18,710	24,053	21,837	26,969	24,581
	<b>No diabetes</b>						
	- deaths	4,147	4,943	4,137	4,848	4,231	4,891
- population count	154,911	108,097	161,040	112,363	164,857	114,973	
	<b>Mortality rate ratio</b>	<b>2.09</b>	<b>1.75</b>	<b>2.03</b>	<b>1.72</b>	<b>1.92</b>	<b>1.66</b>
80-84	<b>Diabetes</b>						
	- deaths	1,217	1,226	1,243	1,309	1,317	1,363
	- population count	12,990	10,042	14,468	11,153	16,338	12,567
	<b>No diabetes</b>						
	- deaths	4,965	4,796	4,842	4,521	4,777	4,393
- population count	102,970	62,131	102,914	61,943	105,414	63,845	
	<b>Mortality rate ratio</b>	<b>1.94</b>	<b>1.58</b>	<b>1.83</b>	<b>1.61</b>	<b>1.78</b>	<b>1.58</b>
85+	<b>Diabetes</b>						
	- deaths	1,793	1,097	1,952	1,308	2,103	1,351
	- population count	10,373	5,578	12,089	6,585	13,956	7,514
	<b>No diabetes</b>						
	- deaths	12,367	6,316	11,843	6,253	12,166	6,386
- population count	104,216	44,583	107,626	46,729	111,939	49,442	
	<b>Mortality rate ratio</b>	<b>1.46</b>	<b>1.39</b>	<b>1.47</b>	<b>1.48</b>	<b>1.39</b>	<b>1.39</b>
Total	<b>Diabetes</b>						
	- deaths	6,437	7,627	6,757	8,071	7,179	8,510
	- population count	191,512	203,115	217,068	229,064	242,007	254,330
	<b>No diabetes</b>						
	- deaths	31,316	31,242	30,051	29,759	30,733	29,939
- population count	4,304,998	4,079,322	4,357,653	4,133,722	4,427,757	4,206,214	
	<b>Mortality rate ratio</b>	<b>4.62</b>	<b>4.9</b>	<b>4.51</b>	<b>4.89</b>	<b>4.27</b>	<b>4.7</b>

## Age-specific Mortality by Fiscal Year and Sex

## Quebec

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
20-29	<b>Diabetes</b>						
	- deaths	15	12	8	5	9	10
	- population count	3,189	1,800	3,514	1,915	3,691	2,035
	<b>No diabetes</b>						
	- deaths	161	501	135	494	150	542
- population count	472,006	495,942	470,530	495,664	472,034	497,513	
	<b>Mortality rate ratio</b>	<b>13.79</b>	<b>6.6</b>	<b>7.93</b>	<b>2.62</b>	<b>7.67</b>	<b>4.51</b>
30-39	<b>Diabetes</b>						
	- deaths	18	39	26	28	23	36
	- population count	7,237	4,967	8,260	5,288	9,051	5,445
	<b>No diabetes</b>						
	- deaths	350	743	342	772	345	754
- population count	614,865	638,372	596,987	620,704	578,438	604,262	
	<b>Mortality rate ratio</b>	<b>4.37</b>	<b>6.75</b>	<b>5.49</b>	<b>4.26</b>	<b>4.26</b>	<b>5.3</b>
40-49	<b>Diabetes</b>						
	- deaths	74	121	66	138	82	152
	- population count	10,853	13,508	12,087	14,959	12,864	15,554
	<b>No diabetes</b>						
	- deaths	840	1,357	859	1,375	947	1,416
- population count	571,896	568,786	581,213	579,207	590,608	589,281	
	<b>Mortality rate ratio</b>	<b>4.64</b>	<b>3.75</b>	<b>3.69</b>	<b>3.89</b>	<b>3.98</b>	<b>4.07</b>
50-54	<b>Diabetes</b>						
	- deaths	100	178	108	170	104	154
	- population count	8,745	12,703	9,829	14,124	10,323	14,831
	<b>No diabetes</b>						
	- deaths	613	1,005	651	1,022	596	980
- population count	228,732	220,460	236,582	227,789	244,404	235,421	
	<b>Mortality rate ratio</b>	<b>4.27</b>	<b>3.07</b>	<b>3.99</b>	<b>2.68</b>	<b>4.13</b>	<b>2.49</b>
55-59	<b>Diabetes</b>						
	- deaths	176	294	141	317	167	322
	- population count	10,363	14,669	11,461	16,537	12,214	17,800
	<b>No diabetes</b>						
	- deaths	737	1,260	784	1,244	778	1,247
- population count	173,726	163,369	181,510	170,340	189,733	177,442	
	<b>Mortality rate ratio</b>	<b>4</b>	<b>2.6</b>	<b>2.85</b>	<b>2.62</b>	<b>3.33</b>	<b>2.57</b>
60-64	<b>Diabetes</b>						
	- deaths	232	504	265	474	257	488
	- population count	12,597	15,791	13,776	17,568	14,223	18,609
	<b>No diabetes</b>						
	- deaths	994	1,688	930	1,565	950	1,611
- population count	147,571	132,384	146,183	130,746	148,156	132,632	
	<b>Mortality rate ratio</b>	<b>2.73</b>	<b>2.50</b>	<b>3.02</b>	<b>2.25</b>	<b>2.82</b>	<b>2.16</b>
65-69	<b>Diabetes</b>						
	- deaths	483	776	436	840	469	836
	- population count	16,390	18,080	17,393	19,696	17,720	20,368
	<b>No diabetes</b>						
	- deaths	1,486	2,595	1,428	2,445	1,367	2,304
- population count	140,357	117,022	139,246	116,736	137,943	116,064	
	<b>Mortality rate ratio</b>	<b>2.78</b>	<b>1.94</b>	<b>2.44</b>	<b>2.04</b>	<b>2.67</b>	<b>2.07</b>

## Quebec (continued)

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
70-74	<b>Diabetes</b>						
	- deaths	754	1,032	715	1,122	741	1,064
	- population count	17,485	16,407	18,998	18,178	19,809	19,397
	<b>No diabetes</b>						
	- deaths	2,052	3,118	2,084	2,949	1,990	2,903
- population count	119,310	87,039	119,579	87,669	119,687	88,354	
	<b>Mortality rate ratio</b>	<b>2.51</b>	<b>1.76</b>	<b>2.16</b>	<b>1.83</b>	<b>2.25</b>	<b>1.67</b>
75-79	<b>Diabetes</b>						
	- deaths	919	1,064	961	1,156	1,047	1,189
	- population count	14,823	11,176	16,673	12,795	18,087	14,026
	<b>No diabetes</b>						
	- deaths	2,805	3,312	2,635	3,282	2,597	3,143
- population count	89,111	55,736	91,279	57,255	94,244	59,446	
	<b>Mortality rate ratio</b>	<b>1.97</b>	<b>1.6</b>	<b>2</b>	<b>1.58</b>	<b>2.1</b>	<b>1.6</b>
80-84	<b>Diabetes</b>						
	- deaths	902	850	1,061	891	1,053	943
	- population count	9,886	5,890	11,131	6,563	11,985	7,310
	<b>No diabetes</b>						
	- deaths	3,404	3,229	3,310	3,068	3,188	2,681
- population count	60,370	31,039	60,528	31,170	60,915	31,199	
	<b>Mortality rate ratio</b>	<b>1.62</b>	<b>1.39</b>	<b>1.74</b>	<b>1.38</b>	<b>1.68</b>	<b>1.5</b>
85+	<b>Diabetes</b>						
	- deaths	1,288	666	1,430	754	1,588	800
	- population count	7,246	3,005	8,414	3,569	9,558	4,000
	<b>No diabetes</b>						
	- deaths	7,299	3,619	7,383	3,532	7,032	3,413
- population count	51,581	18,923	53,246	19,545	55,440	20,505	
	<b>Mortality rate ratio</b>	<b>1.26</b>	<b>1.16</b>	<b>1.23</b>	<b>1.17</b>	<b>1.31</b>	<b>1.2</b>
<b>Total</b>	<b>Diabetes</b>						
	- deaths	4,961	5,536	5,217	5,895	5,540	5,994
	- population count	118,814	117,996	131,536	131,192	139,525	139,375
	<b>No diabetes</b>						
	- deaths	20,741	22,427	20,541	21,748	19,940	20,994
- population count	2,669,525	2,529,072	2,676,883	2,536,825	2,691,602	2,552,119	
	<b>Mortality rate ratio</b>	<b>5.37</b>	<b>5.29</b>	<b>5.17</b>	<b>5.24</b>	<b>5.36</b>	<b>5.23</b>

Data source for the number of deaths among non-diabetic people : Registre des événements démographiques du Québec (1997, 1998, 1999 and 2000). Data from the Fichier des décès of 2000 are preliminary.

## Age-specific Mortality by Fiscal Year and Sex

## Prince Edward Island

Age group	1997/1998		1998/1999		1999/2000			
	Female	Male	Female	Male	Female	Male		
20-64	<b>Diabetes</b>							
	- deaths	*	*	*	*	*		
	- population count	957	1,244	1,133	1,446	1,204	1,529	
	<b>No diabetes</b>							
	- deaths	62	123	63	112	73	114	
- population count	42,026	41,799	41,455	41,234	41,628	41,387		
	<b>Mortality rate ratio</b>		*	*	*	*		
65-69	<b>Diabetes</b>							
	- deaths	8	11	7	11	6	12	
	- population count	243	338	284	364	288	367	
	<b>No diabetes</b>							
	- deaths	28	47	25	41	17	39	
- population count	2,396	2,199	2,359	2,184	2,409	2,214		
	<b>Mortality rate ratio</b>		<b>2.82</b>	<b>1.52</b>	<b>2.33</b>	<b>1.61</b>	<b>2.95</b>	<b>1.86</b>
70-74	<b>Diabetes</b>							
	- deaths	0	15	12	19	10	16	
	- population count	256	296	281	344	291	361	
	<b>No diabetes</b>							
	- deaths	36	56	38	61	33	51	
- population count	2,168	1,743	2,137	1,735	2,135	1,720		
	<b>Mortality rate ratio</b>		<b>0</b>	<b>1.58</b>	<b>2.4</b>	<b>1.57</b>	<b>2.22</b>	<b>1.49</b>
75-79	<b>Diabetes</b>							
	- deaths	16	21	12	19	12	17	
	- population count	281	236	310	264	299	288	
	<b>No diabetes</b>							
	- deaths	44	75	56	73	52	74	
- population count	2,032	1,356	1,966	1,321	1,899	1,339		
	<b>Mortality rate ratio</b>		<b>2.63</b>	<b>1.61</b>	<b>1.36</b>	<b>1.3</b>	<b>1.47</b>	<b>1.07</b>
80-84	<b>Diabetes</b>							
	- deaths	12	8	15	24	25	20	
	- population count	203	147	238	168	271	165	
	<b>No diabetes</b>							
	- deaths	75	78	82	92	67	78	
- population count	1,556	914	1,522	882	1,529	851		
	<b>Mortality rate ratio</b>		<b>1.23</b>	<b>0.64</b>	<b>1.17</b>	<b>1.37</b>	<b>2.11</b>	<b>1.32</b>
85+	<b>Diabetes</b>							
	- deaths	30	7	23	13	26	24	
	- population count	167	77	177	99	198	122	
	<b>No diabetes</b>							
	- deaths	220	120	187	109	212	128	
- population count	1,650	760	1,677	760	1,750	775		
	<b>Mortality rate ratio</b>		<b>1.35</b>	<b>0.58</b>	<b>1.17</b>	<b>0.92</b>	<b>1.08</b>	<b>1.19</b>
<b>Total</b>	<b>Diabetes</b>							
	- deaths	66	62	69	98	84	102	
	- population count	2,107	2,338	2,423	2,685	2,551	2,832	
	<b>No diabetes</b>							
	- deaths	465	499	451	488	454	484	
- population count	51,828	48,771	51,116	48,116	51,350	48,286		
	<b>Mortality rate ratio</b>		<b>3.49</b>	<b>2.59</b>	<b>3.23</b>	<b>3.6</b>	<b>3.72</b>	<b>3.59</b>

\* cell suppressed



## Age-specific Mortality by Fiscal Year and Sex

## Nova Scotia

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
20-29	<b>Diabetes</b>						
	- deaths	0	0	0	0	0	
	- population count	501	372	557	388	577	398
	<b>No diabetes</b>						
	- deaths	26	52	24	52	26	48
- population count	66,504	65,715	65,983	64,859	65,690	64,580	
	<b>Mortality rate ratio</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	
30-39	<b>Diabetes</b>						
	- deaths	5	7	0	0	8	5
	- population count	1,074	850	1,173	947	1,183	977
	<b>No diabetes</b>						
	- deaths	41	86	36	66	39	78
- population count	80,157	75,492	78,600	74,435	77,739	73,540	
	<b>Mortality rate ratio</b>	<b>9.10</b>	<b>7.23</b>	<b>0</b>	<b>0</b>	<b>13.48</b>	<b>4.83</b>
40-49	<b>Diabetes</b>						
	- deaths	7	11	8	21	6	16
	- population count	1,926	2,258	2,152	2,447	2,266	2,505
	<b>No diabetes</b>						
	- deaths	95	161	91	133	93	162
- population count	73,265	70,956	74,484	71,850	76,152	73,025	
	<b>Mortality rate ratio</b>	<b>2.80</b>	<b>2.15</b>	<b>3.04</b>	<b>4.64</b>	<b>2.17</b>	<b>2.88</b>
50-54	<b>Diabetes</b>						
	- deaths	7	24	12	15	13	26
	- population count	1,647	2,048	1,886	2,282	1,969	2,429
	<b>No diabetes</b>						
	- deaths	77	139	78	137	66	118
- population count	29,144	28,442	30,528	29,733	31,865	31,148	
	<b>Mortality rate ratio</b>	<b>1.61</b>	<b>2.40</b>	<b>2.49</b>	<b>1.43</b>	<b>3.19</b>	<b>2.83</b>
55-59	<b>Diabetes</b>						
	- deaths	17	48	14	35	22	34
	- population count	1,736	2,242	1,941	2,502	2,060	2,706
	<b>No diabetes</b>						
	- deaths	112	159	91	143	88	147
- population count	21,820	21,037	22,573	21,713	23,530	22,716	
	<b>Mortality rate ratio</b>	<b>1.91</b>	<b>2.83</b>	<b>1.79</b>	<b>2.12</b>	<b>2.86</b>	<b>1.94</b>
60-64	<b>Diabetes</b>						
	- deaths	38	44	30	56	48	67
	- population count	2,073	2,437	2,246	2,744	2,311	2,870
	<b>No diabetes</b>						
	- deaths	132	191	112	204	111	187
- population count	17,824	17,193	18,134	17,487	18,524	17,662	
	<b>Mortality rate ratio</b>	<b>2.48</b>	<b>1.63</b>	<b>2.16</b>	<b>1.75</b>	<b>3.47</b>	<b>2.20</b>
65-69	<b>Diabetes</b>						
	- deaths	56	78	61	101	51	97
	- population count	2,335	2,530	2,471	2,772	2,549	2,929
	<b>No diabetes</b>						
	- deaths	209	328	157	281	178	265
- population count	16,468	14,651	16,345	14,607	16,448	14,791	
	<b>Mortality rate ratio</b>	<b>1.89</b>	<b>1.38</b>	<b>2.57</b>	<b>1.89</b>	<b>1.85</b>	<b>1.85</b>

## Nova Scotia (continued)

Age group	1997/1998		1998/1999		1999/2000		
	Female	Male	Female	Male	Female	Male	
70-74	<b>Diabetes</b>						
	- deaths	85	126	85	124	107	138
	- population count	2,386	2,380	2,658	2,630	2,715	2,767
	<b>No diabetes</b>						
	- deaths	263	397	285	333	261	356
- population count	15,020	11,589	14,791	11,472	14,583	11,483	
	<b>Mortality rate ratio</b>	<b>2.03</b>	<b>1.55</b>	<b>1.66</b>	<b>1.62</b>	<b>2.20</b>	<b>1.61</b>
75-79	<b>Diabetes</b>						
	- deaths	113	141	124	134	137	160
	- population count	2,252	1,913	2,427	2,053	2,528	2,143
	<b>No diabetes</b>						
	- deaths	423	519	369	472	372	493
- population count	13,697	9,244	13,602	9,176	13,369	9,171	
	<b>Mortality rate ratio</b>	<b>1.62</b>	<b>1.31</b>	<b>1.88</b>	<b>1.27</b>	<b>1.95</b>	<b>1.39</b>
80-84	<b>Diabetes</b>						
	- deaths	129	132	140	129	148	171
	- population count	1,553	1,119	1,713	1,252	1,862	1,407
	<b>No diabetes</b>						
	- deaths	531	535	488	470	493	475
- population count	10,119	6,006	10,059	5,893	10,332	5,956	
	<b>Mortality rate ratio</b>	<b>1.58</b>	<b>1.32</b>	<b>1.68</b>	<b>1.29</b>	<b>1.67</b>	<b>1.52</b>
85+	<b>Diabetes</b>						
	- deaths	165	117	200	113	212	135
	- population count	1,126	608	1,335	716	1,473	799
	<b>No diabetes</b>						
	- deaths	1,302	715	1,184	713	1,251	608
- population count	10,251	4,260	10,457	4,330	10,866	4,423	
	<b>Mortality rate ratio</b>	<b>1.15</b>	<b>1.15</b>	<b>1.32</b>	<b>0.96</b>	<b>1.25</b>	<b>1.23</b>
Total	<b>Diabetes</b>						
	- deaths	622	728	674	728	752	849
	- population count	18,609	18,757	20,559	20,733	21,493	21,930
	<b>No diabetes</b>						
	- deaths	3,211	3,282	2,915	3,004	2,978	2,937
- population count	354,269	324,585	355,556	325,555	359,098	328,495	
	<b>Mortality rate ratio</b>	<b>3.69</b>	<b>3.84</b>	<b>4.00</b>	<b>3.81</b>	<b>4.22</b>	<b>4.33</b>