# National Diabetes Fact Sheet Canada 2007

## What is diabetes?

Diabetes is a chronic condition that stems from the body's inability to sufficiently produce and/or properly use insulin. Your body needs insulin to use sugar as an energy source. Diabetes can lead to serious complications and premature death. However, if you have diabetes you can take steps to control the disease and lower the risk of complications.

## Types of diabetes

**Type 1 diabetes** occurs when the beta cells of your pancreas are destroyed by the immune system and no longer produce insulin. You need an adequate supply of insulin to help your body function. There is no known way to prevent type 1 diabetes; it usually develops in childhood or adolescence.

**Type 2 diabetes** occurs when your body does not make enough insulin and/or does not respond well to the insulin it makes. People are typically diagnosed with type 2 diabetes after the age of 40, although it is now also being seen in children and adolescents. This type of diabetes is associated with excess body weight, and in most people, it is preventable by following a healthy meal plan and exercise program and maintaining healthy weight.

**Gestational diabetes** is a form of diabetes that develops in women during pregnancy and disappears after delivery. Gestational diabetes affects about 4% of all pregnancies and increases the risk of developing type 2 diabetes.

## Pre-diabetes

Pre-diabetes is a key risk factor for type 2 diabetes. It is a risk condition where your blood glucose levels are elevated, but not high enough for a diagnosis of diabetes. Pre-diabetes is diagnosed by measuring impaired fasting glucose or impaired glucose tolerance. Impaired fasting glucose pre-diabetes is associated with fasting blood glucose levels from 6.1 to 6.9mmol/L; impaired glucose tolerance is where blood glucose levels range from 7.8 to 11mmol/L after a 2-hour oral glucose tolerance test.

In Canada, it is estimated that 4 million people between the ages of 40 and 74 have impaired fasting glucose and 1.8 million have impaired glucose tolerance.

## Living with diabetes

Living with diabetes involves working with your health care providers to monitor and manage your blood glucose levels, along with making important changes in your lifestyle.

For all types of diabetes, educating yourself is also an important part of medical care. Learning about diabetes will give you the skills, knowledge and resources needed to help you manage your condition.

If you have type 1 diabetes, you need to take insulin by injection, continuous insulin infusion (pumps) or inhalation. Watching your diet and taking part in physical activity are also important.

If you have type 2 diabetes, you may be able to control your blood glucose by following a healthy meal plan and exercise program and losing excess weight. If you cannot achieve glucose control, you may have to take oral anti-diabetic drugs and/or insulin to maintain your target glucose levels.

Exercise regularly with strength, endurance and flexibility activities. You can tailor physical activities to your particular needs by following the guidelines in *Canada's Physical Activity Guide*.

If you have gestational diabetes, in most cases, eating a balanced diet and getting regular exercise will help to keep blood glucose levels within an acceptable range. If blood glucose levels are not controlled after at least 2 weeks of eating a balanced diet and exercising regularly, you will need insulin injections.

People living with diabetes may also need to take medications to control cholesterol (lipids) and blood pressure because of an increased risk of cardiovascular disease.

## Risk factors

Several factors contribute to a person's risk of developing diabetes. Scientists do not know exactly what causes type 1 diabetes, but they believe that both genetic factors and exposure to viruses are involved.

Besides being overweight or obese, other risk factors that contribute to developing type 2 diabetes include:

- pre-diabetes
- being older than 40 years of age
- having high blood pressure and/or high cholesterol
- having a family history of diabetes
- belonging to certain high-risk ethnocultural populations (e.g. Aboriginal, African, Hispanic, Asian)
- a history of gestational diabetes
- having other conditions which may include vascular disease, polycycstic ovary syndrome, acanthosis nigricans and schizophrenia

## Reducing the risk of diabetes

Like most serious health conditions, the likelihood of developing type 2 diabetes can be reduced. You can minimize your risk of diabetes by making healthy lifestyle choices, such as controlling your diet, losing excess weight and exercising. Weight loss of 5% to 10% has been shown to significantly reduce risk—about 4.5 to 9 kg (10 to 20 lbs.) for a 90-kg (200-lb.) person. Here are some more lifestyle factors to consider:

**Body Mass Index**

The Body Mass Index (BMI) is a simple, widely accepted way of assessing body weight in relation to health for most people aged 20 to 65 (exceptions include people who are very muscular, athletes, and pregnant or nursing women).

According to World Health Organization (WHO) guidelines, for adults over 20 years old, BMI falls into one of the following categories:

| | |
|---|---|
| Below 18.5 | Underweight |
| 18.5–24.9 | Normal |
| 25.0–29.9 | Overweight |
| 30.0–39.9 | Obese |
| Above 40.0 | Very obese |

Body fat stored around your abdomen (rather than the hips and thighs) is also a risk factor for developing type 2 diabetes.

You can calculate your BMI and obtain additional information at: www.hc-sc.gc.ca

**Eating a healthy, balanced diet**

By eating foods that are rich in fibre, reducing the amount of fat in your food selections and adding more fruits and vegetables you can help control your diet and maintain or lose weight. It is also possible to decrease the size and quantity of servings while still ensuring that you meet healthy nutrient intakes.

**Increasing physical activity**

Increasing physical activity is a key element in controlling your weight and reducing the likelihood of developing type 2 diabetes.

Physical activity also helps you maintain better posture and balance, stronger muscles and bones, more energy, reduced stress and continued independent living in later life.

**Managing high blood pressure, cholesterol and glucose**

Diabetes and high blood pressure are often found together. Up to 60% of people with undiagnosed diabetes have high blood pressure. Studies show that good control of blood pressure, cholesterol and glucose can substantially reduce your risk of developing complications and slow their progression.

## Common complications of diabetes

If you have diabetes, you may have other health problems that increase your risk for heart attacks, stroke, kidney disease and eye disease. Some of the common complications are listed below:

### Cardiovascular disease

- Having diabetes increases your risk of developing high blood pressure and other cardiovascular problems, because diabetes adversely affects the arteries, predisposing them to atherosclerosis (hardening of the arteries). Atherosclerosis can cause high blood pressure, which if not treated, can lead to blood vessel damage, stroke, heart failure, heart attack or kidney failure.
- Heart disease and stroke account for about 80% of deaths in people with diabetes. People with diabetes have higher heart disease rates than people without diabetes—2 times higher for men and 3 times higher for women.

### Kidney disease

Diabetes is the leading cause of kidney failure, accounting for 42% of new cases in 2004.

- In 2004, 2,139 people with diabetes began treatment for end-stage renal (kidney) disease
- In 2004, 8,624 people with end-stage kidney disease due to diabetes were undergoing dialysis or had a kidney transplant.

### Blindness

- Diabetic retinopathy causes 600 new cases of blindness each year. It affects almost all people who have lived with diabetes for more than 30 years.

### Other complications

- If you have diabetes, you are more susceptible to many other illnesses. For example, you may be more likely to die of pneumonia or influenza than people who do not have diabetes.

## The cost of diabetes*

- Individuals and families bear the cost of diabetes through medical expenses, inconvenience and deteriorating health. These personal burdens translate into significant cost for Canadian society as a whole**.**
- Diabetes resulted in $884 million in direct health care costs in 2000.
- Indirect costs in lost productivity and premature death added another $1.7 billion, for a total cost of $2.6 billion to the Canadian economy.

*Data used to calculate these figures are based on the costs associated with the primary health reason for hospitalization. Generally, Canadians are admitted to the hospital due to the complications associated with diabetes, limiting the true cost of this disease. These estimates do not include the costs from lost potential years of life or missed days of work. Nor do they take account of the costs of related ailments, such as cardiovascular disease, kidney disease and eye disease. Without these elements, the estimates understate the real economic cost of diabetes in Canada.

## Reducing your risk of complications

Working with your health care providers you can reduce the occurrence of the complications listed above and other diabetes complications by controlling levels of blood glucose, blood pressure and blood lipids, and by receiving other preventive care treatments and advice in a timely manner.

**You can help reduce the risk of diabetes complications by:**

- not smoking
- being physically active
- eating a healthy, balanced diet
- controlling blood glucose levels
- maintaining a healthy cholesterol level
- controlling blood pressure
- taking care of your feet by regularly examining toes and skin
- visiting your dentist
- having regular eye examinations by an eye care specialist
- having regular kidney function testing

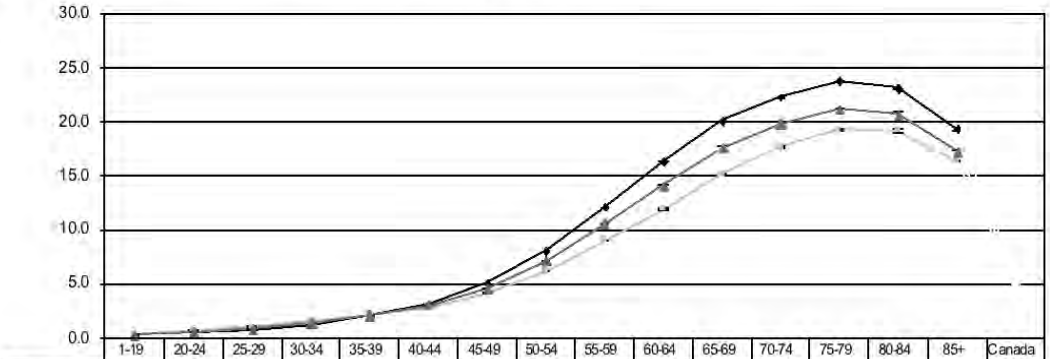
## The face of diabetes in Canada

In 2005, 1.8 million Canadians[1]–5.5% of the population—had diagnosed diabetes.

The information provided in the graphs below present a picture of diabetes in Canada. The data come from the National Diabetes Surveillance System (NDSS).

NDSS

**Figure 1. Prevalence of Diagnosed Diabetes Among Females and Males Aged 1 Year and Older, Canada, 2004-2005**




| | 1-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50-54 | 55-59 | 60-64 | 65-69 | 70-74 | 75-79 | 80-84 | 85+ | Canada |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Females | 0.3 | 0.6 | 1.0 | 1.5 | 2.2 | 2.9 | 4.1 | 6.2 | 9.1 | 11.9 | 15.2 | 17.7 | 19.3 | 19.2 | 16.4 | 5.2 |
| Males | 0.3 | 0.6 | 0.8 | 1.3 | 2.1 | 3.2 | 5.1 | 8.1 | 12.2 | 16.4 | 20.1 | 22.4 | 23.8 | 23.2 | 19.4 | 5.8 |
| Total | 0.3 | 0.6 | 0.9 | 1.4 | 2.1 | 3.0 | 4.6 | 7.1 | 10.6 | 14.1 | 17.6 | 19.9 | 21.3 | 20.7 | 17.3 | 5.5 |

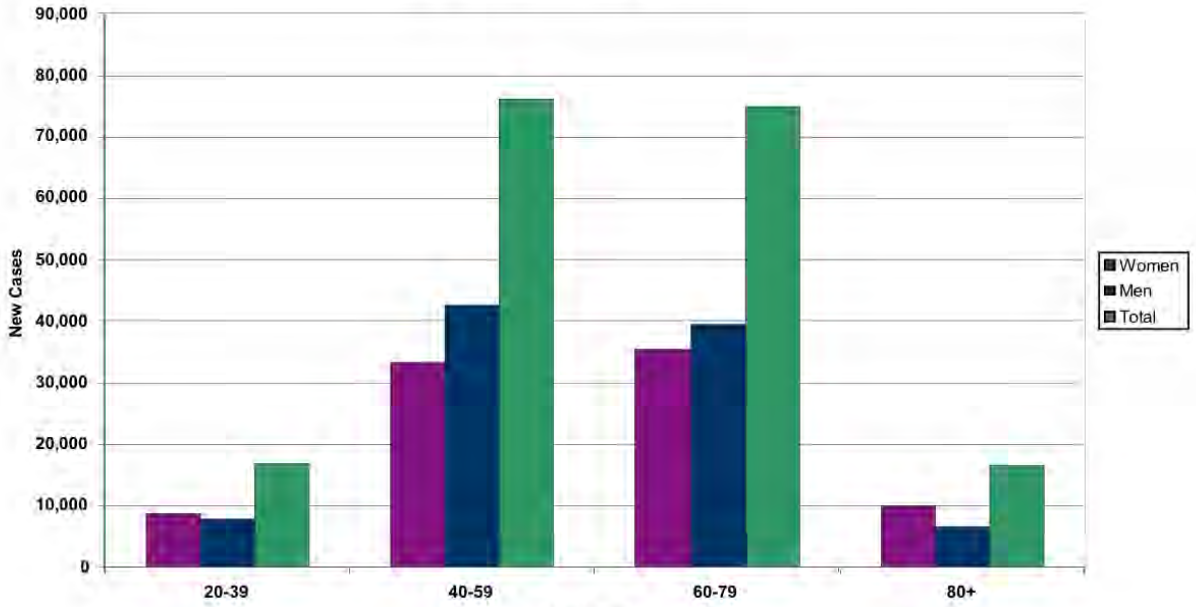
Source: Public Health Agency of Canada, Using NDSS data files contributed by all provinces and territories, as of October 31, 2007

Age Group

‡The 95% Confidence Interval shows an estimated range of values which is likely to include the true prevalence rate 19 times out of 20.

[1]The reference to 1.8 million Canadians refers to individuals aged 1 year and older who have confirmed diagnosed diabetes. The number excludes individuals who are unaware the have diabetes or pre-diabetes.

**Figure 2. Number of New Cases of Diagnosed Diabetes in People Aged 20 and Older, by age Group Canada 2004-2005**

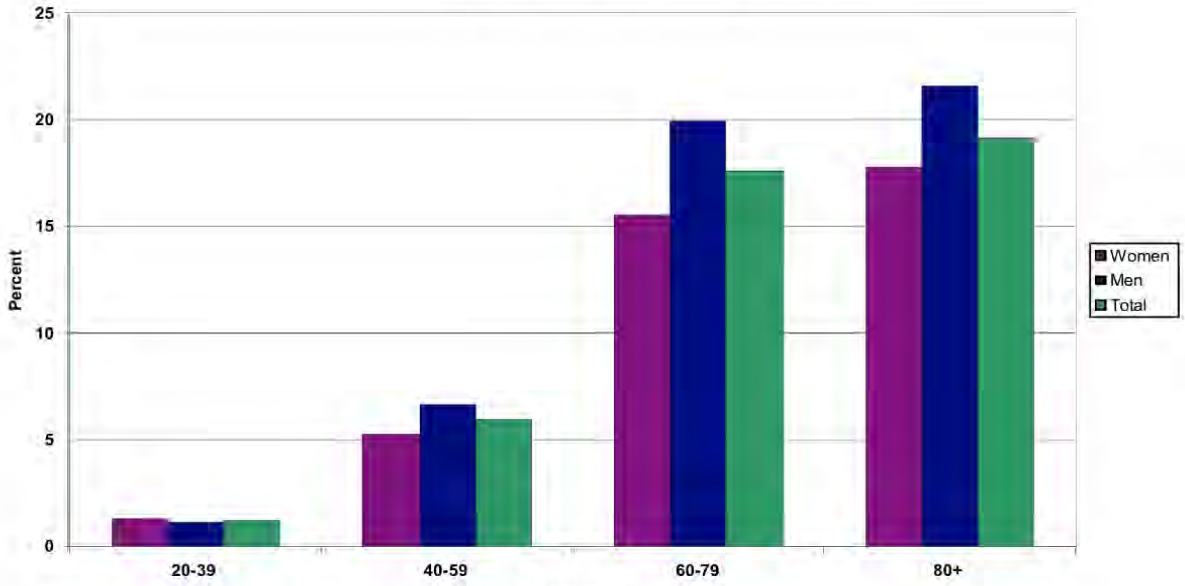



Source: Public Health Agency of Canada,
Using NDSS Data files contributed by all provinces and territories as of Oct 31, 2007

As illustrated in the charts above and below, your likelihood of developing diabetes increases with age:

- 7.1% of all Canadians 20 years and older have diabetes.
- 18% of all Canadians 60 years and older have diabetes.

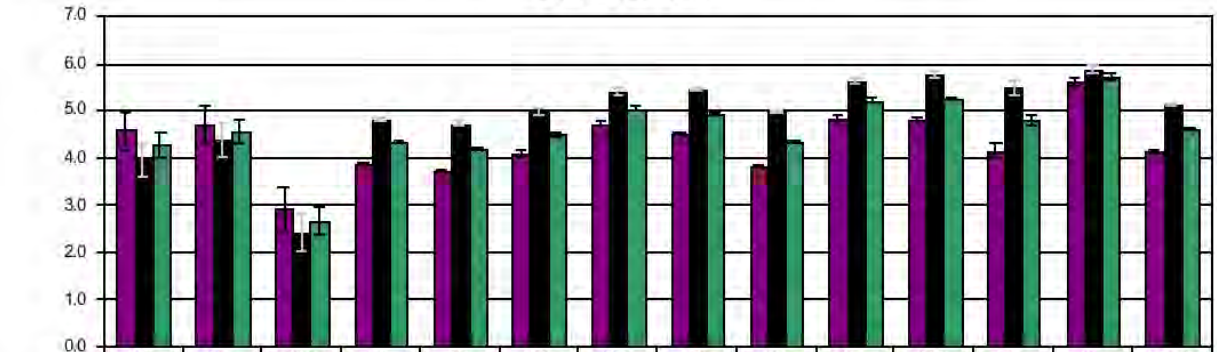
**Figure 3. Prevalence of Diagnosed Diabetes in People Aged 20 and Older, by age Group Canada 2004-2005**




Source: Public Health Agency of Canada,
Using NDSS Data files contributed by all provinces and territories as of Oct 31, 2007

NDSS

**Figure 4. Age-Standardized Prevalence Rates* of Diagnosed Diabetes Among Females and Males Aged 1 Year and Older, by Province and Territory, Canada, 2004-2005**




| | YT | NT | NU | BC | AB | SK | MB | ON | QC | NB | NS | PE | NL | Canada |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Females | 4.6 | 4.7 | 2.9 | 3.9 | 3.7 | 4.1 | 4.7 | 4.5 | 3.8 | 4.9 | 4.8 | 4.2 | 5.6 | 4.2 |
| Males | 4.0 | 4.4 | 2.5 | 4.8 | 4.7 | 5.0 | 5.4 | 5.5 | 5.0 | 5.7 | 5.8 | 5.5 | 5.9 | 5.1 |
| Total | 4.3 | 4.6 | 2.7 | 4.3 | 4.2 | 4.5 | 5.0 | 5.0 | 4.4 | 5.2 | 5.3 | 4.8 | 5.7 | 4.6 |

Source: Public Health Agency of Canada, Using NDSS data files contributed by all provinces and territories, as of October 31, 2007

‡The 95% Confidence Interval shows an estimated range of values which is likely to include the true prevalence rate 19 times out of 20.

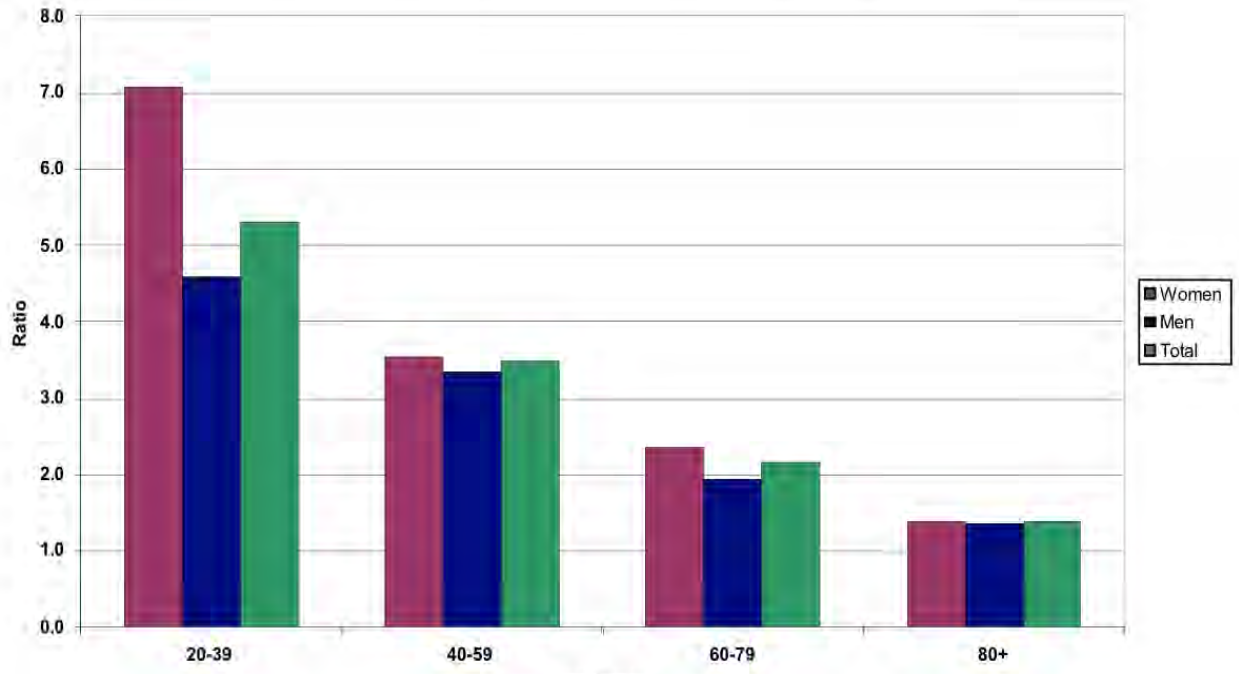
*Age-standardized to 1991 Canadian Population

- The Public Health Agency of Canada uses an age-standardization method for chronic diseases in Canada. This method addresses the varying age structures across Canada's provinces and territories. This is useful for diabetes, where the prevalence rates differ significantly among age groups and increases with age. The formula to calculate these rates uses the 1991 Canadian population based on census data. This method of age-standardization lowered the overall prevalence rate as opposed the age-specific rates in Figure 1 (4.6 to 5.5 respectively).

- The prevalence of diabetes rates vary across Canada. Age-standardized rates, which take account of the different age structure of each province and territory, range from a high of 5.7% in Newfoundland and Labrador to a low of 2.7% in Nunavut.

- The rate for males is lower than for females in Yukon, Northwest Territories and Nunavut. In all of Canada's provinces, the prevalence for males is higher.

**Figure 5. Ratios of Death Rates of Women and Men Aged 20 and Older with Diagnosed Diabetes Compared to Adults Without Diagnosed Diabetes, Canada, 2004-2005**




Source: Public Health Agency of Canada,
Using NDSS Data files contributed by all provinces and territories as of Oct 31, 2007

- The chart compares the death rates of people with diabetes compared to those without diabetes in the same age group.

- Overall, death rates were about twice as high among persons with diabetes compared to those without diabetes. For younger people, the consequences are particularly severe. People aged 20 to 39 years with diabetes have death rates approximately 5 to 7 times higher than those of the same age without diabetes (the actual death rates are 4.6 for men and 7.1 for women).

## Acknowledgements

The following organizations collaborated in compiling the information for this fact sheet:

- Canadian Diabetes Association
  www.diabetes.ca
- Canadian Institutes of Health Research
  www.cihr.gc.ca
- CNIB
  www.cnib.ca
- Diabète Québec
  www.diabete.gc.ca
- Juvenile Diabetes Research Foundation Canada
  www.jdrf.ca
- Public Health Agency of Canada
  www.phac.gc.ca
- The Kidney Foundation of Canada
  www.kidney.ca

## Sources


Boctor, M.A. (2003). Diabetes mellitus. In J. Gray (Ed.), *Therapeutic choices* (805 p.). 4th ed. Ottawa: Canadian Pharmacists Association.

Buchanan, T.A. and Xiang, A.H. (2005). Gestational diabetes mellitus. *Journal of Clinical Investigations*, 115, 485–491.

Canadian Diabetes Association (2003) Canadian Diabetes Association (2003) clinical practice guidelines for the prevention and management of diabetes in Canada, Canadian Journal of Diabetes, 27 (2), pp S10-S13.

Canadian Institute for Health Information. (2006). *Treatment of end-stage organ failure in Canada, 1995 to 2004* [2006 annual report].

Coutinho, M., Gerstein, H.C., Wang, Y..i, et al. (1999). The relationship between glucose and incident cardiovascular events. A meta regression analysis of published data from 20 studies of 95,738 individuals followed for 12.4 years. *Diabetes Care*, 22, 233–240.

Health Canada. (2007). *Eating Well with Canada's Food Guide*. Retrieved October 15, 2007, from www.hc-sc.gc.ca

Health Canada. (2002). *Canada's Physical Activity Guide*. Retrieved October 15, 2007, from www.phac-aspc.gc.ca

International Diabetes Federation. Prevention. Retrieved October 15, 2007, from www.idf.org

Leiter L.A. et al. (2001). Diabetes Screening in Canada (DIASCAN) Study: Prevalence of undiagnosed diabetes and glucose intolerance in family physician offices. *Diabetes Care*, 24(6), 1038–1043.

Public Health Agency of Canada. Economic Burden of Illness Database, Custom Tabulation, Retrieved May 15, 2007, from www.phac-aspc.gc.ca

Public Health Agency of Canada, Using National Diabetes Surveillance System (NDSS) data files contributed by all provinces and territories, as of October 31, 2007.

Norris, S.L. et al. Long-term effectiveness of weight-loss interventions in adults with pre-diabetes: A review. (2005). *American Journal of Preventive Medicine*, 28(1), 126–139.

Rao S.S. et al. (2004). Impaired glucose intolerance and impaired fasting glucose. *American Family Physician*, 15, 69(8), 1961–1968.

Statistics Canada. (2003). Canadian Community Health Survey (CCHS) *The Daily* (self-reported data). Retrieved October 15, 2007, from www.statcan.ca

Statistics Canada. (2004). Canadian Community Health Survey (CCHS) Cycle 2.2, Nutrition. *The Daily*. Retrieved October 15, 2007, from www.statcan.ca

Tuomilehto, J., Lindstrom, J., Eriksson, J.G., et al. (2001). Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. *New England Journal of Medicine*, 344, 1343–1350.

U.S. Department of Health and Human Services and American Diabetes Association. (March 27, 2002). HHS, ADA warn Americans of "pre-diabetes" [press release]. Washington, D.C.: DHHS. Retrieved May 15, 2007, from www.hhs.gov

World Health Organization (WHO). (n.d.) Global Database on Body Mass Index (BMI). Retrieved October 15, 2007, from www.who.int

## Terms to know

**Acanthosis nigricans** is a skin condition, which leads to dark markings found typically around the neck, underarms or groin area. It is most often associated with obesity and may occur at any age.

**Age-standardized rates** A technique called age-standardization dampens the influence of the underlying difference in age distributions from each province or territory, enabling fairer comparisons among populations and over time. For example, before age-standardization, a province with an older population than another will have a higher prevalence of diabetes, all other things being equal. Age-standardization reduces the effect of different age structures when we compare across jurisdictions and time periods. This is useful for diseases, such as diabetes, where the prevalence rates differ significantly among age groups and increases with age. It should be noted though that the formula to calculate these rates uses the 1991 Canadian population based on census data.

**Blood glucose** is the main sugar found in the blood and the body's main source of energy. The A1c blood test is used to measure a person's average blood sugar level over the past 2 to 3 months.

**Blood lipid** is a term for fat in the blood stream, and is measured with a lipid profile blood test. The lipid profile test measures total cholesterol (the fat produced by the liver and found in some foods), triglycerides (the storage form of fat in the body), high-density lipoprotein (HDL) cholesterol (fat that takes extra cholesterol from the blood to the liver for removal), and low density lipoprotein (LDL) cholesterol (fat that takes excess cholesterol around the body to where it's needed, but excess ultimately rests on the inside of artery walls).

**Blood pressure** is the force of blood on the inside walls of blood vessels. It is measured by analyzing both the systolic blood pressure, the pressure when the heart pushes blood out into the arteries, and the diastolic blood pressure, when the heart is at rest.

**Diabetic retinopathy** is diabetic eye disease that results from damage to the small blood vessels in the retina, the back part of the eye that contains the cells that respond to light. It may lead to loss of eyesight. Laser therapy, one possible treatment option, uses a strong beam of light to seal the leaking blood vessels in the eye.

**End-stage renal disease** is kidney failure requiring dialysis or a transplant to survive.

**Impaired fasting glucose** is defined as glucose levels of 6.1 to 6.9 mmol per L in fasting patients.

**Impaired glucose tolerance** is defined as two hour glucose levels of 7.8 to 11.0 mmol per L on the 75-g oral glucose tolerance test.

**Insulin** is a hormone responsible for storing energy in the body. When we eat, insulin signals liver and muscle cells to take in glucose and store it in the form of glycogen, and fat cells to take in glucose and store it in the form of blood lipids and turn them into triglycerides.

**National Diabetes Surveillance System** (NDSS) is a network of provincial and territorial diabetes surveillance systems. It was created to improve the breadth of information about the burden of diabetes in Canada so that policymakers, researchers, health practitioners, and the general public could make better public and personal health decisions. The NDSS has a broad stakeholder base including the federal and all provincial and territorial governments, non-governmental organizations, national Aboriginal groups, and researchers. In each province and territory the health insurance registry database is linked to the physician billing and hospitalization databases to provide a rich data source on diabetes in Canada.

**Polycystic Ovary Syndrome**, sometimes called Polycystic Ovarian Disease, is a hormonal disorder that affects between 6 to 10% of women. It causes the ovaries to produce higher than normal amounts of androgens (male hormones) which interferes with egg production. As a result, the ovary produces a cyst instead of an egg.

**Schizophrenia** is an illness characterized by delusions, hallucinations, disturbances in thinking and withdrawal from social activity. The exact cause is unknown but it is believed to be caused by a biochemical imbalance.

**Vascular Disease** is mainly caused by atherosclerosis or hardening of the arteries. The arteries are blood vessels that supply blood, oxygen and nutrients, to the body from the heart.