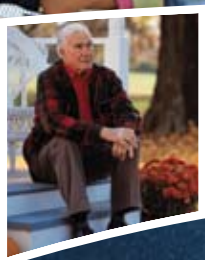
2009

Tracking Heart Disease *and* Stroke *in* Canada







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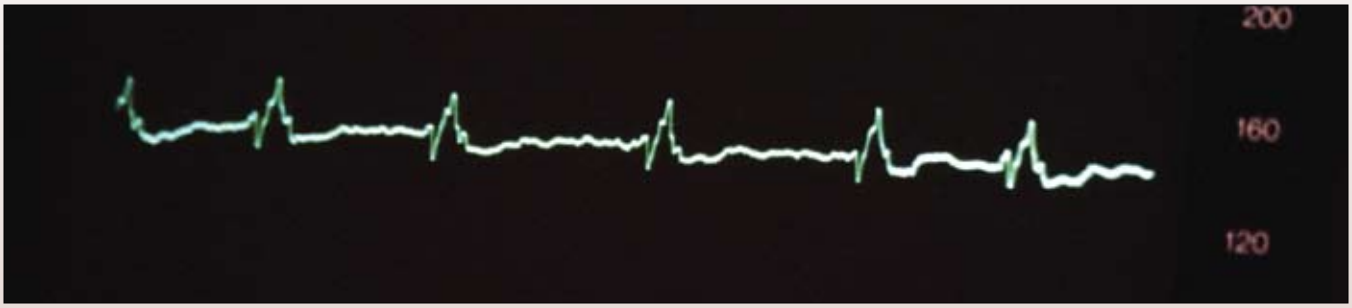
Data Highlight / Prevalence *of* Heart Disease, Stroke *and* Risk Factors

	Source (year)	Number			Percentage (%)		
		Girls/ Women	Boys/ Men	Both sexes	Girls/ Women	Boys/ Men	Both sexes
RISK BEHAVIOURS							
Current daily smoker	CTUMS 2007	1,952,800	2,174,900	4,127,700	14.3	16.4	15.3
Physical inactivity during leisure time	CCHS 2007	7,259,300	6,153,200	13,412,600	52.5	46.5	49.5
Inadequate consumption of vegetables and fruit	CCHS 2007	6,652,600	8,103,600	14,756,200	49.4	63.3	56.2
Excess sodium consumption	CCHS 2004	-	-	-	60.0	85.0	-
Life stress, 'quite a bit' or 'extremely'	CCHS 2007	3,150,800	2,812,200	5,963,000	23.4	21.7	22.6
UNDERLYING HEALTH CONDITIONS							
Current high blood pressure / using medication for high blood pressure	CCHS 2007	2,475,500	2,222,400	4,698,000	19.8	18.6	19.2
Overweight	CCHS 2007	3,284,300	4,849,300	8,133,700	27.3	40.8	34.0
Obese	CCHS 2007	1,899,000	2,135,600	4,034,600	15.8	18.0	16.9
Overweight and obese	CCHS 2007	5,183,400	6,984,900	12,168,200	43.1	58.8	50.9
Diabetes	NDSS 2004/05	852,100	931,800	1,783,800	6.6	7.6	7.1
CVD							
Heart disease*	CCHS 2007	598,400	724,100	1,322,500	4.2	5.3	4.8
Suffers effects of stroke	CCHS 2007	157,100	160,400	317,500	1.1	1.2	1.1

♦ * Heart disease includes heart attack, angina, and congestive heart failure. ♦ Notes: - All data are for respondents age 12+ years except for current daily smoker (15+ years), stress (15+ years), high blood pressure (20+ years), overweight and obese (18+ years), and diabetes (20+ years). - All data are self-reported except for diabetes data which are based on a diagnosis by a physician from health administrative records. - Using self-reported data for obesity and overweight underestimates the actual prevalence. - Numbers are rounded to the nearest 100. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada), the Canadian Tobacco Use Monitoring Survey (Health Canada), and the National Diabetes Surveillance System, which was contributed by all provinces and territories as of October 31, 2007.



Data Highlight / CVD Hospitalizations, 2005/06

	ICD-9 codes	ICD-10-CA codes	Number				Rate per 100,000 population (crude)		
			Girls/ Women	Boys/ Men	Both sexes	Percentage of all hospitalizations (%)	Girls/ Women	Boys/ Men	Both sexes
ALL HOSPITALIZATIONS*			1,235,765	1,211,190	2,466,842	100			
ALL CVD	390 - 459	I00 - I99	163,378	226,196	389,577	15.8	998.4	1408.6	1202.2
Ischemic heart disease	410 - 414	I20 - I25	54,110	106,211	160,321	6.5	330.7	661.4	494.5
Acute myocardial infraction (heart attack)	410	I21 - I22	22,206	38,790	60,996	2.5	135.7	241.6	188.2
Heart failure	428	I50	27,220	27,113	54,333	2.2	166.3	168.8	167.7
Cerebrovascular disease	430 - 434, 436 - 438	I60 - I69	23,700	24,917	48,617	2.0	144.8	155.2	150.0
Acute stroke	430, 431, 434, 436	I60, I61, I63, I64	19,534	18,807	38,341	1.6	119.4	117.1	118.3
Transient ischemic attacks	435	G45 excluding G45.4	4,839	4,351	9,190	0.4	29.6	27.1	28.4

♦ * 'All hospitalizations' excludes pregnancy. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Data Highlight / CVD Mortality, 2004

	ICD-10-CA codes	Number				Rate per 100,000 population (crude)		
		Girls/ Women	Boys/ Men	Both sexes	Percentage of all deaths (%)	Girls/ Women	Boys/ Men	Both sexes
ALL CAUSES of DEATH		112,071	114,513	226,584	100			
ALL CVD	100 - 199	36,695	36,048	72,743	32.1	227.3	227.8	227.4
Ischemic heart disease	120 - 125	17,740	21,571	39,311	17.3	109.9	136.2	122.9
Acute myocardial infraction (heart attack)	121 - 122	7,893	10,232	18,125	8.0	48.9	64.6	56.7
Heart failure	150	2,664	1,766	4,430	2.0	16.5	11.2	13.8
Cerebrovascular disease	160 - 169	8,667	5,959	14,626	6.5	53.7	37.6	45.7
Acute stroke	160, 161, 163, 164	6,932	4,736	11,668	5.1	42.9	29.9	36.5
Transient ischemic attacks	G45 excluding G45.4	60	18	78	0.0	0.2	0.1	0.2

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

A Few Words
from the Chief Public Health Officer

As you consider the information in this report, Tracking Heart Disease and Stroke in Canada, I encourage you to think about what can be done within your community, your organization, or personally to prevent heart disease and stroke.

Progress has been made over the last 30 years. Death rates from heart disease and stroke have decreased and Canadians are reducing their risk by eating more vegetables and fruit, smoking less and becoming more active during leisure-time.

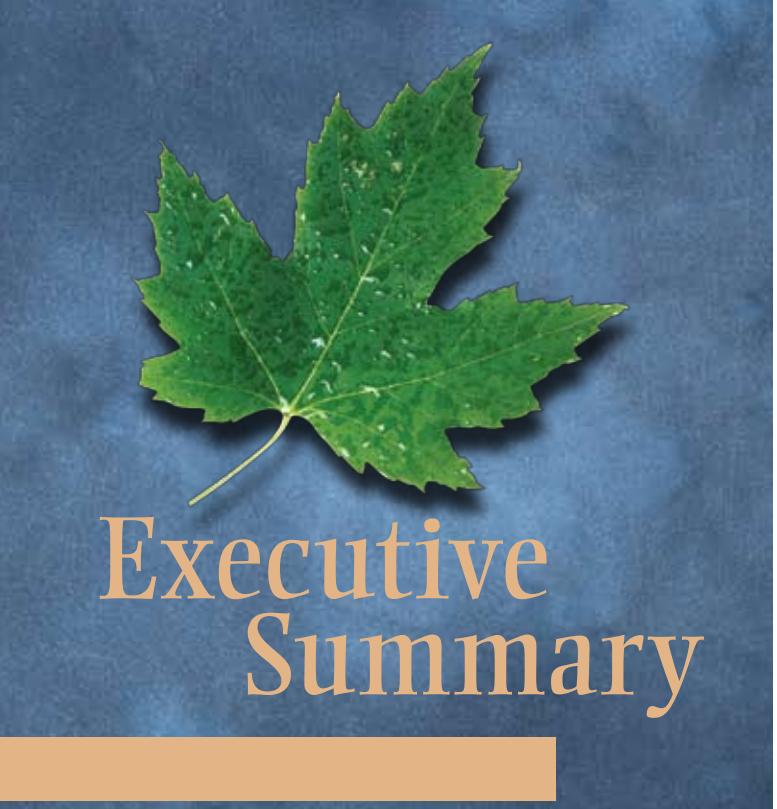
Yet we face a significant public health challenge. Four out of five Canadians over the age of 20 have at least one risk factor for heart disease or stroke. Obesity and diabetes, two major risk factors, are on the rise. With the aging of the population, and the increase in diabetes and obesity, more people will develop heart disease and stroke in the future. This will put greater demands on Canadians, their families, and the health care system.

Preventing heart disease and stroke is a collective challenge built on strong collaborations and grounded in scientific evidence.

This report is an example of such collaboration and I would like to thank the organizations and individuals who contributed to this work.

Good information underpins effective action and Tracking Heart Disease and Stroke in Canada represents an important contribution to improving the health of Canadians.

Dr. David Butler-Jones
Chief Public Health Officer of Canada



Executive Summary

Cardiovascular diseases (CVD) are chronic, lifelong diseases caused by interactions among genetic predisposition, health behaviours, and the environment. Fortunately, treatment can relieve symptoms, improve the quality of life, and reduce the possibility of early death. But even more importantly, CVD can be prevented by not smoking, regular physical activity, healthy nutrition, healthy weight, early recognition and treatment of high blood pressure and high cholesterol, and effective stress management.

This report provides a comprehensive look at CVD to increase awareness about Canada's progress in preventing CVD and its outcomes. It is hoped that governments, volunteer organizations, professional bodies, academics, health service providers, and the public will gain new knowledge from this report to use in decisions to reduce the risk of developing CVD and improving its outcome among Canadians.

A conservative estimate is that 1.6 million Canadians have heart disease or are living with the effects of a stroke. Among seniors, 14.8% of those ages 65 to 74 years report having heart disease, with the proportion climbing to 22.9% over age 75. In this same age group, 7.1% of Canadians report living with the effects of a stroke.

CVD have a major impact on individuals and families, with many individuals reporting fair or poor perceived health, activity restriction, and needing help for daily activities. Anxiety disorders and depression can arise and may influence coping and health outcomes.

In 2000, CVD were the second most costly contributor to total health costs in Canada ($22.2 billion), including $7.6 billion in direct costs and $14.6 billion in indirect costs. In 2000, hospital care was the largest contributor to CVD health care costs ($4.0 billion). Drug costs ($2.1 billion) contributed more than physician care ($1.5 billion). Premature death due to CVD contributed an estimated $9.3 billion in lost productivity. An additional $4.2 billion was lost due to long-term disability and $1.2 billion to short-term disability.

Progress is being made in reducing mortality from CVD. After adjusting for changes in the size and in the aging of the population, the mortality rate for CVD has decreased dramatically from 1960 to 2004. While the exact reason for this decrease is not known, it is likely the result of a combination of factors, including a reduction in the risk of developing CVD with lower rates of smoking and physical inactivity, increased consumption of vegetables and fruit, better diagnosis and treatment of high blood pressure and dyslipidemia, and also better management of individuals with CVD resulting in longer survival.

While the mortality rate is decreasing, the actual number of deaths due to CVD has only recently started to decrease because even with risk reduction and better management, the size of the population is increasing and the population is aging. CVD death rates are highest among those over age 65. In the future, there may be an increase in the number of deaths due to CVD as aging of the population continues in addition to increases in the prevalence of obesity and diabetes, which are two risk factors for CVD.

This report shows that Canadians still run a high risk of developing CVD. Nine out of ten individuals over the age of 20 years have at least one of the following risk factors: smoking, physical inactivity during leisure time, less than recommended daily consumption of vegetables and fruit, stress, overweight or obesity, high blood pressure, or diabetes. Two in five have three or more of these risk factors. Addressing these risk factors will reduce the risk not only of CVD, but also of many other chronic diseases that share the same risk factors.

Some progress is being made in reducing risk in the population for CVD with continued decreased rates since 2000 of smoking and more recently of physical inactivity during leisure time, and increased consumption of vegetables and fruit. However, more needs to be done. The increasing rate of obesity, along with an associated increase in diabetes, has become one of the most important public health challenges facing Canadians. High rates of smoking and obesity among First Nations, Inuit, and Métis are also of concern.

Progress is being made in understanding the genetic susceptibility to CVD. Usually the increased risk for CVD comes from polygenic conditions, or the impact of specific DNA code variations in many genes, rather than from one gene with a large effect. Small changes in genes, called single nucleotide polymorphisms (SNPs), can influence numerous factors that affect the development of CVD such as blood lipids, blood pressure, obesity, diabetes, and insulin resistance.

The most common forms of heart disease are ischemic heart disease including heart attack, and congestive heart failure. Heart disease affects men at an earlier age than women. The rates of hospitalization and death for ischemic heart disease and heart attack among men become noticeable at about 45 years of age and among women at 55 years of age.

Both hospitalization rates and death rates are decreasing for ischemic heart disease and heart attack, suggesting that both prevention and treatment efforts are having a positive effect. These successes, however, are being challenged by the aging of the population, which may increase the number of people with heart disease in the future.

Progress is being made in reducing mortality rates due to stroke. Since 1995, there has been a decline in hospitalization rates for acute stroke. This decrease over time may reflect fewer admissions for both minor and major stroke, as well as lower rates of stroke due to a lower rate of smoking, better management of high blood pressure and dyslipidemia, and better use of preventative treatments such as aspirin. The aging of the population and the large number of baby boomers becoming seniors, along with the increasing rates of obesity and diabetes, may signal an increased number of strokes over the next two decades.

In summary, the ongoing decline in CVD mortality rates is cause for celebration, but not for complacency. Unhealthy behaviours which currently permeate our society continue to put Canadians at risk for developing CVD. Over the next two decades a significant increase may occur in the number of individuals developing heart disease or stroke among the aging baby boomers. This will compromise the health of Canadians, put a strain on the health care system, and have a major economic impact on Canada.

Chapter One
CVD in Canada

Overview

CVD are lifelong diseases caused by the interaction of genetic predisposition, health behaviours, and the environment. Fortunately, treatment can relieve symptoms, improve the quality of life, and reduce the possibility of early death. But even more importantly, CVD can be prevented by not smoking, engaging in regular physical activity, effective stress management, healthy nutrition and healthy weight, and by the early recognition and treatment of high blood pressure, diabetes, and high cholesterol.

The four most common classifications of CVD are:

- **Ischemic heart disease**, in which atheromatous plaques (a build up of fat and other materials) on the inside walls of one or more arteries of the heart interfere with blood supply to the heart muscle; thereby preventing normal function of the heart;
- Myocardial infarction, or **heart attack**, an acute event in which the blood supply to a part of the heart muscle is interrupted long enough to cause damage to the heart. Usually ischemic heart disease is the underlying problem;
- **Congestive heart failure**, in which the heart is not able to pump the blood well enough throughout the body, causing a build up of fluid in the body particularly the lungs or legs; and
- **Cerebrovascular disease** a broad term that includes brain ischemia (lack of oxygen), brain haemorrhage (or bleeding), and disorders of brain blood vessels.

This chapter will describe what we know about people with CVD. Chapter Two will outline the known risk factors for CVD and what progress we are making to reduce the risk of CVD in the population. Subsequent chapters will describe the genetics associated with CVD, and heart disease and stroke in more detail.

Many Canadians have CVD

In 2007, 1.3 million Canadians (4.8% of Canadians - 4.2% of girls and women and 5.3% of boys and men 12 years of age and older) reported having heart disease diagnosed by a health professional, and 317,500 Canadians (1.1% of girls and women and 1.2% of boys and men 12 years of age and older) reported living with the effects of a stroke.

CVD are not restricted to older people. Younger people may have congenital heart disease, a problem with the electrical conduction system of the heart, or early ischemic heart disease. After the age of 35 years the proportion of the population reporting heart disease increased considerably, with a higher proportion of men than women reporting having heart disease (FIGURE 1-1). At age 75 years and older, 20.1% of women and 26.9% of men reported having heart disease. Among the 75 years and older age group, 7.1% of Canadians reported living with the effects of a stroke.

Since the prevalence rates of heart disease and stroke were obtained from self-reports, the true number of people with these conditions is likely underestimated. New methods are being developed to better determine how common CVD are among Canadians.

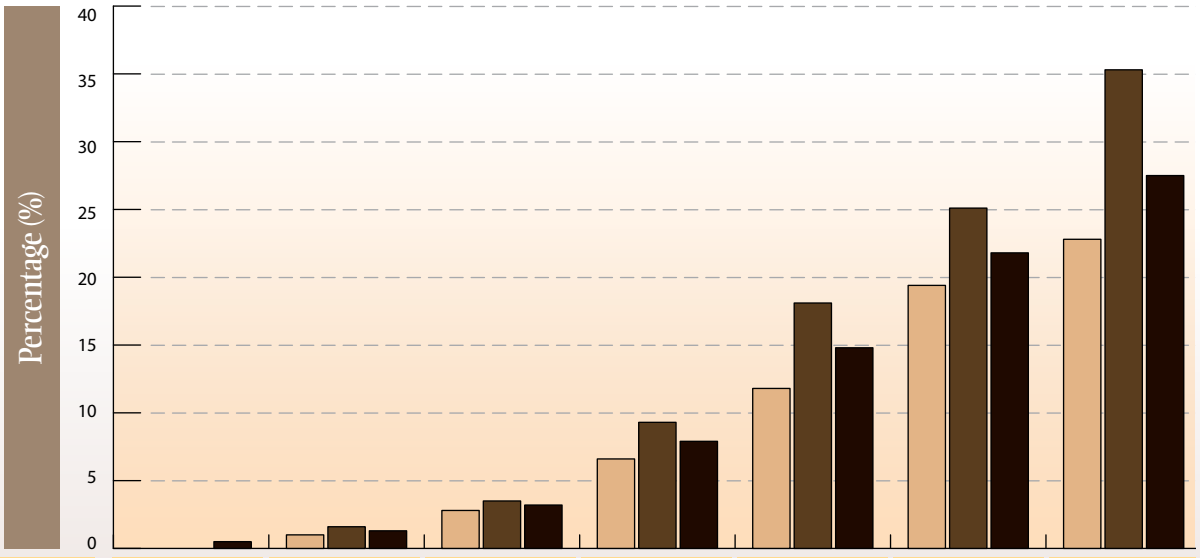
CVD have *a* Major Impact *on* Individuals *and* Families

CVD have a profound impact on peoples' lives and the lives of their family members. Their overall sense of health is affected as are their daily activities, and symptoms of anxiety and depression may develop. The burden of illness includes costly medications, doctor visits, and at times, hospitalization. Unfortunately, one in three people will die from CVD, many under the age of 65.

Poor Health

In 2007, 43.5% of people who reported having heart disease and 57.2% of people who reported that they were living with the results of a stroke rated their health as being only fair or poor (FIGURE 1-2). In contrast, only 6.1% of the population without heart disease or stroke or any of the chronic conditions in FIGURE 1-2 reported their health as being only fair or poor.

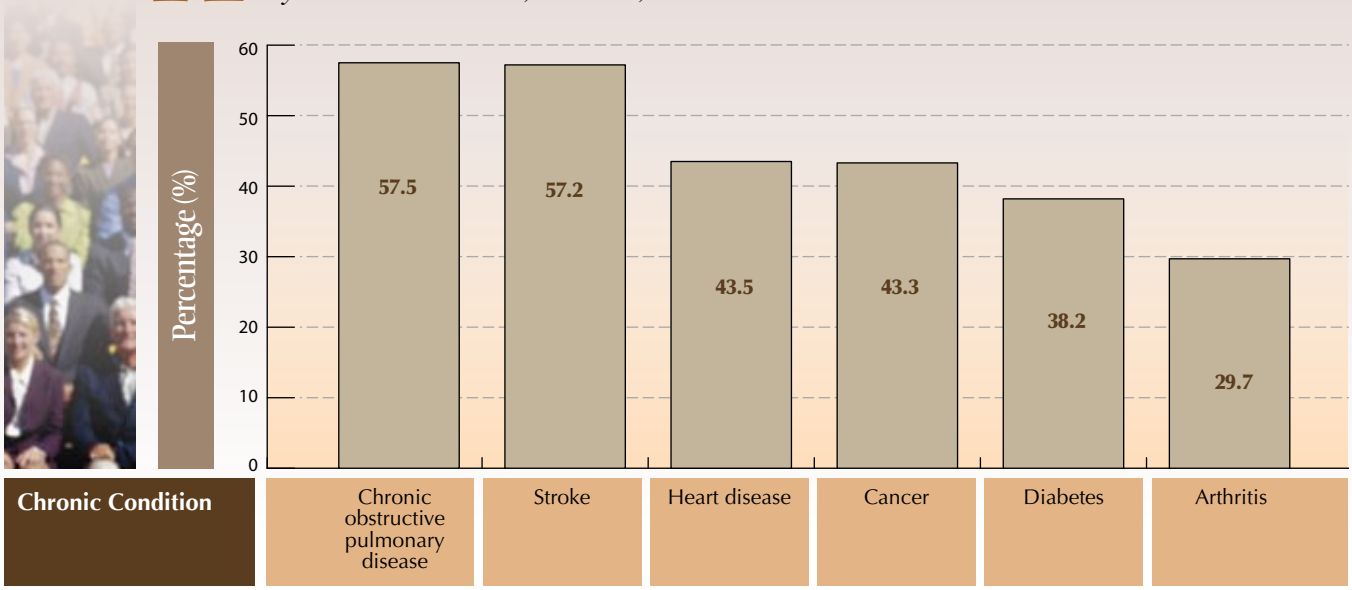
Figure 1-1 *Percentage of the population age 25+ years who reported having heart disease, by sex and age group, Canada, 2007*



Age Group (yrs)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	*	1.0†	2.8	6.6	11.8	19.4	22.8
Men	*	1.6†	3.5	9.3	18.1	25.1	35.3
Both	0.5†	1.3	3.2	7.9	14.8	21.8	27.5

♦ * Value suppressed due to small sample size. ♦ † Marginal variance estimate - data should be interpreted with caution. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Figure 1-2 *Percentage of the population age 12+ years who rated their health as fair or poor, by chronic condition, Canada, 2007*

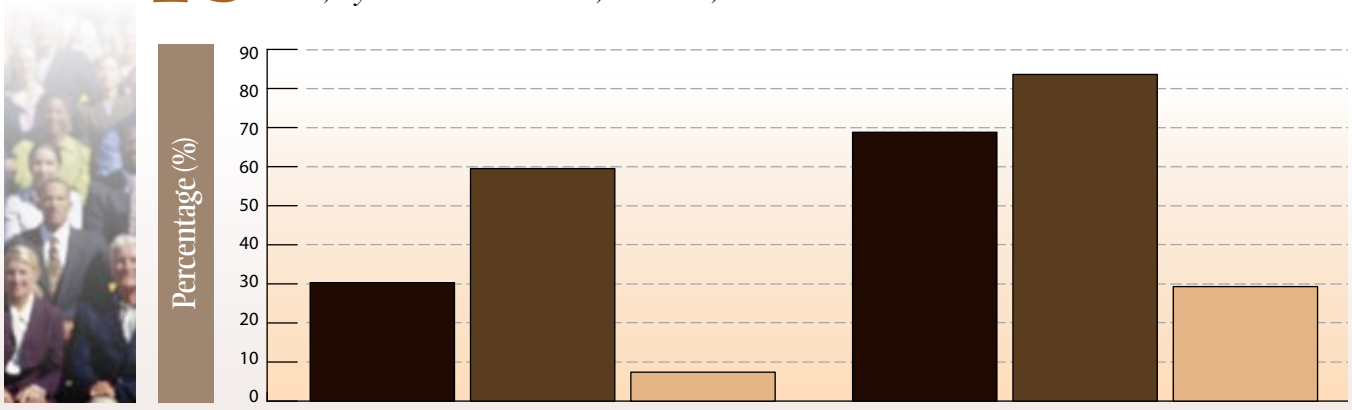


♦ Note: - Respondents are age 12+ years except for chronic obstructive pulmonary disease where respondents are age 30+ years. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Limitations in Daily Activities

Many people who reported living with the effects of a stroke (59.5%) and heart disease (30.3%) stated that they needed help with the activities of daily living (FIGURE 1-3). They also reported feeling limited in carrying out activities that they enjoyed doing (83.6% for stroke and 68.8% for heart disease). It can be a challenge to return to work and this affects not only household income but also the economic productivity of the country.

Figure 1-3 *Percentage of the population age 12+ years who reported specific limitations in their lives, by chronic condition, Canada, 2007*



Limitation	Needed help	Had activity restrictions
Heart disease	30.3	68.8
Stroke	59.5	83.6
Without heart disease or stroke	7.4	29.3

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Anxiety and Depression

Anxiety is a physiological state characterized by cognitive, somatic, emotional, and behavioural components. These combine to create feelings of fear that are greater than warranted by the situation. While everyone is somewhat anxious after an illness, for individuals who have an anxiety disorder or a predisposition to one, the uncertainly about the future living with CVD combined with coping with discomfort and disability associated with CVD may make an anxiety disorder much worse. Unfortunately, anxiety can lead to angina.

Major depression is a mental illness characterized by a sense of hopelessness, loss of interest in usual activities, and diminished ability to experience pleasure. One in five people with ischemic heart disease or with stroke, up to two in five people with congestive heart failure, and one in three people following a heart attack develop clinical depression. Depression can be treated effectively, especially if it is diagnosed early, with a combination of medication, cognitive-behavioural therapy, supportive counselling, and a healthy lifestyle.

Individuals with both CVD and depression have an impaired quality of life, and increased health problems and risk of death. During recovery from a heart attack or heart procedure, depression can intensify pain, worsen fatigue, or cause a person to isolate themselves socially. The presence of depression with ischemic heart disease increases the risks of re-hospitalization and death. Depression may slow recovery after a stroke if it slows the return to the activities of daily living, impairs cognitive function, or reduces good self-care. Depression may also contribute to not following recommendations that help in recovery such as taking medication, stopping smoking, reducing heavy alcohol use, or refraining from using illicit drugs.

CVD Have *a* Major Economic Impact *in* Canada

CVD have a significant economic impact on individuals, families, the community, and the health care system. The available national data reported here describe:

- **Direct costs** - expenditures on hospital care, prescription drugs, physician care, care in other institutions, and additional health expenditures (e.g., for other professionals, capital, public health, prepayment administration, health research, etc). Other direct costs borne by patients and/or other payers are not included, such as costs for transportation to health providers, special diets, or special clothing.
- **Indirect costs** - the value of economic output that has been lost either because of disability, whether short or long-term, or as a consequence of premature death. Other indirect costs are not included in the present report, for example, the value of time lost from work and/or leisure activities by family members or friends who care for the patient.

The methodology applied in determining both direct and indirect costs relating to CVD can be found in the glossary (see 'Economic Burden of Illness in Canada 2000 – methodological notes'). The costs reported in this chapter are only estimates of the true costs due to limitations in the use of existing health administrative and survey data to describe the economic burden of CVD in Canada.

In 2000, a conservative cost estimate of CVD in Canada was $22.2 billion. CVD had the second highest total cost among all diagnostic categories, only slightly behind the leading cause of musculoskeletal diseases at $22.3 billion (FIGURE 1-4). The total costs for CVD included $7.6 billion for health care costs (direct costs), and $14.6 billion for indirect costs due to lost economic productivity. For both the direct and indirect categories, CVD were among the leading contributors to economic costs in Canada.

Figure 1-4 *Costs due to disease* for the leading 20 diagnostic categories, by direct†, and indirect costs‡, Canada, 2000*

♦ * Based on the total cost of illness of $147.9 billion. Expenditures for care in other institutions and additional direct health expenditures are not included. ♦ † Direct costs include hospitals, drugs and physician. ♦ ‡ Indirect costs include mortality, long-term disability and short-term disability. ♦ Notes: - Not all diagnostic categories include short-term disability costs. - The six diagnostic categories that include short-term disability costs are CVD, musculoskeletal diseases, neuropsychiatric conditions, digestive diseases, respiratory diseases and respiratory infections. - Costs by diagnostic category include an unattributable amount of $6.4 billion for direct costs and $1.9 billion for indirect costs (short-term disability only). - Costs by disgnostic category related to suppressed cells for long-term disability are excluded from the total indirect costs. ♦ Source: Public Health Agency of Canada, using data from the Economic Burden of Illness in Canada 2000.

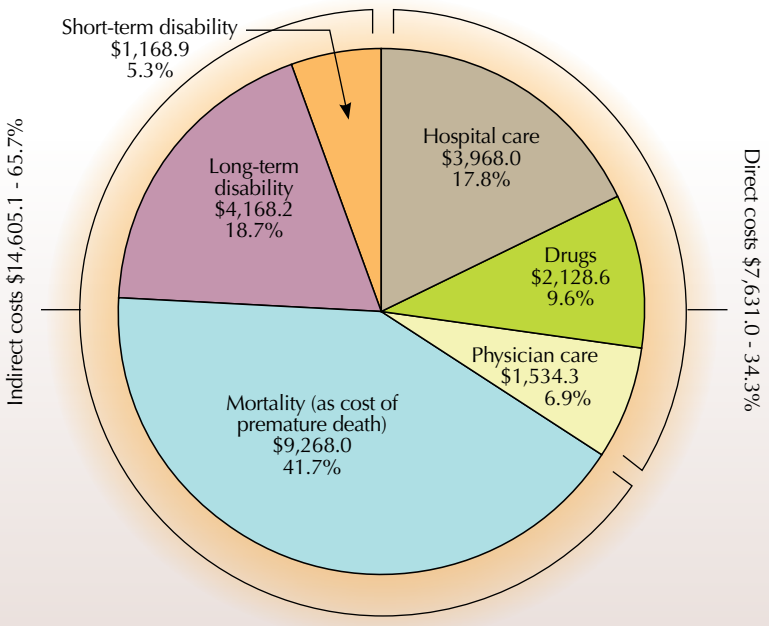
Hospital care was the largest contributor to CVD health care costs ($4.0 billion or 17.8% of all CVD costs). Drug costs contributed more than physician care; drugs amounted to $2.1 billion or 9.6% of CVD costs, and physician care amounted to $1.5 billion or 6.9% of all CVD costs (FIGURE 1-5).

Premature death due to CVD accounted for $9.3 billion in lost productivity. An additional $4.2 billion was lost due to long-term disability and $1.2 billion to short-term disability.

The costs of CVD in Canada were higher for men than for women in all cost categories (TABLE 1-1). The biggest difference was in the costs associated with premature mortality, because CVD affect men at an earlier age than women.

Hospitalization was the highest *direct* cost for all age groups, except for the 15 to 34 year age group where drugs costs were the highest. This suggests that their CVD conditions were more amenable to drug therapy and did not require as much hospitalization. In all age groups, drug costs were higher than physician costs, except for the 0 to 14 age group (TABLE 1-2). Most of these children have congenital heart disease that often requires surgery in hospital and frequent follow-up by physicians.

Figure 1-5 *Percentage of costs due to CVD, by cost component, Canada, 2000*



♦ Note: - Costs are in millions. ♦ Source: Public Health Agency of Canada, using data from the Economic Burden of Illness in Canada 2000.

While those age 65+ generated the highest direct costs for CVD compared to other age groups, the highest *indirect* costs (value of economic output lost) were in the 35 to 64 year age group, where CVD have a major impact on workplace productivity, critical for the economic well-being of Canada.

Table 1-1 *Costs due to CVD, by sex and cost component, Canada, 2000*

	Cost (in $000,000s)		
	Girls/Women	Boys/Men	Both Sexes
DIRECT COSTS			
Hospital Care	$1,867.4	$2,100.6	$3,968.0
Drugs	$1,052.8	$1,075.8	$2,128.6
Physician Care	$758.5	$775.8	$1,534.3
INDIRECT COSTS			
Mortality (as cost of premature death)	$3,017.9	$6,250.0	$9,268.0
Long-Term Disability	$1,723.3	$2,444.9	$4,168.2
Short-Term Disability	$445.4	$723.5	$1,168.9
TOTAL	$8,865.3	$13,370.6	$22,236.0

♦ Source: Public Health Agency of Canada, using data from the *Economic Burden of Illness in Canada 2000*.

Table 1-2 *Costs due to CVD, by age group and cost component, Canada, 2000*

	Cost (in $000,000s)				
	Age Group (years)				
	0-14	15-34	35-64	65+	TOTAL
DIRECT COSTS					
Hospital Care	$38.0	$59.6	$1,104.3	$2,766.2	$3,968.0
Drugs	$6.1	$66.6	$923.2	$1,132.7	$2,128.6
Physician Care	$15.1	$58.3	$613.2	$847.8	$1,534.3
INDIRECT COSTS					
Mortality (as cost of premature death)	$66.4	$391.3	$4,859.1	$3,951.1	$9,268.0
Long-Term Disability	N/A	$126.9*	$2,589.8	$1,451.5	$4,168.2
TOTAL	$125.6	$702.7	$10,089.6	$10,149.3	$21,067.2

♦ * High sampling variability (source: NPHS 1998); data should be interpreted with caution. ♦ Note: - For short-term disability costs, data are not available by age group. - Total short-term disability costs amount to $1,168.9 M. ♦ Source: Public Health Agency of Canada, using data from the *Economic Burden of Illness in Canada, 2000*.

Over half of all CVD hospital costs were associated with ischemic heart disease including heart attacks (31.5% of CVD hospital costs) and cerebrovascular disease (24.7%) (TABLE 1-3). In 2000, hypertensive heart disease, which includes high blood pressure and any conditions due to high blood pressure, was the leading contributor to CVD drug costs (60.2%). Physician costs were equally high for hypertensive and ischemic heart diseases (26.5% and 25.2%, respectively).

For costs associated with premature death from CVD, 59.9% was attributed to ischemic heart disease. However, for long-term disability, cerebrovascular disease (mainly stroke) had a bigger impact (23.2% of costs) than did ischemic heart disease (11.5% of costs).

Table 1-3 *Costs due to selected CVD, by cost component, Canada, 2000*

	ICD-9 codes	ICD-10-CA codes	Cost (in $000,000s) Component (percentage* of CVD costs)					
			Hospital care	Drugs	Physician care	Mortality (as cost of premature death)	Long-term disability	TOTAL
Hypertensive heart disease	402	I10, I13, I15	$140.2 3.5%	$1,280.7 60.2%	$406.8 26.5%	$105.8 1.6%	$312.0† 7.5%	$2,290.50 -
Ischemic heart disease including heart attack	400-414	I20-I25	$1,247.8 31.5%	$460.7 21.6%	$386.4 25.2%	$5,554.1 59.9%	$480.6 11.5%	$8,129.60 -
Cerebrovascular disease	430-434, 436-438	I60-I69	$978.3 24.7%	$40.6 1.9%	$90.1 5.9%	$1,498.3 16.2%	$966.1 23.2%	$3,573.40 -

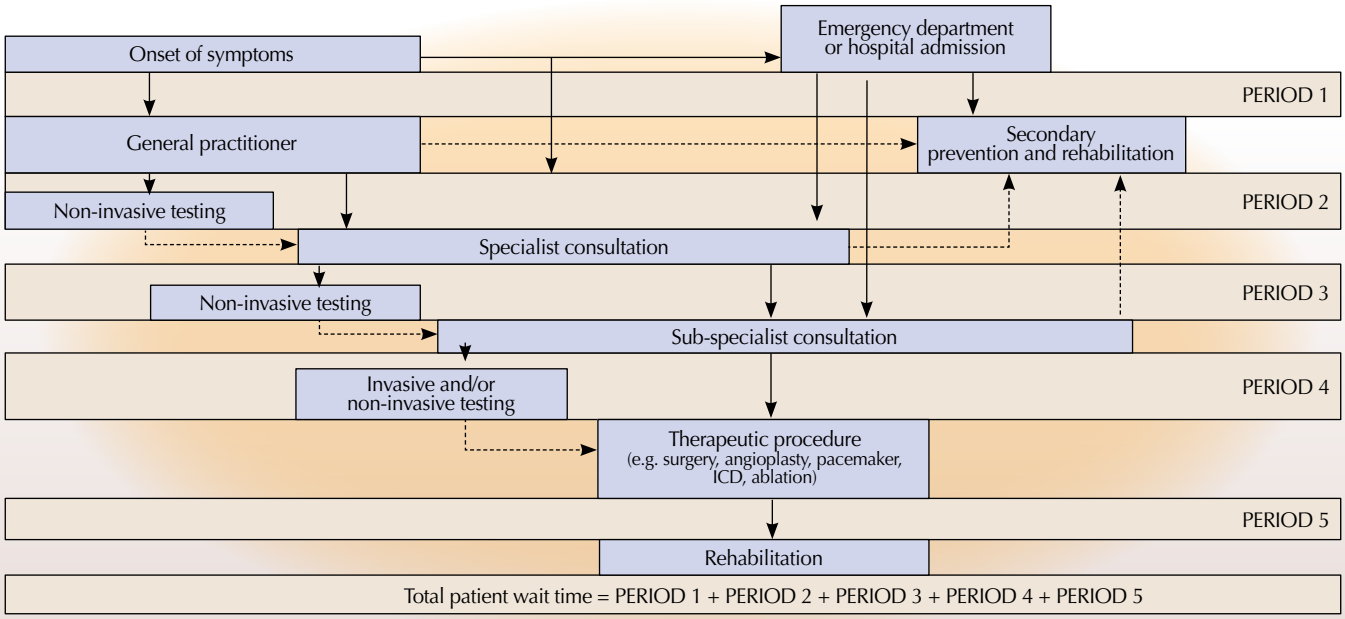
♦ * The percentage indicates the cost of the CVD subcategory out of the total for the cost component. ♦ † Marginal variance estimate (source: NPHS 1998-99); data should be interpreted with caution. ♦ Note: - For short-term disability costs, data are not available by CVD subcategory. ♦ Source: Public Health Agency of Canada, using data from the *Economic Burden of Illness in Canada 2000*.

Health Services Help *to* Manage CVD

Team Care

Patients who experience CVD undergo a complex combination of tests and consultations. The pathway for heart disease is described in FIGURE 1-6.

Figure 1-6 *Pathway from symptoms to rehabilitation for cardiac*



♦ Source: Wait Time Alliance for Timely Access to Health Care, (2005). *It's about time! Achieving benchmarks and best practices in wait time management*. Ottawa: Canadian Medical Association. ♦ Website accessed: www.waittimealliance.ca/images/wta_final_Aug05.pdf.

At the fall 2004 First Ministers' conference on health care, the First Ministers identified an improvement in the timeliness of access to quality heart health care as an important priority for governments. An important first step in this direction was to develop, implement, and monitor optimal waiting times for hospital admission for cardiovascular care. Other best practices that were identified as contributing toward improved access and reduced waiting times were: (1) anticipating and monitoring the demand for services; (2) investing in capacity; (3) coordinating and facilitating access across the system; and (4) gaining the participation of physicians, administrators, and governments in the planning and implementation of initiatives to reduce waiting times.

In 2005, the Canadian Cardiovascular Society (www.ccs.ca) proposed targets for timely access throughout the continuum of cardiovascular care, starting with the initial consultation with a cardiologist, followed, in turn, by diagnostic procedures, therapeutic procedures and services, and rehabilitation programs. Establishing such targets constitutes an initial step in establishing timeliness standards across Canada.

Family physicians are an integral part of cardiovascular care. They are involved in the initial assessment of individuals, the management of symptoms, the coordination of care with CVD specialists, and in the monitoring of patients' care after they have been treated for cardiovascular conditions.

In 2007, 34.6 million, or 10.3% of all visits made by Canadians to community physicians (physicians maintaining an office outside of hospitals) were for the management of CVD, 61.0% of which were for high blood pressure, 13.8% for ischemic heart disease (including angina), 22.3% for other CVD, and 2.8% for cerebrovascular disease.

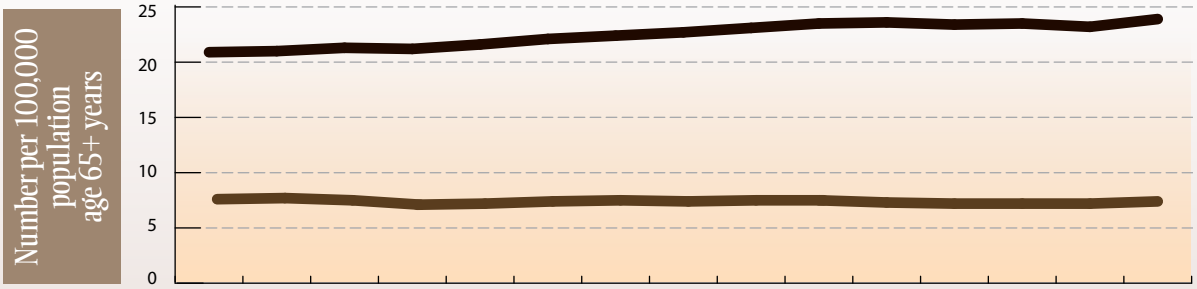
Practicing family physicians identified electrocardiographic, or ECG interpretation as one of the ten most common procedures they perform. About 60% of family physicians practicing in Canada reported that they routinely perform this procedure.

Seniors (age 65+) made 17.9 million visits to physicians in 2007 for high blood pressure, ischemic heart disease, and cerebrovascular disease - almost twice the number of visits for any of the other disease categories. High blood pressure was the most common diagnosis among visits to community physicians for adults ages 40 to 59 years; 85.3% of all CVD-related visits in this age group were for high blood pressure.

In 2007, there were 21.1 million visits (6.3% of all visits to community physicians) for high blood pressure, an increase of 21.0% since 2001. Of these visits for high blood pressure, 79.7% resulted in medication being recommended for treatment. This is a positive indication as prompt treatment decreases the risk associated with high blood pressure.

Timely access to cardiac care also requires access to physicians, nurses, and technical staff who have been specially trained in CVD and its sub-specialties such as heart failure, interventional cardiology, electrophysiology, and echocardiography. In 2008, 1,078 cardiologists and 332 cardiac surgeons were licensed to practice in Canada. Since most CVD occur among older adults, the number of cardiologists and cardiac surgeons per 100,000 persons age 65 years and older have been suggested as a relevant indicator of the supply of specialists relative to patient demand. The number of cardiologists per 100,000 population age 65+ years has been steadily increasing to 23.9 in 2008 (FIGURE 1-7). The number of cardiac surgeons, on the other hand, has remained stable at approximately 7.4 per 100,000 population age 65+ years.

Figure 1-7 *Number of CVD specialists per population age 65+ years, by speciality and year, Canada, 1994-2008*



Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008*
Cardiology	20.9	21.0	21.3	21.2	21.6	22.1	22.4	22.7	23.1	23.5	23.6	23.4	23.5	23.2	23.9
Cardiovascular/ thoracic surgery	7.6	7.7	7.5	7.1	7.2	7.4	7.5	7.4	7.5	7.5	7.3	7.2	7.2	7.2	7.4

♦ * Data for 2008 are estimated. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using statistical information on Canadian physicians (Canadian Medical Association) (http://www.cma.ca/index.cfm/ci_id/16959/la_id/1.htm#1) and data from the census (Statistics Canada).

Quality care for individuals with CVD in a hospital setting benefits from having highly specialized nurses with the skill sets required to deal with the complexity of CVD care. The number of registered nurses undertaking specialty certification in cardiovascular care has increased steadily since the Canadian Nurses Association began offering its certification program in 1991 (FIGURE 1-8).

Figure 1-8 *Number of registered nurses with valid cardiovascular specialty Canadian Nurses Association certification, by year, Canada, 2001-05*

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Nurses Association department of Regulatory Policy (http://www.cna-aiic.ca/CNA/documents/pdf/publications/Cert_bulletin_3_April_06_e.pdf).

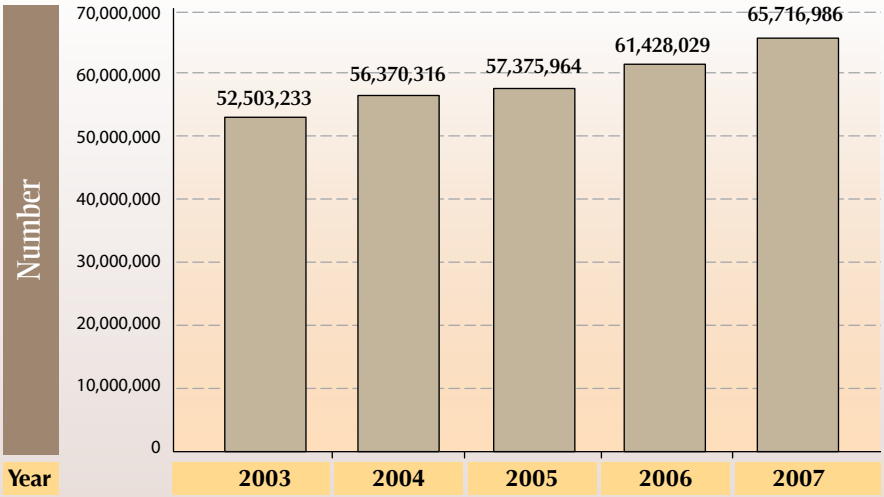
CVD Medication Use

In 2007, in Canada, an estimated 65.7 million prescriptions were dispensed for the treatment of CVD (15.1% of the total number of prescriptions), a substantial increase over the 57.4 million prescriptions dispensed in 2005, and 52.5 million prescriptions dispensed in 2003 (FIGURES 1-9 and 1-10).

ACE inhibitors for high blood pressure and congestive heart failure have continued to be the drugs most prescribed for CVD (18.0 million prescriptions of ACE inhibitors in 2007), which represents a 53.6% increase over 2001. The use of beta-blockers for high blood pressure and ischemic heart disease (15.1 million prescriptions in 2007), and of calcium channel blocking drugs for high blood pressure and ischemic heart disease (for the treatment of angina) (13.6 million prescriptions in 2007) has also increased steadily over the past five years - an increase from 2001 to 2007 of 57.1% for beta blockers and 47.5% for calcium blocking drugs.

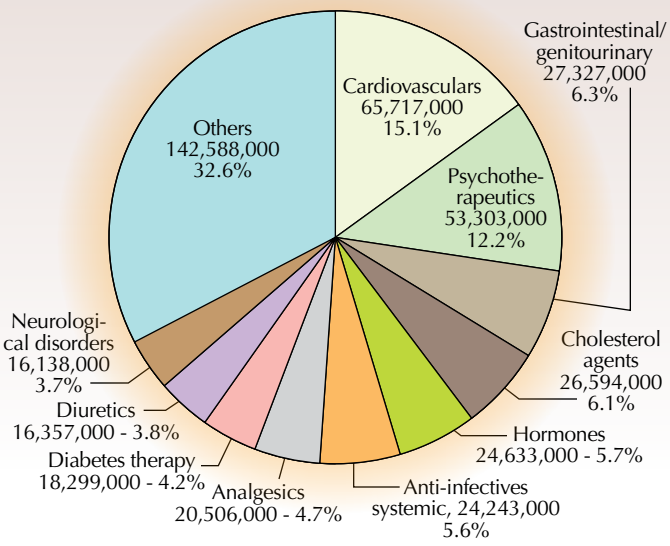
Although diuretics are not typically included in the category of medications for CVD, most are utilized in the treatment of high blood pressure and congestive heart failure. Diuretics accounted for 3.8% of prescriptions dispensed in 2007 (FIGURE 1-10). Another related drug class, cholesterol agents (such as statins), limit the progression of atherosclerosis and are used to prevent CVD. These cholesterol agents accounted for 6.1% of all prescription. Adding these drug groups to the overall CVD drug group suggests that a quarter of all drugs are dispensed for CVD.

Figure 1-9 *Number of prescriptions* for treatment of CVD, by year, Canada, 2003-07*



♦ * Includes new prescriptions and refills. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the CompuScript Database (IMS Health).

Figure 1-10 *Number* and percentage of prescriptions dispensed†‡, top ten therapeutic classes, Canada, 2007*

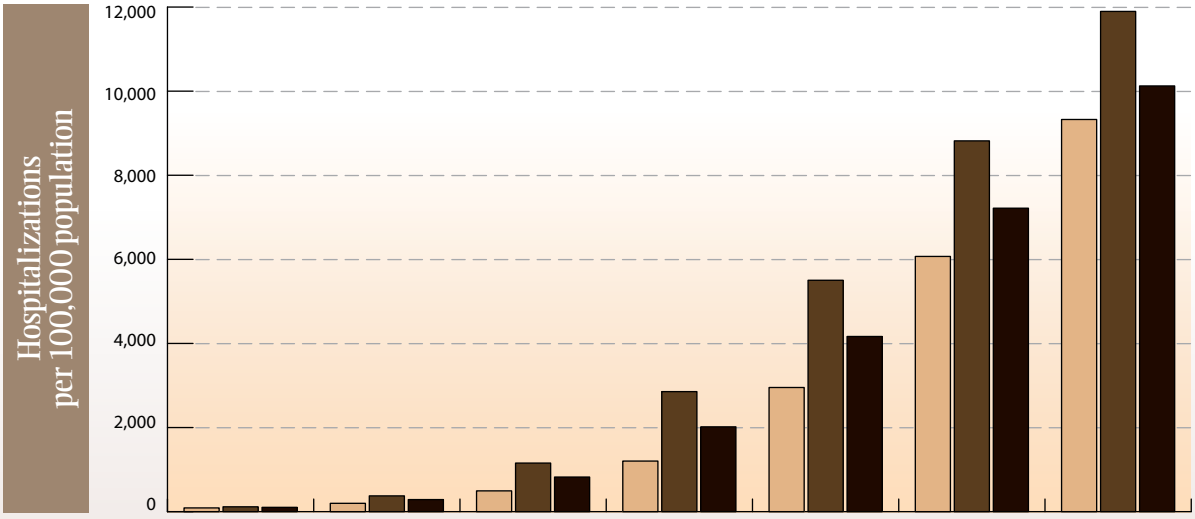


♦ * Rounded to the nearest thousandth. ♦ † Estimated prescriptions dispensed in Canadian retail pharmacies (excludes hospitals). ♦ ‡ Includes new prescriptions and refills. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the CompuScript Database (IMS Health).

Hospitalization

People with more severe CVD may be hospitalized to help control their symptoms, or to be monitored and treated during an acute episode, such as a heart attack. As with the rates of self-reported heart disease indicated above, hospitalization rates increased after age 45, and were higher among men than among women in 2005/06 (FIGURE 1-11). However, the difference between men and women narrowed as women aged. The hospitalization rate for men was 2.4 times higher than women among those ages 55 to 64 years but only 1.3 times higher among those in the 85+ age group.

Figure 1-11 *Rates of hospitalization due to CVD, by sex and age group, Canada, 2005/06*

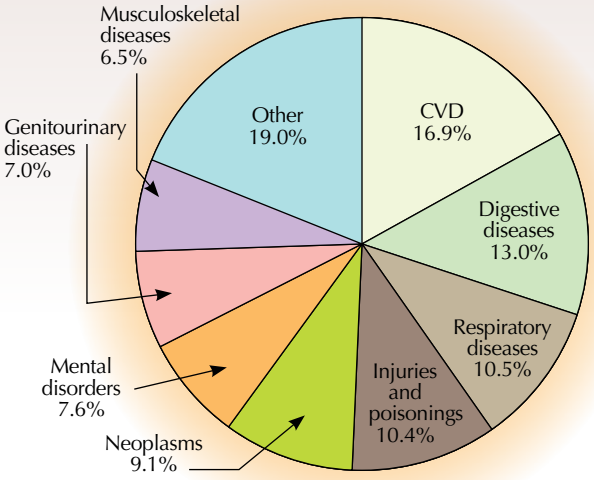


Age Group (yrs)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	88.8	198.0	494.3	1,202.8	2,952.5	6,069.5	9,326.4
Men	115.6	375.3	1,155.2	2,854.6	5,502.8	8,818.0	11,896.5
Both	102.4	287.2	822.9	2,017.3	4,165.8	7,216.7	10,124.2

♦ Notes: - ICD-10-CA codes: I00-I99. - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

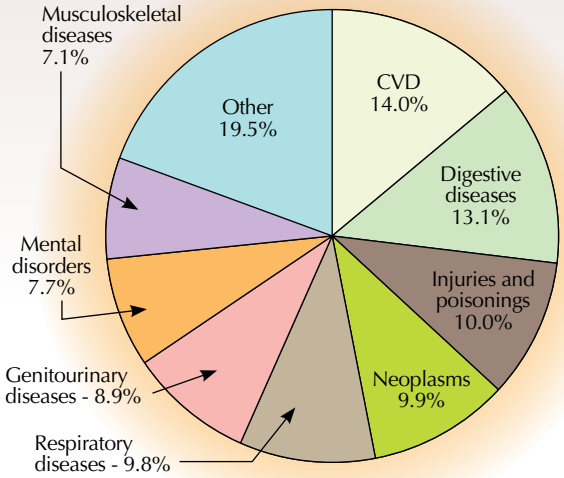
CVD were identified as the most responsible diagnosis for hospitalization in 2005/06 - 19.8% of all hospitalizations for men and 14.0% for women (FIGURES 1-12, 1-13, and 1-14). It was also the condition with the highest number of days spent in hospital overall (17.1% of all days - 18.9% for men and 15.4% for women) (FIGURE 1-15, 1-16, and 1-17).

Figure 1-12 *Percentage of hospitalizations due to all diagnoses*, Canada, 2005/06*



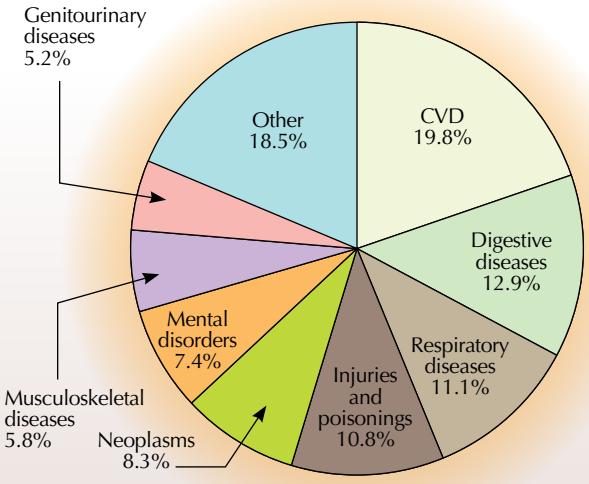
♦ * Excludes pregnancy and childbirth, and newborns. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Standardized to the 1991 Canadian population. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Figure 1-13 *Percentage of hospitalizations due to all diagnoses*, for women, Canada, 2005/06*



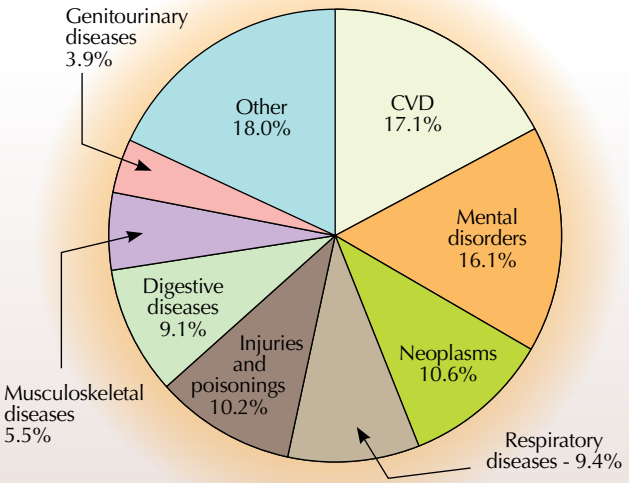
♦ * Excludes pregnancy and childbirth, and newborns. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Standardized to the 1991 Canadian population. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Figure 1-14 *Percentage of hospitalizations due to all diagnoses*, for men, Canada, 2005/06*



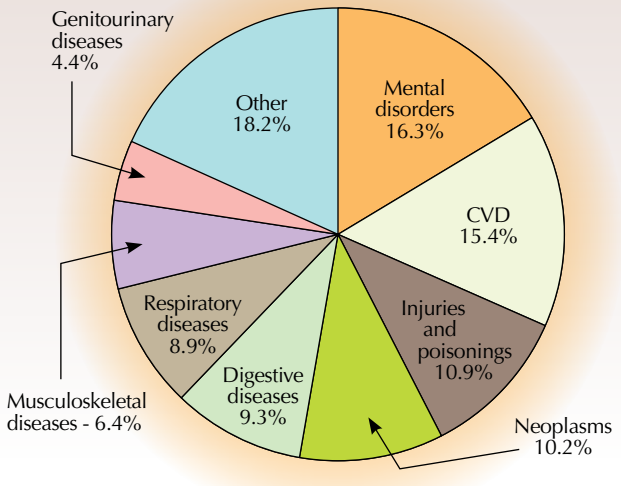
♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Standardized to the 1991 Canadian population. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Figure 1-15 *Percentage of length of stay in hospital due to all diagnoses*, Canada, 2005/06*



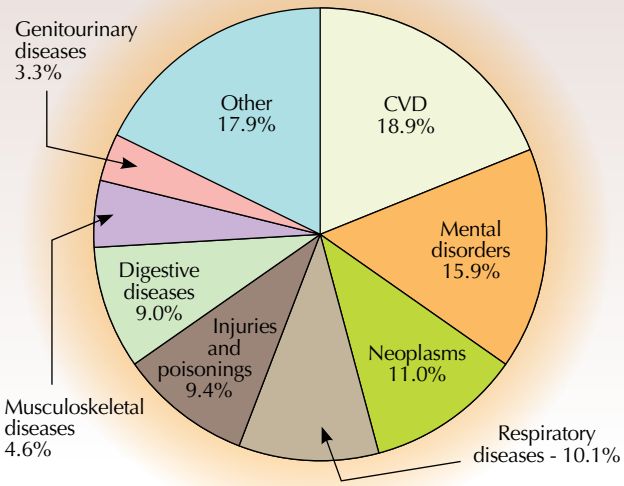
♦ * Excludes pregnancy and childbirth, and newborns. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Figure 1-16 *Percentage of length of stay in hospital due to all diagnoses*, for women, Canada, 2005/06*



♦ * Excludes pregnancy and childbirth, and newborns. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Figure 1-17 *Percentage of length of stay in hospital due to all diagnoses*, for men, Canada, 2005/06*



♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

In 2005/06, the rate of hospitalization with CVD as the most responsible diagnosis was 1,202.2 per 100,000 population (FIGURE 1-18). The decrease in age-standardized hospitalization from the late 1990s to 2004 suggests a change in the use of hospitalization for treating CVD, a decrease in CVD itself, or both.

While rates tell about underlying changes in the population, it is the number of hospitalizations that drives health care costs and the need for human and technical resources to provide care. The number of hospitalizations for CVD increased up to the mid-1990s, associated with an increase in the size of the population and in the aging of the population. After 1995, however, the number slowly began to decline, with a significant decrease after 2003. In 2005, the number of hospitalizations due to CVD was 389,577, compared to a high, in 1995, of 471,946 hospitalizations and a low, in 1971, of 344,133 hospitalizations.

The decline in the number of hospitalizations since 1995 suggests that the care provided outside the hospital and the likely reduction in the risk of developing CVD in the population are overriding the continued influence of the aging of the population on the need for hospital care. It is difficult to predict what the number of hospitalizations will be in the future with increases in the prevalence of obesity and diabetes in the population, two important risk factors for CVD, combined with the aging of the baby boomers cohort of the population.

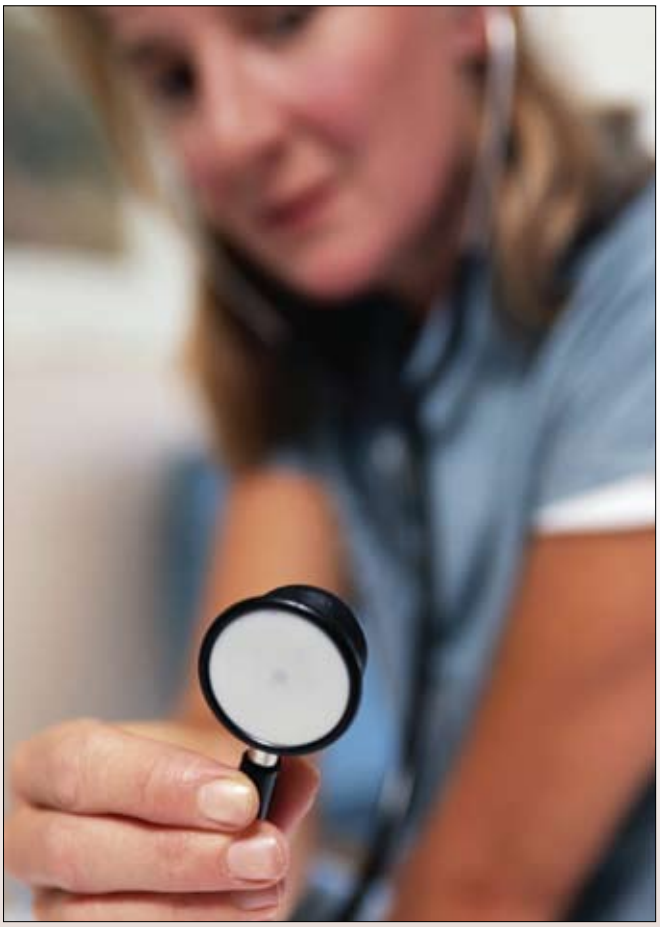


Figure 1-18 *Number and rate of hospitalizations due to CVD*, by year, Canada, 1971/72-2005/06*

♦ * ICD-10-CA codes: I00-I99. ♦ † Standardized to the 1991 Canadian population. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for length of stay in hospital. - The coding schemes for this condition changed in 1979 and 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. - Nunavut data not available in 2002/03. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

People with CVD may be hospitalized for other health problems such as pneumonia. In such cases, CVD are not listed as the most responsible diagnosis but are listed as an additional diagnosis that affects the hospitalization. When such additional diagnoses were taken into account in 2005/06, the number of hospitalizations in which CVD were present doubled (FIGURE 1-19).

Figure 1-19 *Number of hospitalizations due to CVD*, by sex and age group, Canada, 1971/72-2005/06*

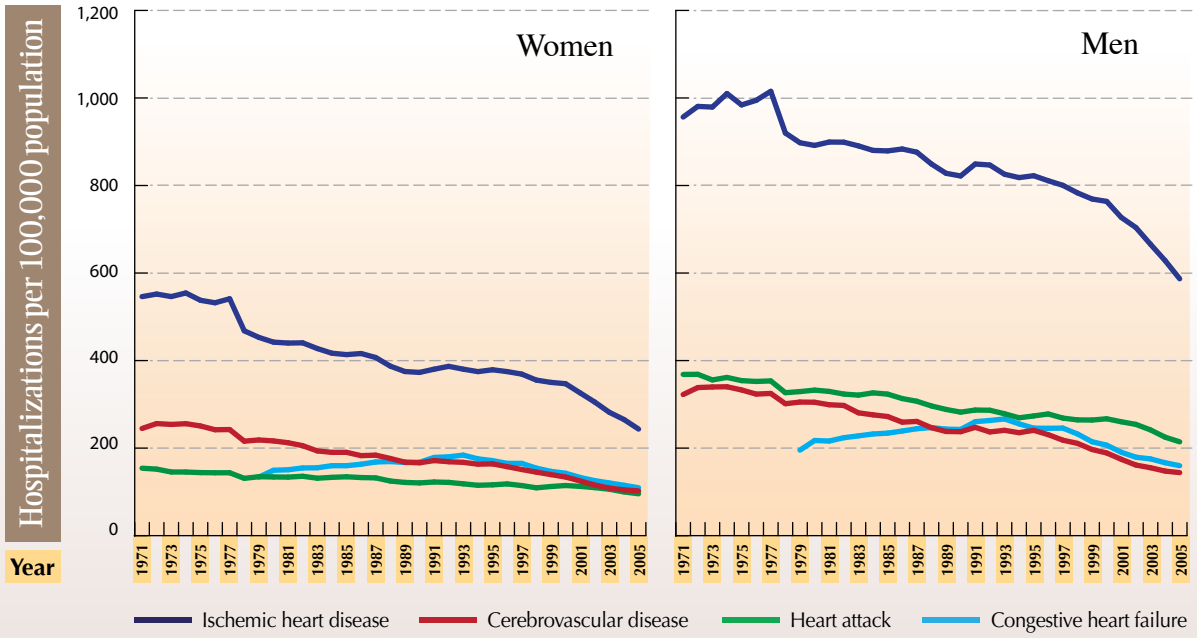
♦ * ICD-10-CA codes: I00-I99. ♦ Notes: - W = women, M = men. - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

In 2005/06, ischemic heart disease (excluding heart attack) was the underlying cause for the hospitalization of one in four people who had been hospitalized with CVD as the most responsible diagnosis. The next most common underlying causes for CVD-related hospitalizations were heart attack (15.7%), congestive heart failure (13.9%), and cerebrovascular disease excluding transient ischemic attacks (12.5%).

While ischemic heart disease was the most common reason for hospitalization for CVD, cerebrovascular disease was the largest contributor to the number of days in hospital (23.1% of all CVD-related days in hospital). Ischemic heart disease (excluding heart attack) (17.6%) and congestive heart failure (17.0%) were the next greatest contributors to the number of CVD-related days in hospital.

Hospitalization rates for all four CVD conditions have been decreasing among women and men (FIGURE 1-20). The decrease for ischemic heart disease was greater for women than for men, but the decrease for the other conditions was similar for both women and men over time.

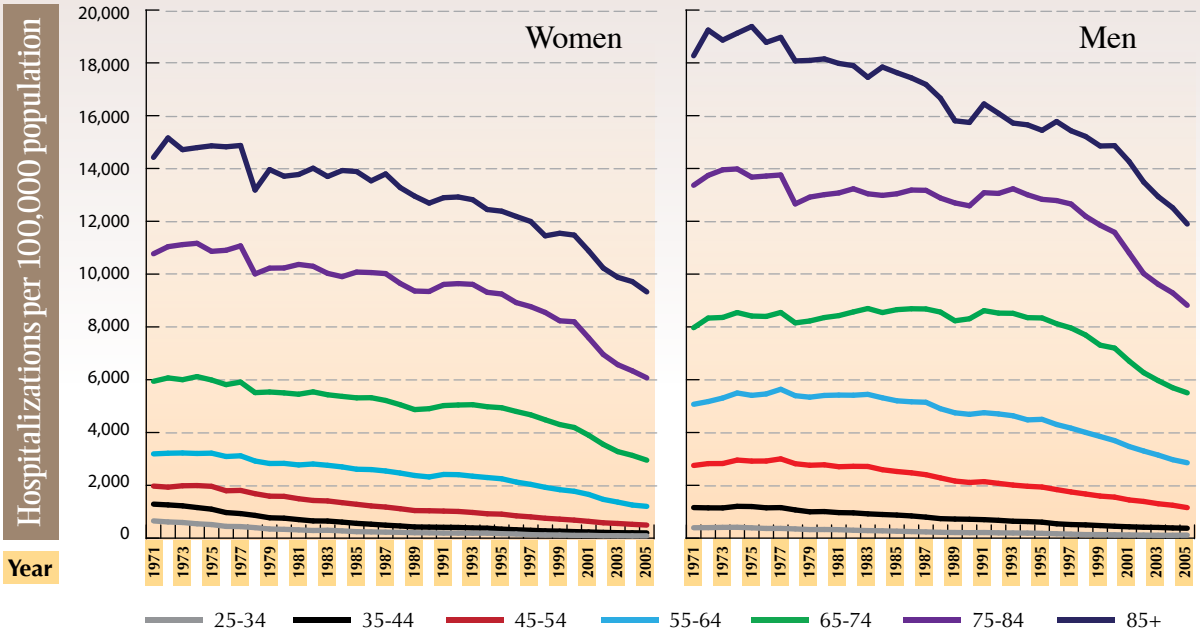
Figure 1-20 *Rates of hospitalization due to selected CVD classifications*, by sex and year, Canada, 1971/72-2005/06*



♦ * ICD-10-CA codes: I20-I25 (ischemic heart disease), I60-I69 (cerebrovascular disease excluding transient ischemic attacks), I21-I22 (heart attack), I50 (congestive heart failure). ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 1979 and 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. - Nunavut data not available in 2002/03. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Hospitalization rates for CVD have been decreasing among women in all age groups since the 1970s, while among men ages 65 to 74 years and ages 75 to 84 years, the decrease did not begin until the mid-1990s. (FIGURE 1-21).

Figure 1-21 *Rates of hospitalization due to CVD*, by sex, age group, and year, Canada, 1971/72-2005/06*



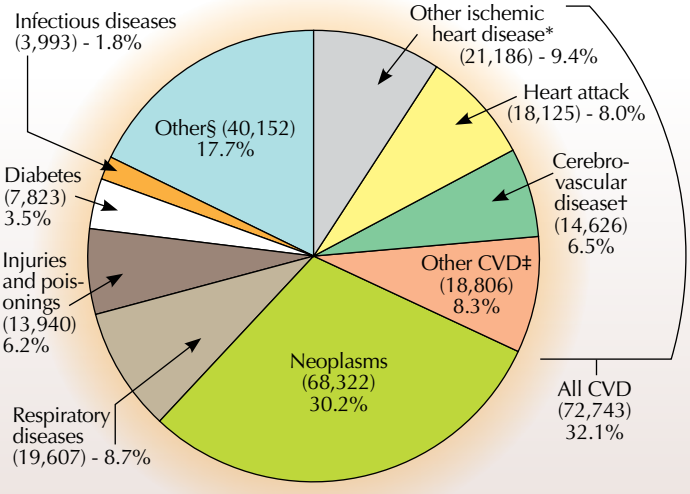
♦ * ICD-10-CA codes: I00-I99. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - The coding schemes for this condition changed in 1979 and 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. - Nunavut data not available in 2002/03. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

CVD are *a* Major Cause *of* Death

According to the World Health Organization (WHO), the worldwide death toll from CVD is 17.5 million people annually, which represents 30% of all deaths. In 2004, CVD were the leading cause of death for Canadians – 72,743 deaths or 32.1% of all deaths (FIGURE 1-22). Cancer, or neoplasms, was a close second. Ischemic heart disease including heart attack caused 54.0% of the CVD deaths, while stroke and other cerebrovascular diseases caused 20.1% of CVD deaths.

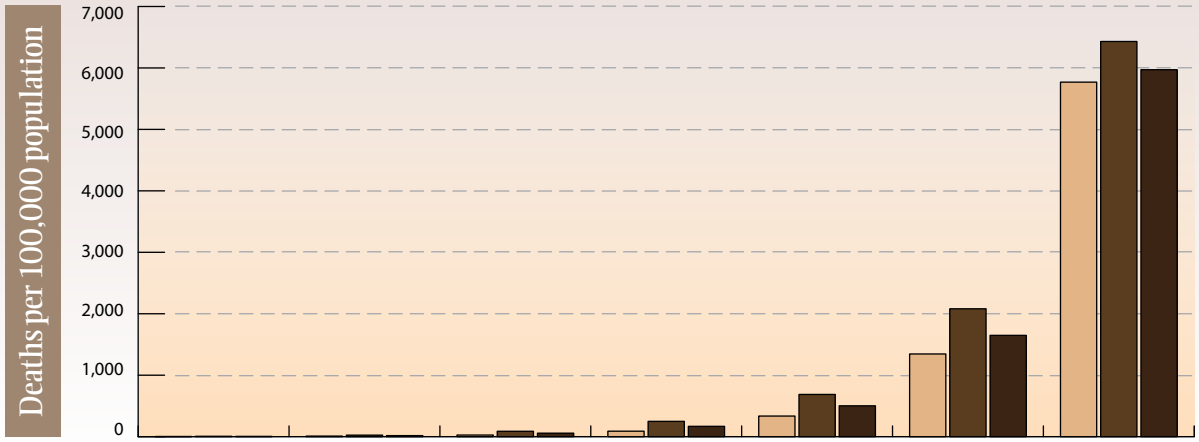
In 2004, for all age groups, men had a higher mortality rate for CVD than women – almost three times higher for those under age 65 years (FIGURE 1-23). The difference between men and women lessened as women got older, such that by the age of 85+, there was little difference in the rates among women and men. Mortality rates began to increase dramatically among men at age 45 and among women at age 55. Mortality rates for both women and men were 3.6 times higher in the 85+ year age group than in the 75 to 84 year age group.

Figure 1-22 *Number and percentage of the leading causes of death, Canada, 2004*



♦ * Other ischemic heart disease = ischemic heart disease - heart attack. ♦ † Cerebrovascular disease excludes transient ischemic attacks. ♦ ‡ Other CVD = circulatory disease – other ischemic heart disease – heart attack – cerebrovascular disease. ♦ § Other = all causes – [respiratory disease, all CVD, accidents/poisoning/violence, neoplasms, infectious diseases, and diabetes]. ♦ Note: - Total number of deaths from all causes = 226,584. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Figure 1-23 *Rates of death due to CVD*, by sex and age group, Canada, 2004*

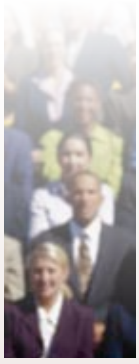


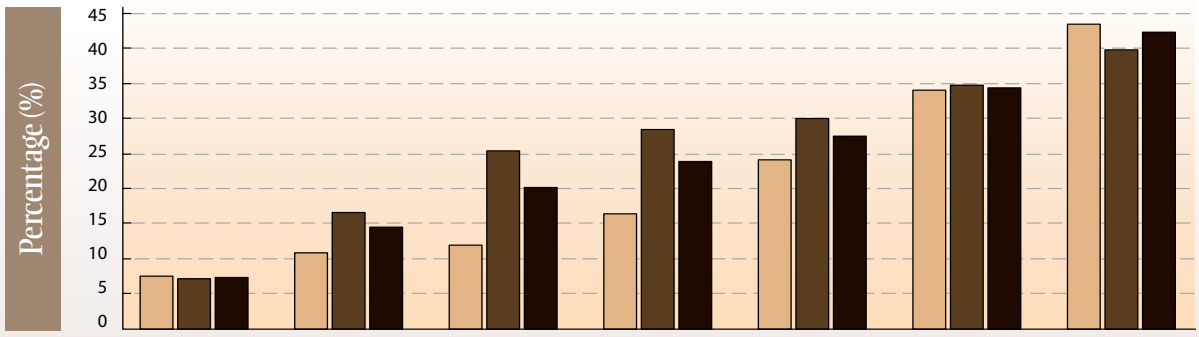
Age Group (yrs)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	3.0	9.1	26.4	89.0	335.3	1,345.6	5,769.0
Men	6.1	24.7	87.6	249.1	687.0	2,081.1	6,430.6
Both	4.6	16.9	56.8	167.9	502.3	1,648.6	5,971.2

♦ * ICD-10-CA codes: I00-I99. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

In 2004, CVD contributed to deaths among adults of every age. Among those ages 35 to 44 years, CVD accounted for one in eight deaths. Among those ages 45 to 54, CVD contributed to one in five deaths, and among those ages 55 to 64, CVD accounted for almost one in four deaths. CVD death rates were highest in the 85+ age group and accounted for about two of every five deaths in this age group (FIGURE 1-24).

Figure 1-24 *Percentage of deaths due to CVD*, by sex and age group, Canada, 2004*





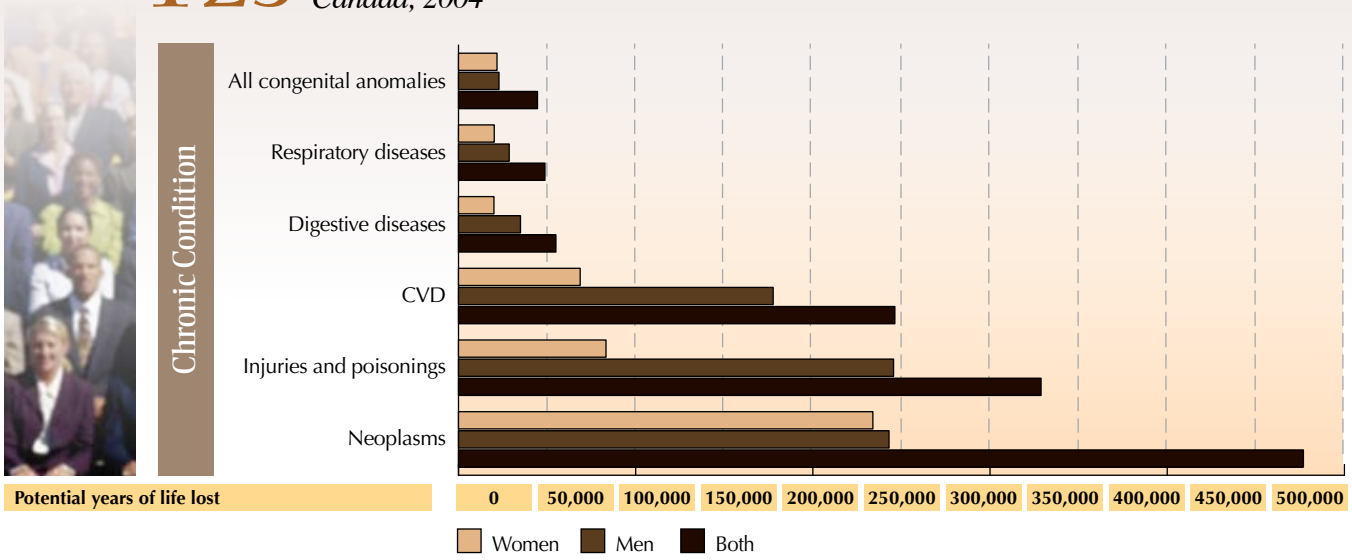
Age Group (yrs)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	7.7	10.9	12.0	16.6	24.0	34.2	43.7
Men	7.2	16.7	25.5	28.6	30.1	34.8	39.9
Both	7.4	14.6	20.2	23.9	27.7	34.5	42.4

♦ * ICD-10-CA codes: I00-I99. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

One way to show the impact of early deaths is to calculate potential years of life lost (PYLL). The PYLL is calculated as the sum of the number of years of life that individual Canadians 'lost', i.e., the number of years of life they did not live owing to premature death, considered as death prior to age 75 years.

In 2004, CVD were responsible for an estimated 246,287 PYLL, exceeded only by cancer and injuries (FIGURE 1-25). Men had 2.6 times the PYLL due to CVD than did women, reflecting the earlier onset of ischemic heart disease among men compared to women. CVD are a common cause of congenital anomalies, another important contributor to potential years of life lost.

Figure 1-25 *Number of potential years of life lost prior to age 75 years, by chronic condition, Canada, 2004*



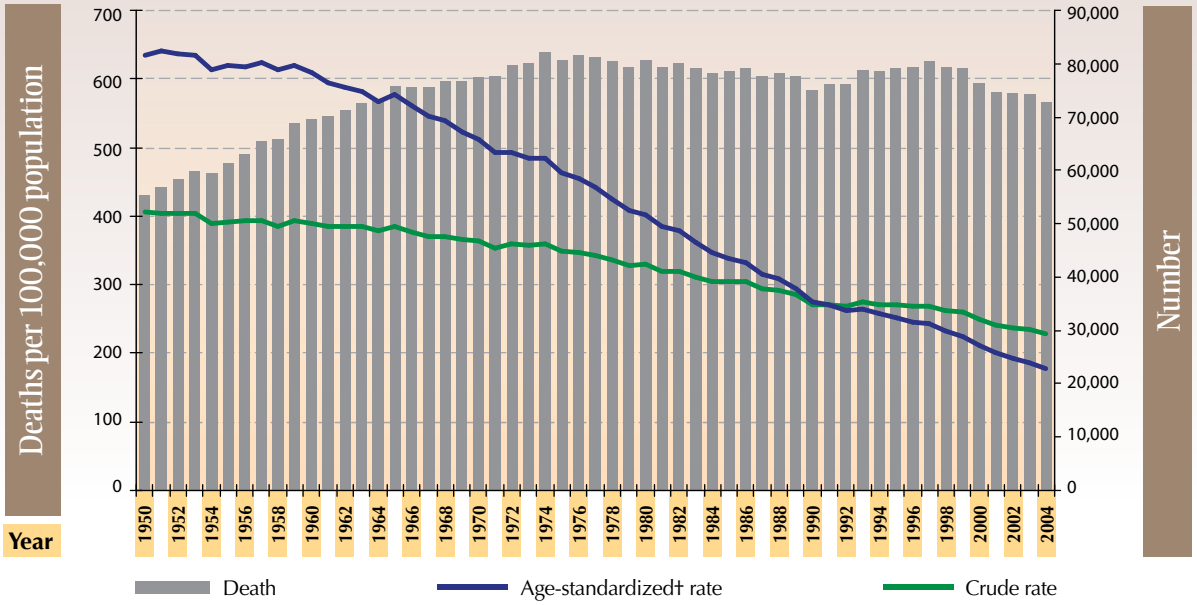
♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

The age-standardized death rate for CVD has decreased dramatically from 1960 to 2004 (FIGURE 1-26). While the reason for this decrease is not known, it was likely the result of a combination of factors, including a reduction in the risk of developing CVD with lower rates of smoking and physical inactivity, increased consumption of vegetables and fruit, better diagnosis and treatment of high blood pressure and dyslipidemia, and also better management of individuals with CVD resulting in longer survival.

The total number of deaths due to CVD initially rose from 1950 to the mid-1970s as the population size increased and as the population aged. Since then the numbers have decreased, even with the ongoing aging of the population, likely due to a reduced risk for CVD and improved survival.

It is difficult to predict future mortality rates from CVD. A widening in the difference between the crude rate and the age-standardized rate in recent years shows the effect of aging of the population on the CVD death rate. This aging effect plus increases in two risk factors for CVD in the population, diabetes and obesity, at some point may contribute to an increase in people developing and dying from CVD.

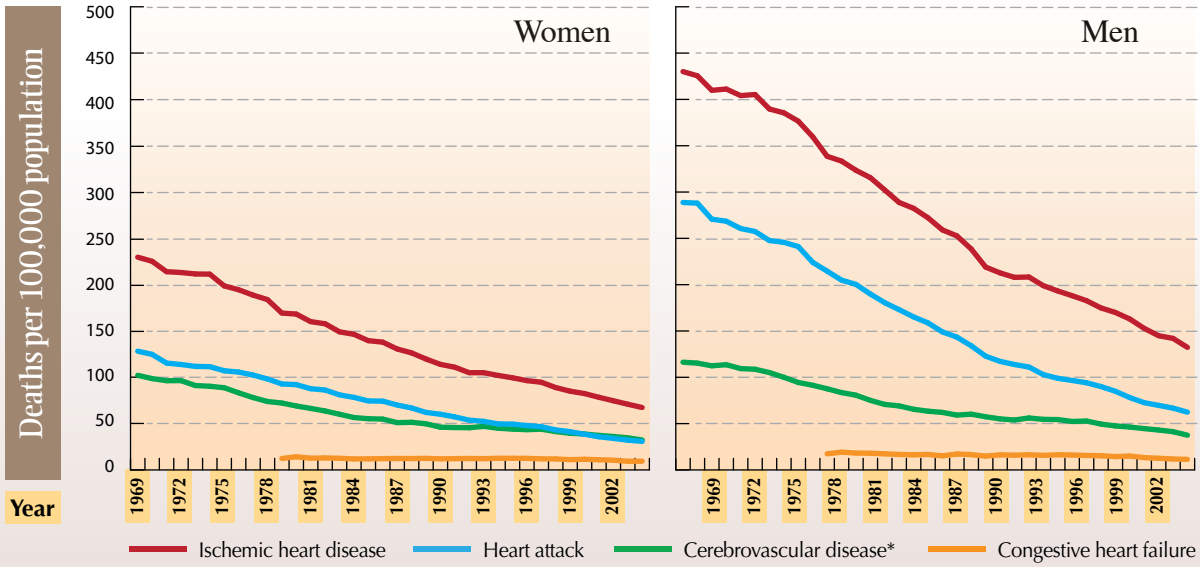
Figure 1-26 *Number and rate of deaths due to CVD*, by year, Canada, 1950-2004*



♦ * ICD-10-CA codes: I00-I99. ♦ † Standardized to the 1991 Canadian population. ♦ Note: - The coding schemes for this condition changed in 1958, 1969, 1979 and 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Between 1969 and 2004, mortality rates for all four of the most common types of CVD decreased substantially: for ischemic heart disease by 70.7% among women and 69.2% among men, for a heart attack by 76.1% among women and 78.4% among men, for cerebrovascular disease by 68.4% among women and 67.8% among men, and for congestive heart failure by 24.2% among women and 34.5% among men (FIGURE 1-27).

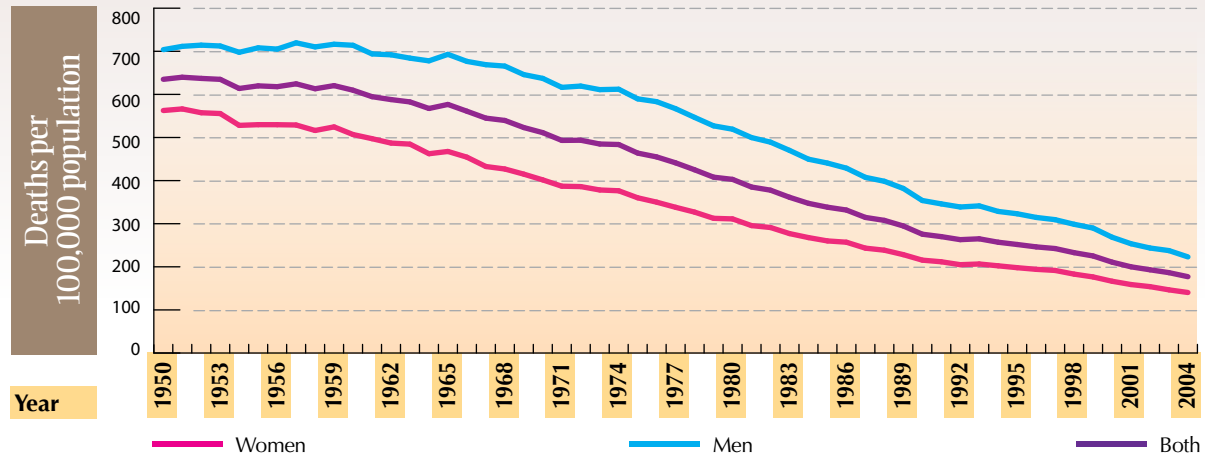
Figure 1-27 *Rates of death due to selected CVD classification, by sex and year, Canada, 1969-2004*



♦ * ICD-10-CA codes: I20-I25 (ischemic heart disease), I60-I69 (cerebrovascular disease excluding transient ischemic attacks), I21-I22 (heart attack), I50 (congestive heart failure). ♦ Notes: - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 1979 and 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

The mortality rate for CVD has been decreasing for both women and men since 1950. While men have had a much higher mortality rate than women in the past, the rates are now converging (FIGURE 1-28). The aging of the population with women living longer than men and the slower decline in CVD death rates among women than men results in a very similar number of deaths due to CVD for women and men. In 2004, there were 36,695 deaths for women and 36,048 deaths for men from CVD.

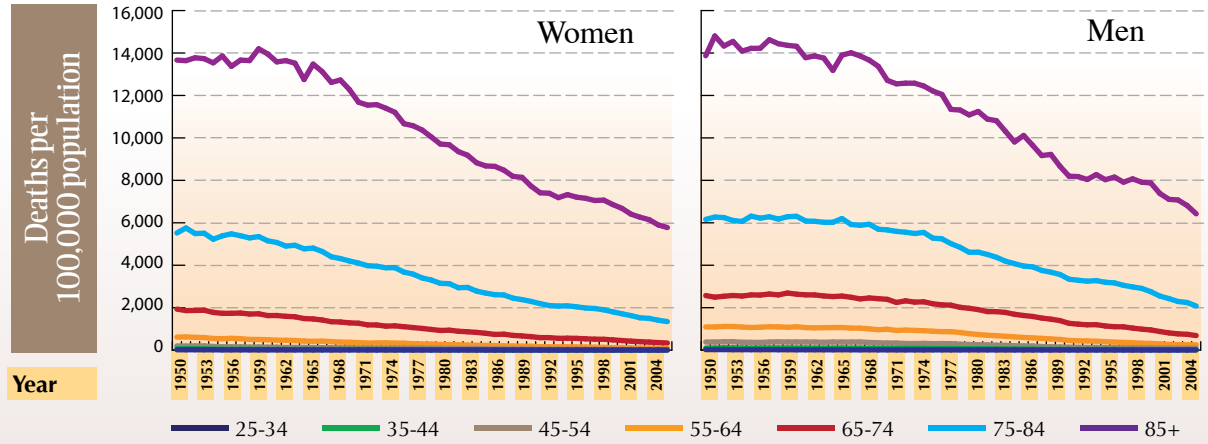
Figure 1-28 *Rates of death due to CVD*, by sex and year, Canada, 1950-2004*



♦ * ICD-10-CA codes: I00-I99. ♦ Notes: - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 1958, 1969, 1979 and 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Both women and men showed steep declines in the rate of death due to CVD among all age groups after the late 1960s (FIGURE 1-29).

Figure 1-29 *Rates of death due to CVD*, by sex, age group, and year, Canada, 1950-2004*



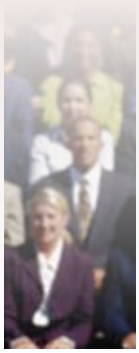
♦ * ICD-10-CA codes: I00-I99. ♦ Note: - The coding schemes for this condition changed in 1958, 1969, 1979 and 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

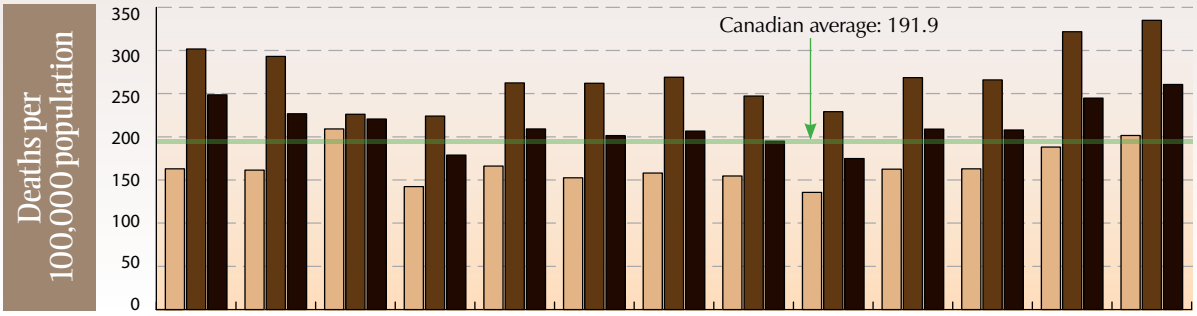
Based on average death rates for 2000 to 2004, Yukon had the highest mortality rate from CVD for women, followed by Newfoundland and Labrador and Prince Edward Island (FIGURE 1-30). Newfoundland and Labrador, closely followed by Prince Edward Island then Nunavut and the Northwest Territories, had the highest rates for mortality for men. Québec and British Columbia had the lowest rates for women, while Yukon, British Columbia and Québec had

the lowest rates among men. This pattern of mortality rates across the country is similar to the pattern of risk factors, with higher rates of risk factors and mortality for CVD in the east compared to the other provinces. Smoking rates are very high in both Nunavut and the Northwest Territories.

In all provinces and most territories, the CVD mortality rate was much higher among men than among women. Only in Yukon was the mortality rate for women close to that of men.

Figure 1-30 *Rates of death due to CVD*, by sex and province/territory, Canada, 2000-2004 (five year average)*





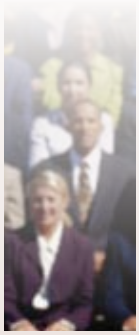
Province/territory	NU	NT	YT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
Women	163.0	161.5	209.2	142.4	166.2	152.6	158.1	154.7	135.7	162.6	163.0	188.2	201.6
Men	301.8	293.2	226.2	224.1	262.5	262.1	269.1	247.3	229.2	268.6	266.0	321.8	335.0
Both	248.7	226.8	220.7	178.9	209.2	201.5	206.7	195.1	174.9	209.0	208.0	244.9	260.7

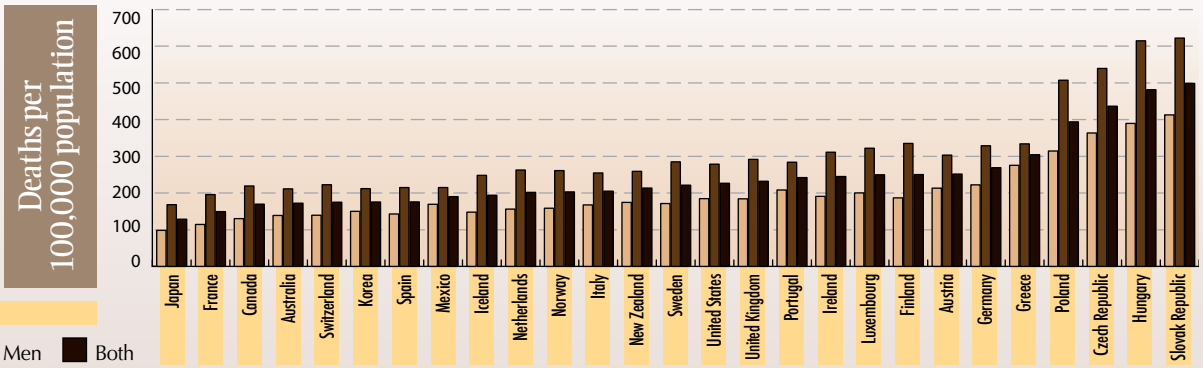
♦ * ICD-10-CA codes: I00-I78. ♦ Note: - Standardized to the 1991 Canadian population. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

According to the Organisation for Economic Cooperation and Development (OECD), among 27 countries, Canada had the third lowest rate of CVD mortality for women and the seventh lowest rate for men in 2003 (FIGURE 1-31). Canada's rate among both women and men was 1.3 times higher than Japan's, the country with the lowest rates for women and men. While rates varied considerably among countries, the rates were always lower among women than among men.

Caution must be used in making international comparisons between countries because countries use various methods to calculate their mortality rates. In addition, while differences in risk factors and in the quality of treatment may account for international differences in mortality rates, much of these differences remain unexplained. Given the change to a western diet and the increase in smoking rates among developing countries, the rate of CVD in these countries will likely rise in the future.

Figure 1-31 *Rates of death due to CVD*, by sex and country, 2003*

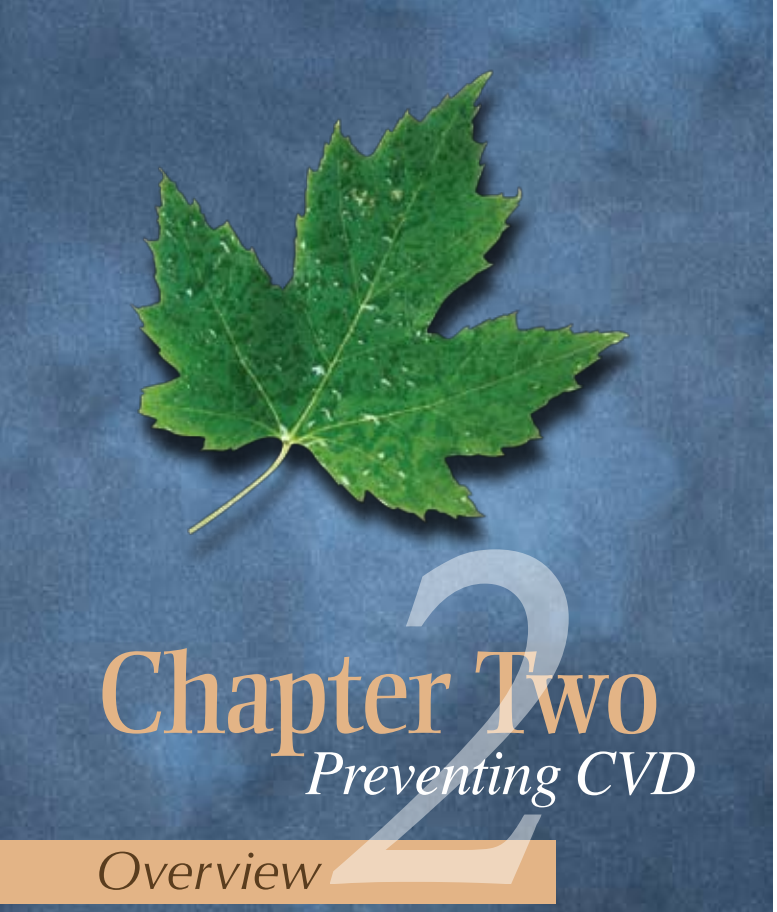




♦ * ICD-10-CA codes: I00-I99. ♦ Notes: - Standardized to the 1980 OECD population. - Only lists countries with data available for 2003. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Organisation for Economic Cooperation and Development Health Data 2008 (Eco-santé 2008).

Summary *of* Highlights

- In 2007, 1.3 million Canadians (4.8% of Canadians – 4.2% of girls and women and 5.3% of boys and men 12 years of age and older) reported having heart disease diagnosed by a health professional, and 317,500 Canadians (1.1% of girls and women and 1.2% of boys and men 12 years of age and older) reported living with the effects of a stroke. At age 75 years and older, 22.9% of Canadians reported having heart disease, and 7.1% of Canadians reported living with the effects of a stroke.
- CVD have a major impact on individuals and families, with many individuals reporting fair or poor perceived health, activity restrictions, and needing help with daily activities. Anxiety disorders and depression can arise and influence coping and health outcomes.
- In 2000, CVD costs in Canada amounted to $22.2 billion. Direct costs such as hospital care, prescription drugs, and physician care accounted for $7.6 billion, and $14.6 billion was attributed to economic output lost due to disability or death.
- CVD were the most responsible diagnosis for hospitalization in 2005/06 (16.9% of all hospitalizations – 19.8% for men and 14.0% for women). When additional hospitalizations were considered with CVD as a related condition, the number of hospitalizations in which CVD were present doubled. CVD also accounted for the highest proportion of days in hospital compared to other health problems.
- Hospitalization rates for CVD have decreased since the 1970s until now, likely due to better management of CVD, a decrease in the risk of developing CVD itself, or both. While the hospitalization rates decreased, the number of hospitalizations due to CVD increased until the late 1990s due to an increase in the number of people in the population and in the aging of the population.
- In Canada in 2004, there were 72,743 deaths due to CVD, representing 32.1% of all deaths; 36,695 women and 36,048 men died from CVD. While CVD were a major contributor to death over age 85 (42.4% of CVD deaths), CVD were also a major contributor to deaths among the 45 to 54 year age group (20.2% of CVD deaths) and the 55 to 64 year age group (23.9% of deaths).
- Mortality rates due to CVD have decreased steadily since the early 1960s. As with decreasing hospitalization rates, the decrease is likely due to a combination of lower rates of people developing CVD due to a reduction in risk factors and better management of CVD with longer survival rates. The aging of the population combined with increases in obesity and diabetes, two CVD risk factors, may increase deaths due to CVD in the future.
- CVD hospitalization and death rates increase dramatically among men at age 45 and among women at age 55. Rates are higher among men than women in all age groups. The difference lessens with age.
- An estimated 65.7 million prescriptions were dispensed for the treatment of CVD. In addition, 34.6 million visits (10.3% of all visits) made by Canadians to community physicians were for the management of CVD.



Chapter Two
Preventing CVD

Overview

CVD can be prevented. Avoiding smoking, maintaining a healthy weight and healthy nutrition, engaging in regular physical activity, and effectively managing stress combined with early detection and treatment of high blood pressure, high cholesterol and diabetes can greatly reduce the risk of developing heart disease or stroke, as well as the risk of having another heart attack or stroke. Depression and anxiety disorders also increase the risk of CVD and contribute to worse outcomes in people with CVD. Early recognition and treatment of these conditions are important to reduce the risk of developing CVD.

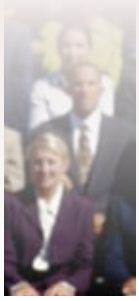
Based on the INTERHEART study, which looked at the association of the major risk factors to a first heart attack around the world, if everyone globally engaged in regular physical activity, ate sufficient vegetables and fruit each day, and did not smoke, then almost 80% of first heart attacks could be prevented in the population.

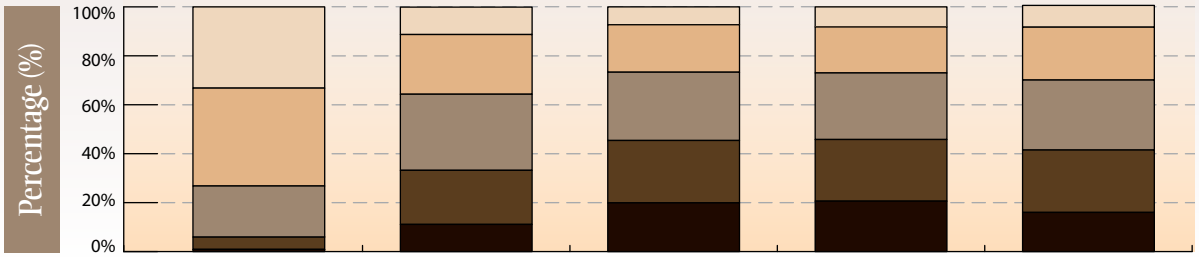
This chapter will describe how well Canadians are doing in the adoption of healthy behaviours, and how such behaviours are affected by income and education.

Tracking CVD Risk Behaviours

In 2007, two in three people ages 12 to 19 years and nine in ten people age 20+ years in Canada had at least one risk factor for CVD (TABLE 2-1) (FIGURE 2-1). Teenaged girls and boys had similar proportions of risk factors, while more men had at least one risk factor in adults age 20+ years. As the number of risk factors increases, so does the risk of CVD. While only 5.9% of teenagers had three or more risk factors, this climbed to 39.5% or two in five among adults.

Figure 2-1 *Percentage of the population age 12+ years who reported one or more risk factors, by age group, Canada, 2007*

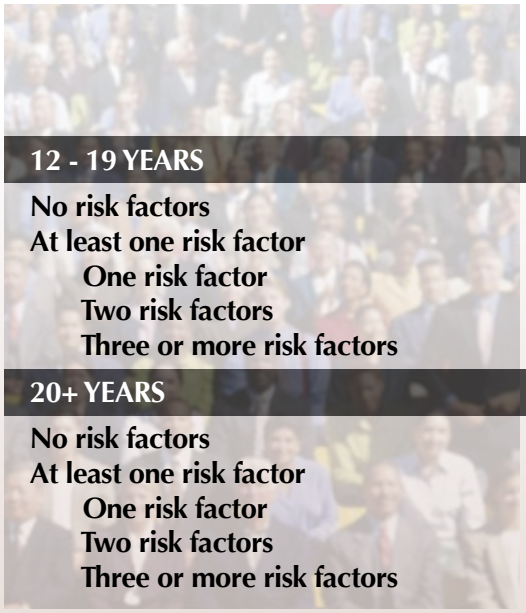




Age group (years)	12-19	20-44	45-64	65-79	80+
No risk factor	33.2	11.2	7.3	8.2	8.9
1 risk factor	40.0	24.4	19.4	18.8	21.6
2 risk factors	20.9	31.1	27.9	27.2	28.6
3 risk factors	5.0	22.1	25.5	25.2	25.0
4 or more risk factors	0.9	11.1	19.9	20.6	16.0[†]

♦ Notes: - Risk factors include tobacco smoking (daily), physical inactivity (leisure time), inadequate consumption of vegetables and fruit, overweight or obese, stress ('quite a bit' or 'extremely'), high blood pressure, and diabetes. - All data are for respondents age 12+ years except for overweight and obese (18+ years), and stress (15+ years). ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Table 2-1 *Percentage of the population age 12+ years at risk for CVD, by sex and age group, Canada, 2007*



	Percentage (%)		
	Girls/Women	Boys/Men	Both Sexes
12 - 19 YEARS			
No risk factors	32.7	33.7	33.2
At least one risk factor	67.3	66.3	66.8
One risk factor	38.7	41.3	40.0
Two risk factors	22.1	19.8	20.9
Three or more risk factors	6.5	5.3	5.9
20+ YEARS			
No risk factors	11.7	6.8	9.3
At least one risk factor	88.3	93.2	90.7
One risk factor	24.2	19.3	21.8
Two risk factors	28.5	30.3	29.4
Three or more risk factors	35.6	43.6	39.5

♦ Notes: - Included in this analysis are the following self-reported risk factors: tobacco smoking (daily), physical inactivity (leisure time), inadequate consumption of vegetables and fruit, stress ('quite a bit' or 'extremely'), overweight and obese, high blood pressure, and diabetes. - All data are for respondents age 12+ years except for overweight and obese (18+ years), and stress (15+ years). ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Tracking health behaviours identifies how the risk of CVD is changing among Canadians. Since 2000, the proportion of self-reported daily smokers has declined by 23.1%, people have become more physically active during leisure time (increase of 7.3%), a greater proportion is consuming at least five servings of vegetables and fruit each day (increase of 10.1%), and the proportion of people reporting that they experience quite a bit or extremely high stress has declined by 11.9% (TABLE 2-2).

Even with these positive changes, too many people still have unhealthy behaviours. In 2007, 15.3% of the population were daily smokers. About half the population did not spend at least 30 minutes per day engaging in moderate physical activity during leisure time, and 56.2% of the population still consumed less than five servings of vegetables and fruit each day. The *Canada Food Guide* recently has increased the recommended amount of vegetables and fruit from four to five up to seven to ten servings per day.

Carrying extra weight, particularly around the abdomen, increases the risk of CVD as well as increasing the risk of diabetes and high blood pressure, also risk factors for CVD. In 2007, using self-reported height and weight, 27.3% of girls and women were considered overweight and 15.8% were considered obese, while among boys and men the proportions were 40.8% and 18.0%. The proportions would be higher if height and weight was physically measured and not based on self-report. In 2004, when people were measured, the rates of overweight and obesity were 28.7% and 23.0% among women and 41.1% and 25.7% among men. Based on measured height and weight, the prevalence of obesity has increased by 67.4% from 13.8% in 1978 to 23.1% in 2004.

The proportion of people with diabetes has increased in the population, whether measured by self-report (4.2% in 2000 to 5.8% in 2007), or from physicians' records (5.5% in 2000/01 to 7.1% in 2004/05). High blood pressure is also increasing for the same reasons as diabetes – an increase in obesity and in the aging of the population.

Table 2-2 *Percentage of the population age 12+ years who reported specific risk factors for CVD, changes over time, Canada, 2000, 2005, and 2007*

	Percentage (%)		
	2000	2005	2007
GIRLS/WOMEN			
Tobacco smoking – daily	18.5	12.3	14.3
Physical inactivity – leisure time	57.0	50.2	52.5
Inadequate consumption of vegetables and fruit	57.1	51.2	49.4
Less overweight (BMI 25 to <27)	11.7	12.1	12.6
More overweight (BMI 27 to <30)	14.3	14.1	14.7
Obese (BMI ≥30)	14.4	14.8	15.8
Life stress – 'quite a bit' or 'extremely'	26.8	24.0	23.6
High blood pressure*	15.8	17.9	18.8
Diabetes	5.2	6.6	†
BOYS/MEN			
Tobacco smoking – daily	21.4	17.7	16.4
Physical inactivity – leisure time	49.6	45.2	46.5
Inadequate consumption of vegetables and fruit	68.1	64.2	63.3
Less overweight (BMI 25 to <27)	18.2	18.9	18.6
More overweight (BMI 27 to <30)	21.6	22.7	22.2
Obese (BMI ≥30)	16.1	16.9	18.0
Life stress – 'quite a bit' or 'extremely'	25.3	22.5	22.3
High blood pressure*	13.1	16.3	17.3
Diabetes	5.9	7.6	†
BOTH SEXES			
Tobacco smoking – daily	19.9	15.0	15.3
Physical inactivity – leisure time	53.4	47.8	49.5
Inadequate consumption of vegetables and fruit	62.5	57.6	56.2
Less overweight (BMI 25 to <27)	15.0	15.5	15.6
More overweight (BMI 27 to <30)	18.1	18.5	18.5
Obese (BMI ≥30)	15.3	15.9	16.9
Life stress – 'quite a bit' or 'extremely'	26.1	23.3	23.0
High blood pressure*	14.5	17.1	18.1
Diabetes	5.5	7.1	†

♦ * In order for comparability across years, only one question is used to derive the prevalence, unlike other figures that use two questions to derive prevalence of high blood pressure. ♦ † Data not available. ♦ Note: - All data are for respondents age 12+ years except for current daily smoker (15+ years), overweight and obese (18+ years), stress (18+ years), high blood pressure (20+ years), and diabetes (20+ years). ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada), the Canadian Tobacco Use Monitoring Survey (Health Canada), and the National Diabetes Surveillance System, which was contributed by all provinces and territories as of October 31, 2007.

Socio-Demographic Factors *and* Risk *of* CVD

Income and Education

The previous report, *'The Growing Burden of Heart Disease and Stroke in Canada, 2003'*, illustrated some of the discrepancies in CVD mortality rates by income in urban Canada. Age-standardized mortality rates due to ischemic heart disease were highest among individuals living in neighbourhoods at the lowest income quintile, more so for men than for women. Mortality rates for individuals living in all income quintiles had decreased over time, and the difference between neighbourhood income quintiles had also decreased. These differences due to income quintile appear to be primarily due to differences in whether people developed CVD, rather than due to differences in treatment and survival.

In 2007, several risk factors including smoking, physical inactivity during leisure time, inadequate consumption of vegetables and fruit, high blood pressure, and diabetes were more common among men and women in the lowest income quintile compared to those in the highest income quintile (TABLE 2-3). The prevalence of diabetes was almost three times higher in the lowest income quintile, while the prevalence was about twice as high for daily smoking and self-reported high blood pressure.

Table 2-3 *Percentage of the population age 12+ years who reported modifiable risk factors, by sex and income quintile, Canada, 2007*

	Income adequacy quintile Percentage (%)				
	Low	Lower middle	Middle	Upper middle	High
GIRLS/WOMEN					
Tobacco smoking – daily	20.4	17.6	15.9	13.3	10.2
Physical inactivity – leisure time	60.8	57.0	53.6	46.4	39.3
Inadequate consumption of vegetables and fruit	56.1	49.1	48.1	47.1	14.3
Less overweight (BMI 25 to <27)	12.5	12.6	11.9	13.7	12.2
More overweight (BMI 27 to <30)	14.7	15.6	14.3	14.0	13.5
Obese (BMI ≥30)	18.9	16.9	17.1	13.9	13.0
Life stress – 'quite a bit' or 'extremely'	25.1	21.7	22.2	25.3	26.5
High blood pressure	25.5	23.2	17.1	14.0	12.7
Diabetes	8.8	5.7	4.3	3.1	2.1*
BOYS/MEN					
Tobacco smoking – daily	28.0	20.2	19.6	18.3	14.4
Physical inactivity – leisure time	54.2	52.7	47.9	42.8	38.0
Inadequate consumption of vegetables and fruit	66.2	63.2	63.8	63.0	62.4
Less overweight (BMI 25 to <27)	16.1	18.5	17.2	18.5	22.7
More overweight (BMI 27 to <30)	17.3	20.2	24.4	23.5	24.6
Obese (BMI ≥30)	17.5	16.8	19.0	18.5	19.7
Life stress – 'quite a bit' or 'extremely'	22.7	19.9	21.0	20.4	25.2
High blood pressure	22.0	20.2	17.1	17.7	16.2
Diabetes	9.6	6.9	6.2	5.2	4.3
BOTH SEXES					
Tobacco smoking – daily	23.5	18.9	17.8	15.9	12.6
Physical inactivity – leisure time	58.2	55.0	50.7	44.5	38.6
Inadequate consumption of vegetables and fruit	60.2	55.8	55.9	55.6	53.1
Less overweight (BMI 25 to <27)	14.0	15.5	14.6	16.3	18.3
More overweight (BMI 27 to <30)	15.8	17.8	19.4	19.2	19.9
Obese (BMI ≥30)	18.4	16.9	18.0	16.4	16.9
Life stress – 'quite a bit' or 'extremely'	24.1	20.9	21.6	22.7	25.8
High blood pressure	24.2	21.7	17.1	15.9	14.7
Diabetes	9.1	6.3	5.2	4.2	3.3

♦ * Marginal variance estimate – data should be interpreted with caution. ♦ Note: - All data are for respondents age 12+ years except for overweight and obese (18+ years), stress (15+ years), and high blood pressure (20+ years). ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

In general, individuals with less education were also more likely to have risk factors for CVD than those with higher education, especially among men. However, the difference was less profound than the differences seen by income (TABLE 2-4).

Table 2-4 *Percentage of the population age 12+ years who reported modifiable risk factors for CVD, by sex and education, Canada, 2007*

	Level of education completed Percentage (%)			
	Less than secondary	Secondary	Some post-secondary	Post-secondary
GIRLS/WOMEN				
Tobacco smoking – daily	14.3	18.4	15.6	7.7
Physical inactivity – leisure time	55.8	56.1	49.0	50.0
Inadequate consumption of vegetables and fruit	55.6	54.1	50.9	44.8
Less overweight (BMI 25 to <27)	13.8	13.0	11.0	12.3
More overweight (BMI 27 to <30)	20.6	15.1	13.7	13.3
Obese (BMI ≥30)	21.9	16.9	15.3	13.9
Life stress – 'quite a bit' or 'extremely'	18.6	20.6	25.1	25.7
High blood pressure	40.5	21.0	17.6	13.7
Diabetes	8.6	5.1	3.4*	3.8
BOYS/MEN				
Tobacco smoking – daily	19.3	18.7	16.1	10.2
Physical inactivity – leisure time	46.1	50.8	42.1	45.8
Inadequate consumption of vegetables and fruit	64.8	68.1	64.8	61.0
Less overweight (BMI 25 to <27)	16.7	17.0	16.6	19.9
More overweight (BMI 27 to <30)	21.7	21.9	19.2	22.8
Obese (BMI ≥30)	20.6	18.2	17.1	17.4
Life stress – 'quite a bit' or 'extremely'	17.0	19.0	17.7	24.7
High blood pressure	29.5	16.0	13.5	17.1
Diabetes	7.9	6.2	4.6	5.8
BOTH SEXES				
Tobacco smoking – daily	17.0	18.5	15.8	8.9
Physical inactivity – leisure time	51.0	53.6	45.6	47.9
Inadequate consumption of vegetables and fruit	60.1	60.7	57.7	52.7
Less overweight (BMI 25 to <27)	15.2	14.9	13.8	16.1
More overweight (BMI 27 to <30)	21.1	18.4	16.4	18.0
Obese (BMI ≥30)	21.3	17.5	16.2	15.7
Life stress – 'quite a bit' or 'extremely'	17.8	19.9	21.5	25.2
High blood pressure	35.2	18.6	15.6	15.4
Diabetes	8.2	5.6	4.0	4.8

♦ * Marginal variance estimate – data should be interpreted with caution. ♦ Note: - All data are for respondents age 12+ years except for tobacco smoking (15+ years), overweight and obese (18+ years), stress (15+ years), and high blood pressure (20+ years). ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada) and the Canadian Tobacco Use Monitoring Survey (Health Canada).

Many factors likely contribute to the higher prevalence of CVD risk factors among individuals with low income and low education, such as lack of knowledge about healthy behaviours, lack of access to healthy foods, which are often more expensive, and high levels of stress, which with a lack of resources, skills, and social support, may lead to unhealthy coping behaviours.

While the prevalence of some risk factors was higher among people with low income and low education, this does not imply targeting programs only to those with low income. In fact, most people in the population with CVD risk factors are in the middle or high income groups, since these groups have the highest number of people in the population.

Place of Residence and CVD Risk Factors

People living far from urban centres were more likely to smoke daily, be overweight or obese, and experience high levels of stress than were their urban counterparts (TABLE 2-5). Where girls and women lived had little impact on how physically active they were in their leisure time, but for boys and men, living in the city was associated with more regular physical activity during their leisure time.

Table 2-5 *Percentage of the population age 12+ years who reported modifiable risk factors, by sex and urban/rural residence, Canada, 2005*

	Urban/rural residence Percentage (%)				
	Cities	Close to city	Some distance from city	Far from city	Very far from city
GIRLS/WOMEN					
Tobacco smoking – daily	14.0	18.2	19.1	18.4	20.1
Physical inactivity – leisure time	50.7	48.4	51.5	48.4	50.7
Life stress – 'quite a bit' or 'extremely'	24.1	22.8	21.5	21.0	20.0
Some overweight (BMI 25 to <27)	12.0	13.8	12.8	14.1	12.0
More overweight (BMI 27 to <30)	14.0	16.0	16.1	16.8	17.4
Obese (BMI ≥30)	13.7	17.0	18.5	19.9	20.0
BOYS/MEN					
Tobacco smoking – daily	17.5	21.8	22.1	21.9	21.5
Physical inactivity – leisure time	44.4	47.3	47.3	47.6	54.9
Life stress – 'quite a bit' or 'extremely'	22.1	22.5	20.5	20.4	19.8
Some overweight (BMI 25 to <27)	18.8	19.1	17.8	18.3	22.1
More overweight (BMI 27 to <30)	22.1	23.2	23.5	22.7	23.7
Obese (BMI ≥30)	15.7	20.4	19.5	21.9	21.0
BOTH SEXES					
Tobacco smoking – daily	15.7	20.0	20.5	20.2	20.8
Physical inactivity – leisure time	47.4	47.8	49.2	47.9	52.8
Life stress – 'quite a bit' or 'extremely'	23.1	22.6	21.0	20.8	19.9
Some overweight (BMI 25 to <27)	15.4	16.4	15.3	16.2	17.0
More overweight (BMI 27 to <30)	18.0	19.6	19.8	19.7	20.6
Obese (BMI ≥30)	14.7	18.7	19.0	20.8	20.5

♦ Notes: - Standardized to the 1991 Canadian population. - All data are for respondents age 12+ years except for overweight and obese (18+ years), and stress (15+ years).
♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Ethnicity and Risk Factors

Certain groups, whether due to cultural or genetic predispositions, are experiencing particularly high rates of heart disease, for example, South Asians. Others, like the Chinese, experience less heart disease, but more stroke. Therefore, it remains important to adopt and adhere to healthy behaviours and to have risk for high cholesterol, high blood pressure, and diabetes monitored and if necessary, treated.

Behavioural choices reflect the ethnic and cultural world in which people live. People of Chinese origin had lower rates of daily smoking and of being overweight or obese compared to Canadians of Caucasian origin in 2007 (TABLE 2-6). On the other hand, they had higher rates of physical inactivity during leisure time and were more likely to consume less than five servings of vegetables and fruit per day.

For Canadians of South Asian origin, a lower proportion reported daily smoking and obesity compared to Caucasian Canadians. Canadians of Southeast Asian origin were less likely to be more overweight than Caucasian Canadians, but smoking rates were higher than in South Asian Canadians.

Table 2-6 *Percentage of the population age 12+ years who reported modifiable risk factors, by self-reported race/ethnicity, Canada, 2007*

	Self-reported race/ethnicity Percentage (%)				
	Caucasian	Chinese	South Asian	Black	Southeast Asian
Tobacco smoking – daily	18.6	6.0	5.0	7.0	17.2
Physical inactivity – leisure time	48.2	59.8	58.2	53.8	56.2
Inadequate consumption of vegetables and fruit	54.9	69.9	59.5	56.0	64.4
Less overweight (BMI 25 to <27)	15.6	11.4	17.1	21.1	16.2*
More overweight (BMI 27 to <30)	19.2	6.7	17.8	20.9	10.6*
Obese (BMI ≥30)	18.1	2.8*	9.5	14.5	†
Life stress – 'quite a bit' or 'extremely'	22.7	17.5	23.0	20.8	18.6

♦ * Marginal variance estimate – data should be interpreted with caution. ♦ † Value suppressed due to small sample size. ♦ Notes: - Although ethnic differences are well established for high blood pressure and diabetes, data were not presented due to small sample sizes. - All data are for respondents age 12+ years except for overweight and obese (18+ years), and stress (15+ years). ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Tobacco Smoking

Tobacco smoke contains chemicals that contribute to the build up of fat in blood vessels, causing them to become constricted. This constriction reduces the blood flow to the heart, brain, kidneys, and other organs. Tobacco smoke also allows other gases, such as carbon monoxide, to replace oxygen in the blood, forcing the heart to work harder. It can lead to high blood pressure, an increased tendency for blood to clot, and a decrease in the ability to be physically active. It can also lead to angina, leg amputation, heart attack, or stroke, and increases the risk of recurrent heart disease after bypass surgery. Women who both smoke and use oral contraceptives have an increased risk of stroke from subarachnoid haemorrhage. In 2002, there were around 37,000 deaths attributable to tobacco smoking. Second-hand smoke resulted in some 579 deaths from ischemic heart disease in non-smoking Canadians.

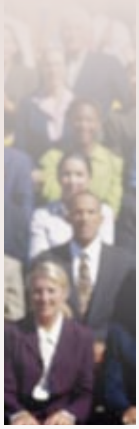
In general, stopping smoking results in immediate benefits. Within minutes of stopping smoking, blood pressure and pulse rate improve and after eight hours, chances of a heart attack begin to fall. After five years, the risk of heart attack falls to almost half of the risk seen by smokers, and after ten years, the risk of heart attack is the same as for a non-smoker.

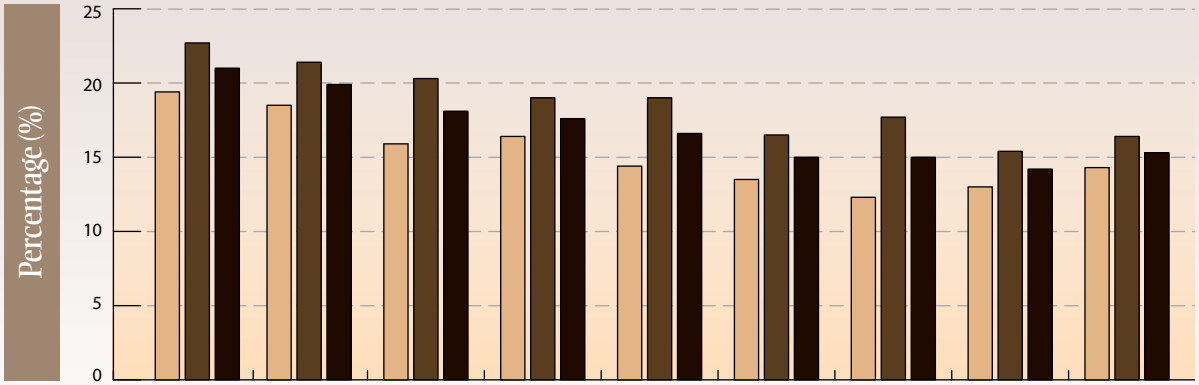
In the INTERHEART study, smoking, whether current or former, was one of the two strongest factors associated with heart attack across several countries. Heavy smokers were nine times more likely to have a heart attack than were non-smokers.

The INTERHEART study also calculated population attributable risks (PAR) for various risk factors associated with the risk of a heart attack in regions around the world. The PAR considers how much a risk factor contributes toward causing heart attacks in the population, and is based on how common a risk factor is across the population as well as the risk of a heart attack relating to that risk factor. Globally, smoking contributed to 15.8% of heart attacks among women in the population, and 44.0% of heart attacks for men.

The reduction in smoking for both women and men in Canada from 1999 until now is truly a success story, although the end of the story remains to be written (FIGURE 2-2).

Figure 2-2 *Percentage of the population age 15+ years who were daily smokers, by sex and year, Canada, 1999-2007*



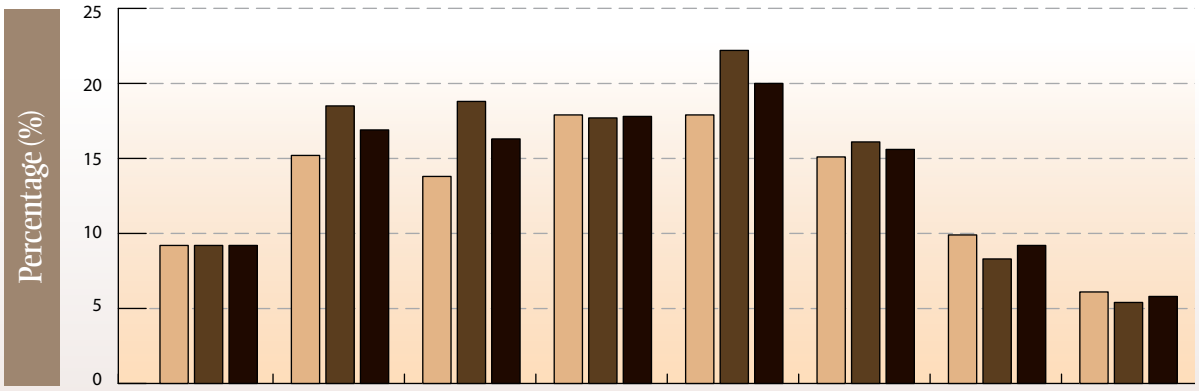


Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
Women	19.4	18.5	15.9	16.4	14.4	13.5	12.3	13.0	14.3
Men	22.7	21.4	20.3	19.0	19.0	16.5	17.7	15.4	16.4
Both	21.0	19.9	18.1	17.6	16.6	15.0	15.0	14.2	15.3

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Tobacco Use Monitoring Survey (Health Canada).

In Canada in 2007, almost one in six adults over age 15 was still smoking daily and young women and men continue to become addicted to tobacco products (FIGURE 2-3). In 2007, 9.2% of teens reported smoking cigarettes daily, a proportion that was similar in both women and men in the 15 to 19 year age group. The highest daily smoking rates were for men ages 45 to 54 years, and for women ages 35 to 44 and 45 to 54 years. One possible explanation for the lower prevalence of daily smoking among women ages 25 to 34 years is that fewer women smoke before and during pregnancy and childrearing.

Figure 2-3 *Percentage of the population age 15+ years who were daily smokers, by sex and age group, Canada, 2007*

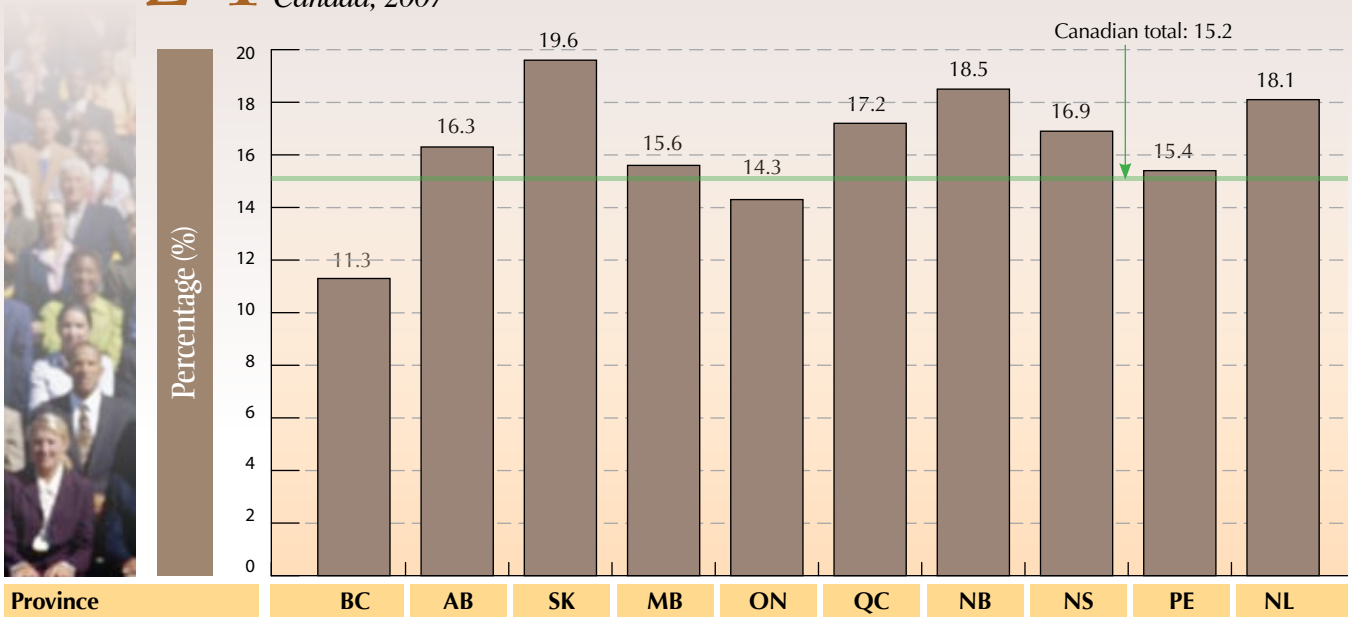


Age group (years)	15-19	20-24	25-34	35-44	45-54	55-64	65-74	75+*
Women	9.2	15.2	13.8	17.9	17.9	15.1	9.9	6.1
Men	9.2	18.5	18.8	17.7	22.2	16.1	8.3	5.4
Both	9.2	16.9	16.3	17.8	20.0	15.6	9.2	5.8

♦ * The older age groups were combined due to small sample sizes. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Tobacco Use Monitoring Survey (Health Canada).

In 2007, the proportion of Canadians that smoked daily was lower in British Columbia and Ontario than in all other provinces (FIGURE 2-4). The proportion of the population who were daily smokers has decreased in all provinces since 2000.

Figure 2-4 *Percentage of the population age 15+ years who were daily smokers, by province, Canada, 2007*



♦ Notes: - Standardized to the 1991 Canadian population. - The territories are excluded from this analysis. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Tobacco Use Monitoring Survey (Health Canada).

Physical Activity

National guidelines from the Public Health Agency of Canada recommend at least 60 minutes of light physical activity every day or 30 minutes of moderate physical activity four days a week as part of an active lifestyle. The emphasis is on incorporating physical activity into everyday life, for example, walking or biking instead of driving a car, or getting off the bus a few stops early and walking the rest of the distance.

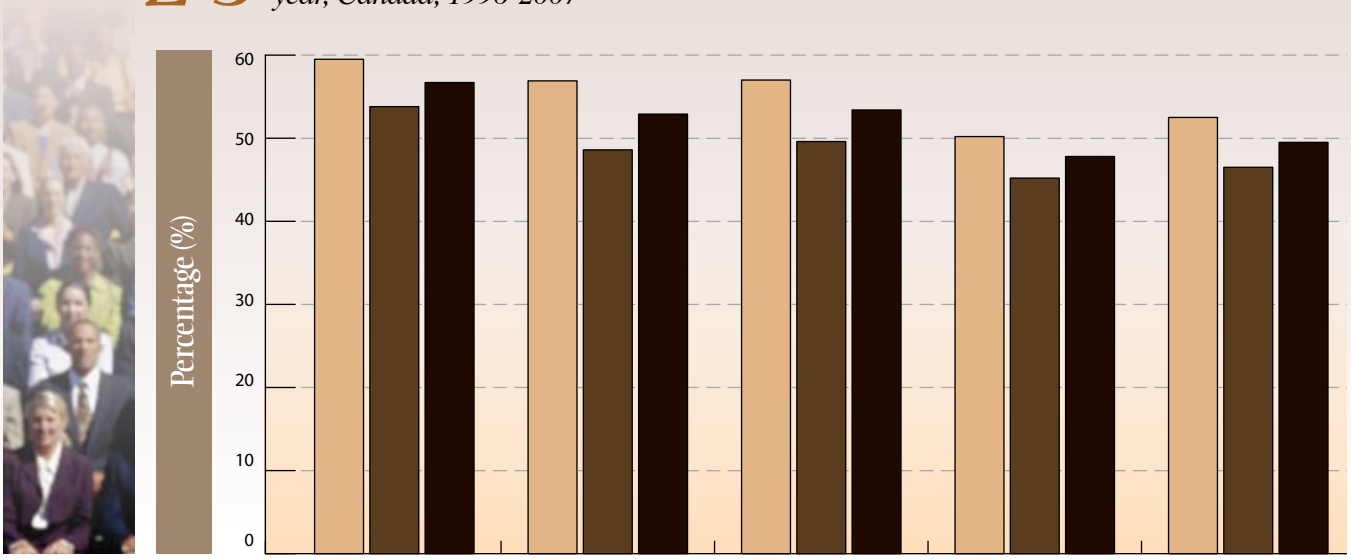
Regular physical activity benefits every part of the body, from the brain to the toes. It helps to reduce or maintain a healthy weight and blood pressure, manage stress, and give a sense of well-being. It also strengthens muscle tone, including the heart muscle, and lowers cholesterol levels. All of these factors contribute to a lower risk of developing heart disease.

Based on data from the INTERHEART study, at the population level, 37.3% of the risk of a heart attack for women was related to inadequate physical activity, while for men it was 22.9%. This, in part, is because more women than men are physically inactive.

Currently, data on work-related activity or incidental physical activity in daily lives (such as walking to work or school) are not available for analysis. It is important in the future to include these other aspects for a more comprehensive overall look at physical activity.

Fewer people were reporting being inactive during their leisure time than in previous years (FIGURE 2-5). The levels of inactivity during leisure time dropped from 56.7% to 49.5% overall from 2000 to 2007: from 59.5% to 52.5% among girls and women and from 53.8% to 46.5% among boys and men.

Figure 2-5 *Percentage of the population age 12+ years who were physically inactive, by sex and year, Canada, 1996-2007*

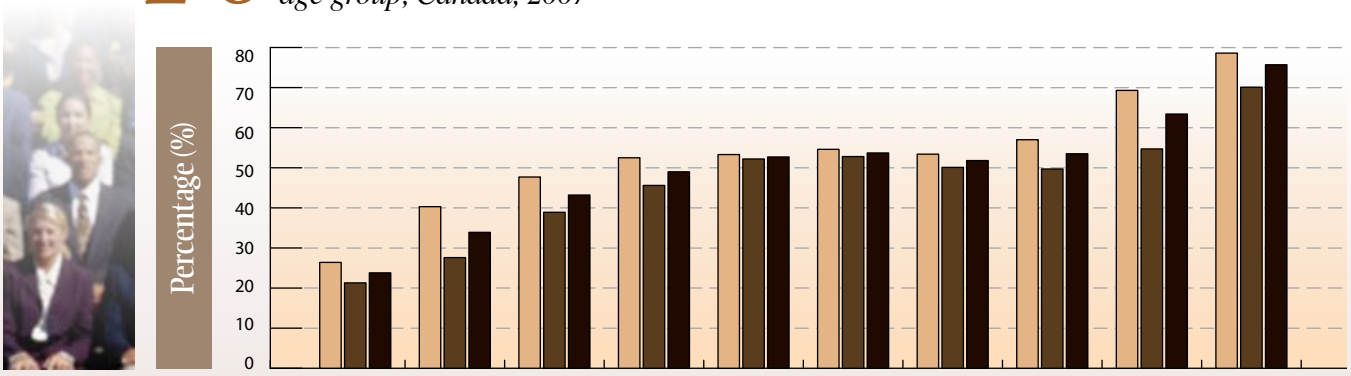


Year	1996	1998	2000	2005	2007
Women	59.5	56.9	57.0	50.2	52.5
Men	53.8	48.6	49.6	45.2	46.5
Both	56.7	52.9	53.4	47.8	49.5

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

However there is still a long way to go. In all age groups, more girls and women than boys and men were physically inactive during their leisure time (FIGURE 2-6). Teen women from ages 12 to 19 were 1.4 times more likely than teen men of the same age group to be inactive during leisure time. As Canadians aged, they were less and less physically active during leisure time.

Figure 2-6 *Percentage of the population age 12+ years who were physically inactive, by sex and age group, Canada, 2007*

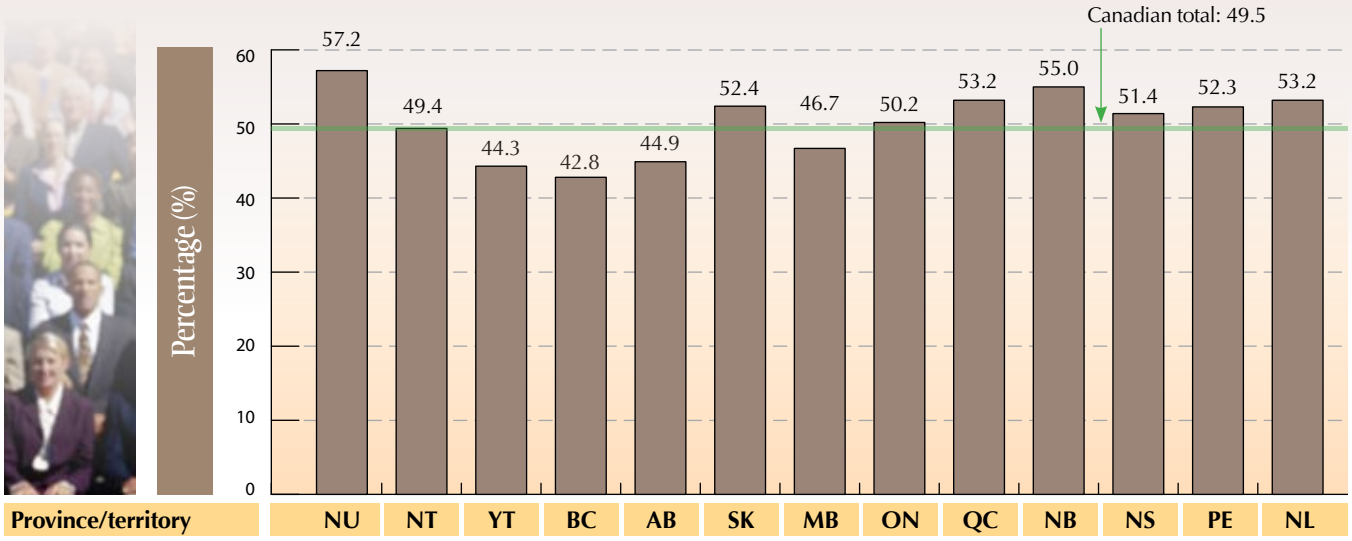


Age group (years)	12-14	15-19	20-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	26.4	40.3	47.7	52.5	53.3	54.6	53.4	57.0	69.3	78.6
Men	21.3	27.6	38.9	45.6	52.2	52.8	50.1	49.7	54.7	70.1
Both	23.8	33.9	43.2	49.0	52.7	53.7	51.8	53.5	63.4	75.7

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Across Canada, there was an east-west gradient in leisure time physical inactivity, with higher levels in the Atlantic provinces and lower levels in British Columbia (FIGURE 2-7). Residents in both Nunavut and the Northwest Territories also reported higher levels of physical inactivity during leisure time. The populations in the east and north may have more physical activity during their regular day, for example, fishing and hunting, and this may be a reason for less physical activity during leisure time.

Figure 2-7 *Percentage of the population age 12+ years who were physically inactive, by province/territory, Canada, 2007*



♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Healthy Nutrition

A healthy diet that can prevent CVD includes eating vegetables and fruit (seven to ten servings per day), whole grains, fish - especially fatty fish (two servings per week), nuts, seeds and legumes, and low intake of red meat and saturated fats. The avoidance of trans-fats and a low intake of sodium (less than 1,500 mg a day) are also important. While some nutrients such as potassium, folate and fibre may help to explain the benefits for CVD that are derived from a healthy diet, other dietary components (for example, sterols and other unidentified compounds) found in these foods are also important. To maintain a healthy weight, the number of calories consumed should balance a person's physical activity level. People should drink no more than two alcoholic beverages a day in order to avoid long-term unhealthy consequences of increased alcohol consumption.

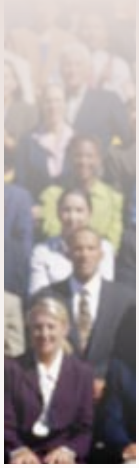
Vegetables and Fruit

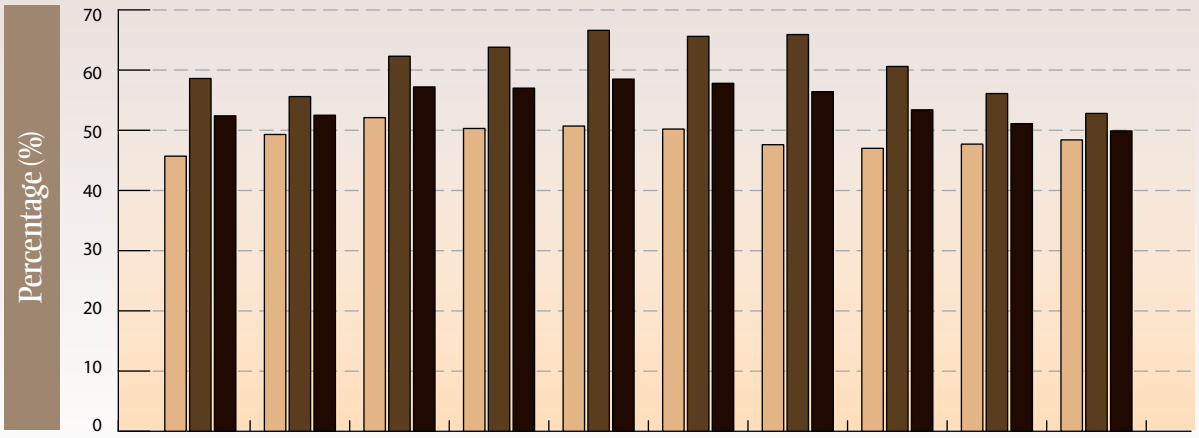
Based on INTERHEART data, regular physical activity together with an adequate daily consumption of vegetables and fruit could reduce the risk of heart attacks in the population by 40%. If not smoking is included, then the reduction would be 79%. Globally, inadequate consumption of vegetables and fruit contributed to 13.7% of heart attacks in the population, 17.8% for women and 10.3% for men.

In 2007, 56.2% of Canadians age 12+ (49.4% of girls and women and 63.3% of boys and men) reported consuming less than five daily servings of vegetables and fruit (TABLE 2-1). Compared to 2000 data, however, the situation has improved. Since 2000, inadequate consumption of vegetables and fruit has declined from 62.5% to 56.2%. In 2007, adults in the lower versus the higher income quintiles were more likely to consume fewer than five daily servings of vegetables and fruit (60.2% versus 53.1%).

Teenage boys and older men did much better than men ages 20 to 64 years (FIGURE 2-8). Much less variation was seen among girls and women, but women age 55+ did slightly better than those under age 55.

Figure 2-8 *Percentage of the population age 12+ years who consumed less than the recommended number of daily servings of vegetables and fruit, by sex and age group, Canada, 2007*



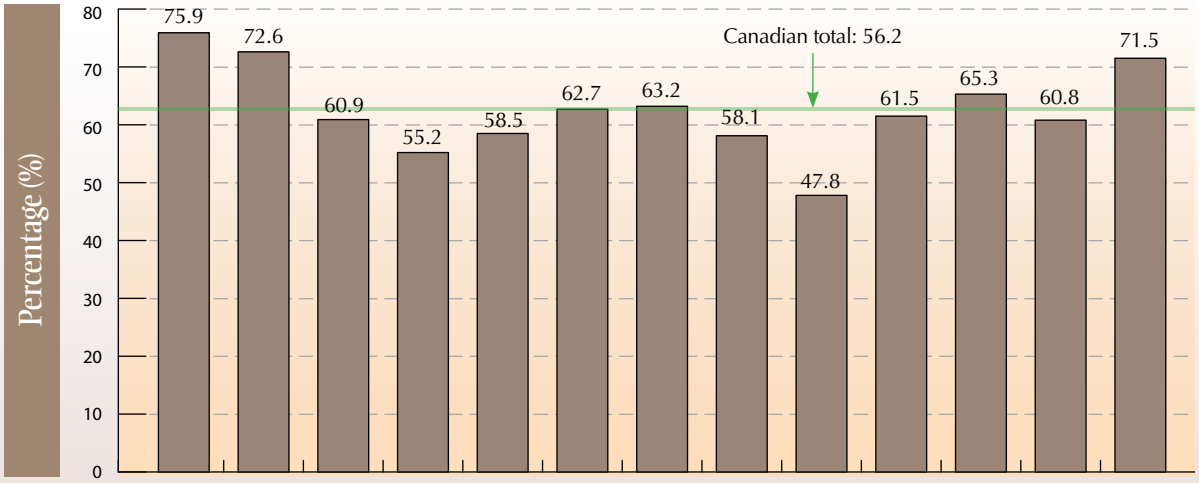


Age group (years)	12-14	15-19	20-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	45.7	49.3	52.1	50.3	50.7	50.2	47.6	47.0	47.7	48.4
Men	58.6	55.6	62.3	63.8	66.6	65.6	65.9	60.6	56.1	52.8
Both	52.4	52.5	57.2	57.0	58.5	57.8	56.4	53.4	51.1	49.9

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

A general east-west gradient, similar to that found with physical inactivity, was seen with vegetable and fruit consumption, with a higher proportion of individuals consuming less than five servings of vegetables and fruit in the Atlantic provinces, and a lower proportion in British Columbia (FIGURE 2-9). Individuals in Québec, British Columbia, Ontario, and Alberta reported the lowest levels of inadequate vegetable and fruit consumption. Nunavut, the Northwest Territories, and Newfoundland and Labrador had the highest proportions of individuals who consumed less than five daily servings of vegetables and fruit.

Figure 2-9 *Percentage of the population age 12+ years who consumed less than the recommended number of daily servings of vegetables and fruit, by province/territory, Canada, 2007*



Province/territory	NU	NT	YT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Breakfast

Eating breakfast alerts the body's metabolism to leave its fasting state and enter an active calorie-burning state, which helps the body become and remain active, both physically and mentally, throughout the day. The routine of a healthy breakfast is believed to promote better weight management, and increase mental performance and alertness. According to the 2004 Statistics Canada CCHS Cycle 2.2 survey on nutrition, about 10% of Canadians age four years and older reported that they had not had breakfast the day before they were interviewed. One in five men ages 19 to 30 years did not have breakfast the day before they were interviewed.

Snacks

Snacking is a common practice among Canadians. Children and adults under age 50 consumed more calories from snacks than were consumed at breakfast, and about the same amount of calories that were consumed at lunch (TABLE 2-7). This, in itself, is not a problem. However, when Canadians snack, almost half of the calories come from less healthy foods that are particularly high in fat, sugar, salt, and calories. Also, the practice of daily snacking can interfere with a realistic awareness of one's total daily caloric intake.

Children and teens ages 4 to 18 obtained more calories from snacking (27.4%) than did adults age 19+ (22.6%). Children and teens in the lowest income quintile obtained fewer calories during the day from snacking compared to the other income quintiles, while adults in the lowest income quintile obtained more calories during the day from snacking compared to the other income quintiles.

Table 2-7

Self-reported distribution of calories by meal, by sex and age group, Canada, 2004

Age group (years)	Meal Percentage (%)			
	Breakfast	Lunch	Dinner	Snacks
GIRLS/WOMEN				
4 – 8*	18.0	25.6	29.5	26.8
9 – 13	17.1	24.7	31.9	26.2
14 – 18	16.4	23.1	32.5	27.9
19 – 30	17.7	23.4	33.1	25.8
31 – 50	17.0	22.6	37.1	23.3
51 – 70	19.1	24.7	36.8	19.4
71+	21.2	27.5	34.7	16.6
BOYS/MEN				
4 – 8*	18.0	25.6	29.5	26.8
9 – 13	18.0	24.9	30.9	26.3
14 – 18	16.4	22.5	31.5	29.6
19 – 30	16.4	22.2	34.9	26.5
31 – 50	17.1	24.9	35.4	22.6
51 – 70	17.6	23.1	37.6	21.7
71+	21.9	25.8	36.1	16.3

♦ * The 4 to 8 year age group has combined outcomes for both sexes. ♦ Note: - The territories are excluded from this analysis. ♦ Source: Statistics Canada, using data from the Canadian Community Health Survey, Cycle 2.2 Nutrition (CANSIM table 105-2012).

Eating Fast Food

In 2004, a quarter of Canadian adults reported that on the day preceding their interview they had consumed at least some food prepared in a fast food restaurant. The percentage was highest among women and men ages 19 to 30 years (34.3% among women and 39.3% among men) (TABLE 2-8).

Children and seniors were more likely than those in other age groups to have all their meals at home. The concern about eating in a fast food restaurant is that the food choices may not be healthy. In addition, when food is prepared at home, people are usually more aware of what the food contains, how it is prepared, and how it is cooked. For example, at home, they themselves can control how much salt and fat are added to food, including during cooking and preparation.

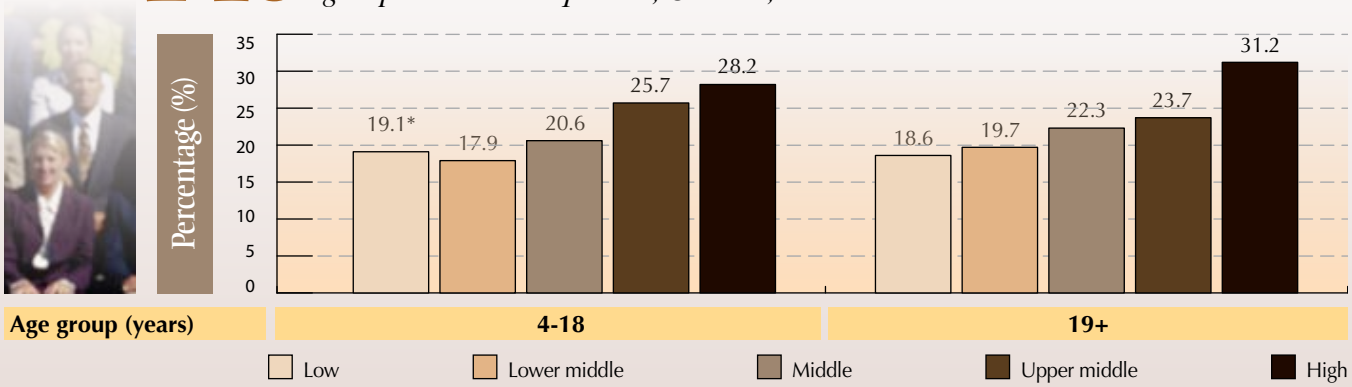
Table 2-8 *Percentage of food prepared at various locations, by sex and age group, Canada, 2004*

Age group (years)	Location of food preparation Percentage (%)		
	At home only	At least some fast food	Other combination
GIRLS/WOMEN			
4 – 8*	60.8	18.9	20.4
9 – 13	60.2	19.4	20.4
14 – 18	44.3	34.5	21.2
19 – 30	43.1	34.3	22.6
31 – 50	48.5	28.1	23.4
51 – 70	61.2	15.4	23.4
71+	75.7	8.6	15.7
BOYS/MEN			
4 – 8*	60.8	18.9	20.4
9 – 13	54.9	22.9	22.3
14 – 18	44.6	32.6	22.8
19 – 30	37.9	39.3	22.7
31 – 50	44.8	29.8	25.4
51 – 70	57.3	20.0	22.7
71+	72.1	10.0	17.9

♦ * The 4 to 8 year age group has combined outcomes for both sexes. ♦ Notes: - The territories are excluded from this analysis. - The term 'at least some fast food' includes combinations of those who ate fast food only, fast food and food at home, and fast food and 'other'. ♦ Source: Statistics Canada, using data from the Canadian Community Health Survey, Cycle 2.2 Nutrition (Table 9).

People in the lower income quintile were less likely to report eating food prepared at a fast food establishment than those in the higher income quintile (FIGURE 2-10). For adults age 19+, 18.6% in the lowest income quintile compared to 31.2% in the highest income quintile reported eating food prepared at a fast food establishment.

Figure 2-10 *Percentage of the population age 4+ years who ate at least some fast food, by age group and income quintile, Canada, 2004*



♦ * Marginal variance estimate – data should be interpreted with caution. ♦ Notes: - The territories are excluded from this analysis. - The term 'at least some fast food' includes combinations of those who ate fast food only, fast food and food at home, and fast food and 'other'. ♦ Source: Statistics Canada, using data from the Canadian Community Health Survey, Cycle 2.2 Nutrition (Table 9).

Fat Intake

Both the total amount of fat in the diet and the type of fat are important to prevent CVD. For children and teens below age 19, the recommended total daily fat intake is between 25% and 35% of caloric intake. For adults age 19 years and older, the recommended fat intake is between 20% and 35% of caloric intake. It is also recommended that adults minimize the contribution of saturated fats and avoid trans-fat intake. *Canada's Food Guide* recommends people on a heart healthy diet have 30% or less of their total calories from fat.

Canadians have reduced their average daily intake of fat since 1972, from 40% of total calories to about 31.3% in 2004. However, in 2004, one-fifth of Canadians still consumed more than the total recommended calories from fat (based on the 35% upper limit). The proportion of the population that exceeded the recommended daily fat intake increased up to age 50 and then began to decrease (TABLE 2-9). About one in four adults ages 31 to 50 years consumed more than 35% of their total calories from fat. A higher proportion of men than women exceeded the recommended upper limit of daily fat intake.

Most fat consumed by adults comes from the meat and alternatives group (31.6% of all daily fat intake). Sandwich foods accounted for 15.9% of daily fat intake while sweet baked goods accounted for 8.5%. A reduction in fat intake could come from reducing the consumption of any of these foods.

Income influences consumption of fat in the diet. Among adults age 19+ years, one in four of the upper-middle and high income quintiles exceeded the daily limit of recommended fat intake, as compared to one in seven (15%) of the lower income quintile.

Table 2-9 *Percentage of the population age 4+ years who exceeded the acceptable macronutrient distribution range of fat intake, by sex and age group, Canada, 2004*

Age group (years)	Exceeded recommended daily fat intake of 35% of total calories Percentage (%) (95% confidence interval)	
GIRLS/WOMEN		
4 – 8*	6.8	(2.9-10.6)†
9 – 13	11.5	(6.0-17.0)†
14 – 18	13.5	(6.1-20.8)†
19 – 30	‡	
31 – 50	28.1	(22.2-34.0)
51 – 70	22.5	(17.6-27.5)
71+	16.7	(11.9-21.5)
BOYS/MEN		
4 – 8*	6.8	(2.9-10.6)†
9 – 13	11.0	(5.5-16.5)†
14 – 18	15.6	(9.7-21.6)†
19 – 30	17.4	(9.3-25.5)†
31 – 50	27.3	(21.0-33.6)
51 – 70	23.0	(17.1-28.8)
71+	21.3	(15.8-26.8)

♦ * The 4 to 8 year age group has combined outcomes for both sexes. ♦ † Marginal variance estimate – data should be interpreted with caution. ♦ ‡ Value suppressed due to small sample size. ♦ Note: - The territories are excluded from this analysis. ♦ Source: Statistics Canada, using data from the Canadian Community Health Survey, Cycle 2.2 Nutrition (CANSIM table 105-2014).

Overweight *and* Obesity

Excessive weight increases the risk for CVD by increasing the risk of developing diabetes and high blood pressure, both important risk factors for CVD. Visceral fat, which is found in the abdomen and surrounding vital organs, is also a direct and independent risk factor for CVD.

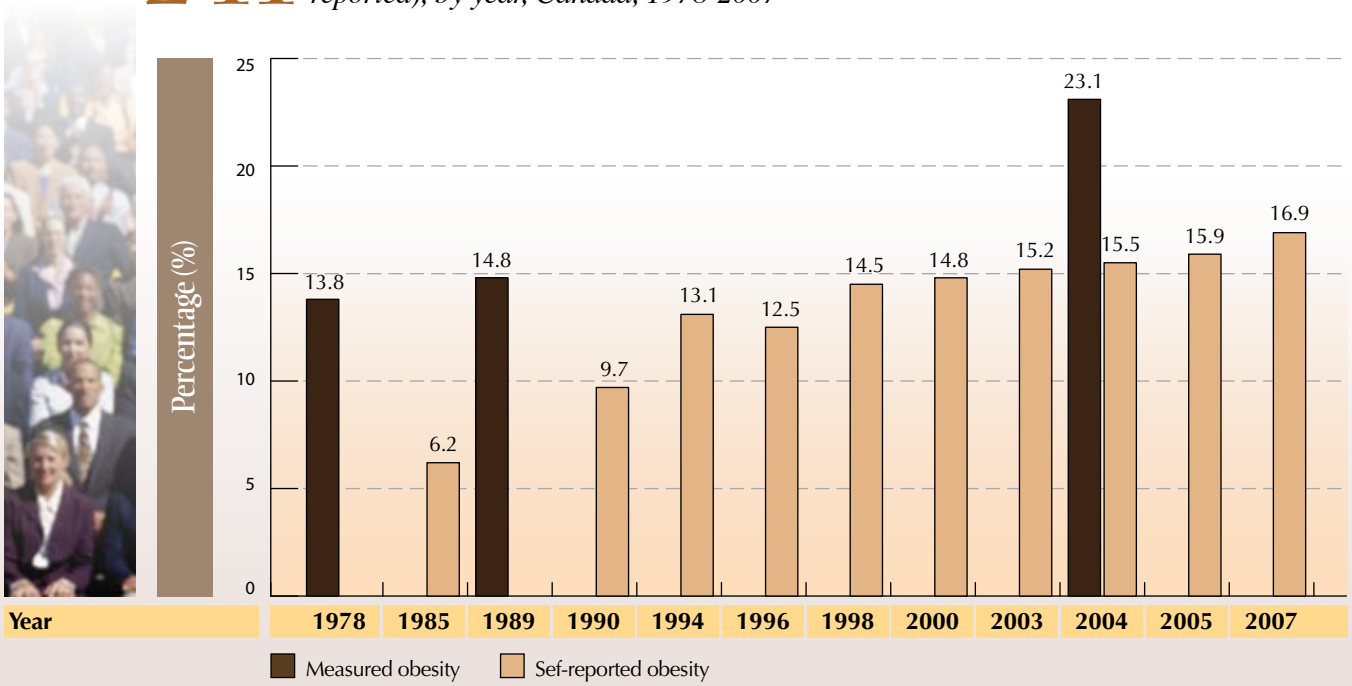
How much an individual weighs relates to the food and drink taken in, how the body processes them, and by activity level. There is a strong genetic component in how the body processes food and in triggers for eating. Individuals with a predisposition to being overweight have a more difficult time than others to achieve that intricate healthy balance between what they eat and drink and the amount of physical activity they undertake.

The environment in which we live influences not only what we eat and drink but also our level of physical activity. Motor vehicles are the primary mode of transport, not walking or biking. Eating in restaurants usually tempts us into eating larger portions and higher caloric food, while the caloric and nutritional content of restaurant food is not always available to consumers. At home, higher caloric carbohydrates like pasta often are selected over vegetables and fruit because they are less expensive. Workplace and school cafeterias do not always offer healthy food choices. Unhealthy foods are marketed to children at a higher rate than healthy foods. So while individual responsibility is important, reducing obesity in the population will require much more than education. Workplace and community changes are also needed to promote healthy weights in the population.

Body mass index (BMI), which is related to both height and weight, is one way to measure excessive weight. The WHO defines *overweight* as having a BMI of 25.0 to 29.9, and *obese* as a BMI greater than or equal to 30.0. Another measure is weight that is carried around the abdomen, or abdominal obesity. If the waist measures more than the hips (more specifically, if the waist to hip ratio is greater than one), then the risk of CVD increases.

Abdominal obesity was measured by waist to hip ratio in the international INTERHEART study to assess the contribution of CVD risk factors, separately as well as collectively, to the risk of a heart attack within the population. After adjusting for all other risk factors, 20.1% of the risk of a heart attack was attributable to abdominal obesity. In high- and middle-income countries like Canada, abdominal obesity contributed more to the risk of a heart attack than smoking at the population level. This is because in Canada, obesity is now much more prevalent than smoking.

Figure 2-11 *Percentage of the population age 18+ years who were obese (measured and self-reported), by year, Canada, 1978-2007*

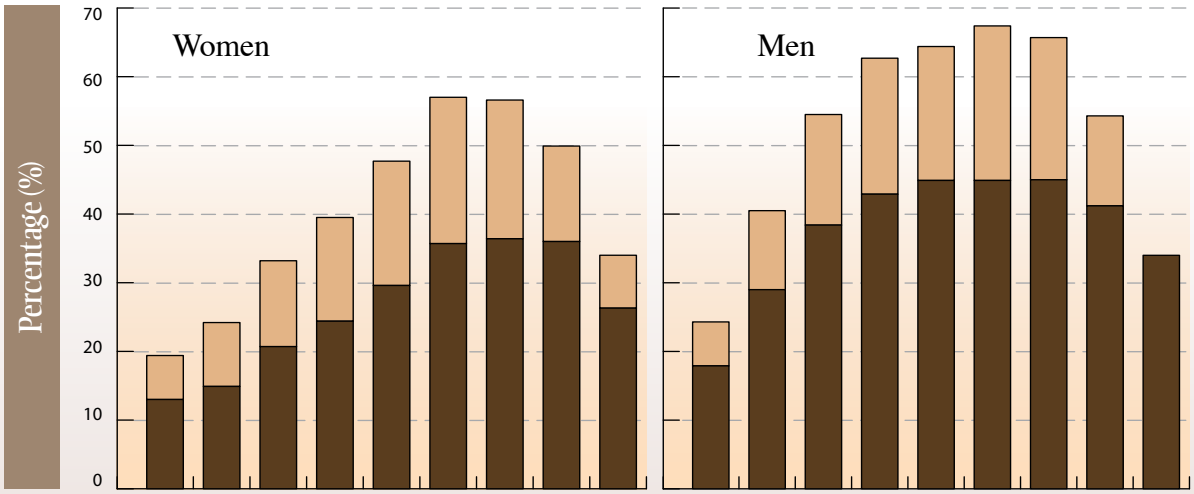


♦ Note: - The territories are excluded from this analysis. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Using 2004 measured data, 51.7% of women and 66.8% of men were overweight or obese In 2007, 43.1% of women and 58.8% of men were considered overweight or obese (BMI ≥25.0), based on self-reported height and weight. Both measured and self-reported obesity among the population age 18+ years showed a steady increase between 1978 and 2007, with a 67.4% increase in measured obesity during that time (FIGURE 2-11). It should be noted that people tend to underreport weight and overestimate height when asked. This is the reason why measured levels of obesity are higher compared to self-reported data.

Becoming overweight or obese begins early in life. In 2007, 13.9% of children and teens age 12 to 19 were considered to be overweight and 5.0% were obese. This is a 4.8% decrease in overweight from 2005, but a 2.0% increase in obesity from 2005. Although the proportion of women and men who were obese was similar, a much higher proportion of men than women was overweight (FIGURE 2-12). Over one in five women and one in three men ages 18 to 24 years were considered overweight or obese in 2007. The prevalence of overweight and obesity increased with age. Women ages 55 to 64 years were 2.1 times more likely to be overweight or obese than younger women ages 18 to 24 years. Among men, being overweight or obese was 1.9 times as high among those ages 55 to 64 than in the younger age group. In women, obesity was highest in the 45 to 74 year age range, with 19.7% of women self-reported as obese. In men, obesity was highest in the 35 to 74 year age range, with 20.5% of men self-reported as obese.

Figure 2-12 *Percentage of the population age 18+ years who were overweight or obese, by sex and age group, Canada, 2007*

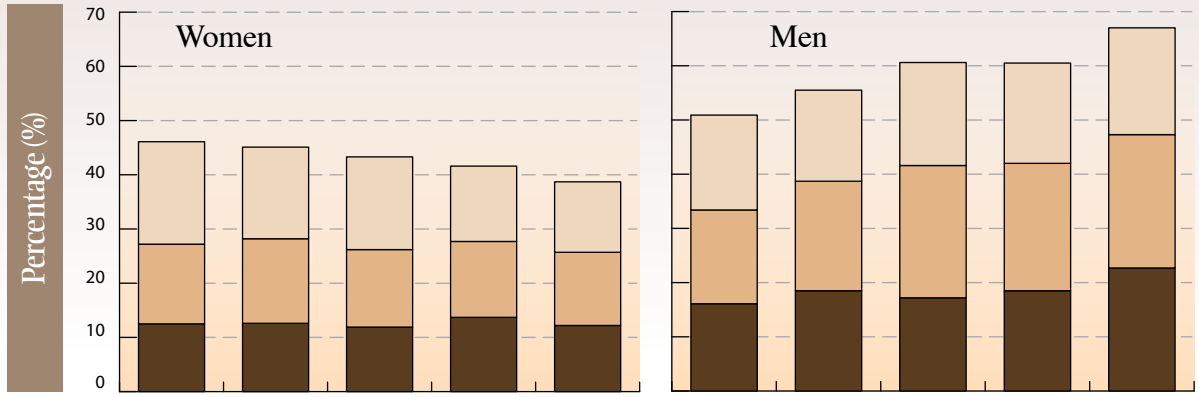


Age group (years)	18-19	20-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	18-19	20-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
Obese (BMI ≥30)	6.4	9.3	12.5	15.1	18.1	21.3	20.2	13.9	7.7	6.4*	11.5	16.1	19.8	19.5	22.5	20.7	13.1	†
Overweight (BMI 25 to <30)	13.0*	14.9	20.7	24.4	29.6	35.7	36.4	36.0	26.3*	17.9	29.0	38.4	42.9	44.9	44.9	45.0	41.2	34.0*

♦ * Marginal variance estimate – data should be interpreted with caution. ♦ † Value suppressed due to small sample size. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

A much higher proportion of women in the lowest income quintile was obese compared to high income women (18.9% versus 13.0%) (FIGURE 2-13). The proportion that was overweight was similar among women of various income quintiles. In contrast, men in the high income quintile were more likely than men in the low income quintile to be both overweight and obese.

Figure 2-13 *Percentage of the population age 18+ years who were overweight or obese, by sex and income quintile, Canada, 2007*

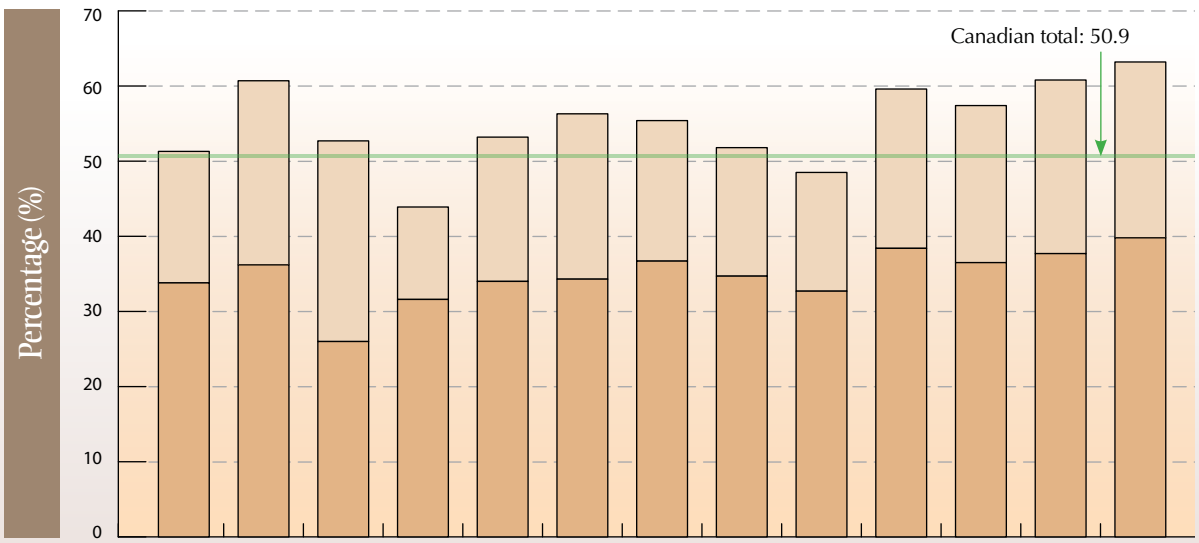


Income adequacy quintile	Low	Lower middle	Middle	Upper middle	High	Low	Lower middle	Middle	Upper middle	High
Obese (BMI ≥30)	18.9	16.9	17.1	13.9	13.0	17.5	16.8	19.0	18.5	19.7
More overweight (BMI 27 to <30)	14.7	15.6	14.3	14.0	13.5	17.3	20.2	24.4	23.5	24.6
Less overweight (BMI 25 to <27)	12.5	12.6	11.9	13.7	12.2	16.1	18.5	17.2	18.5	22.7

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Across Canada, the proportion of the population age 18+ years that was overweight or obese was higher in the Atlantic provinces and the territories, and was lower in British Columbia, Ontario and Québec (FIGURE 2-14). This is a similar pattern to that of other risk factors, such as smoking and physical inactivity.

Figure 2-14 *Percentage of the population age 18+ years who were overweight or obese, by province/territory, Canada, 2007*



Province/territory	NU*	NT	YT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL

Obese (BMI ≥30) Overweight (BMI 25 to<30)

♦ * Marginal variance estimate for obesity data – data should be interpreted with caution. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Diabetes

Diabetes is a significant risk factor for the development of high blood pressure, stroke, heart disease, and vascular disease. The longer an individual has diabetes, the greater the risk of developing CVD. In addition, individuals with CVD have a higher risk of dying from CVD if they also have diabetes.

Diabetes mellitus, identified by high blood sugar, includes several types. Type 1 diabetes develops when the body's immune system destroys the cells which make insulin. Type 2 diabetes usually begins with insulin resistance, in which the body's cells are unable to use insulin properly, and is eventually followed by a declining ability to produce insulin. Another type of diabetes, known as gestational diabetes, may occur during pregnancy.

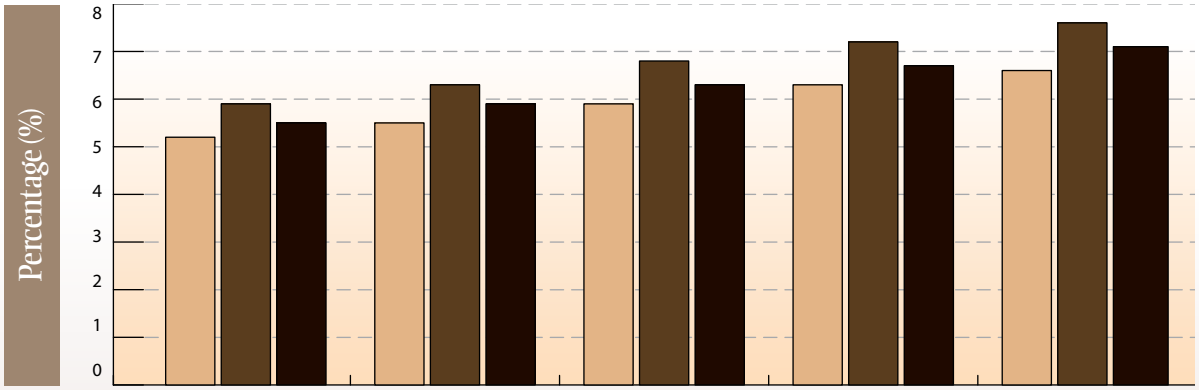
Maintaining a healthy weight through healthy nutrition and regular physical activity can help prevent the onset of type 2 diabetes. Early recognition and effective management of type 1 and type 2 diabetes, including the management of glucose, high blood pressure, dyslipidemia, physical activity, and abdominal obesity, can decrease the risk of heart disease and other diabetes-associated complications, such as peripheral vascular disease, amputation, vision problems, and kidney failure.

The INTERHEART study identified that if diabetes were eliminated from the global population, the rate of heart attack could decrease by 19.1% among women and 10.1% among men globally. If no one smoked, had high blood pressure, or had diabetes, the rate of heart attack in the population could be halved.

In 2004/05, 7.1% of the population aged 20+ (6.6% of women and 7.6% of men) were diagnosed with type 1 or type 2 diabetes by a health professional. Over the age of 65, about one in five Canadians had diabetes. The prevalence is likely underestimated because of undiagnosed diabetes in the population.

Between 2000/01 and 2004/05, the proportion of Canadian adults who had been diagnosed with diabetes by a health professional increased by 26.9% among women and by 28.8% among men (FIGURE 2-15).

Figure 2-15 *Percentage of the population age 20+ years who had diabetes, by sex and year, Canada, 2000/01-2004/05*

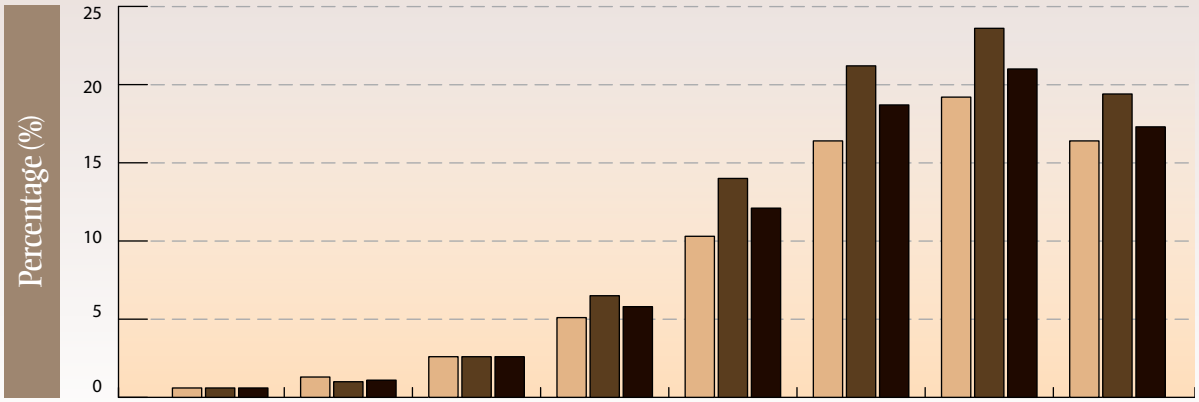


Year	2000/01	2001/02	2002/03	2003/04	2004/05
Women	5.2	5.5	5.9	6.3	6.6
Men	5.9	6.3	6.8	7.2	7.6
Both	5.5	5.9	6.3	6.7	7.1

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the National Diabetes Surveillance System, which was contributed by all provinces and territories as of October 31, 2007.

In 2004/05, the prevalence of diabetes among children and teens (ages two to 19) was 0.3%. The prevalence was similar in women and men up to age 44 years (FIGURE 2-16). After age 45, a greater proportion of men than women had diabetes. In the 75 to 84 year age group, 23.6% of men and 19.2% of women had diabetes.

Figure 2-16 *Percentage of the population age 20+ years who had diabetes, by sex and age group, Canada, 2004/05*

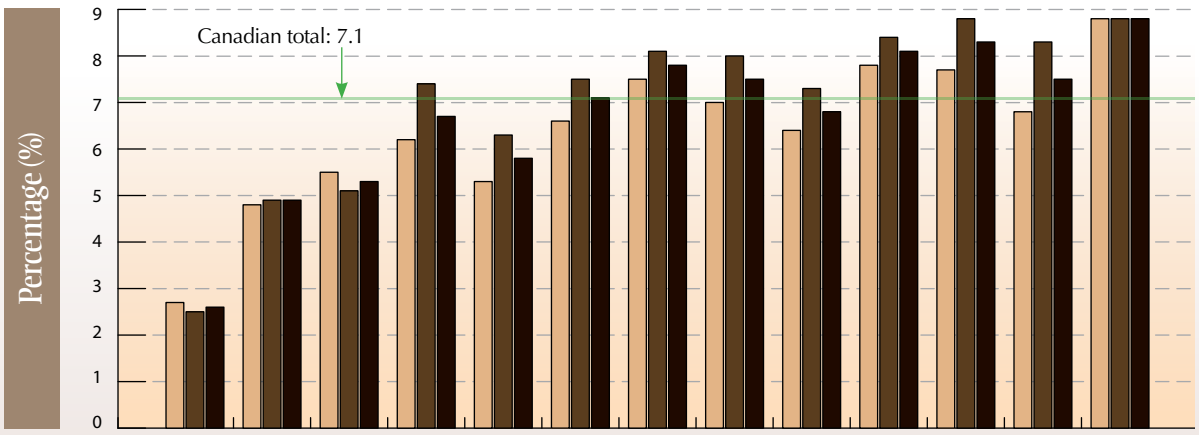


Age group (years)	20-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	0.6	1.3	2.6	5.1	10.3	16.4	19.2	16.4
Men	0.6	1.0	2.6	6.5	14.0	21.2	23.6	19.4
Both	0.6	1.1	2.6	5.8	12.1	18.7	21.0	17.3

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the National Diabetes Surveillance System, which was contributed by all provinces and territories as of October 31, 2007.

In 2004/05, the proportion of the population that reported having diabetes in the eastern provinces was higher than for Canada as a whole (FIGURE 2-17). This reflects the higher rates of obesity in these provinces. The lowest proportions were in the northern territories. The Inuit have a low prevalence of diabetes, which may contribute to the lowest rates of diabetes in Canada being within the Northwest Territories and Nunavut.

Figure 2-17 *Crude prevalence rates of diagnosed diabetes among the population age 20+ years, by sex and province/territory, Canada, 2004/05*



Province/territory	NU	NT	YT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
Women	2.7	4.8	5.5	6.2	5.3	6.6	7.5	7.0	6.4	7.8	7.7	6.8	8.8
Men	2.5	4.9	5.1	7.4	6.3	7.5	8.1	8.0	7.3	8.4	8.8	8.3	8.8
Both	2.6	4.9	5.3	6.7	5.8	7.1	7.8	7.5	6.8	8.1	8.3	7.5	8.8

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the National Diabetes Surveillance System, which was contributed by all provinces and territories as of October 31, 2007.

High Blood Pressure

High blood pressure, or hypertension, doubles or triples the risk for stroke, ischemic heart disease, peripheral vascular disease, and heart failure. In a blood pressure measurement, the top number is the systolic pressure – the pressure created by the heart as it pumps blood out to the body. The bottom number is the diastolic pressure – the pressure remaining in the blood vessels between heart pumps.High blood pressure is defined as systolic blood pressure greater or equal to 140 mmHg or diastolic blood pressure greater or equal to 90 mmHg.

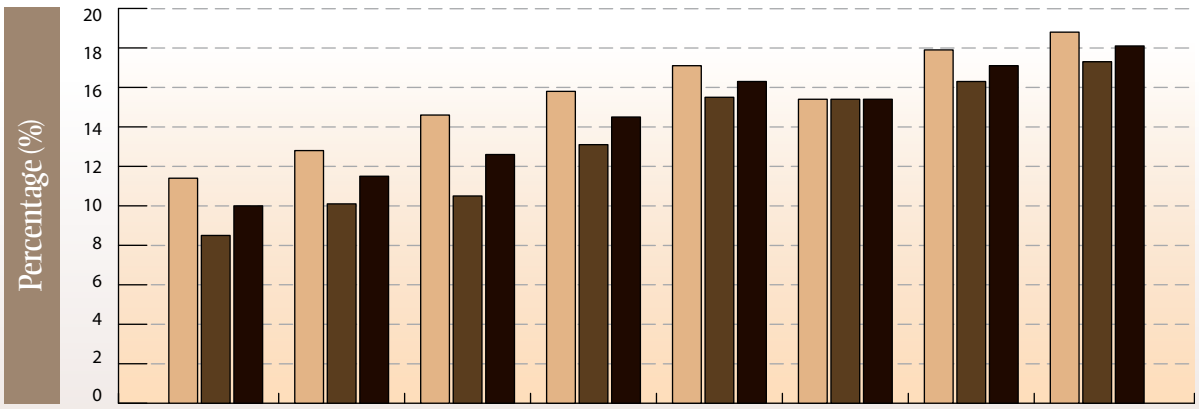
High blood pressure was established as a leading risk factor for CVD in the American Framingham Heart Study. The INTERHEART study, which focused on the population attributable risk of risk factors for first heart attack, found that if everyone in the population had normal blood pressure levels then the risk of heart attack at the population level could be reduced by 35.8% among women and 19.5% among men.

Individuals who carry excess weight, who are physically inactive, who are heavy drinkers of alcohol, or who have excessive salt intake are more likely to develop high blood pressure. It is also commonly associated with other metabolic cardiovascular risk factors, such as insulin resistance, diabetes, obesity, dyslipidemia, and hyperuricemia (high levels of uric acid in the blood).

High blood pressure is often silent having few, if any, symptoms. The Canadian Hypertension Society (www.hypertension.ca) recommends that all adults have their blood pressure checked every year, or, if additional risk factors (such as diabetes or CVD) are present, more frequently. If the initial blood pressure reading is high, then follow-up readings within the next six months should be performed to see if high blood pressure actually exists since it is not uncommon for a person with normal blood pressure to have occasional high readings. When the average blood pressure of several readings taken over a period of time is high, a diagnosis of high blood pressure is established. Research evidence strongly supports the benefits of treating high blood pressure to reduce the incidence of stroke, heart attack, ischemic heart disease, vascular disease, renal diseases, heart failure, and overall death rate.

In 2007, 18.1% of the adult population (18.8% of women and 17.3% of men) reported having had high blood pressure diagnosed by a health care professional (FIGURE 2-18). Between 1994 and 2007, the prevalence of self-reported high blood pressure diagnosed by a health care professional rose from 10.0% to 18.1%. This increase may be, in part, because more people are being screened and are having their high blood pressure diagnosed.

Figure 2-18 *Percentage of the population age 20+ years who had high blood pressure, by sex and year, Canada, 1994-2007*

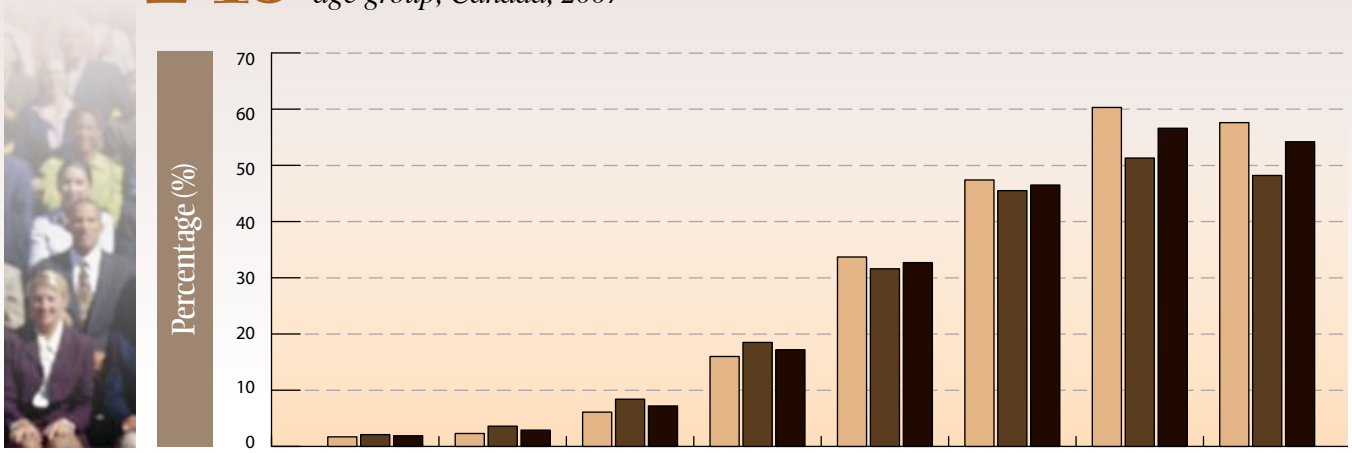


Year	1994	1996	1998	2000	2002	2004	2005	2007
Women	11.4	12.8	14.6	15.8	17.1	15.4	17.9	18.8
Men	8.5	10.1	10.5	13.1	15.5	15.4	16.3	17.3
Both	10.0	11.5	12.6	14.5	16.3	15.4	17.1	18.1

♦ Note: Unlike other high blood pressure figures, one question was used to derive this variable in order to allow for historical comparisons. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

The proportion of the population that reported having high blood pressure increased with age (FIGURE 2-19). Up to age 74, the proportions for both men and women were similar, but after age 74, the prevalence of high blood pressure was higher among women than among men.

Figure 2-19 *Percentage of the population age 20+ years who had high blood pressure, by sex and age group, Canada, 2007*

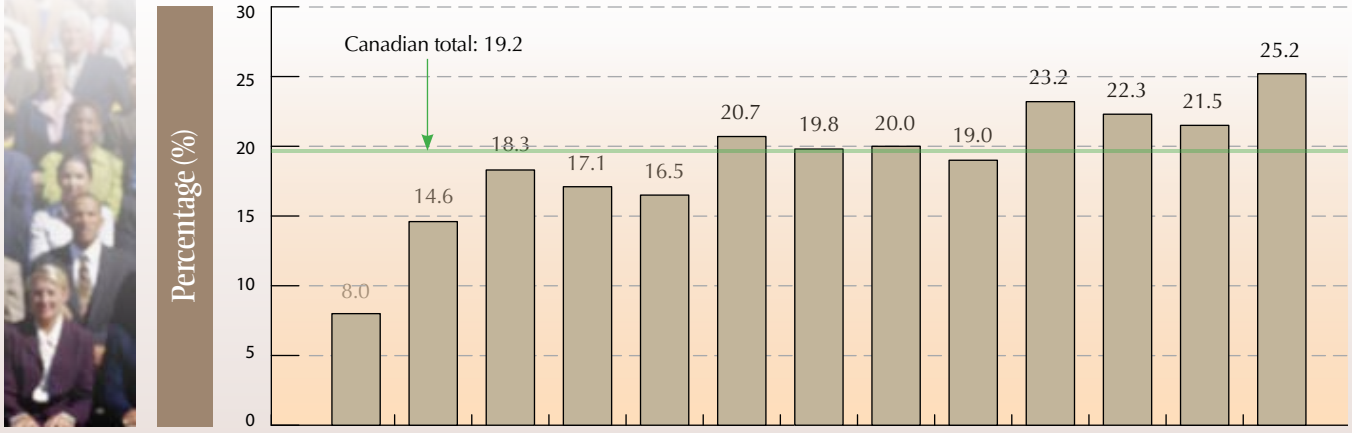


Age group (years)	20-24	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	1.7*	2.3	6.1	16.0	33.7	47.4	60.3	57.6
Men	2.1*	3.6	8.4	18.5	31.6	45.5	51.3	48.2
Both	1.9*	2.9	7.2	17.2	32.7	46.5	56.6	54.2

♦ * Marginal variance estimate – data should be interpreted with caution. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

In 2007, the Atlantic provinces had a higher proportion of individuals reporting a diagnosis of or medication for high blood pressure than did the other parts of Canada (FIGURE 2-20). The proportions in British Columbia, Alberta, and all of the territories were lower than in other provinces. This pattern is consistent with higher rates of obesity in the Atlantic provinces.

Figure 2-20 *Percentage of the population age 20+ years who had high blood pressure, by province/territory, Canada, 2007*



Province/territory	NU	NT	YT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL

♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

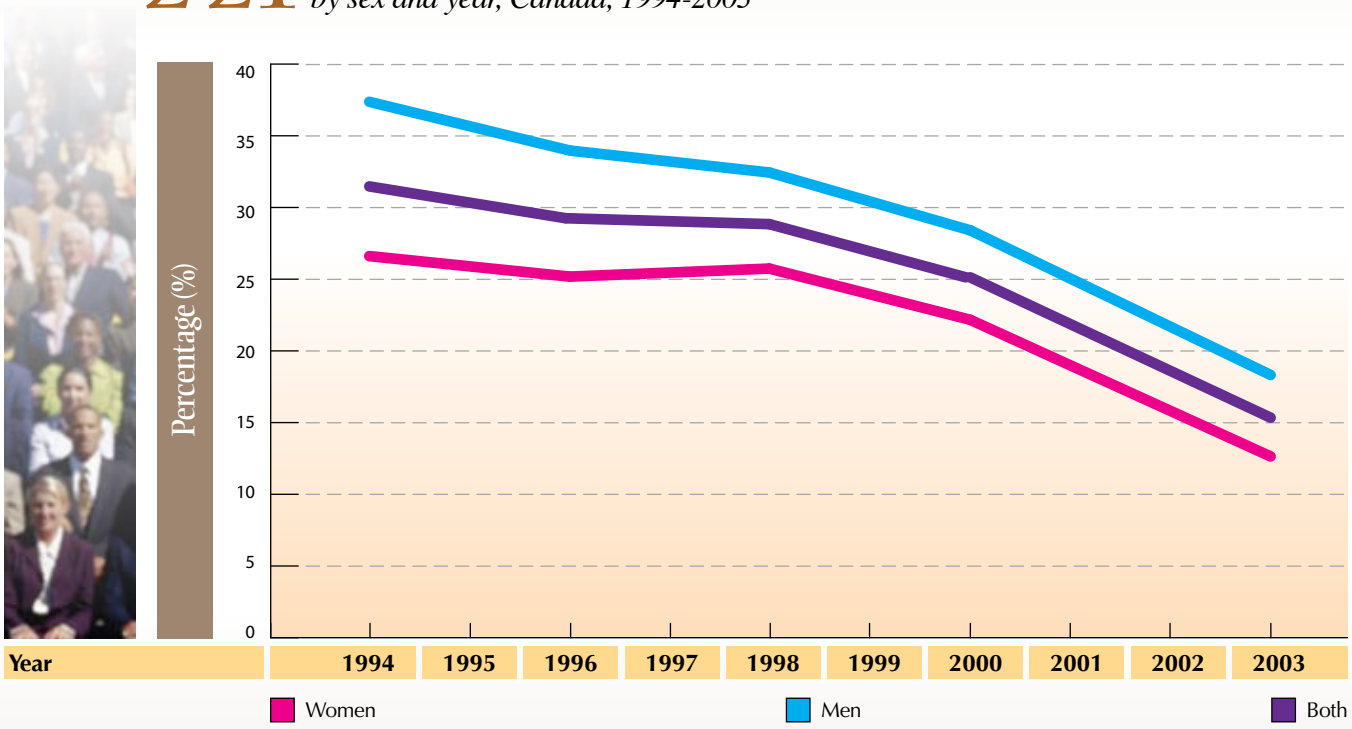
Treatment of High Blood Pressure

In 1999, the Canadian Hypertension Education Program (CHEP) was created through a major initiative to improve the management of high blood pressure in Canada. The CHEP develops clinical practice guidelines for high blood pressure screening and treatment, provides education programs, and tracks high blood pressure in the population.

From 1994 to 1998, there was a gradual reduction in the proportion of people with self-reported high blood pressure who were not treated with antihypertensive drugs (FIGURE 2-21). However, from 1999 onwards, a much greater decrease has been seen corresponding to the creation of the CHEP program. Also, since 1999, the difference in prevalence between men and women has been closing. It has long been suspected that some of the difference seen in rates of high blood pressure between men and women was a reflection of greater visits to the physician by women than by men. More education has likely shifted some of this imbalance.

Since 1999 there has been an increase in the use of anti-hypertensive therapy following a diagnosis of high blood pressure based on analysis of Statistics Canada, National Population Health Survey data. In addition, subsequent to the initiation of the CHEP program in 1999, there has been an improvement in the continued use of hypertension drug therapy two years following an initial diagnosis.

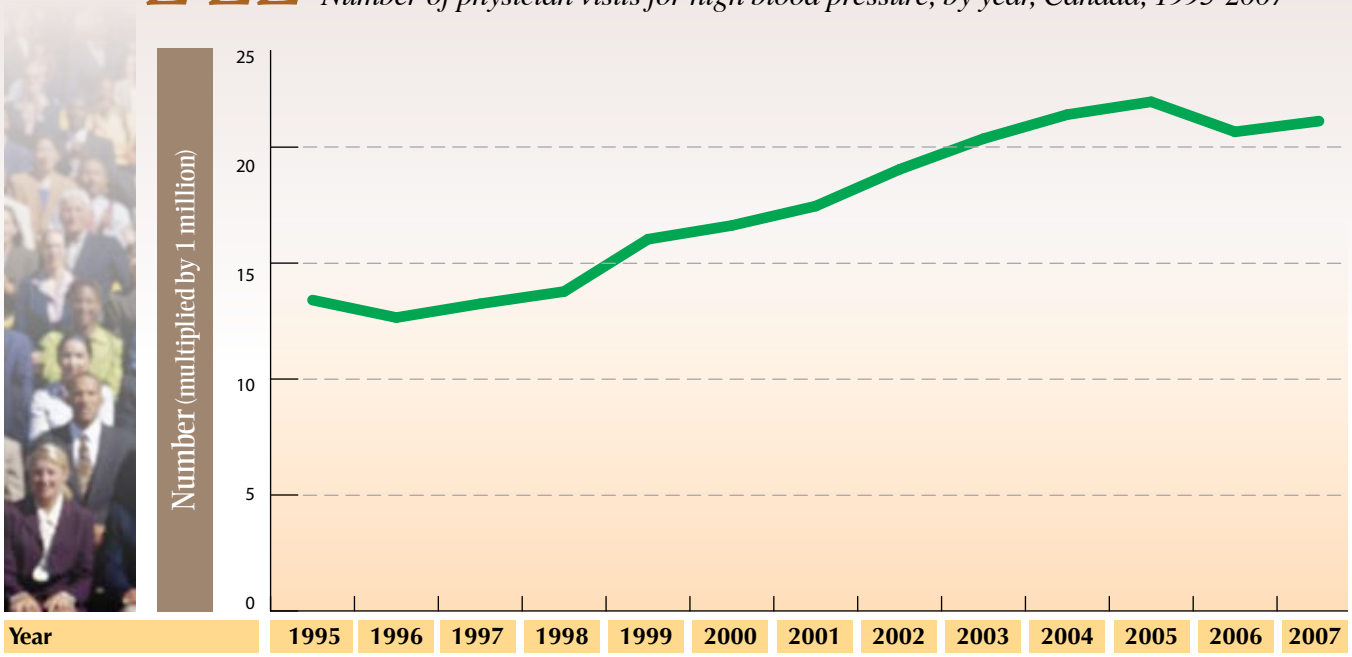
Figure 2-21 *Percentage of the population with high blood pressure who were aware but not treated, by sex and year, Canada, 1994-2003*



♦ Source: The Canadian Hypertension Education Program, using data from the National Population Health Survey and Canadian Community Health Survey (Statistics Canada).

The number of physician visits for high blood pressure has been increasing steadily since 1995 (FIGURE 2-22). In 2007, 21.1 million visits to community physicians in Canada were for high blood pressure. In addition, there has been a 72.4% increase in antihypertensive prescriptions dispensed (both single and combination drugs) in Canada between 1998 and 2004 (from 15,390.9 prescriptions per 100,000 to 26,535.6 prescriptions per 100,000 population age 20+).

Figure 2-22 *Number of physician visits for high blood pressure, by year, Canada, 1995-2007*



♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Disease and Therapeutic Index Database (IMS Health).

Salt *and* Sodium

In 2004, the National Academy of Sciences (United States) was commissioned by the American and Canadian governments to update nutritional recommendations for dietary sodium.

The most recent dietary reference intake states that an adequate adult dietary sodium intake should be below 1,500 milligrams (mg) per day for optimal health. Canada's Food Guide recommends specific amounts that vary by age (Table 2-10). Salt is actually composed of 40% sodium and 60% chloride by weight. When the term 'salt' is used from a health perspective, it refers only to the sodium content in the salt.

Reduced sodium intake lowers blood pressure. The CHEP recommends a dietary sodium intake of less than 100 mmol/day (2300 mg/day) for the prevention of high blood pressure. The 2004 CCHS 2.2 Nutrition Survey found that adult Canadians consumed on average 3,100 mg of sodium per day, excluding the salt added in cooking and at the table, which is in excess of the recommended intake of salt. In every age group, more than one in two individuals consumed more than the recommended tolerable intake of sodium (TABLE 2-10). It has been estimated that from 10% to 20% of dietary sodium is added while cooking or eating at the table; thus adult Canadians are most likely consuming an average of approximately 3,500 mg per day. Processed foods are the main source of sodium for most people, accounting for 77% of average daily sodium intake. Another 12% occurred naturally in foods, and salt added during cooking (6%) or at the table (5%) make up the remainder.

Table 2-10 *Percentage of the population age 1+ years with usual sodium intake above the tolerable upper intake level, by sex and age group, Canada, 2004*

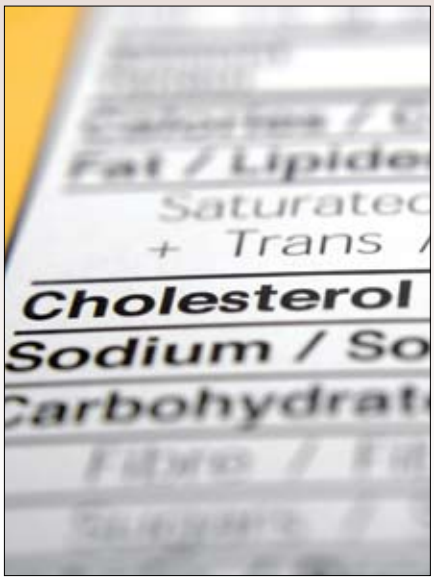
Age group (years)	Percentage above tolerable upper intake level (95% confidence interval)	Tolerable upper intake level (mg)
GIRLS/WOMEN		
1 – 3	77.1 (71.6 – 82.5)	1,500
4 – 8	92.7* (88.8 – 96.5)	1,900
9 – 13	83.0† (77.8 – 88.1)	2,200
14 – 18	82.0† (76.8 – 87.2)	2,300
19 – 30	76.3† (66.5 – 86.2)	2,300
31 – 50	72.1† (66.3 – 78.0)	2,300
51 – 70	62.3† (56.2 – 68.4)	2,300
71+	45.1*† (37.6 – 52.6)	2,300
BOYS/MEN		
1 – 3	77.1 (71.6 – 82.5)	1,500
4 – 8	92.7* (88.8 – 96.5)	1,900
9 – 13	96.9 (94.7 – 99.1)	2,200
14 – 18	97.1 (95.4 – 98.8)	2,300
19 – 30	98.8 (96.9 – 100)	2,300
31 – 50	91.7 (87.3 – 96.1)	2,300
51 – 70	85.7 (81.5 – 89.9)	2,300
71+	76.9 (70.0 – 83.7)	2,300

♦ * Significantly different from estimate for preceding age group of the same sex ($p < 0.05$). ♦ † Significantly different from estimate for males in the same age group ($p < 0.05$). ♦ Notes: - Excludes salt added at the table or while cooking. - The territories are excluded from this analysis. ♦ Source: Garriguet, D. (2007). Sodium consumption at all ages. *Health Reports*, 18(2):47-52.

A recent Canadian study showed the potential to substantially reduce the prevalence and improve the management of high blood pressure and reduce health costs in Canada by reducing average population dietary intakes of sodium. An average reduction in dietary sodium intake of 1,840 mg per day could decrease high blood pressure prevalence by 30.3%, resulting in one million fewer Canadians with high blood pressure.

The study also estimated that the reduction in sodium intake would lead to a 84.8% improvement in the rate of treated and controlled high blood pressure in Canada, 1.3 million fewer community physician visits by Canadians per year, and a cost savings from drugs, office visits, and laboratory testing directly related to high blood pressure of approximately $430 million per year. The extent of the reduction in dietary sodium that is necessary to result in these benefits would bring intake levels in line with the dietary recommendations adopted by Health Canada (from the current average 3,100 mg per day to the recommended 1,500 mg per day). The benefits listed above are only from high blood pressure, and do not account for the expected associated reduction in CVD and its related costs as well. Dietary sodium reduction may also reduce the long term risk of cardiovascular events such as stroke and heart attack.

Cholesterol *and* Blood Lipids



Cholesterol and blood lipids are critical to several body functions, but they can also cause major damage in the body by creating plaques in the lining of blood vessels, which can cause a reduction in blood flow to the heart, brain, and other parts of the body.

Dyslipidemia is a term used to describe abnormally high levels of cholesterol, low density lipoproteins (LDL), and triglycerides (all of which increase the risk of fat deposits in the blood vessels), and abnormally low levels of high density lipoproteins (HDL), which are protective. Elevated levels of total serum cholesterol and of low density cholesterol (LDC) are important risk factors for all types of CVD, including stroke due to carotid artery disease, where the large vessels in the neck carrying blood to the brain are narrowed or blocked. The current Statistics Canada Canadian Health Measures Survey is collecting data that will tell us how many Canadians have healthy and unhealthy levels of blood lipids.

Apolipoproteins are lipid-binding proteins that combine with cholesterol and triglycerides to form lipoproteins. ApoB and ApoA1 are subclasses of apolipoproteins. In the INTERHEART study, raised ApoB/ApoA1 levels and smoking were the two strongest risk factors associated with first heart attack. Almost half of the risk of a heart attack in the global population was attributed to raised blood apolipoproteins.

Reducing fat intake to less than 30% of calories in the diet, choosing mono- or poly-unsaturated fats over saturated or trans-fats, having less than 300 mg of cholesterol per day, and engaging in regular physical activity help to maintain a healthy balance of fats in the body. Some families and individuals have a genetic predisposition for unhealthy levels of cholesterol and other lipids. Testing the blood levels of these lipids can identify people who could benefit from taking cholesterol-lowering drugs.

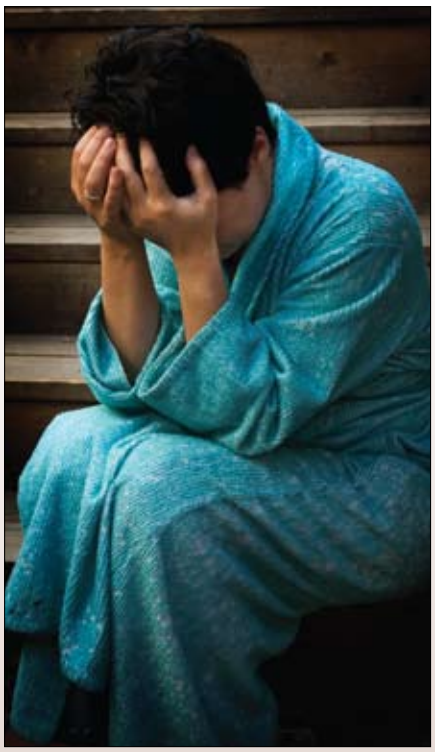
Mental Health *and* Illness

Mental Health

Mental health contributes to vitality and to the ability to find meaning and joy in life, form healthy relationships, contribute to the community, cope with life's challenges, and realize one's dreams. One's choices in behaviour are intimately linked to one's mental health. Behaviours such as tobacco smoking, misuse of drugs and alcohol, and overeating are unhealthy ways to cope with stress and day-to-day challenges. All these behaviours increase the risk of CVD.

Many Canadians report quite a bit or extremely high levels of daily stress in 2007 – 22.6% overall (23.4% of women and 21.7% of men). However, self-reported stress has been decreasing over time, with a 13.4% decrease since 2001. Stress and anger have been found to increase cholesterol levels. Prolonged, checked, or untreated high levels of anxiety, stress, anger, and hostility increase the risk of developing ischemic heart disease. Unmanaged stress can lead to damage to the arteries, irregular heart rhythms, high blood pressure, and a weakened immune system. High levels of anxiety increase the risk of a heart attack, blood clots, or death.

Life stress is highest in the middle years of life (ages 25 to 64 years), and both in the lowest and highest income categories. People at the lowest income quintile are much more likely than those having higher incomes to report that their mental health is only fair or poor, that they have trouble coping with everyday demands, that they find dealing with unexpected challenges difficult, and that they have high levels of stress. For more detail, see the Public Health Agency of Canada report *'The Human Face of Mental Health and Mental Illness in Canada'* (2006). It is not



surprising, then, that people living with low income are more likely to smoke daily, to have less healthy eating habits, and, among women, to be overweight or obese – all of which are behaviours influenced by mental health and all of which contribute to an increased risk of CVD.

Promoting and supporting mental health is a critical underpinning of all effective programs to promote healthy behaviours to reduce the risk of CVD. The Canadian Mental Health Association suggests that regular physical activity, positive thinking, and staying connected to others are helpful ways to encourage positive mental health.

Mental Illness

Many studies have shown depression to be a major risk factor both for the development of coronary heart disease in healthy patients and for adverse cardiovascular outcomes in patients with established heart disease. Women with diabetes who are depressed have a higher risk of developing and dying from ischemic heart disease than women with diabetes who are not depressed.

Depression in the first month after a heart attack has been found to have an adverse effect on six-month outcomes regardless of whether it is new in onset, present only transiently, or of a persistent nature. Post heart attack depression is associated with a 2.0 to 2.5 increased risk of impaired cardiovascular outcomes, which include angina, physical limitations, and poorer quality of life.

Severe mental illnesses, such as schizophrenia, are also found to be associated with an increase in deaths from heart disease and stroke beyond that which could be explained by other possible reasons, such as the effects of antipsychotic medications, smoking, and social deprivation (which includes variables such as unemployment, overcrowding, and a lack of amenities).

In the INTERHEART study, psychosocial factors including depression, stress at work or home, financial stress, significant life events, and lack of locus of control contributed to 32.5% of the risk of a first heart attack in the population globally. The impact was greater with women than men, with 40.0% of the risk of heart attack in the population attributed to psychosocial factors in women, compared to 25.3% in men.

Risk *of* CVD Among Aboriginal Peoples

Over one million people in Canada identify themselves as First Nations (698,025 status and non-status), as Métis (389,780) or as Inuit (50,480). Based on the 2006 census, this number represents about 3.6% of the total Canadian population. This percentage, however, likely underestimates the true numbers by 30,000 to 35,000, due to the fact that enumeration was not completed on 30 First Nations reserves and settlements.

First Nations

Half of the First Nations people living across Canada are under 25 years of age. The highest proportions of all First Nations people live in Ontario and British Columbia. In 2006, 42% of the status First Nations people lived on-reserve.

The report by the Assembly of First Nations '*First Nations Public Health: A Framework for Improving the Health of Our People and Our Communities*' (2006) states:

"Over four centuries, colonization took its toll on the physical, mental, emotional and spiritual health of First Nations communities. The present day determinants of health reflect these injustices. The high rates of unemployment, lower education opportunities, poor housing, overcrowding and lack of basic amenities such as running water and indoor toilets are but a few social issues that contribute to the poor health of First Nations." (p. v).

The risk of CVD among First Nations is very connected to these social, political and economic determinants.

Two sources of data provide information on CVD risk - the Statistics Canada Canadian Community Health Survey (CCHS) for people who self-identified as being First Nations and who lived off-reserve, and the First Nations Regional Longitudinal Survey (RHS) coordinated by the National Assembly of First Nations for people living on-reserve. The 2002/03 First Nations RHS (rhs-ers.ca) was conducted by First Nation regional organizations in 238 First Nation communities across Canada. More information on data sources, data collection, and sampling are available on the RHS website.

First Nations People Living Off-Reserve

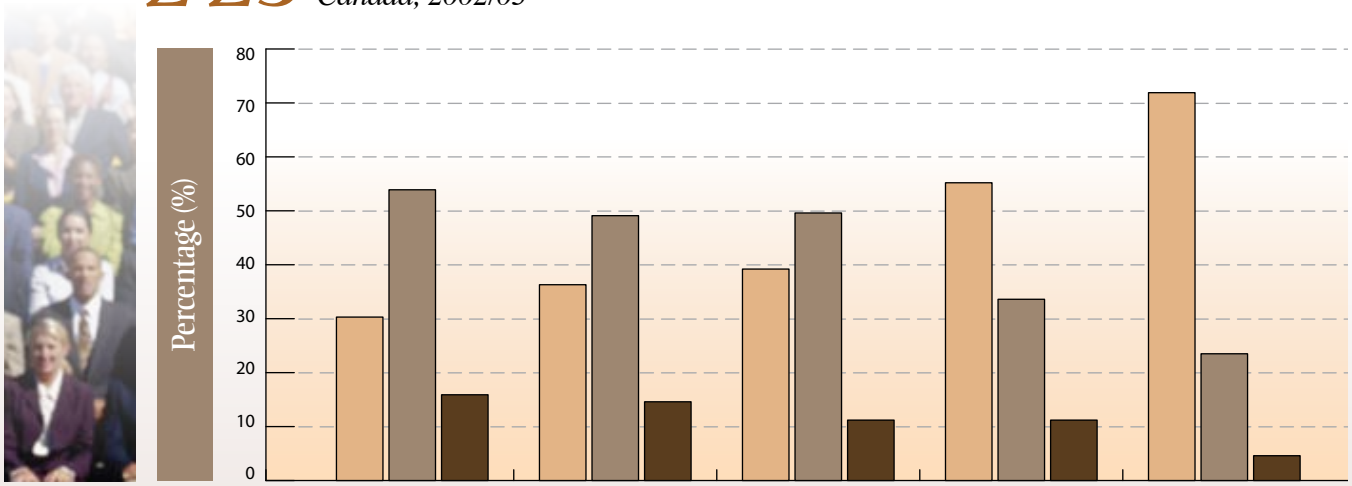
First Nations individuals who lived off-reserve reported high rates of several CVD risk factors. In 2005, 5.9% of the adult population age 20+ years reported having diabetes. One in three (30.5%) were overweight, and over one in four (27.2%) were obese. Many people (61.9%) ate less than the recommended five or more servings of vegetables and fruit per day.

In 2005, one in three (32.2%) First Nations individuals living off-reserve smoked tobacco daily. One in four (23.7%) First Nations individuals reported quite a bit or extremely high levels of daily stress. While many were physically inactive during leisure time (41.3%), this proportion was lower than in the general population. The prevalence of self-reported high blood pressure (11.2%) was also lower than in the general population.

First Nations People Living On-Reserve

More than half the population of First Nations adults living on-reserve smoked, either daily (46.0%) or occasionally (12.8%).Those ages 18 to 29 years had the highest proportion of daily smokers at 53.9%, and the proportions significantly decreased in the older age groups, with 23.5% of those age 60+ years smoking daily (FIGURE 2-23). For both sexes and across all age groups, the proportion of on-reserve First Nations adults who smoked was double the proportion found in the general population.

Figure 2-23 *Smoking status of the First Nations population age 18+ years, by age group, Canada, 2002/03*

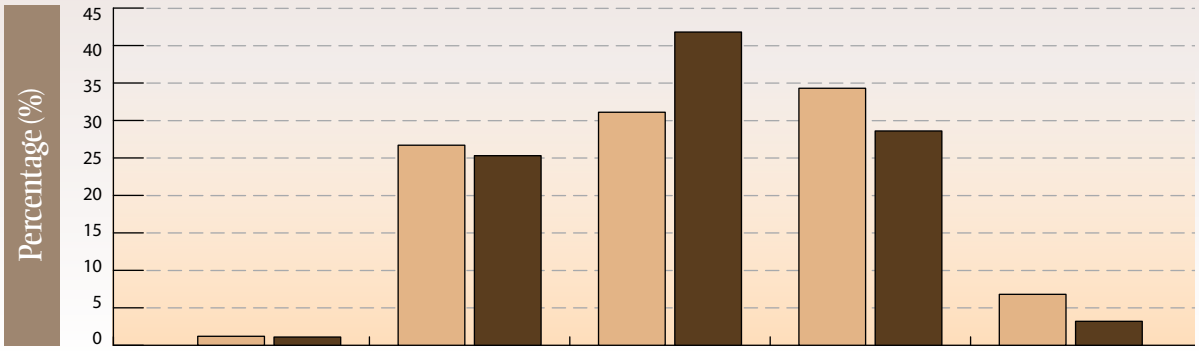


Age group (years)	18-29	30-39	40-49	50-59	60+
Non-smoker	30.3	36.3	39.2	55.2	71.9
Daily smoker	53.9	49.1	49.6	33.6	23.5
Occasional smoker	15.9	14.6	11.2	11.2	4.6

♦ Source: First Nations Centre. (2005). First Nations Regional Longitudinal Health Survey (RHS) 2002/03: Results for Adults, Youth, and Children Living in First Nations Communities. Ottawa: First Nations Centre.

Almost three-quarters of the First Nations adults living on-reserve were overweight or obese, based on self-reported height and weight (FIGURE 2-24). Many children and youth were overweight or obese: 42.2% of youth (ages 12 to 17 years) and 58.5% of children (ages 0 to 11 years).

Figure 2-24 *Body mass index of the First Nations population age 18+ years, by sex, Canada, 2002/03*



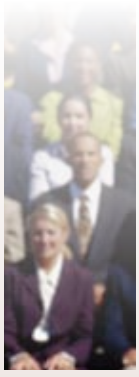
Body mass index (BMI)	Underweight (BMI<18.5)	Acceptable (BMI 18.5-25.0)	Overweight (BMI>25.0-30.0)	Obese (BMI>30.0-40.0)	Morbidly obese (BMI>40.0)
Women	1.2	26.7	31.1	34.3	6.8
Men	1.1	25.3	41.8	28.6	3.2

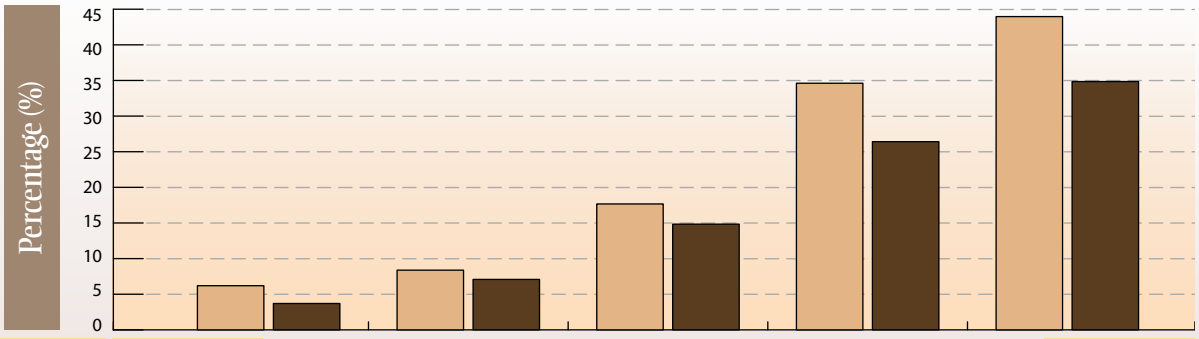
♦ Source: First Nations Centre. (2005). First Nations Regional Longitudinal Health Survey (RHS) 2002/03: Results for Adults, Youth, and Children Living in First Nations Communities. Ottawa: First Nations Centre.

Only one-fifth of First Nations adults participated in at least 30 minutes of leisure time physical activity on most days of the week; 84.8% of First Nations women and 73.3% of First Nations men were considered physically inactive during leisure time. This physical inactivity is likely a contributing factor to the high rates of obesity.

Among adults living on-reserve, 20.4% had been diagnosed with high blood pressure. The prevalence of high blood pressure increased with age for both sexes (FIGURE 2-25). Among those age 60+ years, 44.0% of women and 34.9% of men had high blood pressure, which was significantly higher than the proportions seen in the general population. This may reflect in part the high rates of obesity in the population.

Figure 2-25 *Percentage of the First Nations population age 18+ years who had high blood pressure, by sex and age group, Canada, 2002/03*



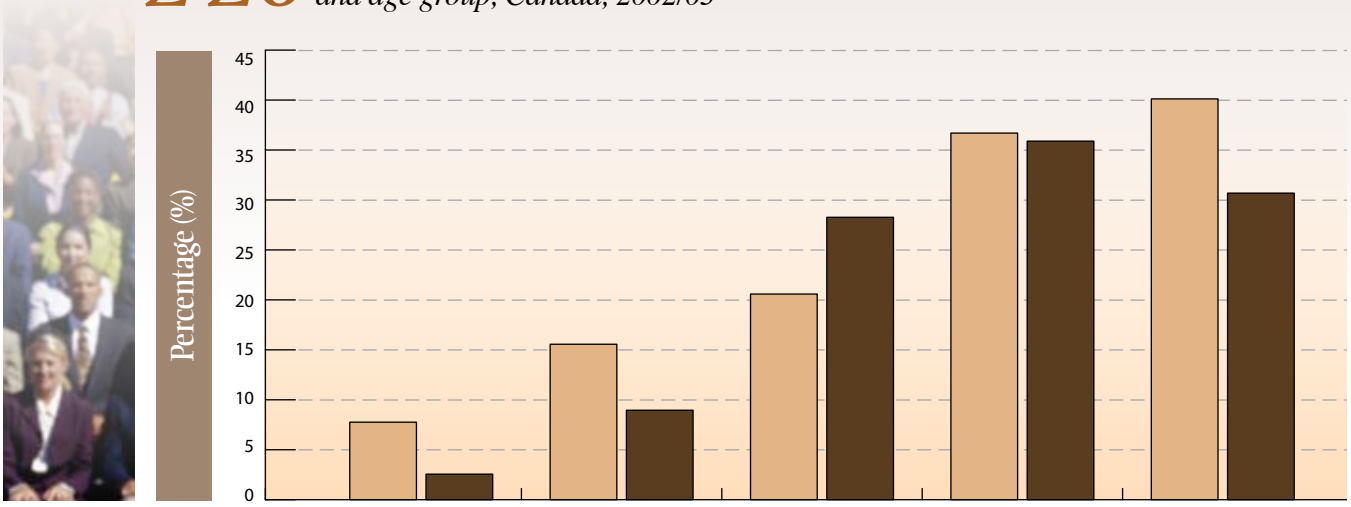


Age group (years)	18-29	30-39	40-49	50-59	60+
Women	6.4	8.4	17.8	34.8	44.0
Men	3.7	7.1	14.9	26.4	34.9

♦ Note: - Age-adjusted. ♦ Source: First Nations Centre. (2005). First Nations Regional Longitudinal Health Survey (RHS) 2002/03: Results for Adults, Youth, and Children Living in First Nations Communities. Ottawa: First Nations Centre.

The prevalence of self-reported diabetes among First Nations adults (19.7%) living on-reserve was nearly four times as great as it was in the general population. This is likely an underestimate of the true prevalence due to the under-diagnosis of diabetes. By age 65+ years, 40.2% of women and 30.4% of men had been diagnosed with diabetes (FIGURE 2-26). In most age groups, a greater proportion of women than men had diabetes. This is in contrast to the non-Aboriginal population, where men were slightly more likely to have diabetes than women. The prevalence of diabetes was higher among those living in isolated communities.

Figure 2-26 *Percentage of the First Nations population age 25+ years who had diabetes, by sex and age group, Canada, 2002/03*



Age group (years)	25-34	35-44	45-54	55-64	65+
Women	7.8	15.7	21.1	36.7	40.2
Men	2.5	8.7	28.6	36.1	30.4

♦ Source: First Nations Centre. (2005). First Nations Regional Longitudinal Health Survey (RHS) 2002/03: Results for Adults, Youth, and Children Living in First Nations Communities. Ottawa: First Nations Centre.

Inuit

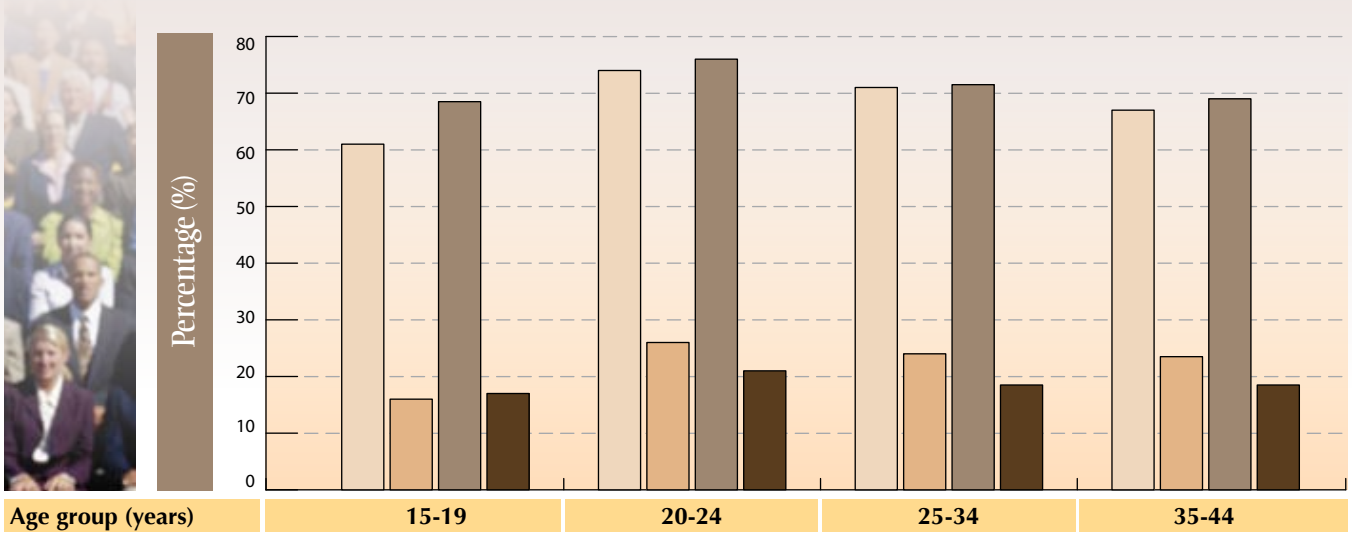
Most Inuit live in the north regions of Canada – including the Inuvialuit region in the Northwest Territories (3,115), Nunavut (24,635), Nunavik in northern Québec (9,565), and Nunatsiavut in northern Labrador (4,715). Approximately 17% of all Inuit live in large urban centres in southern Canada.

There is little information available on CVD among Inuit at the national level. However, two primary data sources, the 2001 Aboriginal Peoples Survey (APS) and the recent *Qanuippitaa* Survey, do provide some CVD figures. The 2001 APS collected information from Inuit in the four Inuit regions across the north and from those in southern Canada. In addition, data from the Census provide insight into some of the socio-economic conditions that may impact the health of Inuit. The *Qanuippitaa* Survey was recently conducted in Inuit communities in Nunavik, northern Quebec. In the next few years additional information will come from the *"Qanuqitpit? Qanuippitali? Kanuivit?" "How about us? How are we?"* - a 2007/2008 Inuit Health Survey for Nunavut, Inuvialuit region, and Nunatsiavut. It is funded by International Polar Year (IPY), the Government of Canada, Canadian Institutes for Health Research (CIHR), and the Northern Contaminants Program (NCP).

The *Qanuippitaa* Survey found that 16.7% of Inuit adults in Nunavik reported suffering from high blood pressure, while 4.1% reported cerebrovascular disease, and 6.7% reported other CVD. A small percentage, 2.3%, reported coronary heart disease. Finally, 7.9% reported having high cholesterol. In the territory of Nunavut, where about 85% of all residents are Inuit, the mortality rate for heart attack was 1.2 times lower than the Canadian rate (42.2 deaths per 100,000 population in Nunavut for 2000-2004 average, compared to 49.2 deaths per 100,000 population for Canada overall). Similarly, Inuit in the north are less likely to die from ischemic heart disease than their non-Inuit counterparts across the country.

Smoking rates for Inuit are among the highest in Canada (FIGURE 2-27). In 2001, seven in ten Inuit adults were current smokers, compared to two in ten Canadians as a whole. Of these, about 60.2% of Inuit were daily smokers compared to 18.0% of other Canadians.

Figure 2-27 *Percentage of Inuit and other Canadians who were daily smokers, by sex and age group, Canada, 2001*



♦ Source: Inuit Tapiriit Kanatami, using data from the 2001 Aboriginal Peoples Survey and 2001 Canadian Tobacco Use Monitoring Survey (Statistics Canada).

All Inuit men in Canada | All Canadian men outside of territories | All Inuit women in Canada | All Canadian women outside of territories

The diabetes rate is much lower for Inuit than non-Inuit. In 2001, 2.3% of Inuit adults in Canada reported having been diagnosed with diabetes. However, the rate is on the increase and is of growing concern. Foods imported from the south, which are frequently higher in sugar and unhealthy fats, are growing more and more popular. In many Inuit communities today, there is less consumption of healthy traditional foods. Recent research has shown that a traditional diet high in omega-3 fatty acids found in marine foods can lower the likelihood of death from CVD among Inuit in Nunavik.

Diabetes is also linked to a more sedentary lifestyle. A recent study, the *Qanuippitaa* survey, indicates that 82.1% of Inuit adults in Nunavik do not attain the level of physical activity required for significant health benefits. Furthermore, 29.8% of Inuit ages 18 to 74 years are overweight, while 28.3% are obese. However, only about three in ten Inuit consider themselves overweight or obese.

There are many social and economic factors that can impact cardiovascular health of Inuit. They live in some of the most crowded housing conditions in the country. Almost 40% of Inuit in the north lived in crowded homes compared to just 3% of all people in Canada as a whole. Crowded homes can lead to stress and other conditions that impact heart health.

While more Inuit are completing secondary school and are moving on to post-secondary studies, many still do not finish high school. About one-half of Inuit ages 25 to 64 years have not completed high school, compared to 15% of non-Inuit. Reasons for this gap include negative residential school experiences, having to learn in a second language, and a lack of an Inuit-specific curriculum, among others.

The cost of living in the north is extremely high, with healthy food staples costing several times more than what is paid in the south. Costs for heating fuel, clothing, and other necessities are also much higher in Inuit communities. Despite this, incomes for Inuit are much lower. In 2001, the median income for Inuit across the country was $13,700, compared to over $22,000 for all Canadians. While many Inuit take part in unpaid activities such as caring for children and seniors, community work, and hunting and fishing, a lack of meaningful paid labour in the north can contribute to high levels of unemployment in Inuit communities. High rates of unemployment, low incomes, crowded housing, and challenges coming from a quickly changing world in addition to other factors can contribute to stress levels and can impact overall mental health.

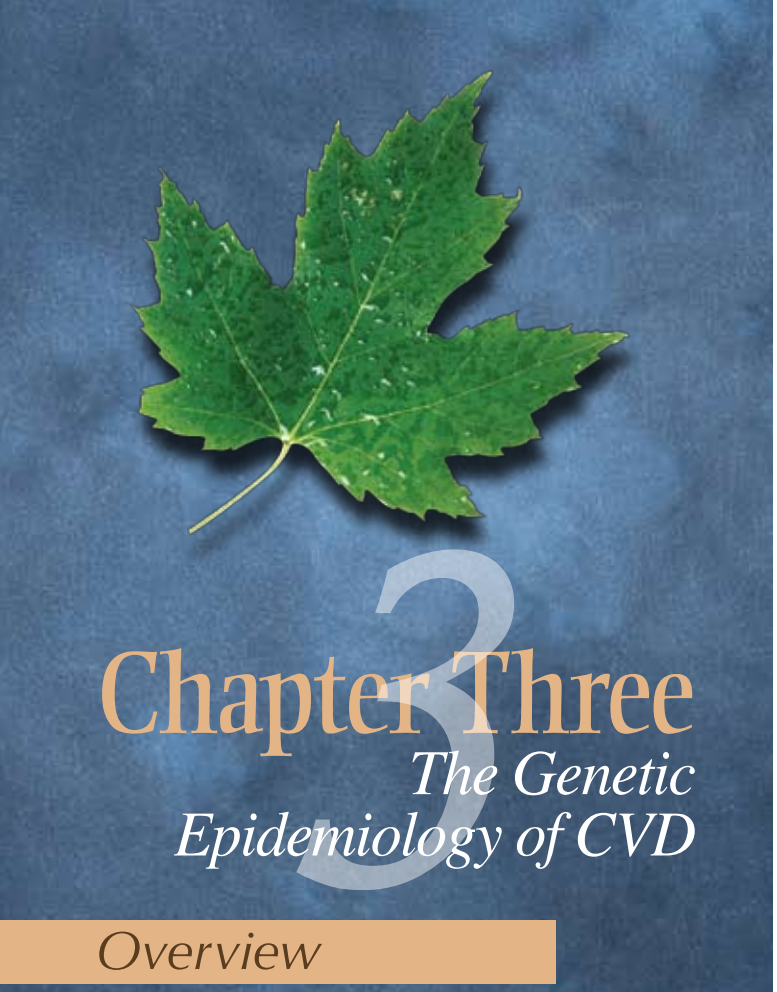
Métis

The Métis group was formed from the community of French fur traders and Cree women in the Prairies, and of English and Scottish traders and Dene women in the North. Currently most individuals who self-identify as being Métis live in urban centres in Ontario (73,605), Manitoba (71,805), Saskatchewan (48,120), Alberta (85,495) and British Columbia (59,445).

According to the 2005 Canadian Community Health Survey, individuals who self-identify as being Métis had many risk factors for CVD. About a third (32.1%) of Métis were daily smokers. Two in five (39.5%) Métis were physically inactive during leisure time. A third (32.6%) of the population was considered overweight based on self-reported height and weight, with an additional 20.4% considered obese. About two thirds (63.9%) of the population had an inadequate consumption of vegetables and fruit each day. Almost a quarter (24.2%) of the population reported that they felt quite a bit or extremely stressed on a daily basis. Among the Métis, the proportion of the population with high blood pressure was 12.0%, and 4.8% reported that they had diabetes.

Summary *of* Highlights

- The risk of CVD can be greatly reduced by not smoking, participating in regular physical activity, effectively managing stress, maintaining healthy nutrition and healthy weight, and by the early recognition and treatment of high blood pressure, high cholesterol, and diabetes.
- Nine in ten people age 20+ years in Canada had at least one risk factor for CVD. Two in five individuals had three or more risk factors. As the number of risk factors increases, so does the risk of CVD.
- The prevalence of specific risk factors for CVD were as follows:
  - Almost one in six adults age 15+ were smoking daily. More men than women smoked, and proportions peaked in the 45 to 54 year age group.
  - About half of the population did not spend at least 30 minutes per day engaging in physical activity during leisure time, and this increased with age. More women than men were physically inactive, particularly among teenagers.
  - Over half the population age 12+ reported consuming less than five daily servings of vegetables and fruit with the highest proportion in the 35 to 44 year age group. More men than women consumed less than five daily servings.
  - One in five people age 12+ consumed more than the total recommended calories from fat, with the highest proportion in the 31 to 50 year age group. More men than women exceeded the upper limit of daily fat intake.
  - More than one in two adults was overweight or obese. More men than women were overweight (40.8% versus 27.3%), and a similar proportion for both were obese (18.0% and 15.8%) based on self-report. The proportion who are obese would be higher if they were measured (in 2004, 23.0% of women and 25.7% of men were obese based on actual measurements). The 55 to 64 year age group had the highest proportion of individuals who were overweight or obese.
  - In 2004/05, 7.1% of adults reported having diabetes, with the highest proportion in the 75 to 84 year age group (one in five individuals). Slightly more men than women had diabetes.
  - Over one in six adults reported they had been diagnosed with high blood pressure, and the proportion increased with age. Proportions were similar for women and men except in the older age groups where more women than men had been diagnosed with high blood pressure.
- On a positive note, since 2000, the proportion of self-reported daily smokers has declined by 23.1%, people have become more physically active during leisure time (increase of 7.3%), more people are consuming at least five servings of vegetables and fruit each day (increase of 10.1%), and the proportion of the population who reported being quite a bit or extremely stressed on a daily basis has declined (decrease of 11.5%).
- On a negative note, since 2000, increases have been seen in the proportion of the population who are overweight (increase of 3.0%) or obese (increase of 10.5%), who have been diagnosed with high blood pressure (increase of 24.8%), and who have been diagnosed with diabetes (increase of 29.1%). The increase in obesity in part is driving the increase in high blood pressure and diabetes.
- The prevalence of some risk factors is higher among individuals in the lowest income quintile. Diabetes was four times higher and the prevalence of daily smoking and high blood pressure were about twice as high for women in the lower income quintile compared to women in the highest income quintile. For men, risk factors decreased with increasing income, except for overweight, obesity, or life stress, which increased with increasing income.
- First Nations adults had much higher rates of smoking, overweight and obesity, and diabetes than the Canadian population.
- Inuit adults had a much higher proportion of their population who were smokers than the general population.
- Individuals who self-identify as Métis had higher rates of smoking, overweight and obesity compared to the general population.



Chapter Three

The Genetic Epidemiology of CVD

Overview

A strong family history of CVD is one of the important risk factors for CVD. This reflects the importance of the messages on the genes obtained from each parent, which are made up of DNA nucleotides and grouped on chromosomes present in cells. They provide the instruction manual, or code, that directs cells in making proteins that control nearly every type of cellular function. It has been found that no two people (except identical twins) have identical genomic codes and that between any two people, one is likely to find millions of differences among the three billion letters of DNA making up the genome code. Naturally occurring changes in the DNA code affect the structure and function of the proteins that are manufactured by the cells. It is these changes in proteins that have such an important impact on the health and disease of individuals, including CVD.

The scientific consensus is that at least 50% of the risk for ischemic heart disease comes from genetic predisposition. In general, an earlier age of onset of ischemic heart disease in an individual is associated with a greater risk that close family members of that individual may also develop this disease. For people with a genetic predisposition, it is very important that they adopt healthy behaviours to decrease their risk of developing CVD.

Genetics *and* CVD

Usually the increased risk for CVD comes from polygenic conditions, or the impact of specific DNA code variations in many genes, rather than from one gene with a large effect. The most common types of DNA variants across the genome are called 'single nucleotide polymorphisms' (SNPs). Depending on the gene in which they occur, SNPs can influence numerous factors that affect the development of CVD, such as blood lipids, blood pressure, obesity, diabetes, and insulin resistance.

Monogenic conditions result from a mutation (or change) in a single gene. To date, over 1,200 mutations have been identified as responsible for single gene disorders relating to CVD. However, such disorders are rare, having a prevalence of less than 0.1%, and accounting for only 5% to 10% of all CVD.

- Single gene forms of **high blood pressure** predispose individuals both to coronary artery disease (CAD) and stroke.
- Recent progress has been made in identifying genes for rare monogenic forms of **stroke**.
- DNA mutations in the low-density lipoprotein (LDL) receptor gene underlie 'familial **hypercholesterolemia**'. Some single gene disorders cause low HDL cholesterol, which can also lead to ischemic heart disease. This is more frequently seen among the French Canadian population in the province of Québec. Genetic studies have led to the development of effective medication for treating hypercholesterolemia, namely statins.
- The gene for hypertrophic **cardiomyopathy** (enlarged muscle of the heart) was the first gene to be identified in cardiology in relation to a single gene disorder. About a third of all cases of dilated cardiomyopathy (distension of the heart) are considered familial, and for half these cases it is an autosomal dominant trait (a single variant copy from one parent, if present, will cause the condition).
- Mutations in a single gene have been identified for **cardiac arrhythmias** (i.e., irregularities in how the heart beats) such as the long QT syndrome, Brugada syndrome, catechoaminergic polymorphic ventricular tachycardia, short QT syndrome, Wolff-Parkinson-White syndrome, and idiopathic atrial fibrillation.

  These 'electrical' heart diseases often result in unexpected deaths in young individuals, most of whom previously appeared healthy. Once more is known about the link between genetics and health outcomes, genetic screening of young individuals from families at risk may lead to the prophylactic implantation of a cardioverter-defibrillator or other medical therapy to reduce the risk of death.

Some DNA mutations are population-specific. For example, a unique marker found only among the Oji-Cree increases susceptibility to early onset type 2 diabetes and, subsequently, to heart disease. For the Inuit, there is a much lower rate of diabetes and heart disease. However, their genetic profile does not appear to be more favourable than in other populations. The lower rates of heart disease may be attributable to protection from lifestyle factors, such as diet, that may override any genetic susceptibility. Alternatively, or perhaps in addition, there may be other genetic factors among the Inuit yet to be discovered, factors that afford them greater protection from succeptibility to heart disease.

Genetics *and* Obesity

Obesity is a complex trait, like blood pressure and lipids, and follows the same genetic model. On one hand, there exist rare genetic variants (mutations) in one of about ten genes that underlie rare single gene forms of obesity in a few families, representing less than 5% of cases of obesity. On the other hand, most people who are obese have the cumulative influence of many small, common genetic effects that create susceptibility, combined with an unhealthy diet and/or lack of regular physical activity.

Some of the genes implicated in rare inherited forms of obesity include the MC4R, LEP, and LEPR genes. Other findings include (a) severe obesity in a child with a chromosomal inversion in a region encompassing the BDNF gene, and (b) single mutations in one of 11 genes, which have been found to account for 2% to 4% of all cases of severe early onset obesity.

Twin and other studies provide powerful evidence that genetics influence obesity, including traits such as absolute fat mass and distribution of fat. A number of candidate genes for obesity have been identified that may contribute to increased susceptibility, including the FTO and ADIPOQ genes.

Genetic differences in the ability to regulate food intake could result in obesity. The signals of the body from sites such as adipose tissue, the gut, and other organs are typically sent to the brain to indicate fullness and to cease food intake. Like all body functions, this process is regulated by proteins, which are coded for by genes. If the genes create proteins that do not function in the usual way, then the person could overeat. Such individuals may lose weight readily in response to caloric restriction, and are likely to benefit most from pharmacological agents that suppress appetite.

Genetic changes may also influence pre-fat cell differentiation and fat storage. This could lead some individuals to be susceptible to weight gain, even if they do not overeat. The body's ability to regulate spontaneous physical activity may be another area for genetics research. Activity uses up calories and if people are predisposed to less activity then they will put on more weight than those who are predisposed to more activity.

The Future

Studies of the genome will open new doors and increase knowledge about disease initiation and progression. The related field of proteomics examines the proteins that are coded by the genes in order to understand the molecular mechanisms that can contribute to the creation of disease susceptibility.

Researchers hope not only for a gene-based prediction of illness, but also the use of genetics to identify risk for CVD, to improve assessment, and to provide more individualized and targeted treatment and prevention. This kind of 'personalized medicine' not only identifies patients at risk, but also tailors treatment by targeting specific molecular pathways with the appropriate drugs.

The field of pharmacogenomics studies the relationships between and among genetic variants and how they influence drug effects. To date, more than 20 genes have been implicated in variable outcomes of drug therapy in CVD. The translation of such findings into routine clinical practice, once accomplished, will have the potential to direct and monitor the effectiveness of therapy.

Another area of great interest is nutrigenomics, which uses genomic information and techniques in molecular biology and genomics to (a) identify molecular targets of nutrient action, and (b) elucidate the genetic basis for variability in nutrient response. Moreover, through nutrigenomics, one may observe the interaction of genes and diet by examining who is at risk and how diet can modify this risk. As an example, a preliminary study has shown the possible increase in the risk of heart attack based on the genetic predisposition to rapid or slow metabolism of coffee.

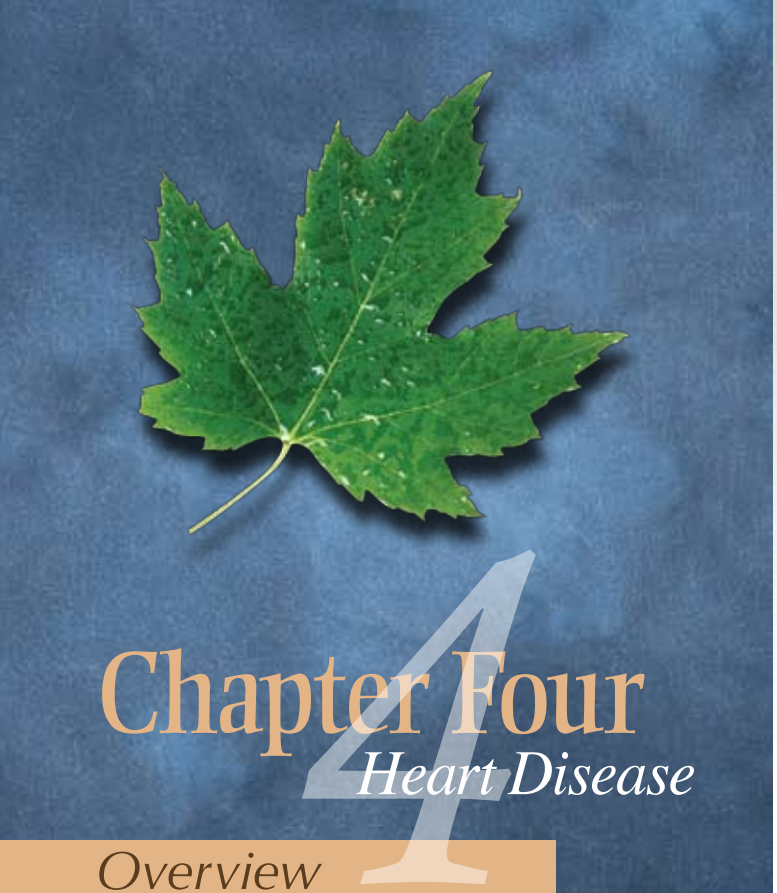
Progress in CVD genetics has led to some successful applications of genetic testing, particularly for rare monogenic disorders. However, the use of genetic testing to predict the risk of common CAD, rhythm disturbances, cardiomyopathy, and stroke is not yet appropriate in a clinical setting. This is because particular genetic markers that are statistically associated with CVD in a population have not as yet been translated into reliable predictors of risk for the individual.

There are also other issues to consider with widespread genetic screening for CVD. These include clinical usefulness, the individual's interpretation of the results, and the emotional and psychological impact of the results. One must make every effort to avoid the potential for misunderstanding, whether by individuals or by healthcare providers, as well as to prevent any unforeseen consequences of the widespread use of genetic information in CVD risk assessment.

More research that insists on rigorous data collection, validation, and replication in large-scale epidemiologic studies will provide a better understanding of the predictive value of individual genetic markers or clusters of markers. Also, cost-benefit analyses will identify the feasibility of their use in future clinical applications.

Summary *of* Highlights

- A genetic susceptibility combined with unhealthy behaviours and an unhealthy environment increases the risk of CVD.
- Usually the increased risk for CVD comes from polygenic conditions, or the impact of specific DNA code variations in many genes, rather than from one gene with a large effect.
- Small changes in genes, called single nucleotide polymorphisms (SNPs), can influence numerous factors that affect the development of CVD such as blood lipids, blood pressure, obesity, diabetes, and insulin resistance.
- There are some rare forms of CVD (prevalence of less than 0.1%) for which a single gene increases the risk of CVD, for example, for some types of cardiomyopathy or electrical disturbances.
- Obesity could be affected by genes in many ways, including genetic differences in the ability to regulate food intake, in pre-fat cell differentiation and fat storage, or in the body's ability to regulate spontaneous physical activity.
- Eventually, researchers hope that the understanding of genetics will provide more individualized and targeted prevention and treatment.



Chapter Four
Heart Disease

Overview

Three common classifications of heart disease are ischemic heart disease, acute myocardial infarction (AMI) or heart attack, and congestive heart failure. Medication and surgery, where necessary, can improve symptoms and quality of life as well as reduce the risk of dying from heart disease. It is also important to manage underlying risk conditions such as diabetes and high blood pressure, and for the individual to have a healthy lifestyle with no smoking, regular physical activity, a healthy diet low in fat and sodium, and good stress management in order to reduce the progression of heart disease and improve the quality of life.

In 2007, many people who reported having heart disease still continued to smoke (13.8%), were obese (25.4%), and reported high levels of stress (21.6%) (FIGURE 4-1). Over half of those with heart disease were still physically inactive during leisure time, with a higher proportion among women (67.9%) than among men (57.0%). Compared to women, more men with heart disease were overweight and consumed less than five servings of vegetables and fruit per day.

Many people who have heart disease also have other health problems. In 2007, 24.0% also reported having diabetes, 59.9% reported having high blood pressure, 6.6% reported having chronic obstructive pulmonary disease (in a population age 30 years and older), 40.5% reported having arthritis, 9.8% reported having an anxiety disorder, and 8.5% reported fair or poor mental health. A collaborative, multidisciplinary approach with both primary and specialized care best helps individuals manage all of their health problems effectively and efficiently.

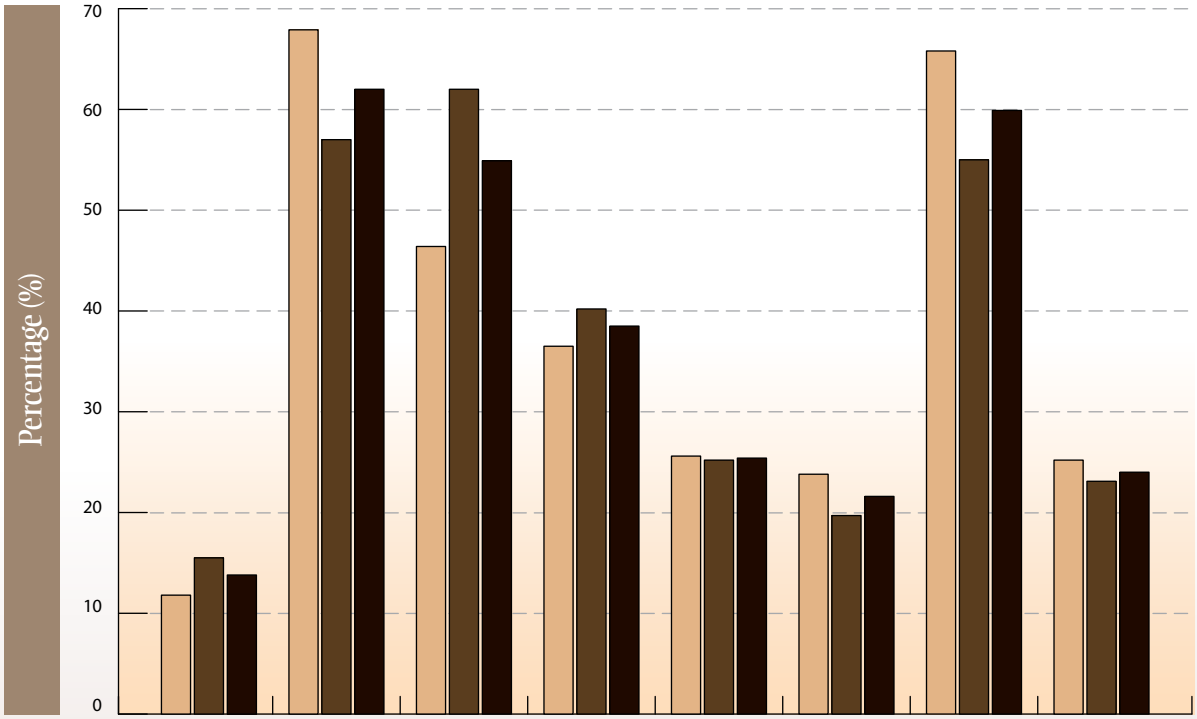
Ischemic Heart Disease

Ischemic heart disease refers to a condition in which the heart muscle is damaged or works inefficiently because of the absence or relative deficiency of its blood supply. It can cause a heart attack, angina (chest pain), and sudden death. Ischemic heart disease is also called coronary heart disease or coronary artery disease because a thickening of the inner lining of the blood vessels to the heart (coronary vessels) with fat deposits and other materials (atherosclerosis) usually causes poor blood flow to heart muscle.

Hospitalizations Due to Ischemic Heart Disease

In 2005/06, there were 160,323 hospitalizations with ischemic heart disease as the condition most responsible for staying in hospital (FIGURE 4-2). The number of hospitalizations rose from 1971 to 2000 then declined. The increase in the number of hospitalizations was due both to an increase in the number of people in the population and aging of the population. Adjusting for both of these factors (age-standardized rate), reveals that the rate of hospitalizations has fallen substantially since the 1970s, and even more so since 2000. Likely contributors to this decrease include a reduction in smoking rates, the use of statins to control dyslipidemia, better management of underlying conditions such as high blood pressure, and better treatment of ischemic heart disease outside of the hospital.

Figure 4-1 *Percentage of the population age 12+ years with heart disease, by sex and risk factors, Canada, 2007*



Risk factor	Tobacco smoking	Physial inactivity	Inadequate consumption of vegetables and fruit	Overweight (BMI 25 to <30)	Obese (BMI ≥30)	Stress	High blood pressure	Diabetes
Women	11.8	67.9	46.4	36.5	25.6	23.8	65.8	25.2
Men	15.5	57.0	62.0	40.2	25.2	19.7	55.0	23.1
Both	13.8	62.0	54.9	38.5	25.4	21.6	59.9	24.0

♦ Note: - All data are for respondents age 12+ years except for overweight and obese (18+ years), stress (15+ years), and high blood pressure (20+ years). ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Community Health Survey (Statistics Canada).

Figure 4-2 *Number and rate of hospitalizations due to ischemic heart disease*, by year, Canada, 1971/72-2005/06*

♦ * ICD-10-CA codes: I20-I25. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for length of stay in hospital. - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 1979 and 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. Nunavut data not available in 2002/03. Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

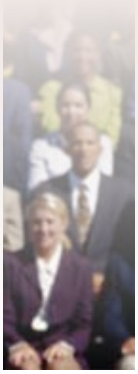
As people age, they commonly develop more than one health problem. Over age 65 years many people admitted for other conditions also had ischemic heart disease listed as an accompanying diagnosis (FIGURE 4-3).

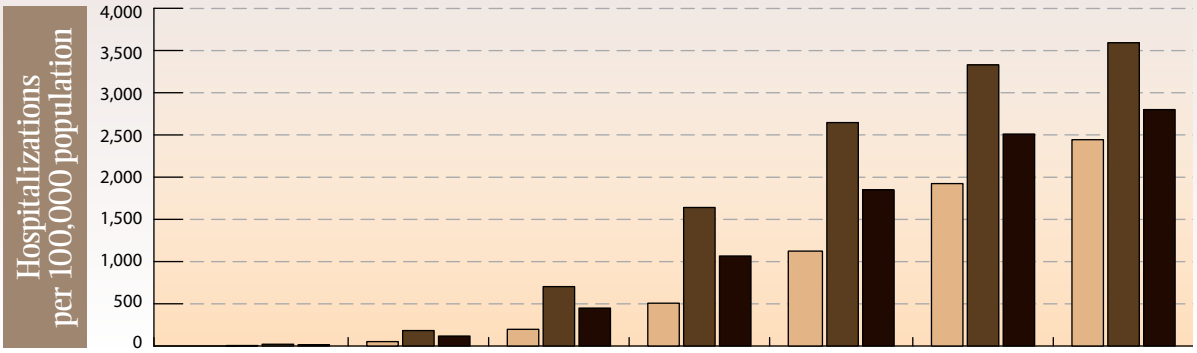
Figure 4-3 *Number of hospitalizations due to ischemic heart disease*, by sex and age group, Canada, 2005/06*

♦ * ICD-10-CA codes: I20-I25. ♦ Notes: - W = women, M = men. - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

In 2005/06, hospitalization rates for ischemic heart disease were much higher among men than among women for all ages, and rates for both sexes increased steadily with age (FIGURE 4-4). Among men, the rates of hospitalization increased considerably from ages 45 to 54 years onwards, while among women, this change happened ten years later, at ages 55 to 64 years.

Figure 4-4 *Rates of hospitalization due to ischemic heart disease*, by sex and age group, Canada, 2005/06*



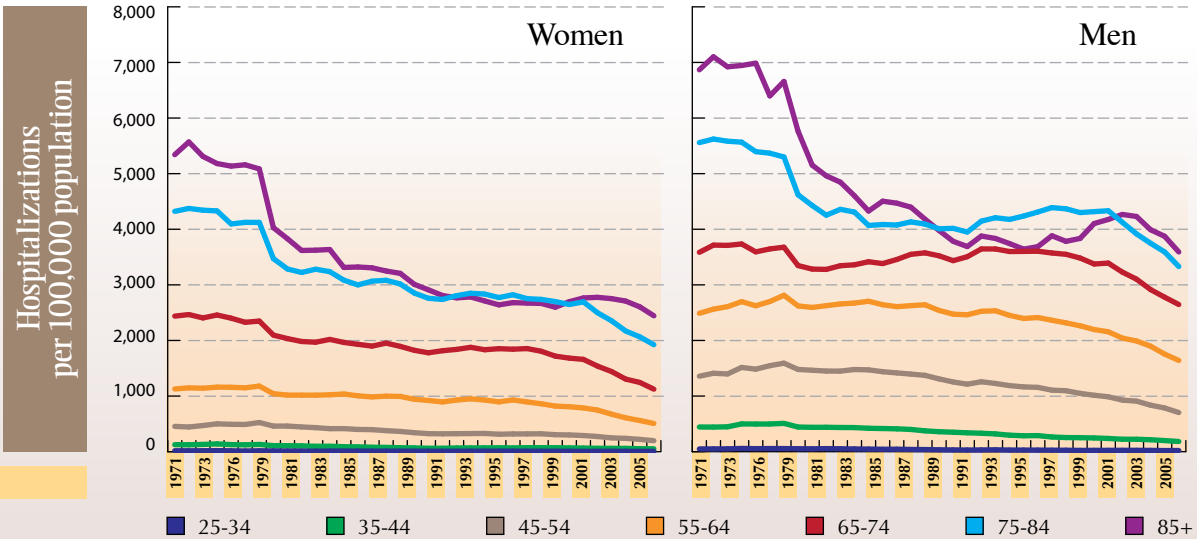


Age group (years)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	5.5	52.1	197.5	507.1	1,124.0	1,923.7	2,443.7
Men	20.9	182.8	703.4	1,640.6	2,646.4	3,329.6	3,591.8
Both	13.3	117.8	449.0	1,066.0	1,848.3	2,510.5	2,800.2

♦ * ICD-10-CA codes: I20-I25. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

The hospitalization rate for ischemic heart disease has decreased for women and men of all age groups since 1971 (FIGURE 4-5). The oldest age groups, ages 75 to 84 years and 85+ years, have seen the biggest decrease in hospitalization rates between 1971 and 2005 (about a 50% decrease) for both women and men.

Figure 4-5 *Rates of hospitalization due to ischemic disease*, by sex, age group, and year, Canada, 1971/72-2005/06*

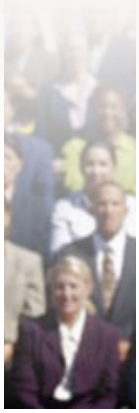


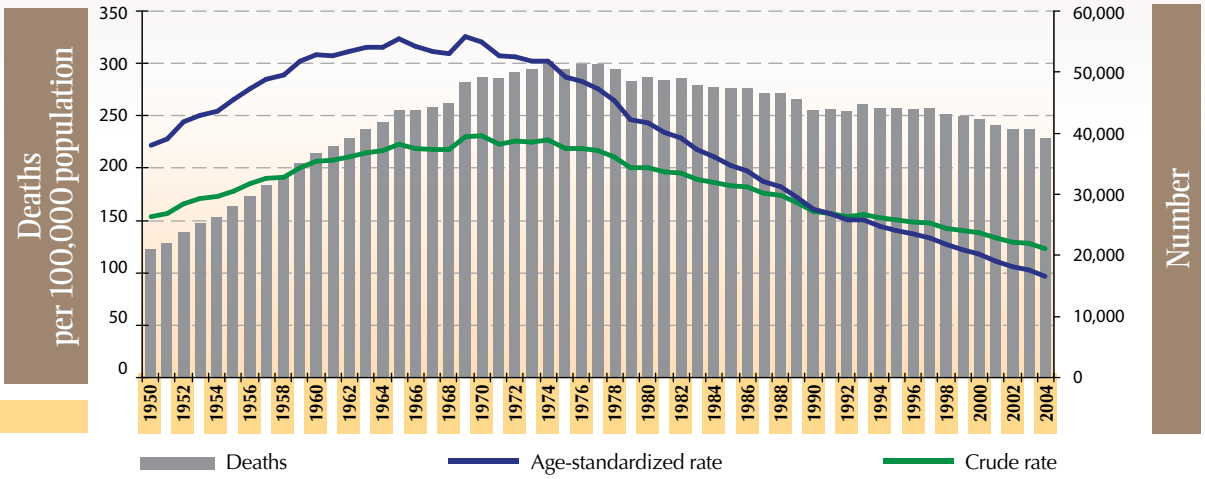
♦ * ICD-10-CA codes: I20-I25. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - The coding schemes for this condition changed in 1979 and 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. Nunavut data not available in 2002/03. Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Deaths Due to Ischemic Heart Disease

In 2004, 39,311 people died from ischemic heart disease (FIGURE 4-6). The rate of people dying from ischemic heart disease rose steeply from 1950 until 1970. Since then, the crude and age-standardized rates have been decreasing steadily. The decrease in the death rate is likely in part attributable to lower smoking rates but also to better management of high cholesterol, high blood pressure, and ischemic heart disease itself. The number of deaths due to ischemic heart disease has been decreasing more slowly than the age-standardized rate because the population is aging - note the age-standardized rate is lower than the crude rate in recent years. The crude rate adjusts for changes in the number of people in the population, and the age-standardized rate also adjusts for changes in the age structure of the population. It is difficult to say what ischemic heart disease crude death rates will be in the future with the aging of the population combined with increasing rates of obesity and diabetes.

Figure 4-6 *Number and rate of deaths due to ischemic heart disease*, by year, Canada, 1950-2004*

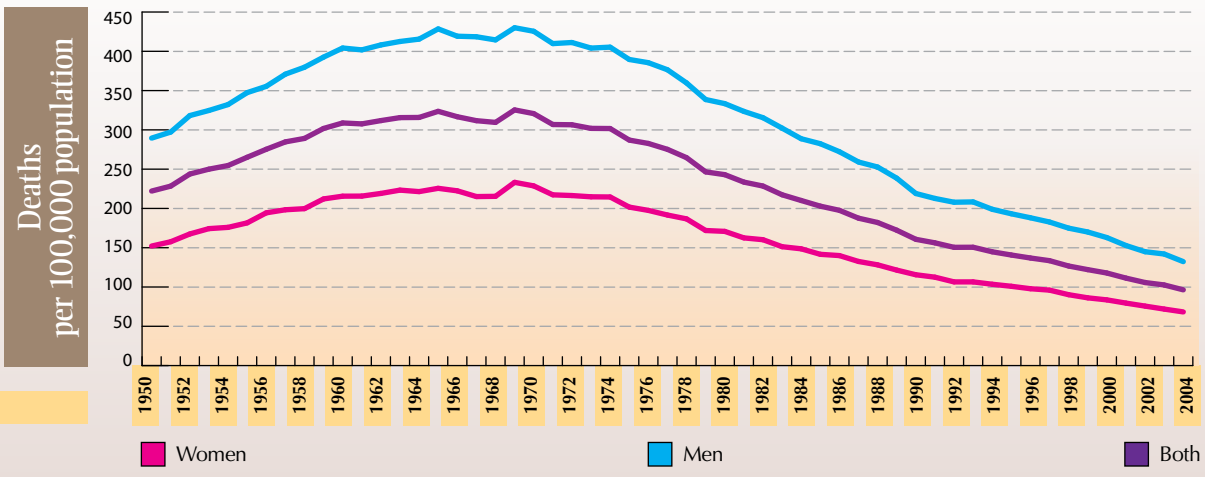




♦ * ICD-10-CA codes: I20-I25. ♦ Notes: - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 1958, 1969, 1979 and 2000, and this may influence trends. In particular, ICD-6 and ICD-7 coding sometimes may include 422 (not included here). ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from Vital Statistics Database (Statistics Canada).

In the 1970s, the mortality rate was much higher for men compared to women (FIGURE 4-7). The rates for both men and women have decreased since then and the difference in mortality rates between men and women has also decreased.

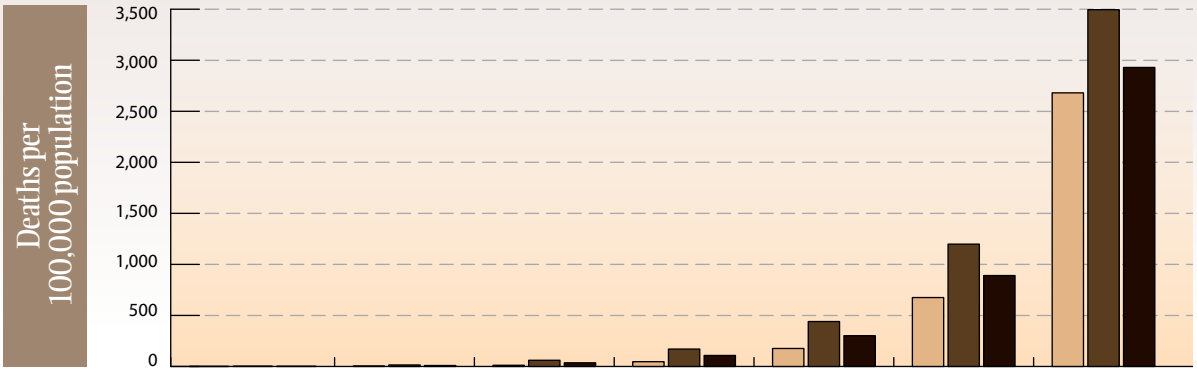
Figure 4-7 *Rates of death due to ischemic heart disease*, by sex and year, Canada, 1950-2004*



♦ * ICD-10-CA codes: I20-I25. ♦ Notes: - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 1958, 1969, 1979 and 2000, and this may influence trends. In particular, ICD-6 and ICD-7 coding may sometimes include 422 (not included here). ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

As expected, death rates from ischemic heart disease are highest among those age 85+ years (FIGURE 4-8). Among men, the death rates increase considerably in the 45 to 54 year age group, while among women this occurs ten years later in the 55 to 64 year age group, similar to the ages at which hospitalization rates for ischemic heart disease increase for men and women. In all age groups, the death rate for ischemic heart disease is higher among men than among women.

Figure 4-8 *Rates of death due to ischemic heart disease*, by sex and age group, Canada, 2004*

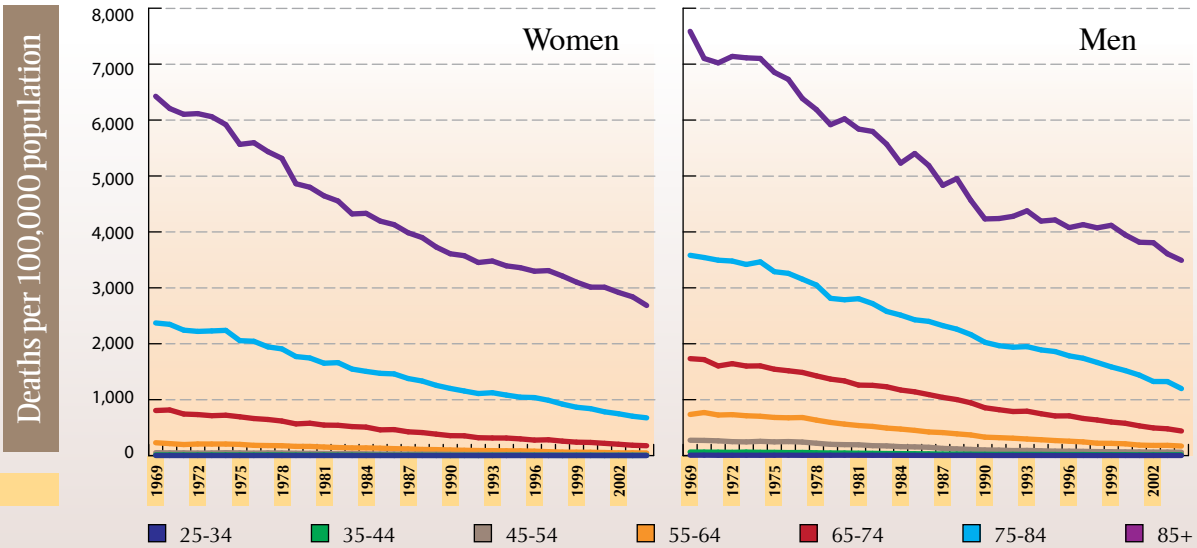


Age group (years)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	0.4	3.7	11.8	46.9	176.3	675.2	2,680.6
Men	1.9	14.8	60.8	170.6	440.3	1,198.5	3,495.5
Both	1.2	9.3	36.2	107.9	301.7	890.8	2,929.6

♦ * ICD-10-CA codes: I20-I25. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Among both women and men, rates of death for ischemic heart disease have been declining since 1969 for all age groups (FIGURE 4-9).

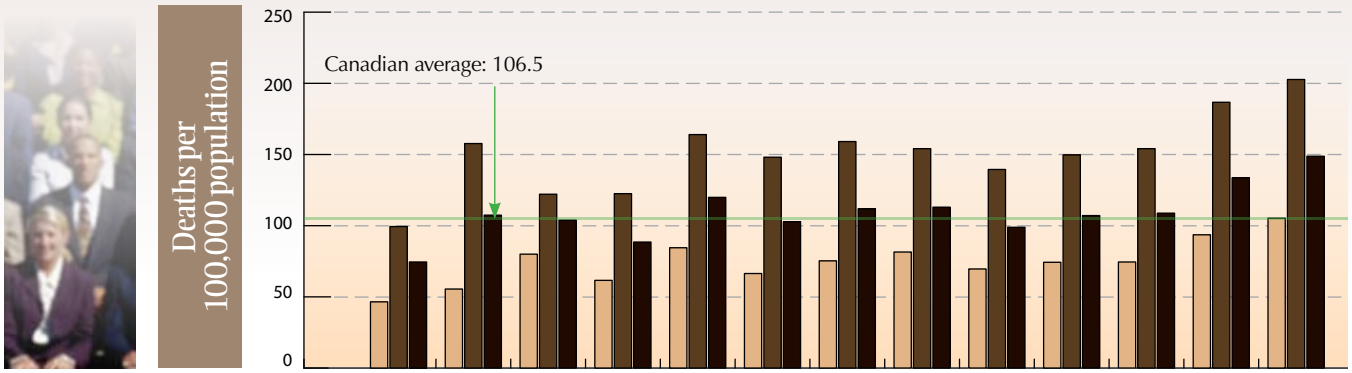
Figure 4-9 *Rates of death due to ischemic heart disease*, by sex, age group, and year, Canada, 1969-2004*



♦ * ICD-10-CA codes: I20-I25. ♦ Note: - The coding schemes for this condition changed in 1979 and 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Mortality rates due to ischemic heart disease show variation across the provinces and territories, particularly among men (FIGURE 4-10). For both women and men, mortality rates have been highest in Prince Edward Island and in Newfoundland and Labrador. Among women, the lowest mortality rates have been in Nunavut and the Northwest Territories, while among men, the lowest mortality rates have been in Nunavut, Yukon, and British Columbia. Of note is the much higher death rate among men in the Northwest Territories compared to women. These differences highlight the differences in risk factors among the provinces and territories.

Figure 4-10 *Rates of death due to ischemic heart disease*, by sex and province/territory, Canada, 2000-2004 (five year average)*

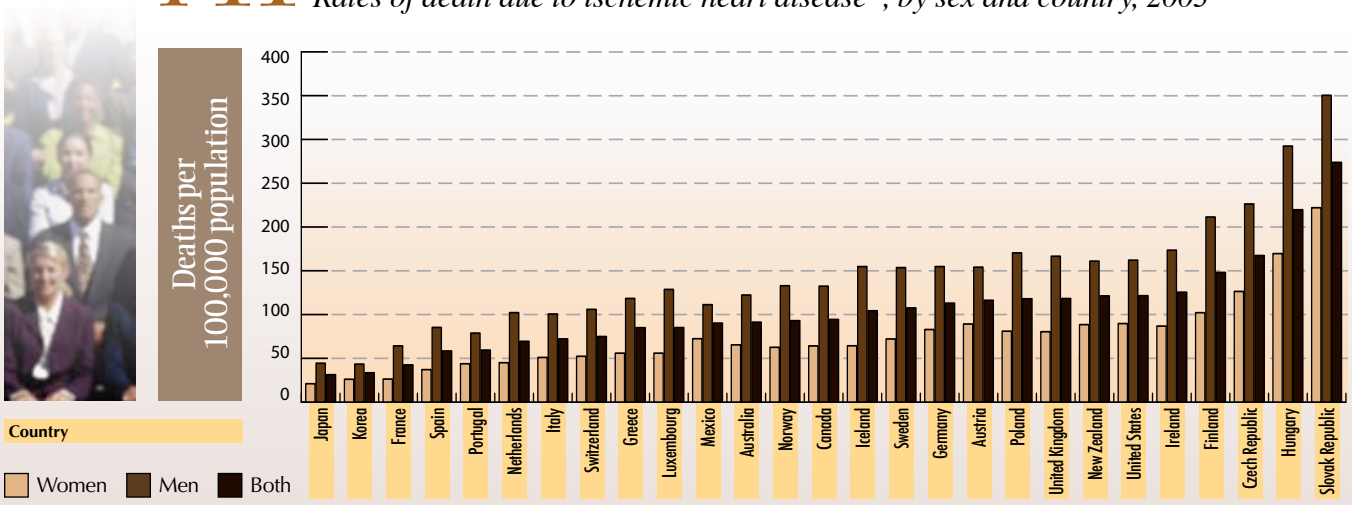


Province/territory	NU	NT	YT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
Women	46.5	55.5	80.0	61.6	84.5	66.4	75.3	81.5	69.6	74.3	74.5	93.6	105.3
Men	99.4	157.7	122.1	122.5	164.0	148.1	159.1	154.1	139.5	149.7	154.1	186.7	202.7
Both	74.5	107.4	103.9	88.5	119.9	102.8	111.8	113.0	98.9	107.1	108.8	133.6	148.8

♦ * ICD-10-CA codes: I20-I25. ♦ Note: - Standardized to the 1991 Canadian population. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

In 2003, Canada had the 14th lowest mortality rate for ischemic heart disease among 27 countries (FIGURE 4-11). Japan had the lowest mortality rate for women, while Korea had the lowest mortality rate for men. Canada's rates of death due to ischemic heart disease were 3.1 times higher than Japan's rates for women and Korea's rate for men.

Figure 4-11 *Rates of death due to ischemic heart disease*, by sex and country, 2003*



♦ * ICD-10-CA codes: I20-I25. ♦ Notes: - Standardized to the 1980 OECD population. - Only lists countries with data available for 2003. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Organisation for Economic Co-operation and Development Health Data 2008 (Eco-santé 2008).

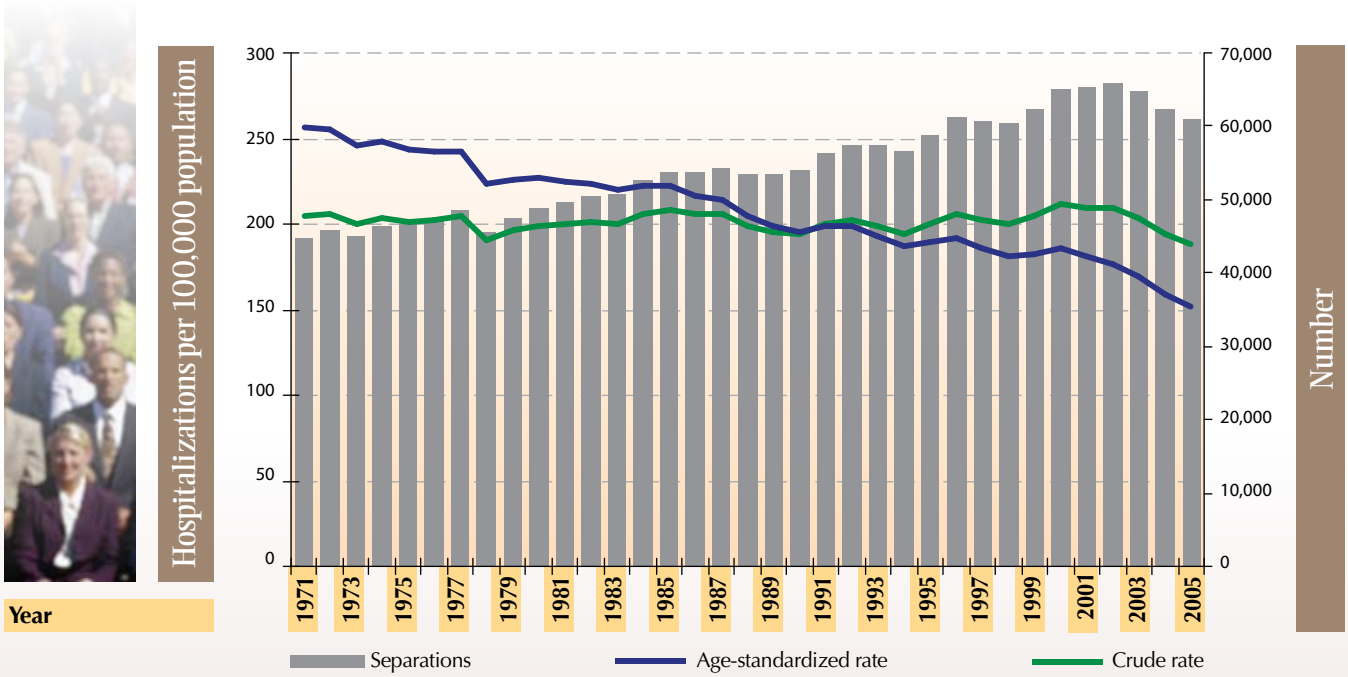
Heart Attack

A heart attack is an acute event in which the blood supply to a part of the heart muscle is interrupted long enough to cause damage to the heart. The most common reason for this damage is the formation of a thrombus (clot) in one of the arteries supplying blood to the heart. Such a clot obstructs the blood flow to the particular area of cardiac muscle supplied by that artery, causing damage to the heart muscle. Ischemic heart disease is often the underlying cause as vessels with plaque are more prone to form clots.

Hospitalizations Due to Heart Attack

Almost one in four people die from a heart attack before they reach medical care. If they do reach hospital, then most are admitted for treatment. In 2005/06, there were 60,996 hospitalizations due to heart attacks (FIGURE 4-12). The trend in hospitalization for heart attack was very similar to that for ischemic heart disease. The age-standardized rate of hospitalization for heart attack decreased from 1971 onwards, likely reflecting better prevention of ischemic heart disease and also better management of ischemic heart disease out of hospital, both of which decrease the risk of heart attack. The number of hospitalizations had been increasing since 1971, only showing a decrease from 2002 onwards due to an increase in the number of people in the population and the aging of the population. The number of hospitalizations reflects the need for health services.

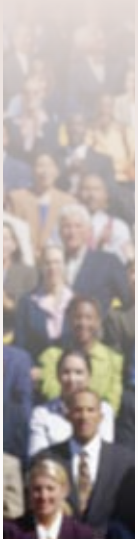
Figure 4-12 *Number and rate of hospitalizations due to heart attack*, by year, Canada, 1971/72-2005/06*

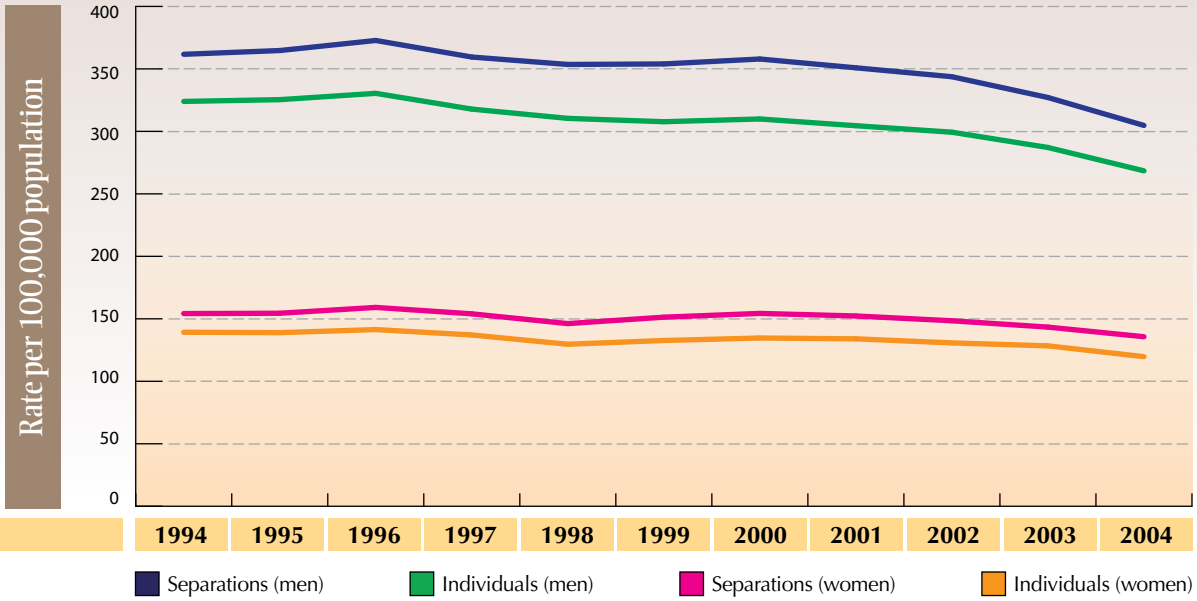


♦ * ICD-10-CA codes: I21-I22. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 1979 and 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. Nunavut data not available in 2002/03. Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

The above hospitalization data used separations from hospital for a heart attack. Each separation is considered a new 'case', whereas analysing the data by person may group multiple hospital visits for one 'case'. Analysing the data by person rather than by separations, in 2004 the hospitalization rate by person was 11.9% less than the rate for admissions for men, and 11.8% less for women, indicating that about 12% had more than one admission for a heart attack during a one year period (FIGURE 4-13). This proportion has not changed very much since 1994. However, a lower number of women were admitted for heart attack when compared to men.

Figure 4-13 *Rates of hospitalization due to heart attack*, by separations and individuals, by sex and year, Canada, 1994/95-2004/05*

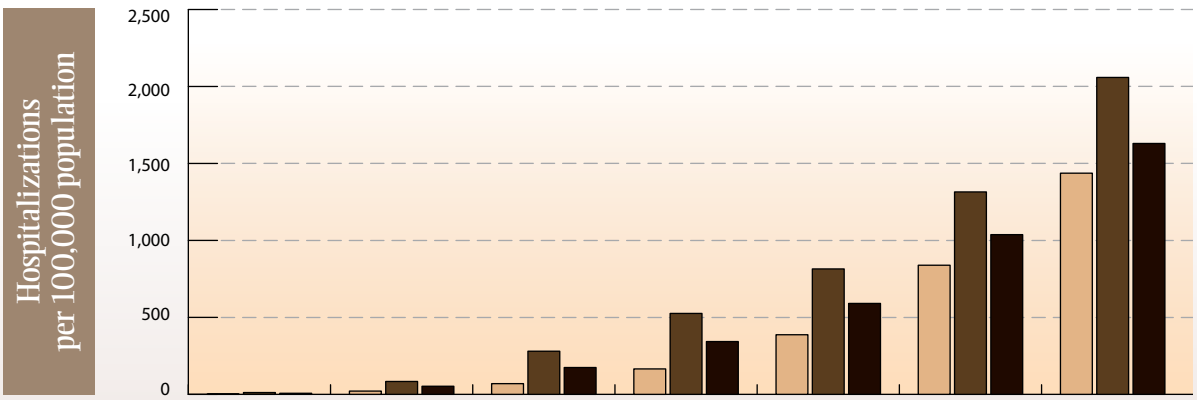




♦ * ICD-9 code: 410; ICD-10-CA codes: I21, I22. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Data are for age 20+ years. - Data are based on fiscal year. - Standardized to the 1991 Canadian population by five year age groups. - The coding schemes for this condition changed in 2001, and this may influence trends. ♦ Source: Health Division, Statistics Canada, using Hospital Person Oriented Information.

In 2005/06, hospitalization rates for heart attack were higher among men than among women in all age groups (FIGURE 4-14). Heart attacks occurred in both men and women under age 45. As with ischemic heart disease, rates were considerably higher among men over age 45 years and among women over age 55 years.

Figure 4-14 *Rates of hospitalization due to heart attack*, by sex and age group, Canada, 2005/06*

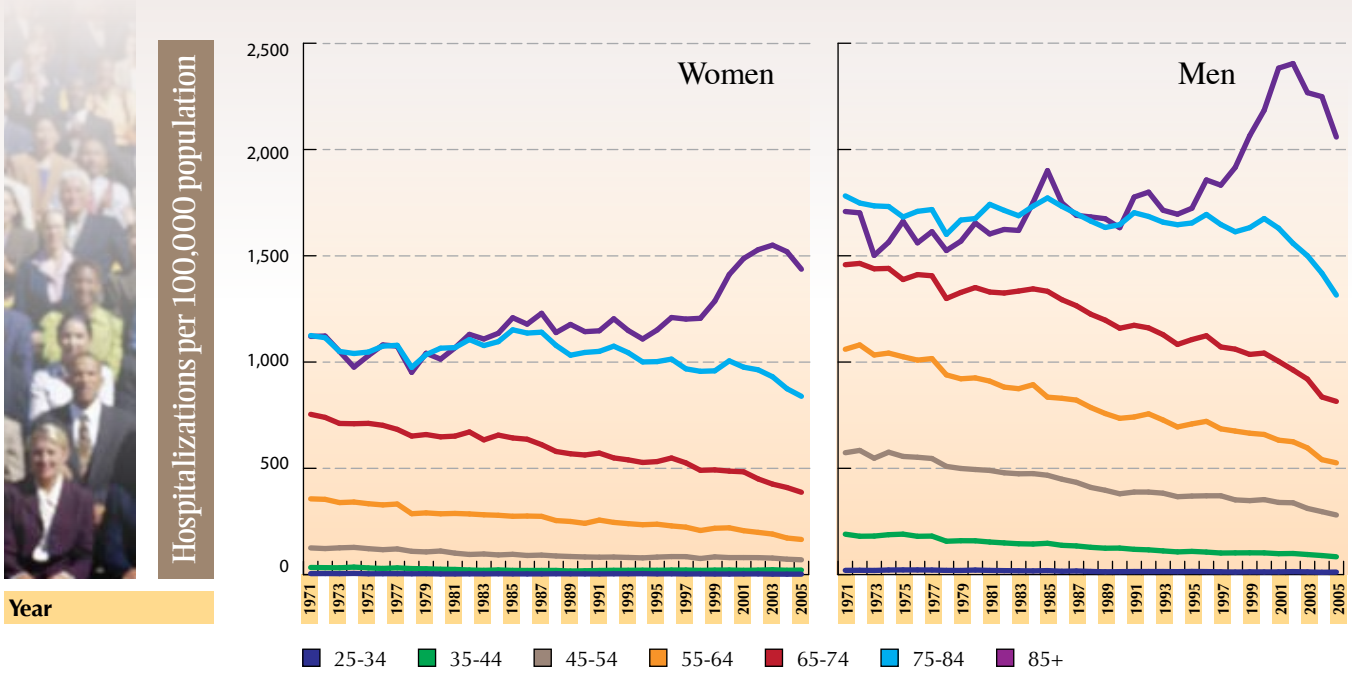


Age group (years)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	2.1	21.2	69.6	165.3	387.3	838.9	1,436.8
Men	11.8	83.8	280.4	525.8	814.8	1,315.0	2,058.7
Both	7.0	52.7	174.4	343.0	590.7	1,037.6	1,629.8

♦ * ICD-10-CA codes: I21-I22. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Hospitalization rates for heart attack have been decreasing since the 1970s for all age groups, except for those age 85+ years (FIGURE 4-15). The increasing rates of hospitalization for heart attack for women and men in the oldest age group may reflect that while one can delay the impact of ischemic heart disease with a healthy lifestyle and good management, eventually the disease runs its course and an outcome, like having a heart attack, occurs. The increasing rates of hospitalization in the oldest age group may also be attributed to the aging of the population, as the age distribution in the 85+ age group shifts towards an older population.

Figure 4-15 *Rates of hospitalization due to heart attack*, by sex, age group, and year, Canada, 1971/72-2005/06*



♦ * ICD-10-CA codes: I21-I22. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - The coding schemes for this condition changed in 1979 and 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. Nunavut data not available in 2002/03. Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Deaths Due to Heart Attack

As with ischemic heart disease, the total number of deaths due to heart attack has been declining since 1970, from 31,457 deaths in 1969 to 18,125 deaths in 2004 (FIGURE 4-16). After adjusting both for the increase in the number of people in the population and for the aging of the population, the age-standardized mortality rate showed a 4.6-fold reduction since 1969. This may reflect several factors, including earlier diagnosis of milder cases, primary and secondary prevention of cases due to a reduction in smoking, less physical inactivity, more consumption of vegetables and fruit, decreased consumption of saturated fats, and better treatment of risk conditions such as high blood pressure, the use of statins for dyslipidemia, as well as more effective management of acute cases.

Figure 4-16 *Number and rate of deaths due to heart attack*, by year, Canada, 1969-2004*

♦ * ICD-10-CA codes: I21-I22. ♦ Notes: - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 1979 and 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

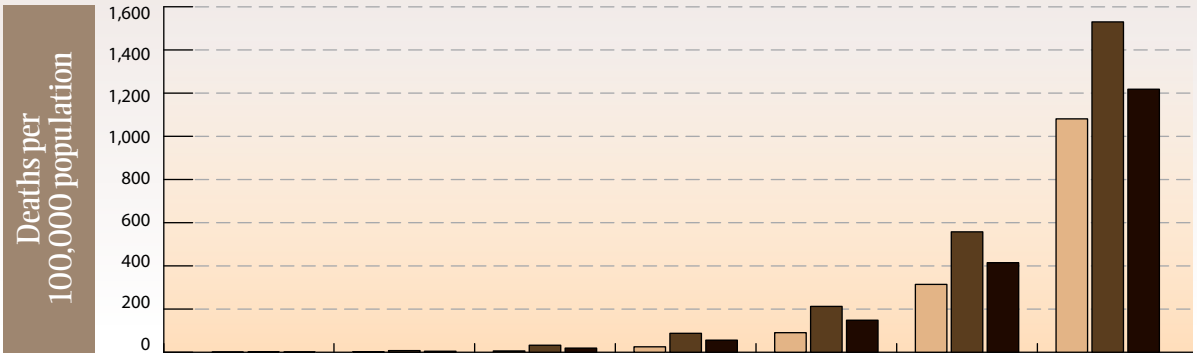
As with ischemic heart disease mortality rates, men have had higher rates of death due to heart attack than women (FIGURE 4-17). Both women and men have shown a decline in the mortality rate due to heart attack since 1970 – a 4.6-fold decrease among men and 4.2-fold decrease among women.

Figure 4-17 *Rates of death due to heart attack*, by sex and year, Canada, 1969-2004*

♦ * ICD-10-CA codes: I21-I22. ♦ Notes: - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 1979 and 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

In all age groups, men had higher rates of death from heart attack than women, but the difference between men and women decreased with increasing age (FIGURE 4-18). Among those ages 35 to 44 years, men were 4.3 times more likely to die of a heart attack than were women. By ages 55 to 64 years, this had decreased to 3.5 times, by ages 75 to 84 years it was down to 1.8 times, and by age 85+ years it was only 1.4 times higher among men than among women.

Figure 4-18 *Rates of death due to heart attack*, by sex and age group, Canada, 2004*

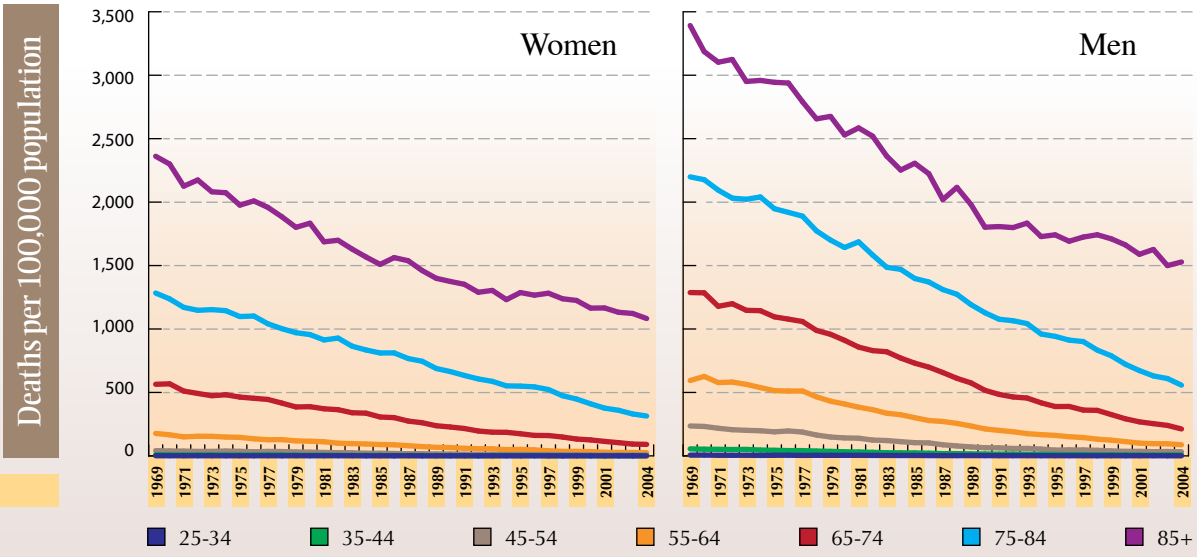


Age group (years)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	0.2	1.9	6.1	25.2	90.6	314.3	1,080.9
Men	0.8	7.6	32.5	87.7	212.3	557.7	1,529.9
Both	0.5	4.7	19.2	56.0	148.4	414.5	1,218.1

♦ * ICD-10-CA codes: I21-I22. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Among both women and men, rates of death from a heart attack have been declining since 1969 for all age groups, but have been slowing since the 1990s in the 85+ age group (FIGURE 4-19).

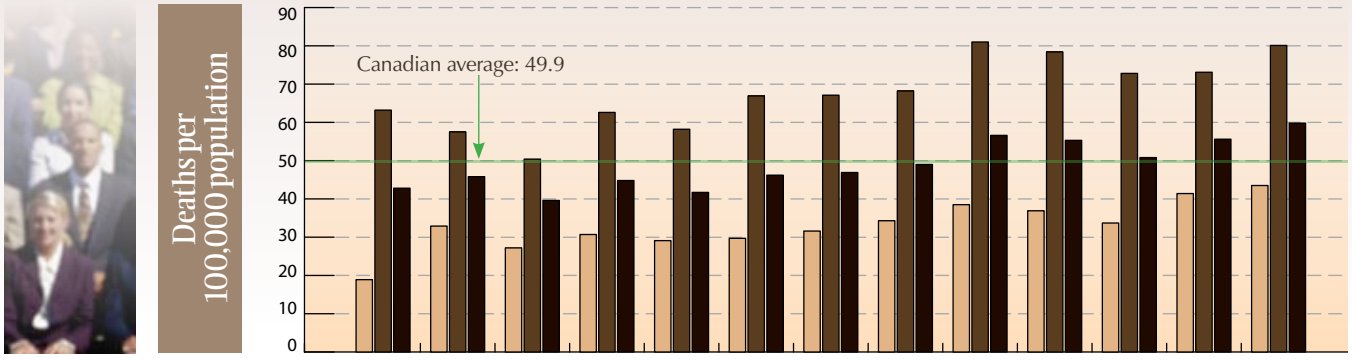
Figure 4-19 *Rates of death due to heart attack*, by sex, age group, and year, Canada, 1969-2004*



♦ * ICD-10-CA codes: I21-I22. ♦ Note: - The coding schemes for this condition changed in 1979 and 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Among the provinces and territories, more variability was seen among men than among women in death rates due to a heart attack (FIGURE 4-20). Nunavut had very low death rates for women compared to the other provinces and territories. Québec, New Brunswick, and Newfoundland and Labrador had the highest mortality rates for men attributed to heart attack. The differences likely reflect, in part, differences in prevalence of risk factors in the populations.

Figure 4-20 *Rates of death due to heart attack*, by sex and province/territory, Canada, 2000-2004 (five year average)*

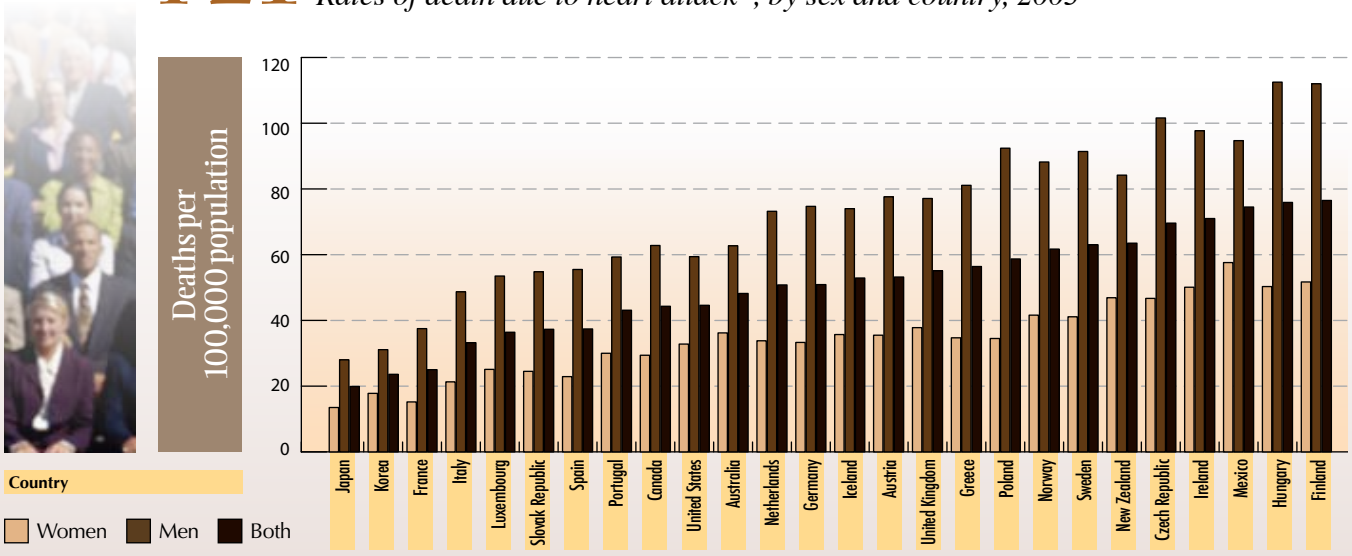


Province/territory	NU	NT	YT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
Women	18.9	32.9	27.2	30.7	29.1	29.7	31.6	34.3	38.5	36.9	33.7	41.4	43.5
Men	63.2	57.5	50.4	62.6	58.2	66.9	67.1	68.2	81.0	78.4	72.8	73.1	80.1
Both	42.8	45.8	39.6	44.8	41.7	46.2	46.9	49.0	56.6	55.3	50.8	55.6	59.8

♦ * ICD-10-CA codes: I21-I22. ♦ Note: - Standardized to the 1991 Canadian population. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

In 2003, Canada had the 8th lowest mortality rate from heart attack for women among 26 countries, while for men Canada had the 11th lowest mortality rate (FIGURE 4-21). Japan had the lowest mortality rates for both women and men, with less than half the rates of Canada.

Figure 4-21 *Rates of death due to heart attack*, by sex and country, 2003*



♦ * ICD-10-CA codes: I21-I22. ♦ Notes: - Standardized to the 1980 OECD population. - Only lists countries with data available for 2003. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Organisation for Economic Co-operation and Development Health Data 2008 (Eco-santé 2008).

Congestive Heart Failure

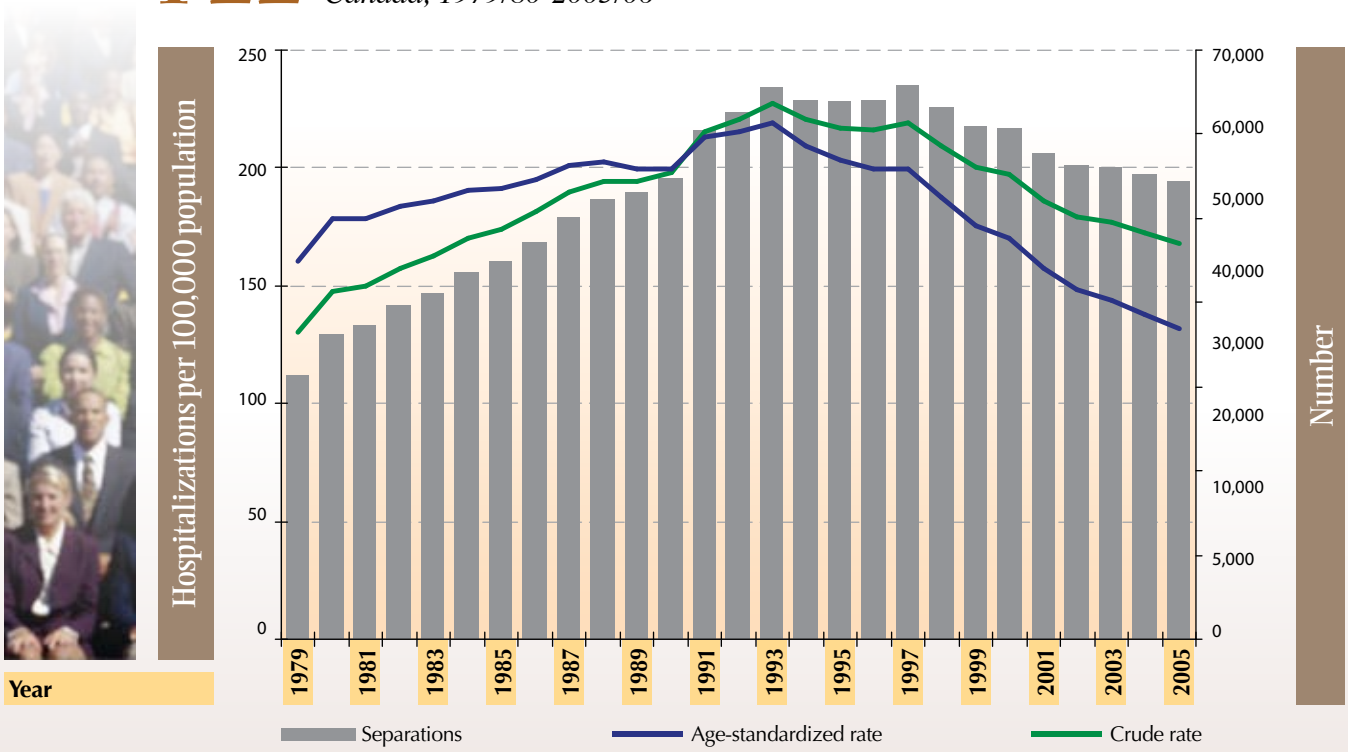
Congestive heart failure is the inability of the heart to maintain an adequate pumping function throughout the body, typically resulting in a build up of fluid in the body, particularly the lungs or legs. It can be caused by ischemic heart disease or may develop after a heart attack, but can also be caused by cardiomyopathy (disease of the heart muscle), the effects of lung disease such as chronic obstructive pulmonary disease (COPD), the effects of long-term high blood pressure, arrhythmia (disturbances of heart rhythm), or valvular heart disease.

Congestive heart failure can occur suddenly, for example, following a heart attack, or it can develop over a period of time. The symptoms include shortness of breath, swelling of the legs, and a low energy level. Individuals with congestive heart failure are at risk of dying suddenly from a disturbance in heart rhythm. The management of congestive heart failure includes medications, restriction of fluid intake, and a low salt diet. Sometimes a surgical procedure is required such as bypass surgery or the implantation of a cardioverter device, and for some people, a heart transplant.

Hospitalizations Due to Congestive Heart Failure

From 1979 to 1993, the rates of hospitalization for congestive heart failure increased (FIGURE 4-22). However, since 1994, the number and rates of hospitalization have been decreasing. In 2005/06, there were 54,333 hospitalizations for congestive heart failure, compared to 31,461 in 1979 and 65,755 in 1997. The recent decrease in hospitalizations for congestive heart failure has likely been due to earlier and better treatment of congestive heart failure out of hospital and better management of underlying conditions such as high blood pressure, dyslipidemia, and ischemic heart disease.

Figure 4-22 *Number and rate of hospitalizations due to congestive heart failure*, by year, Canada, 1979/80-2005/06*



♦ * ICD-10-CA code: I50. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. Nunavut data not available in 2002/03. Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Many people hospitalized for congestive heart failure had more than one hospitalization during the year (FIGURE 4-23). Over time, the number of multiple admissions per year has decreased, such that the gap between visit-oriented and person-oriented data has decreased. Effective management of congestive heart failure likely has contributed to this change.

Figure 4-23 *Rates of hospitalization due to congestive heart failure*, by separations and individuals, by sex and year, Canada, 1994/95-2004/05*

♦ * ICD-9 code: 428; ICD-10-CA code: I50. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Data are for age 20+ years. - Data are based on fiscal year. - Standardized to the 1991 Canadian population by five year age groups. - The coding schemes for this condition changed in 2001, and this may influence trends. ♦ Source: Health Division, Statistics Canada, using Hospital Person Oriented Information.

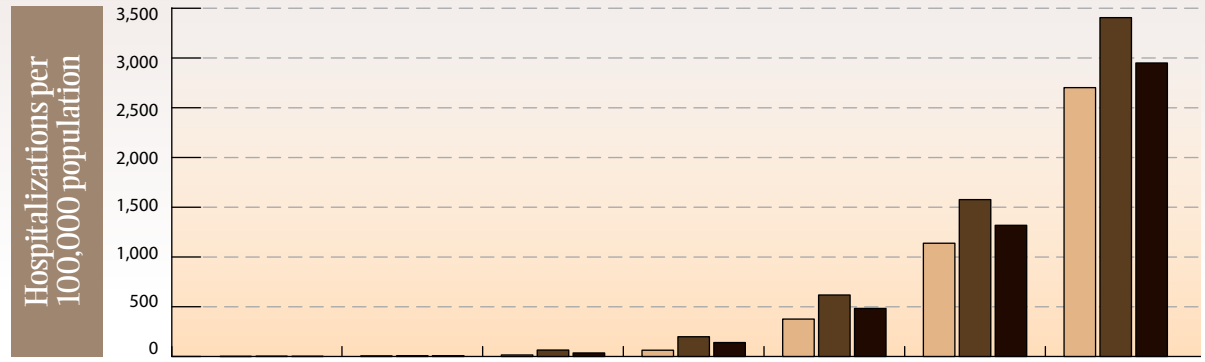
Congestive heart failure, in addition to being identified as the most responsible reason for a hospital stay, is also identified as an associated cause for many other hospitalizations (FIGURE 4-24). On average, in only one-third of hospitalizations where the individual was admitted with congestive heart failure was it identified as the most responsible reason for hospitalization. This underscores that congestive heart failure often presents as the end-stage of other health conditions.

Figure 4-24 *Number of hospitalizations due to congestive heart failure*, by sex and age group, Canada, 2005/06*

♦ * ICD-10-CA code: I50. ♦ Notes: - W = women, M = men. - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

In 2005/06, hospitalization rates for congestive heart failure increased with age (FIGURE 4-25). In all age groups, the rates were higher among men than among women, but, unlike other CVD conditions, the difference in rates between the sexes was small. Hospitalization rates for congestive heart failure increased after age 65 years, later than for ischemic heart disease (age 45 for men and age 55 for women). This reflects that congestive heart failure tends to occur after conditions such as ischemic heart disease have been present for years.

Figure 4-25 *Rates of hospitalization due to congestive heart failure*, by sex and age group, Canada, 2005/06*

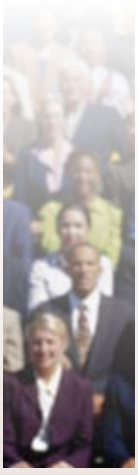


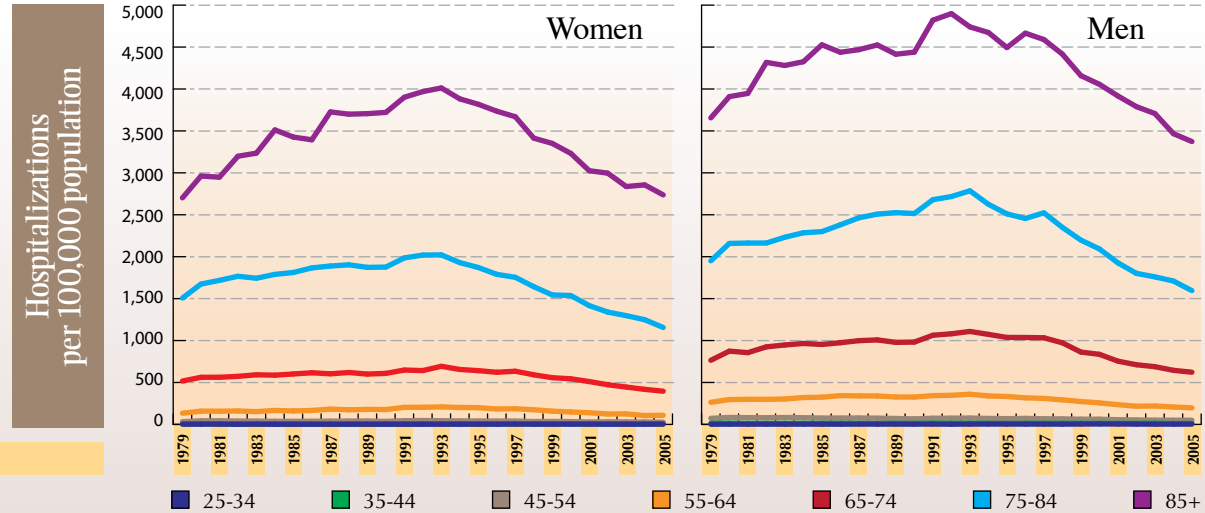
Age group (years)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	3.2	6.6	26.2	108.7	395.9	1,155.9	2,737.0
Men	3.7	11.5	50.0	198.0	622.4	1,595.2	3,373.3
Both	3.5	9.1	38.0	152.8	503.6	1,339.2	2,934.4

♦ * ICD-10-CA code: I50. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

The decreasing trend in hospitalizations for congestive heart failure in the 1990s occurred in all ages (FIGURE 4-26). The decline in rates was seen earlier among women (at around 1992), than among men (at around 1997).

Figure 4-26 *Rates of hospitalization due to congestive heart failure*, by sex, age group, and year, Canada, 1971/72-2005/06*





♦ * ICD-10-CA code: I50. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - The coding schemes for this condition changed in 1979 and 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. Nunavut data not available in 2002/03. Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Deaths Due to Congestive Heart Failure

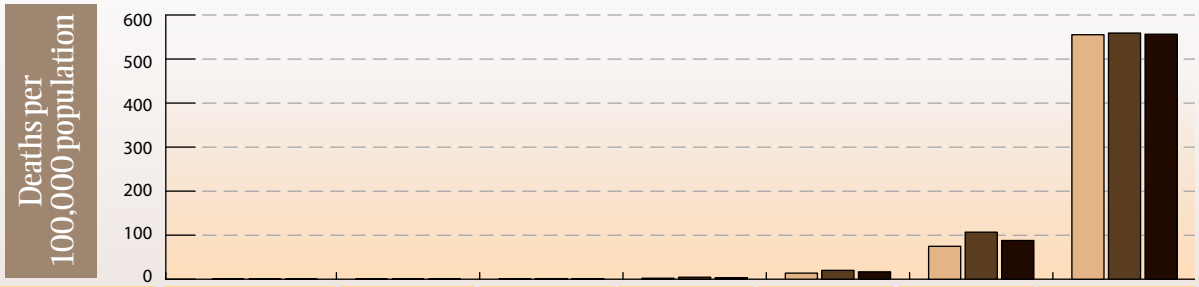
After peaking in 2000 at 4,835 deaths, the number of deaths due to congestive heart failure declined to 4,430 deaths in 2004 (FIGURE 4-27). The increase in the number of deaths up to 2000 was mostly due to an increase in the population and aging of the population. Both the death rates and the number of deaths have been decreasing since 2000. This pattern is very different from that seen for ischemic heart disease and heart attack, where death rates have been decreasing since the 1970s. Deaths from congestive heart failure likely reflect an end-stage outcome of ischemic heart disease, which is a progressive disease.

Figure 4-27 *Number and rate of deaths due to congestive heart failure*, by year, Canada, 1979-2004*

♦ * ICD-10-CA code: I50. ♦ Notes: - Standardized to the 1991 Canadian population. - The coding scheme for this condition changed in 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

In 2004, mortality rates due to congestive heart failure were very low among individuals under the age of 65 years (FIGURE 4-28). Over the age of 85, the rates were six times higher than among those ages 75 to 84 years. In all age groups, the rates among men were higher than those among women, but the differences were far less than for the other CVD conditions. The pattern of changes in numbers and rates was very similar among men and women.

Figure 4-28 *Rates of death due to congestive heart failure*, by sex and age group, Canada, 2004*



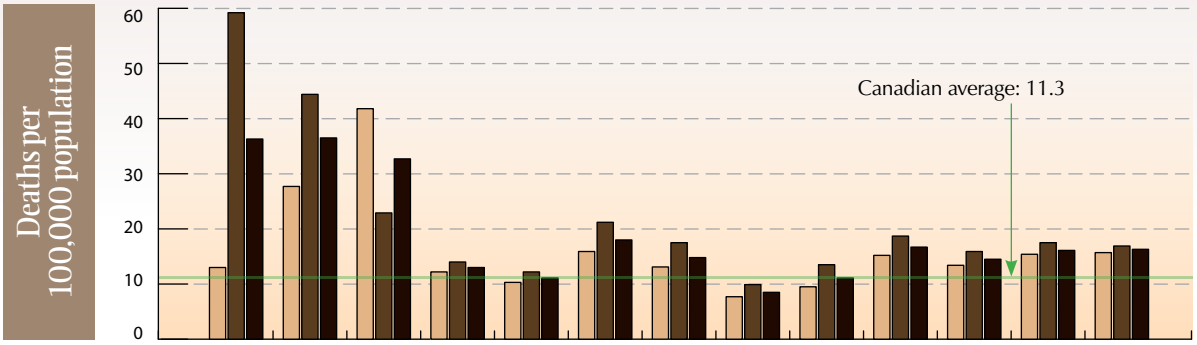
Age group (years)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	0.1	0.1	0.7	2.2	13.8	74.7	555.2
Men	0.1	0.2	1.3	4.5	20.1	106.8	559.0
Both	0.5	0.2	1.0	3.3	16.8	87.9	556.4

♦ * ICD-10-CA code: I50. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

In contrast to the mortality rates for other CVD conditions, the mortality rates for congestive heart failure were much higher in Nunavut than for other parts of Canada (FIGURE 4-29). Part of this difference may be related to how the cause of death is recorded on the death certificate. Heart failure is a general term that can be used if the heart simply stops beating, and may be used if another cause of death is not obvious. This may be the reason why Nunavut had higher rates of death due to heart failure but lower rates due to ischemic heart disease and heart attack.

Saskatchewan, Manitoba, New Brunswick, and Prince Edward Island had higher mortality rates for congestive heart failure among men. The Northwest Territories and the Yukon had higher rates among women than did the other provinces.

Figure 4-29 *Rates of death due to congestive heart failure*, by sex and province/territory, Canada, 2000-2004 (five year average)*



Province/territory	NU	NT	YT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
Women	13.0	27.7	41.8	12.2	10.3	15.9	13.1	7.7	9.5	15.2	13.4	15.4	15.7
Men	59.2	44.4	22.9	14.0	12.2	21.2	17.5	9.9	13.5	18.7	15.9	17.5	16.9
Both	36.3	36.5	32.7	13.0	11.1	18.0	14.8	8.5	11.1	16.7	14.5	16.1	16.3

♦ * ICD-10-CA code: I50. ♦ Note: - Standardized to the 1991 Canadian population. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Surgical Procedures *for* Heart Disease

Several surgical procedures can improve the quality of life for individuals with heart disease and decrease illness and death. For example, coronary bypass grafting and angioplasty improve blood flow to the heart for people with ischemic heart disease. Valve surgery can repair leaking valves that contribute to congestive heart failure, and thereby improve chances of survival. Also, pacemaker implants can support the electrical functioning of the heart.

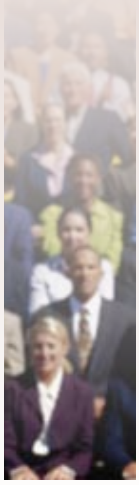
The Hospital Morbidity Database only covers hospital separations, so the data in this report do not include procedures done on an outpatient basis. This will impact the completeness of data on angioplasties and pacemaker implantations that are often done on an outpatient basis.

Coronary Artery Bypass Grafting

Coronary artery bypass grafting (CABG) uses arteries or veins from other parts of the body to bypass blockages in the arteries to the heart. The increased use of arteries instead of veins to bypass blocked coronary vessels has resulted in significantly improved outcomes.

The number of CABG surgeries has been higher among men than among women (FIGURE 4-30). This in part reflects the higher rates of ischemic heart disease and heart attack among men compared to women. After an increase in the number of CABG surgeries among men between 1995/96 and 2001/02, the number has now levelled off. Angioplasties are now being done as an alternative procedure (FIGURE 4-32). Little change in the number of CABG surgeries among women has been seen since 1995.

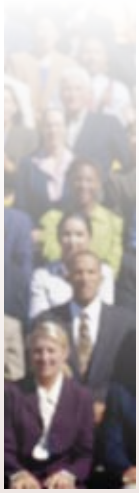
Figure 4-30 *Number of coronary artery bypass grafting*†, by sex and year, Canada, 1995/96-2005/06*



♦ * CCP code: 48.1. ♦ † CCI code : 1.IJ.76. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

In 2005/06, the higher rate of CABG for men than women was seen in all age groups (FIGURE 4-31). A few men and women as young as 30 to 39 underwent this procedure. For both sexes, the rate of CABG increased with age, peaking at ages 70 to 79 years with 205 procedures per 100,000 population among women and 634 procedures per 100,000 population among men.

Figure 4-31 *Rate of coronary artery bypass grafting*†, by sex and age group, Canada, 2005/06*



Age group (years)	30-39	40-49	50-59	60-69	70-79	80-89	90+
Women	1	8	34	107	205	98	6
Men	3	38	195	459	634	305	18

♦ * CCP code: 48.1. ♦ † CCI code: 1.IJ.76. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

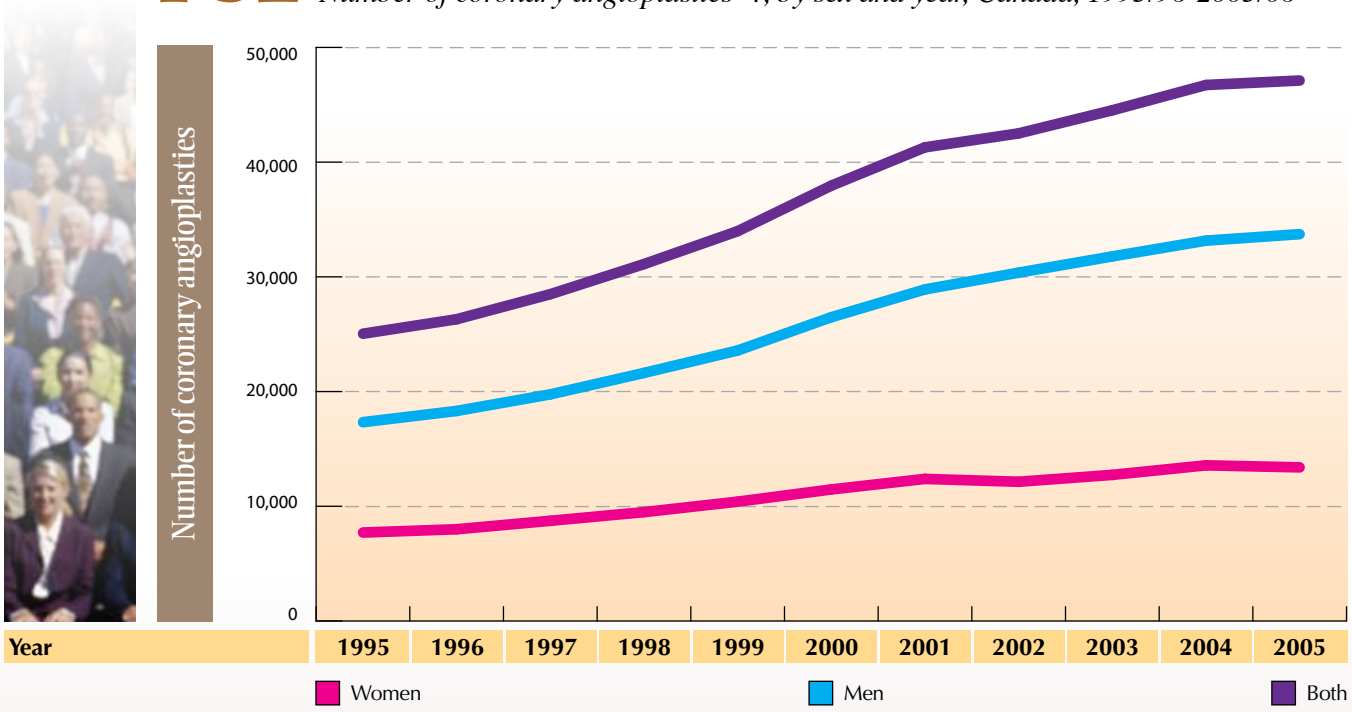
Coronary Angioplasties

Coronary angioplasty opens a blocked or narrowed coronary artery. This is the intervention of choice rather than bypass surgery for the majority of individuals with blocked arteries. By restoring blood flow to a coronary artery, balloon angioplasty (a balloon inflated in the artery that opens it up) preserves heart muscle function and improves outcome. Hospital stay is minimal as many angioplasties are now being done as an outpatient procedure. The addition of a stent (a small tube that stays in the artery to keep it open), particularly one that gives out an anti-thrombotic drug, has markedly improved the results of angioplasty.

Each province independently developed their approach to inpatient versus outpatient coding of procedures for angioplasties, and some may be missed with the coding selected for this report. The national total would be greater once these differences are taken into account.

More men than women had angioplasties, reflecting in part the high rates of heart disease among men (FIGURE 4-32). Between 1995/96 and 2005/06, the number of angioplasties performed on both women and men increased, but, as with bypass surgery, the increase was greater for men than for women. In 1995/96, the number of angioplasties among men was 2.2 times higher than for women, but in 2005/06 was 2.5 times higher.

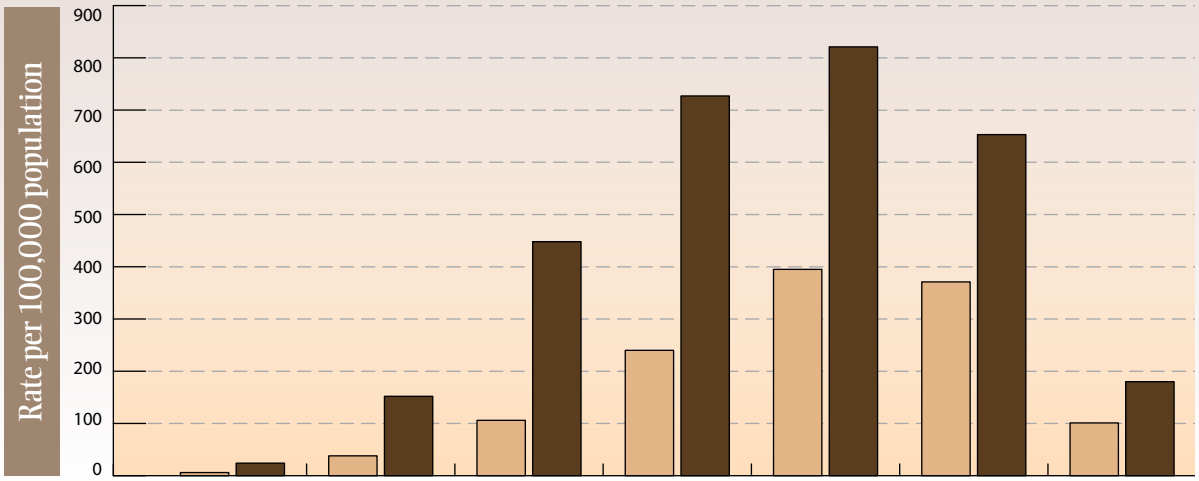
Figure 4-32 *Number of coronary angioplasties*†, by sex and year, Canada, 1995/96-2005/06*



♦ * CCP codes: 48.0, 51.59. ♦ † CCI codes: 1.IJ.50, 1.IJ.57, excluding LA, MI, QF, VS, WC, WK. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

In 2005/06, the rate of angioplasties was higher among men than women in all age groups (FIGURE 4-33). The rate increased with age, peaking in the 70 to 79 year age group for both sexes, although rates remained quite high in the 80 to 89 year age group as well. Rates for this procedure were higher in all age groups when compared to bypass procedures, particularly in those age 80+ years, where it was 3.8 times higher among women in the 80 to 89 year age group.

Figure 4-33 *Rate of coronary angioplasties*†, by sex and age group, Canada, 2005/06*



Age group (years)	30-39	40-49	50-59	60-69	70-79	80-89	90+
Women	6	38	106	240	395	371	101
Men	24	152	448	727	821	653	180

♦ * CCP codes: 48.0, 51.59. ♦ † CCI codes: 1.IJ.50, 1.IJ.57 excluding LA, MI, QF, VS, WC, WK. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Valve Surgery

The heart has four chambers (two atria and two ventricles). Blood flows from the body through the veins to the right atrium then is pumped into the right ventricle. From there it is pumped to the lungs, then back to the left atrium where it is pumped into the left ventricle. Finally the left ventricle pumps the blood out to the body through the arteries.

Each chamber of the heart has a valve at its opening to stop the blood from flowing back once it has been pumped to another chamber or to the arteries. These valves can become damaged, causing the blood to leak back from where it came or they can become constricted, in some cases from the time of birth. Many damaged heart valves can be repaired while others can be replaced, either with a prosthetic tissue valve or a mechanical valve. Since the lifespan of a prosthetic valve is limited, younger individuals may need to undergo repeated valve surgery. The majority of operations involve one damaged valve, although some individuals require the repair and/or replacement of more than one. Older individuals may also have ischemic heart disease and require bypass surgery in addition to the valve surgery.

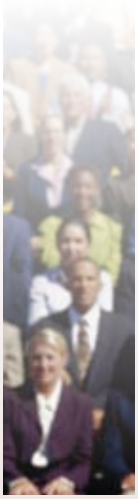
The number of surgeries increased from 1995/96 to 2005/06, with more men than women having valve surgeries (FIGURE 4-34). After 2000/01, the number for men increased faster than did the number for women, a finding that is similar to the higher rates of men undergoing bypass surgery and coronary angioplasties compared to women.

Figure 4-34 *Number of valve surgeries*†, by sex and year, Canada, 1995/96-2005/06*

♦ * CCP codes: 47.0 to 47.2. ♦ † CCI codes: 1.HS.80, 1.HT.80, 1.HU.80, 1.HV.80, 1.HT.89, 1.HS.90, 1.HT.90, 1.HU.90, 1.HV.90. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

In 2005/06, the rate of valve surgery increased with age for both sexes up to ages 70 to 79 years, remaining high among those ages 80 to 89 years and then decreasing (FIGURE 4-35). In all age groups, the rate for men was higher than for women.

Figure 4-35 *Number of valve surgeries*†, by sex and age group, Canada, 2005/06*



Age group (years)	30-39	40-49	50-59	60-69	70-79	80-89	90+
Women	4	8	18	57	118	68	8
Men	6	14	43	108	202	150	28

♦ * CCP codes: 47.0 to 47.2. ♦ † CCI codes: 1.HS.80, 1.HT.80, 1.HU.80, 1.HV.80, 1.HT.89, 1.HS.90, 1.HT.90, 1.HU.90, 1.HV.90. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Pacemaker Implantation

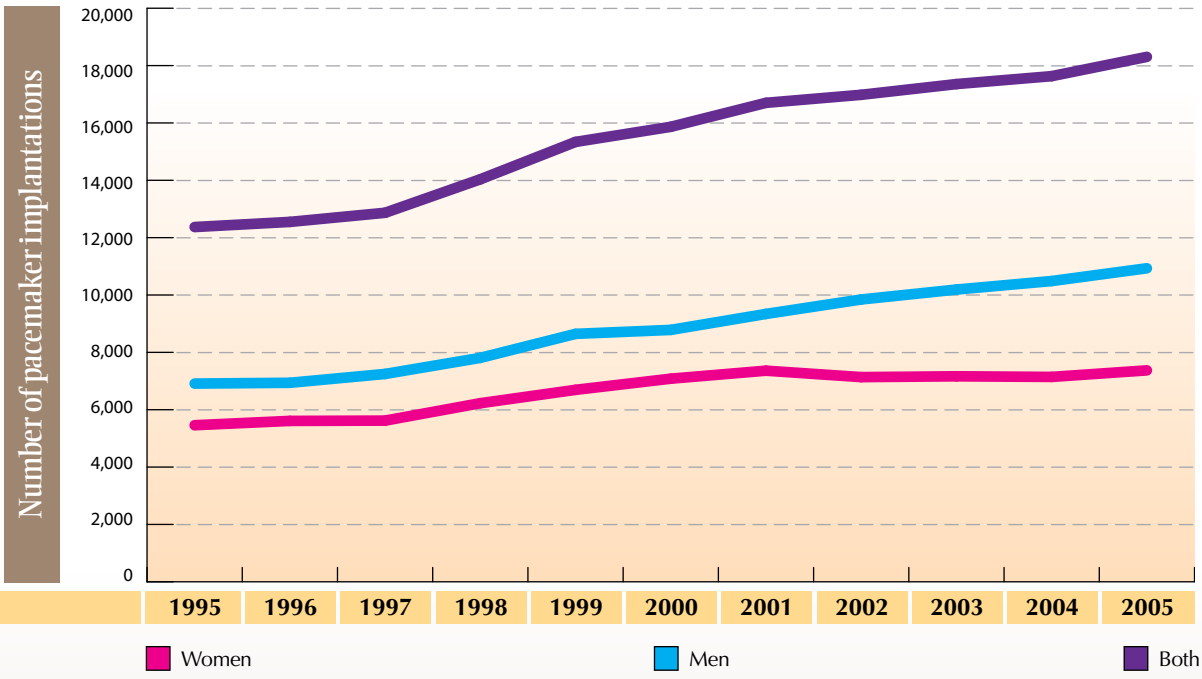
The heart beats in response to a trigger from the electrical system imbedded in the heart muscle. Various conditions like cardiomyopathy, ischemic heart disease, or a heart attack can impair the functioning of this electrical system. The result can be an irregular heart beat, or in some cases, death.

Pacemakers can be placed in the heart to maintain the heart beating when required. They are becoming smaller and increasingly sophisticated. Consequently, their performance can be better matched to an individual patient's needs. This not only prevents death, but also improves the quality of life. The indications for pacemaker implantation are broadening as the range of response capabilities increases.

Each province independently developed their approach to inpatient versus outpatient coding of procedures. Since only procedures listed for inpatients are included in the hospitalization database, the national total is higher than reported here.

The broadening of indications for pacemaker implantation has contributed to their increased use. The number of pacemaker implantations has been higher among men than among women, which is consistent with the higher rates of ischemic heart disease among men (FIGURE 4-36). The rates among women and among men had been parallel until the past few years, when the number of implants among men began to increase without any increase among women.

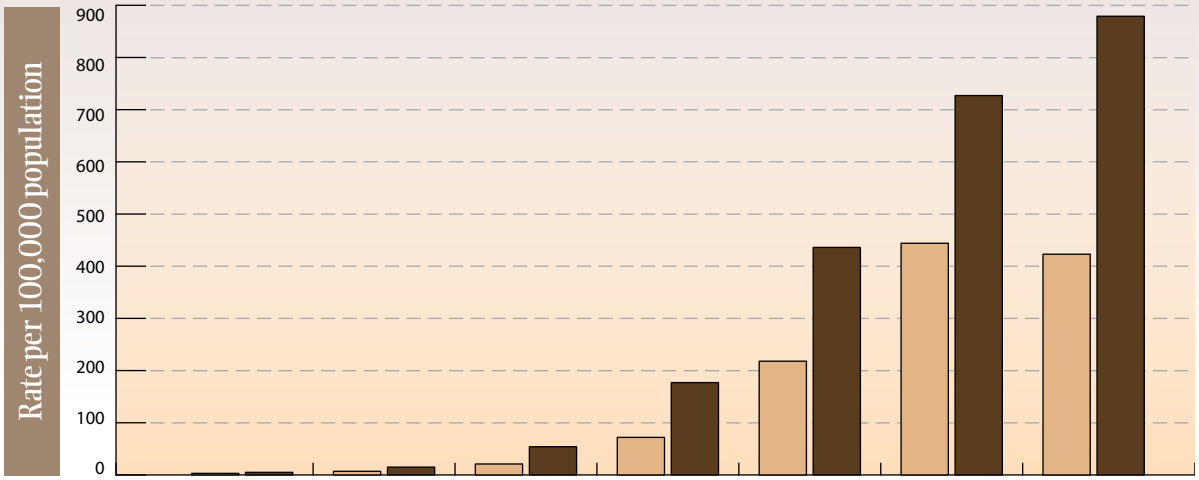
Figure 4-36 *Number of pacemaker implantations*†, by sex and year, Canada, 1995/96-2005/06*



♦ * CCP code: 49.7. ♦ † CCI codes: 1.H*.53, excluding 1.HP.53LAQP, 1.HZ.53LAKP, 1.HD.53GRJA, 1.HB.53LAJA, 1.HZ.53LANN, 1.HZ.53GRNN. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

The rate of pacemaker implantations increases with age, and for all ages is higher among men than among women (FIGURE 4-37).

Figure 4-37 *Rate of pacemaker implantations*†, by sex and age group, Canada, 2005/06*



Age group (years)	30-39	40-49	50-59	60-69	70-79	80-89	90+
Women	3	7	21	72	218	444	423
Men	5	15	54	177	436	727	879

♦ * CCP code: 49.7. ♦ † CCI codes: 1.H*.53, excluding 1.HP.53LAQP, 1.HZ.53LAKP, 1.HD.53GRJA, 1.HB.53LAJA, 1.HZ.53LANN, 1.HZ.53GRNN. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Heart Transplantations

Heart transplantation is a potentially lifesaving procedure for people who are expected to die soon from their heart disease. The number of heart and combined heart and lung transplantations performed in Canada each year falls far short of the need, and the limited availability of donor organs remains a major challenge. Mechanical devices to support or replace heart function offer some hope for the future.

In Canada, from 1996 to 2005, 1,564 first heart transplantations and 58 re-transplantations were carried out. The annual number of heart transplantations increased by 4.2% during this time period. While most of the first heart transplantations were performed on those age 35 years and older (54.2% were ages 35 to 59 years while 21.7% were age 60+ years), 9.1% were performed on individuals ages 18 to 34 years (FIGURE 4-38). Three out of four transplant recipients were men.

Figure 4-38 *Number of heart transplantations*, by age group and year, Canada, 1996-2005*

♦ * First grafts only. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Canadian Organ Replacement Register (Canadian Institute for Health Information).

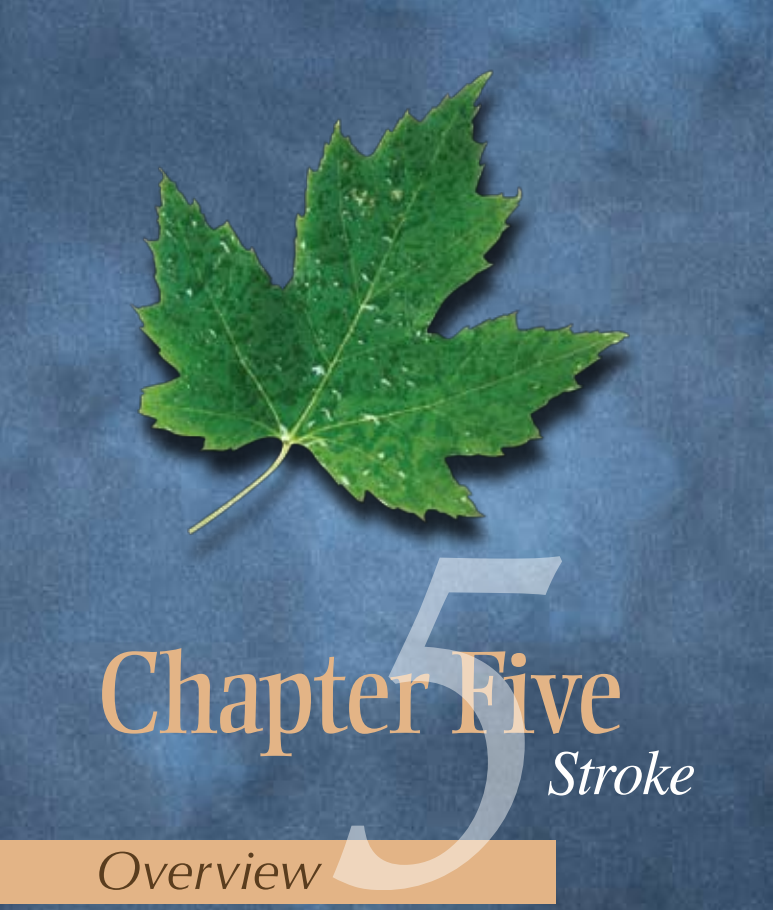
Between 1996 and 2005, the most common primary diagnosis for a heart transplant differed according to age. For those ages 18 to 34 years, dilated cardiomyopathy was cited as the reason for 22.3% of the transplantations. Among those ages 35 to 59 years and those age 60+ years, coronary heart disease was the most commonly cited primary diagnosis, followed by cardiomyopathy. Individuals with cardiomyopathy as the cause of heart disease had improved survival when compared to those with coronary artery disease or congenital heart disease.

Heart transplantation recipients, depending on their medical status at listing, undergo a median waiting time between one day (for urgent cases) and 243.5 days (for non-urgent cases). Between 1996 and 2004, there was an overall increase of 27.6% in the number of individuals waiting for a heart transplantation. However, in 2005, the number waiting for a transplantation was 96, which was a 23.2% decrease from 2004. Unfortunately, an average of 31 patients died per year while waiting for the procedure.

Between 1996 and 2004, 84.9% of individuals receiving a transplant lived at least one year. When comparing the two time periods of 1990 to 1995 and 1996 to 2004, the more recent period of 1996 to 2004 showed an increased probability of survival (from 82% one year survival to 85%). During the more recent time period, more of the individuals were over age 61 than for the earlier time period.

Summary *of* Highlights

- In 2005/06, there were 160,323 hospitalizations for ischemic heart disease and 60,996 hospitalizations for a heart attack with these conditions as the most responsible diagnosis. This increased to 365,791 and 98,403 when hospitalizations in which these conditions were listed as an accompanying diagnosis were also included.
- There were 39,311 deaths due to ischemic heart disease and 18,125 deaths due to a heart attack in 2004.
- Hospitalizations and deaths due to ischemic heart disease and heart attack increased with age, with a major increase after age 45 for men and 55 for women, and were higher for men than for women. The difference between sexes decreased with age.
- The rate of hospitalization and deaths for ischemic heart disease and heart attack have been decreasing since 1970, likely due to healthier behaviours (avoiding smoking, engaging in regular physical activity, eating vegetables and fruit), effective detection and management of risk conditions such as high blood pressure and dyslipidemia, and effective management of ischemic heart disease and heart attack. It is difficult to predict whether increasing rates of obesity and diabetes, two major risk factors for heart disease, will change this downward trend in the future.
- The number of hospitalizations and deaths due to congestive heart failure was much lower than for the other types of heart disease. In 2005/06, there were 54,333 hospitalizations for congestive heart failure and in 2004, 4,430 deaths due to congestive heart failure.
- In only one-third of hospitalizations where the individual was admitted with congestive heart failure was it identified as the most responsible reason for admission. This underscores how congestive heart failure often presents as the end-stage of other health conditions.
- The rates of hospitalization and death due to congestive heart failure increased with age, with a major increase after age 65, and were only slightly higher for men than for women at all ages.
- Hospitalization and mortality rates for congestive heart failure have now begun to decrease. This reduction in deaths may reflect improved treatment particularly in out of hospital settings as well as a consequence of a reduced incidence of ischemic heart disease, however the latter possibility requires confirmation with further research.
- More surgical procedures for heart disease including coronary artery bypass grafting, coronary angioplasties, valve surgery, and pacemaker implantation were performed on men than on women in their thirties with a peak in the 70 to 79 year age group. In Canada, from 1996 to 2005, 1,564 first heart transplantations and 58 re-transplantations were carried out.



Chapter Five
Stroke
Overview

Cerebrovascular disease is a broad term that includes brain ischemia, brain haemorrhage, and disorders of brain blood vessels. Ischemic cerebrovascular disease (lack of blood flow) includes ischemic stroke, transient ischemic attack (TIA), silent ischemic stroke, and occlusion, stenosis, or dissection of the extracranial and intracranial arteries. Haemorrhagic stroke (bleeding) includes spontaneous subarachnoid haemorrhage, usually due to intracranial cerebral aneurysms, and intracerebral haemorrhage. Rarer types of cerebrovascular diseases include venous sinus thrombosis and cerebral vasculitis.

Acute stroke, the most common of all these conditions, is a syndrome of acute brain dysfunction due to a vascular (or blood vessel) cause. Stroke is an episodic condition with multiple possible underlying causes. It is differentiated into three major types: ischemic stroke (lack of blood flow), intracerebral haemorrhage (bleeding into the brain), and atraumatic subarachnoid haemorrhage (rupture of aneurysm at the base of the brain). While all three types are associated with a loss of function, they differ with respect to those whom they most often affect, their causes, treatments, and outcomes. Individuals who experience symptoms that last for a brief duration (24 hours or less according to the WHO definition) may be diagnosed as having had a TIA.

Currently, approximately 300,000 people are living with the effects of a stroke in Canada. Stroke has a significant and lasting impact upon individuals, their families, and the health-care system. It is a leading cause of death and disability, with estimated costs of $3.6 billion in health care costs and lost economic output due to premature mortality and long-term disability in 2000 (TABLE 1-3).

Stroke is feared more as a disabling disease rather than a fatal one. People who have had a stroke have stated that they consider severe disability a worse outcome than death. Formal assessment of the health state preference of the general population, using time trade-off analysis, has shown that more than 80% of people considered having a major stroke to be a fate worse than death.

The risk of death after a stroke has fallen slowly for six decades due to improvements in care. However, it has become increasingly apparent that the total burden of this disease is higher than previously thought due to the significant cognitive compromise resulting from undiagnosed cerebrovascular disease. Stroke is increasingly appreciated as a medical emergency, and systems of stroke care are now being implemented across Canada to increase the likelihood that an individual having a stroke will have access to both effective interventions and evidence-based care. It is anticipated that such changes will further reduce death and disability from stroke. However, the rising prevalence of obesity and diabetes will likely put more people at risk of having a stroke in the coming decades.

Hospitalizations Due *to* Stroke

The true incidence and prevalence of stroke and TIA in Canada are unknown. While hospitalization data are useful, they provide only a partial picture. The population-based audit for 2004, undertaken by the Registry of the Canadian Stroke Network, showed that about one-third of all individuals having a stroke or TIA seen in emergency departments of stroke centres were not admitted to hospital. Hospitalization data do not include individuals seen and discharged directly from the emergency department to other types of institutions (such as those with a minor stroke or TIA or those seen in outpatient settings), and do not include individuals who die of a stroke before coming to hospital. For every symptomatic stroke event, it is estimated that there are up to ten people who suffer an undetected or unrecognized stroke that results in a subtle cognitive deficit rather than paralysis, loss of vision, or disturbance of language. In the future, Canadian administrative data will include visits to emergency departments for a stroke, which will allow for a more comprehensive picture of stroke.

It is reasonable to assume, then, that the hospitalization rates presented here significantly underestimate the true number of individuals in Canada who have had a stroke. They likely pertain to individuals who have had a more severe stroke. Despite these limitations, hospitalization rates are currently the best available data for examining the burden of stroke and its relation to healthcare policy and planning.

Cerebrovascular disease accounted for 2.0% of all hospital admissions in 2005/06 – with 55.6% of cerebrovascular disease hospitalizations in the 65 to 84 year age group, and 17.2% in those over age 85. Acute stroke is the most common diagnosis among these admissions, and is attributed to either an occlusion of the cerebral arteries, resulting in an ischemic stroke (about 85% of all strokes), or to bleeding from an artery, resulting in a haemorrhagic stroke (about 15% of all strokes).

The rates of hospitalization for stroke for women and men are outlined in Table 5-1. Women had higher crude hospitalization rates for acute stroke and TIA than did men. This is in part because there are more older women than men, and stroke is more common among older individuals. In addition, stroke affects women at an older age than it does men. The age-standardized rates, which adjust for the differences in age among women and men with stroke, were actually greater among men than among women, except for stroke from subarachnoid haemorrhage.

Table 5-1 *Rates of hospitalization due to selected cerebrovascular disease classifications, by sex, Canada, 2005/06*

	ICD-9 codes	ICD-10-CA codes	Crude hospitalization rates (per 100,000 population)			Age-standardized* hospitalization rates (per 100,000 population)		
			Girls/ Women	Boys/ Men	Both sexes	Girls/ Women	Boys/ Men	Both sexes
Cerebrovascular disease	430-434, 436-438	I60-I69	144.8	155.2	150.0	102.3	144.0	121.4
Cerebrovascular disease including transient ischemic attacks	430-438	I60-I69, G45, excluding G45.4	175.0	182.9	179.0	123.2	169.7	144.5
Acute stroke	430, 431, 434, 436	I60, I61, I63, I64	119.4	117.1	118.3	82.8	108.8	94.9
Subarachnoid haemorrhage	430	I60	9.4	6.3	7.9	7.6	5.6	6.6
Intracerebral haemorrhage	431	I61	14.3	16.1	15.2	10.3	14.9	12.5
Ischemic stroke	434	I63	50.5	52.7	51.6	34.9	48.9	41.5
Acute but ill-defined stroke	436	I64	45.3	42.0	43.6	30.0	39.4	34.3
Occlusion and stenosis of precerebral arteries	433	I65	11.5	22.1	16.8	9.1	20.5	14.2
Transient ischemic attack	435	G45, excluding G45.4	29.6	27.1	28.4	20.4	25.2	22.6
Retinal vascular occlusion	362.3	362.3	0.2	0.3	0.2	0.1	0.2	0.2

♦ * Standardized to the 1991 Canadian population. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

A large proportion of the strokes in hospital (36.9%) are not identified by the type of stroke using administrative data, but this is gradually changing. The ability of health care professionals to diagnose a stroke has improved significantly over the past twenty years with the increased availability of computed tomography (CT) or magnetic resonance imaging (MRI). In the late 1970s and early 1980s, CT was introduced into large academic hospitals. This was followed in the mid-late 1980s by the introduction of MRI. Diffusion into community hospitals was naturally slower, and many such hospitals did not have access to CT scanners until the 1990s. Even today, many hospitals remain without access to MRI. Neuroimaging access substantially influences the accuracy of the diagnosis of cerebrovascular disease, both in determining whether a given individual has had a stroke at all, as well as in identifying the type of stroke. Hence, with respect to the different types of stroke, acquiring access to these relatively recent technologies will influence trends in hospitalizations. Rural and urban coding of stroke differs substantially, and this likely represents differing access to both technology and expertise.

The increase in imaging capability in the early 1990s may have led to a diagnosis bias creeping into administrative data. More accurate diagnosis has likely increased the specificity of administrative data. Such an effect would be expected to result in a decline in the number of hospitalizations with acute stroke, as physicians are able to identify in previously inconclusive situations coded as a stroke whether or not the individual really did have a stroke. There is some evidence for this effect in carefully studied cohorts in North America. What the magnitude of this effect is, compared to other causes of declining stroke rates such as improved control of high blood pressure, remains unknown.

The length of an individual's stay in hospital is a good predictor of costs associated with a health problem. Stroke generally has a long length of stay compared to other health problems, and is therefore more expensive for the health care system. In 2004, the length of hospital stay rose with increased age, across all stroke types. Length of stay was also higher among women than among men across all diagnostic categories, with the exception of intracerebral haemorrhage, for which the length of stay was similar in both sexes (TABLE 5-2) (Note that these data represent the length of stay for a single admission to one institution only. Transfers between healthcare facilities are treated as separate visits and length of stay is calculated separately for each institution).

The length of stay for stroke is governed principally by the severity of the brain injury. It is also influenced by other factors outside the control of hospitals, such as the availability of family support, rehabilitation services, and additional community supports.

Table 5-2 *Average length of stay in hospital due to selected cerebrovascular disease classifications, by sex, Canada, 2005/06*

	ICD-9 codes	ICD-10-CA codes	Mean length of stay (days)		
			Girls/Women	Boys/Men	Both sexes
Cerebrovascular disease	430-434, 436-438	I60-I69	16.8	14.3	15.5
Cerebrovascular disease including transient ischemic attacks	430-438	I60-I69, G45	14.9	12.9	13.9
Acute stroke including other and unspecified	430-436	I60-I64	18.0	15.8	16.9
Acute stroke	430, 431, 434, 436	I60, I61, I63, I64	18.2	16.1	17.2
Subarachnoid haemorrhage	430	I60	16.2	14.8	15.6
Intracerebral haemorrhage	431	I61	18.3	16.9	17.6
Ischemic stroke	434	I63	19.9	17.0	18.4
Acute but ill-defined stroke	436	I64	16.8	14.7	15.8
Occlusion and stenosis of precerebral arteries	433	I65	7.1	6.1	6.4

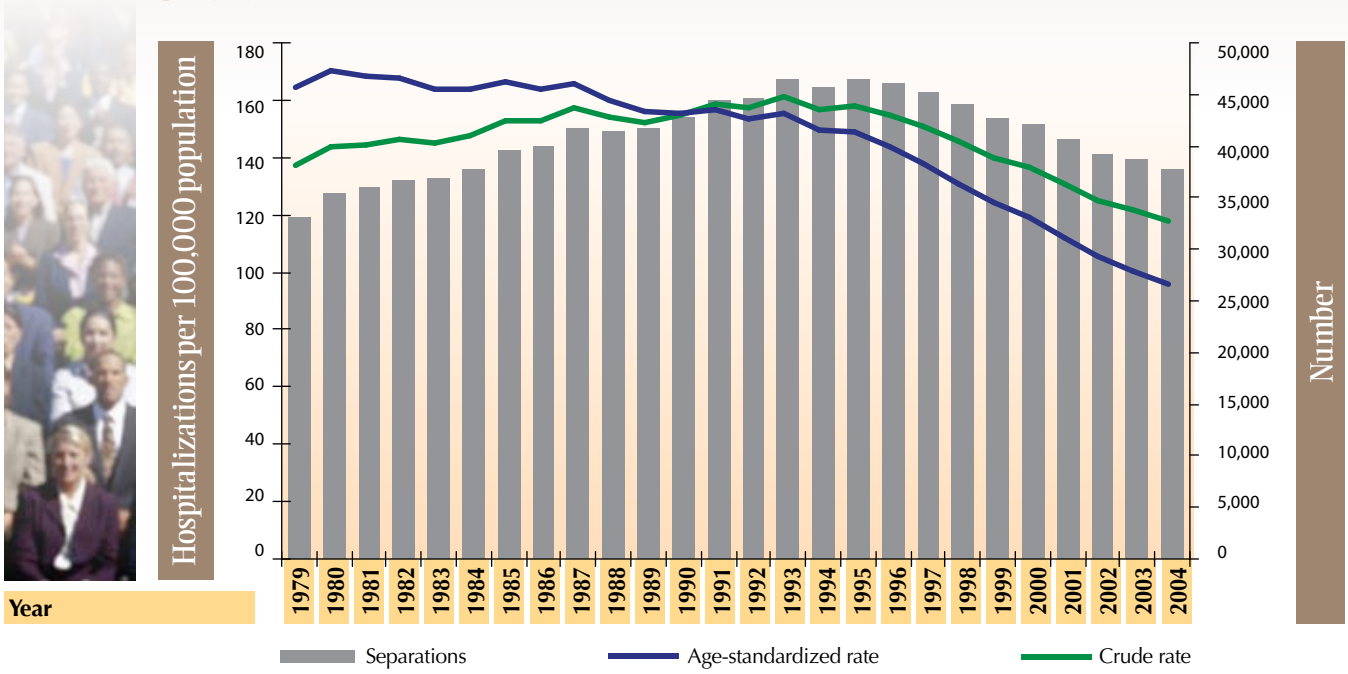
♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

The total number of hospitalizations due to stroke rose substantially from 1979 to 1995 due in part to an aging of the population (FIGURE 5-1). After that peak, the number began to decline even as the population continued to age. In 2005/06, there were 38,341 hospitalizations attributed to acute stroke, compared to a high of 46,473 in 1995 and a low of 33,168 in 1979.

The age-standardized hospitalization rate for stroke has been decreasing steadily since 1970. This rate controls for both increases in the size of the population and in the aging of the population over that time. The decrease may reflect fewer admissions for both minor stroke and TIA due to changes in patterns of care. As well, better detection and management of blood pressure and cholesterol, more attention to a healthy diet, and better use of preventative treatments such as aspirin all likely contribute to the decrease in hospitalization rates for stroke.

The challenge is to identify what will happen with stroke hospitalizations in the future as the population continues to age and with increases in the proportion of the population with diabetes and obesity, which are two risk factors for stroke. The number of hospitalizations for stroke may increase again.

Figure 5-1 *Number and rate of hospitalizations due to acute stroke*, by year, Canada, 1979/80-2005/06*



♦ * ICD-10-CA codes: I60, I61, I63, I64. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Standardized to the 1991 Canadian population. - The coding schemes for this condition changed in 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. Nunavut data not available in 2002/03. Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

One individual could be admitted to hospital more than once, either for the same or for a different stroke. In 1994, individual-based hospitalizations, which group multiple visits per patient for stroke, were lower than hospitalizations representing the actual number of visits (FIGURE 5-2). However, in recent years, the difference between the number of patients who were hospitalized for stroke and the total number of hospital visits they incurred has decreased. This suggests that stroke management may be decreasing the risk of subsequent strokes, or that an individual with a stroke is being better managed in the community reducing the necessity of re-hospitalization. Men had higher rates than women, both for hospital visits and for the number of individuals who had at least one hospital admission for stroke, but this difference between the sexes has also decreased over time.

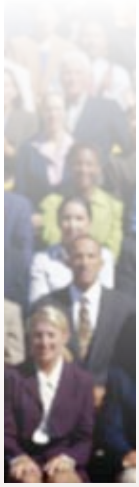
Figure 5-2 *Rates of hospitalization due to acute stroke*, by separations and individuals, by sex and year, Canada, 1994/95-2004/05*

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004

♦ * ICD-9 codes: 430, 431, 434, 436; ICD-10-CA codes: I60, I61, I63, I64. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Data are for age 20+ years. - Data are based on fiscal year. - Standardized to the 1991 Canadian population by five year age groups. - The coding schemes for this condition changed in 2001, and this may influence trends. ♦ Source: Health Division, Statistics Canada, using Hospital Person Oriented Information.

In 2005/06, hospitalization rates for stroke were higher for men than women in all age groups. While hospitalization rates for stroke were much higher over the age of 65, younger individuals were hospitalized for stroke as well (FIGURE 5-3).

Figure 5-3 *Rates of hospitalization due to acute stroke*, by sex and age group, Canada, 2005/06*

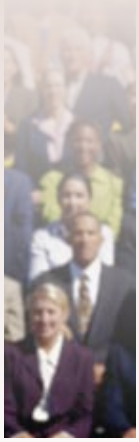


Age group (years)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	8.1	22.4	48.9	107.9	296.0	796.1	1,457.9
Men	8.1	24.8	64.5	180.8	441.0	953.1	1,513.9
Both	8.1	23.6	56.7	143.8	365.0	861.6	1,475.3

♦ * ICD-10-CA codes: I60, I61, I63, I64. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Men have higher rates of stroke than women at all ages (FIGURE 5-4). Since the early 1990s, hospitalization rates for acute stroke have decreased for all age groups.

Figure 5-4 *Rates of hospitalization due to acute stroke*, by sex, age group, and year, Canada, 1979/80-2005/06*

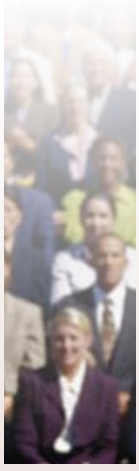


♦ * ICD-10-CA codes: I60, I61, I63, I64. ♦ Notes: - Hospitalizations are based on the most responsible diagnosis for the length of stay in hospital. - The coding schemes for this condition changed in 2001, and this may influence trends. - Prior to 1993/94, only included the ten Canadian provinces. Nunavut data not available in 2002/03. Québec data not available in 2005/06. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Deaths Due *to* Stroke

In 2004, there were 14,626 deaths due to cerebrovascular disease and 11,668 of these deaths were due to stroke. The total number of deaths due to stroke decreased from 1979 to 1990, and then peaked in 1997 (FIGURE 5-5). This increase was due to the aging of the population, as both the crude and age-standardized death rates were decreasing overall among both women and men. This finding is consistent with the decrease in hospitalizations for stroke. It is likely that prevention interventions such as those directed toward high blood pressure control, a decrease in smoking, and better stroke care have contributed to this decrease in death rates.

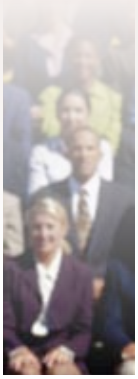
Figure 5-5 *Number and rate of deaths due to acute stroke*, by year, Canada, 1979-2004*

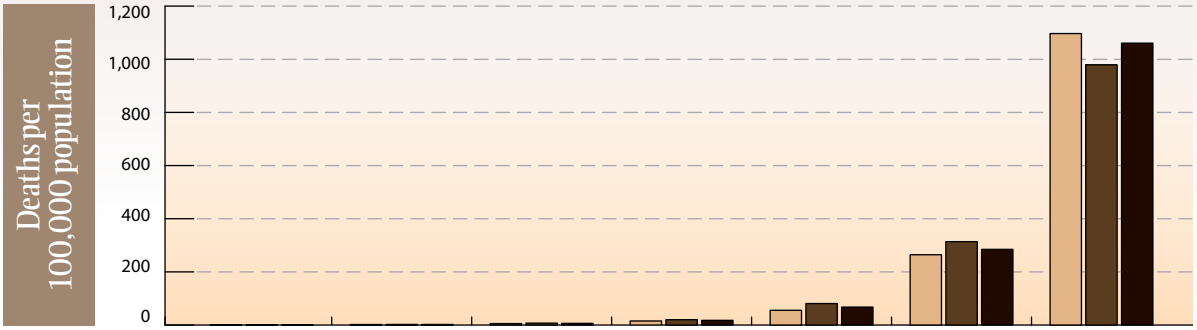


♦ * ICD-10-CA codes: I60, I61, I63, I64. ♦ Notes: - Standardized to the 1991 Canadian population. - Note that the coding scheme for this condition changed in 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

In 2004, death rates for stroke were higher after the age of 65 years, with the highest rates among those age 85+ years (FIGURE 5-6). While not common, stroke does occur under age 65 – in 2004, 1,056 stroke deaths or 9.1% of all strokes were under age 65. Men had only slightly higher death rates from stroke than did women in most age groups, and rates were slightly higher among women in the 85+ year age group. These findings were in contrast to the much higher rates of hospitalization for men than women. Recent registry and clinical trial data suggest that women who have a stroke have slightly higher mortality rates and poorer outcomes than men. The generally similar rates between women and men reflect the fact that mortality is most directly affected by stroke severity, and not by sex.

Figure 5-6 *Rates of death due to acute stroke*, by sex and age group, Canada, 2004*



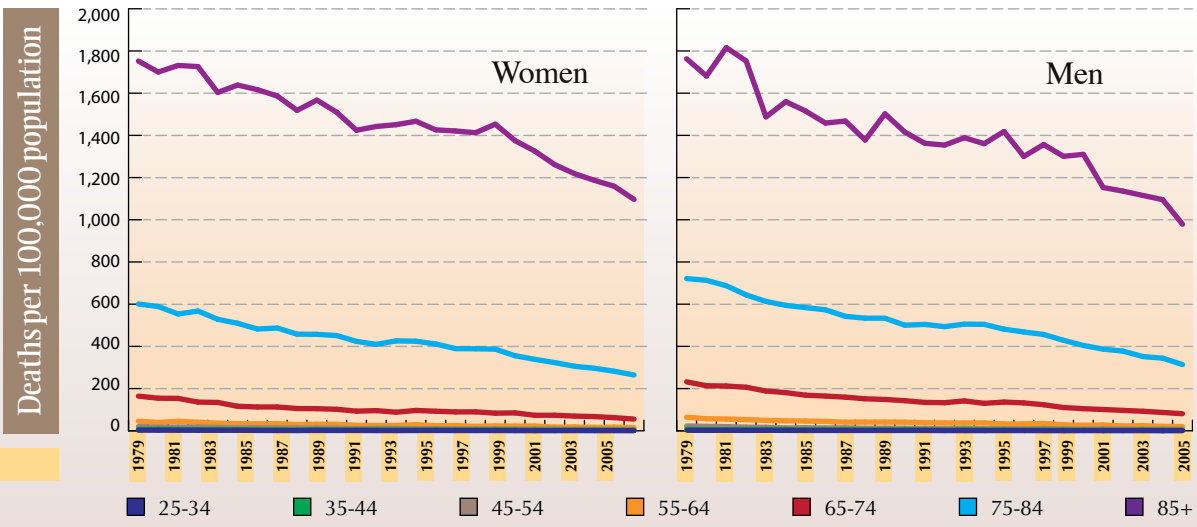


Age group (years)	25-34	35-44	45-54	55-64	65-74	75-84	85+
Women	0.5	2.0	5.5	15.3	55.5	264.5	1,096.7
Men	0.7	2.3	7.2	20.2	80.9	313.8	978.9
Both	0.6	2.2	6.3	17.7	67.6	284.8	1,060.6

♦ * ICD-10-CA codes: I60, I61, I63, I64. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Rates of death for acute stroke for all ages have been declining since 1979 (FIGURE 5-7).

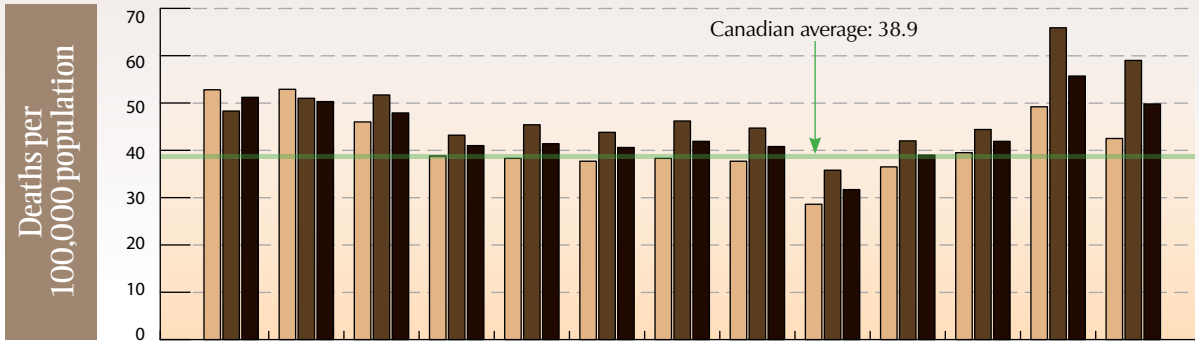
Figure 5-7 *Rates of death due to acute stroke*, by sex, age group, and year, Canada, 1979-2004*



♦ * ICD-10-CA codes: I60, I61, I63, I64. ♦ Note: - The coding schemes for this condition changed in 2000, and this may influence trends. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Considerable variation existed in rates of death due to cerebrovascular disease (mostly stroke) across the provinces and territories (FIGURE 5-8). Prince Edward Island had the highest death rate from stroke in Canada among men, and the Northwest Territories and Nunavut had the highest death rates for women. Quebec reported the lowest mortality rates both for men and for women. In general, Prince Edward Island and Newfoundland and Labrador had higher rates than the other provinces, particularly among men.

Figure 5-8 *Rates of death due to cerebrovascular disease*†, by sex and province/territory, Canada, 2000-2004 (five year average)*

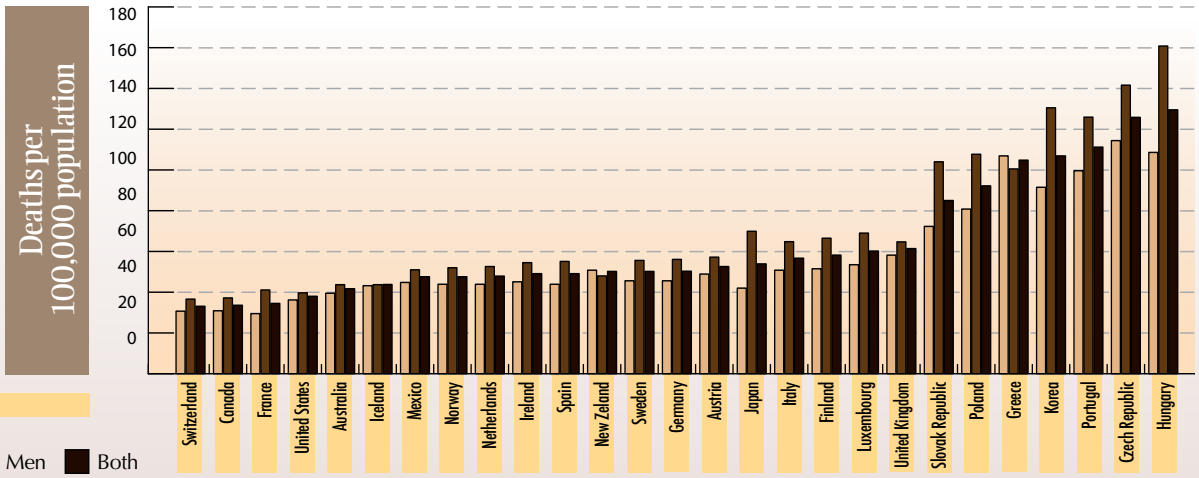


Province/territory	NU	NT	YT	BC	AB	SK	MB	ON	QC	NB	NS	PE	NL
Women	52.8	52.9	46.0	38.8	38.3	37.7	38.3	37.7	28.6	36.5	39.5	49.2	42.5
Men	48.3	51.0	51.7	43.2	45.4	43.8	46.2	44.7	35.8	42.0	44.4	65.9	59.0
Both	51.2	50.3	47.9	41.0	41.4	40.6	41.9	40.8	31.7	39.0	41.9	55.7	49.8

♦ * ICD-10-CA codes: I60-I69. ♦ † Cerebrovascular disease excludes transient ischemic attacks. ♦ Note: - Standardized to the 1991 Canadian population. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Vital Statistics Database (Statistics Canada).

Internationally, Canada had the second lowest rate of deaths from cerebrovascular disease (mostly stroke) among men (behind Switzerland) and third lowest among women (behind France and Switzerland) (FIGURE 5-9). While Japan had the lowest death rates for CVD overall, its rates for cerebrovascular disease were higher than those of Canada.

Figure 5-9 *Rates of death due to cerebrovascular disease*†, by sex and country, 2003*



♦ * ICD-10-CA codes: I60-I69. ♦ † Cerebrovascular disease excludes transient ischemic attacks. ♦ Notes: - Standardized to the 1980 OECD population. - Only lists countries with data available for 2003. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Organisation for Economic Co-operation and Development Health Data 2008 (Eco-santé 2008).

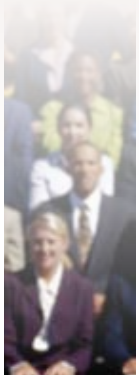
Procedures *for* Stroke Prevention

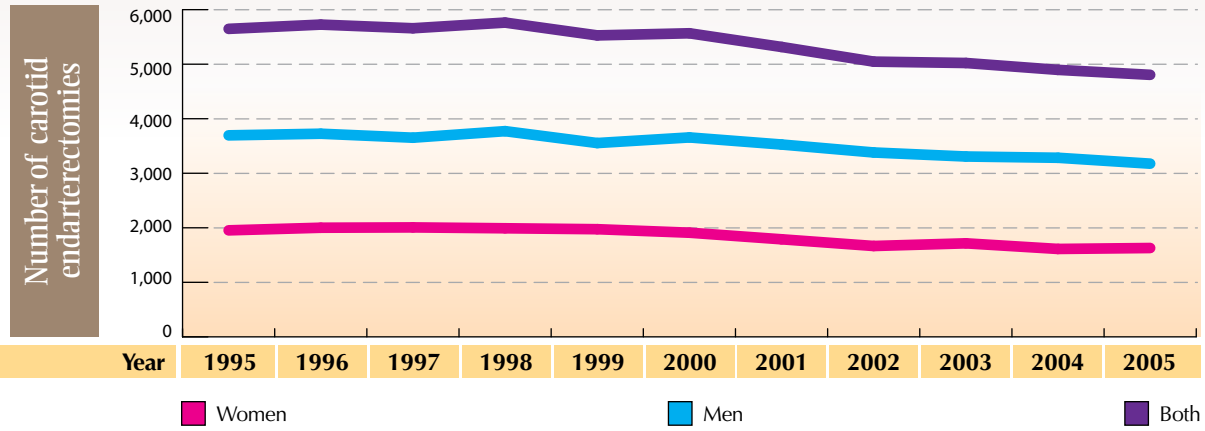
Carotid Endarterectomy

Carotid endarterectomy is a surgical procedure to remove atherosclerotic plaque in the carotid artery located in the neck and leading to the brain. It is a procedure that is carried out to prevent stroke. Individuals with recent ischemic stroke or TIA and with at least 70% stenosis (narrowing) of the internal carotid artery benefit the most from this procedure.

From 1995/96 to 2005/06, the number of carotid endarterectomies performed on men was higher than the number performed on women (FIGURE 5-10). For both sexes, the number of carotid endarterectomies has decreased slightly since 2000.

Figure 5-10 *Number of carotid endarterectomies**†, by sex and year, Canada, 1995/96-2005/06*

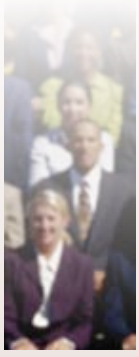


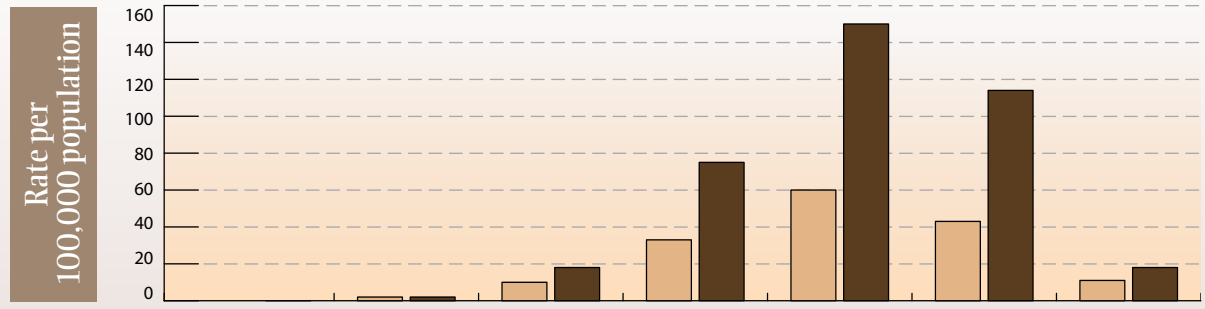


♦ * CCP code: 50.12. ♦ † CCI code: 1.JE.57, 1.JE.50, 1.JE.87. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

In 2005/06, the rate of carotid endarterectomy was highest among adults ages 70 to 79 years (FIGURE 5-11). While the rate still remained high in the 80 to 89 year age group, it dropped in those age 90+ years. In all age groups, the rate among men was higher than the rate among women. In the 70 to 79 year and 80 to 89 year age groups, the rates among men were at least 2.5 times higher than among women.

Figure 5-11 *Rates of carotid endarterectomies**†, by sex and age group, Canada, 2005/06*





Age group (years)	30-39	40-49	50-59	60-69	70-79	80-89	90+
Women	‡	2	10	33	60	43	11
Men	0	2	18	75	150	114	18

♦ * CCP code: 50.12. ♦ † CCI code: 1.JE.57, 1.JE.50, 1.JE.87. ♦ ‡ Data with less than five procedures not shown. ♦ Source: Chronic Disease Surveillance Division, Centre for Chronic Disease Prevention and Control, Public Health Agency of Canada, using data from the Hospital Morbidity Database (Canadian Institute for Health Information).

Stroke Management

Stroke is a common and serious health problem. The reorganization and standardization of stroke care services and the implementation of best practices in Canada require a multifaceted strategy. The Canadian Stroke Strategy, a joint initiative of the Canadian Stroke Network and the Heart and Stroke Foundation of Canada, is providing leadership in these areas. Its aim is to produce measurable change in stroke service delivery and impact in every province and territory by 2010. Through the synthesis and dissemination of *Canadian Best Practice Recommendations for Stroke Care* (www.canadianstrokestrategy.ca), the development of a comprehensive performance measurement framework, and the creation of point-of-care tools to support the implementation of best practice initiatives, the first important steps have been taken.

Canada's dispersed population presents numerous challenges, especially to the implementation of best practices for stroke care. This is largely a consequence of a marked unevenness, outside of Canada's large cities, in the availability of and/or access to the requisite human and technological resources. This was highlighted in a national survey of stroke resources that found highly variable access to computed tomography, stroke specialists, and rehabilitation programs. Similarly, a survey of stroke care services in the Atlantic provinces in 2004/05 found that among 102 acute care hospitals in the predominantly rural provinces of New Brunswick, Newfoundland and Labrador, Nova Scotia, and Prince Edward Island, only 19% provided thrombolytic (clot-busting) therapy for stroke. In contrast, 96% of these respondents reported that they had the capability to provide thrombolytic therapy for heart attack. Care on a dedicated unit has been shown to reduce morbidity and mortality. However, in this survey, stroke unit care was exceptionally rare, with 89% of individuals with a stroke being managed on general medical wards. In the future, such regional disparities in stroke care may be addressed, at least in part, by telemedicine technology, which has the potential to bring the expert(s) to non-specialized rural hospitals.

In Ontario, a three-year analysis (2003 to 2006) of the impact of an integrated stroke system on patient care delivery and outcomes revealed that evidence-based integrated stroke care is possible and can have significant benefits for individuals with stroke. For example, 29% of individuals with an ischemic stroke who arrived at a designated regional stroke centre hospital within 2.5 hours of onset of a stroke received acute thrombolytic (clot-busting) medication. In addition, at these same centres, 71% of individuals with a stroke were cared for on acute stroke units. This was consistent with current best practice recommendations. Up to 70% of individuals with a stroke were admitted to hospital, and 64% of the patients who had been discharged directly from the emergency department of a regional stroke centre with a diagnosis of minor stroke or TIA were referred to dedicated stroke prevention clinics for ongoing assessment and management. Hospital readmission rates at one year following stroke have decreased from 14% to 11% ($p<0.001$) for all individuals with a stroke, and one-year mortality has decreased from 24% to 22% ($p<0.001$) over three years.

More than half of all stroke survivors will require some form of rehabilitation. Lack of easy access to the rehabilitation system can worsen outcomes and increase the number of individuals in acute hospital beds past the acute phase of their stroke. Further, evidence is emerging that individuals with stroke may have worse outcomes if rehabilitation is delayed. Monitoring the intensity, frequency and quality of stroke care provided in a diverse range of rehabilitation settings (such as outpatient and community rehabilitation settings) remains a significant challenge.

Data from the National Rehabilitation Reporting System (NRS, maintained at the Canadian Institute for Health Information) show that the interval between stroke onset and admission to an inpatient rehabilitation unit in Canada averaged 29 days in 2005/06 (TABLE 5-3). Once in inpatient rehabilitation, the average length of stay was 38 days. The NRS determines post-stroke disability by measuring disability both at the time of admission and discharge, using the *Functional Independence Measure* (FIM) tool. The maximum possible score on the FIM is 126, with lower scores indicating lower functional ability. Stroke patients were admitted to inpatient rehabilitation in 2004/05 and 2005/06 with average initial FIM scores of 76 and 77 respectively, and average discharge scores of 98 and 99, demonstrating that substantial gains in functional recovery were attained in inpatient rehabilitation. The entry FIM scores were high, indicating that patients who already have higher functional status are those being accepted to inpatient rehabilitation. Many other stroke survivors who would likely benefit from inpatient rehabilitation (e.g., those with initial FIM scores in the 60s and low 70s) may not have access to required rehabilitation therapies and their recovery may be impeded as a result.

Table 5-3 *Inpatient rehabilitation by performance measure and year, Canada, 2004/05-2005/06*

Performance measure		2004/05 (n=4,916)	2005/06 (n=5,188)
Stroke onset to admission to rehabilitation (average number of days)		**28 days**	**29 days**
Functional Independence Measure (FIM) scores (mean score)	Total admission FIM score	76	77
	Total discharge FIM score	98	99
	Total change in FIM score	22	22
Length of stay in inpatient rehabilitation (mean (median) number of days)		**38 (35) days**	**38 (34) days**
Reason for discharge (percentage of stroke patients)	Service goals met and discharged to community	73%	73%
	Service goals met and referral/transfer to another setting	16%	16%
	Service goals not met	10%	11%

♦ Notes: - Represents data from all healthcare facilities (N=85) across Canada that contribute data to the National Rehabilitation Reporting System. - Inclusion: cases within RCG Code 1 (stroke). ♦ Source: Canadian Stroke Network, using data from the National Rehabilitation Reporting System (Canadian Institute for Health Information).

Summary *of* Highlights

- Currently, approximately 300,000 people are living with the effects of a stroke in Canada. Stroke is differentiated into three major stroke types: ischemic stroke, intracerebral haemorrhage, and atraumatic subarachnoid haemorrhage. Ischemic stroke is the most common form of stroke (about 85% of strokes).
- A significant burden is placed on patients who experience stroke, on their families and caregivers, and on the health-care system. With increasing evidence for the link between silent strokes and cognitive deficits, the full magnitude of this burden for cerebrovascular disease is yet to be realized.
- The ability of health care professionals to diagnose stroke has improved significantly over the past twenty years with the increased availability of computed tomography (CT) or magnetic resonance imaging (MRI).
- Since 1995, there has been a decline in hospitalization rates for acute stroke. This decrease over time may reflect fewer admissions both for minor and major stroke, as well as lower rates of stroke due to a lower rate of smoking, better high blood pressure and dyslipidemia management, and better use of preventative treatments such as aspirin.
- The decline in hospitalization rates is likely influenced by changes in the patterns of stroke management and care, with a shift in the site of care for non-disabling stroke or TIA to outpatient and community settings. Using hospitalization as a surrogate consistently and increasingly underestimates stroke occurrence.
- The aging of the population and the large number of baby boomers becoming seniors, along with the increasing rates of obesity and diabetes may signal an increase in the number of strokes over the next two decades.
- Women had higher crude hospitalization rates for acute stroke than did men. This is in part because there are more older women than men, and stroke affects women at an older age than it does men. When an adjustment was made for the older age of women, the standardized rates were actually greater among men than among women, except for subarachnoid haemorrhage. Men had higher rates of death than women in all age groups except the oldest age group of 85+.
- In 2004, there were 11,668 deaths due to stroke. The rates of death for acute stroke have been declining since 1979. It is likely that prevention interventions such as those directed toward high blood pressure, a decrease in smoking, and an improvement of care have contributed to this decrease in death rates.
- More than half of all stroke survivors will require some form of rehabilitation. The interval between stroke onset and admission to an inpatient rehabilitation unit in Canada averaged 29 days in 2005/06. Once in inpatient rehabilitation, the average length of stay was 38 days.
- Stroke is a condition where improved prevention and care can be both cost saving as well as have a significant impact on the quality of life. Canada has established best practice recommendations for stroke and is providing a clear direction as to what should be done to manage the many aspects of stroke care and recovery.

Closing Words

From the Scientific Editor

In summary, the ongoing decline in cardiovascular mortality rates is cause for celebration, but not for complacency. Unhealthy behaviours which currently permeate our society continue to put Canadians at risk for developing CVD. Over the next two decades, a significant increase may occur in the number of individuals developing heart disease or stroke among the aging baby boomers. This will compromise the health of Canadians, put a strain on the health care system, and have a major economic impact on Canada.

Obesity rates are increasing, a trend that is particularly alarming among children and youth, given that eating and physical activity habits formed early persist into adulthood. Obesity increases the risk of diabetes and most people with diabetes die from CVD. The consumption of fresh vegetables and fruit continues to be below recommended levels and over half of the population, once having entered their twenties, is physically inactive during leisure time. While the continuing decline in smoking rates is good news, without persistent efforts to reduce the availability of tobacco products, to prevent uptake among young people, and to help smokers of all ages quit, one cannot be confident that this decline will continue.

This document is not meant to be alarmist, nor is its main purpose to address possible solutions. Rather, it is the most current picture of CVD in Canada. The data presented here undoubtedly will raise new questions, stimulate research and policy options, and bring about a further enhancement of our surveillance system.

Much remains to be done to enhance the CVD surveillance system. The reality is that the current picture of CVD in Canada is incomplete as a result of an inadequate CVD surveillance system. Work is underway to link provincial administrative data in tracking new cases (incidence) and in determining outcomes of CVD and high blood pressure. In addition, clinical registries developed by service providers and researchers are being investigated to identify interventions and outcomes of CVD. Regional-level school and community surveys are being conducted by providers at the local level to help shape programs and policies for CVD prevention. Future editions of this report will include this information.

The data in this report are also available on the Internet through a computer-based system called 'Infobase' (http://infobase.phac-aspc.gc.ca). With data on risk factors, hospitalizations, and mortality that have been included in the present report, readers will be able to create tables and maps by region. All such data are updated regularly as they become available. Another useful resource is the Canadian Cardiovascular Outcomes Research Team (CCORT) Atlas series (http://www.ccort.ca/atlas.asp), which looks at many related topics affecting the cardiovascular health and outcomes of Canadians and examines how geography affects the delivery of cardiovascular care in Canada.

We welcome feedback from our readers, especially suggestions on how to improve future editions of this report. The team that worked on the present edition and all of the experts who reviewed the draft versions merit our sincerest appreciation. Moreover, given the continuing expansion of our knowledge in this area, both theoretical and clinical, each successive update will undoubtedly require even greater efforts and resources.

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Resources

American Heart Association	www.americanheart.org
American Psychological Association	www.apa.org
Assembly of First Nations	www.afn.ca
Blood Pressure Canada	hypertension.ca/bpc
Canadian Cardiovascular Outcomes Research Team	www.ccort.ca
Canadian Cardiovascular Society	www.ccs.ca
Canadian Chronic Disease Infobase	www.infobase.phac-aspc.gc.ca
Canadian Hypertension Society	hypertension.ca/chs
Canadian Hypertension Education Program	hypertension.ca/chep
Canadian Institute for Health Information	www.cihi.ca
Canadian Institutes of Health Research - Institute of Circulatory and Respiratory Health	www.cihr-irsc.gc.ca/e/8663.html
Canadian Medical Association	www.cma.ca
Canadian Stroke Network	www.canadianstrokenetwork.ca
Canadian Stroke Strategy	www.canadianstrokestrategy.ca
Centers for Disease Control and Prevention (United States)	www.cdc.gov
First Nations Regional Longitudinal Health Survey	rhs-ers.ca
Health Canada – Eating Well with Canada's Food Guide	www.hc-sc.gc.ca/fn-an/food-guide-aliment/index-eng.php
Heart and Stroke Foundation of Canada	www.heartandstroke.ca
INTER-HEART	www.phri.ca/interheart/index.htm
Mood Disorders Society of Canada	www.mooddisorderscanada.ca
Organisation for Economic Co-operation and Development	www.oecd.org
Public Health Agency of Canada	www.phac-aspc.gc.ca
Qanuippitaa?	www.qanuippitaa.com
Statistics Canada	www.statscan.ca
Wait Time Alliance for Timely Access to Health Care	www.waittimealliance.ca/
World Health Organization	www.who.int

Glossary

Acceptable Macronutrient Distribution Range (AMDR)

The AMDR is a range of intake for a particular energy source (protein, fat, or carbohydrate), expressed as a proportion of total energy (kcal), that is associated with reduced risk of chronic disease while providing adequate intake of essential nutrients.

Acute Myocardial Infarction
(ICD-9 410; ICD-10-CA I21-I22)

Also called a heart attack. An event typically presenting with a sudden onset of severe chest discomfort associated with changes on an electrocardiogram and elevated enzyme levels in the blood, indicating myocardial necrosis (heart muscle damage) due to the formation of a thrombus (clot) in a coronary artery, obstructing blood flow to the area of cardiac muscle supplied by that artery.

Age-Standardized Rate

Represents what the crude rate would be if the population under study had the age distribution of the standard population. It is the weighted average of age-specific rates applied to a standard distribution of age.

Aneurysm (ICD-9 442; ICD-10-CA I72)

A sac formed by the dilation of the wall of an artery, a vein or the heart. It is filled with fluid or clotted blood, often forming a pulsating protrusion.

Angina Pectoris (ICD-9 413; ICD-10-CA I20)

A symptomatic manifestation of ischemic heart disease, describing a severe squeezing or pressure-like thoracic pain, brought on by exertion or stress, usually lasting less than 30 minutes at a time. An increase in frequency or occurrence at rest especially at night is called unstable angina and may indicate an increased risk of a heart attack.

Angioplasty (CCP 48.0, 51.59; CCI 1.IJ.50, 1.IJ.57 excluding LA, MI, QF, VS, WC, WK)

The dilation of a blood vessel by means of a balloon catheter. The balloon is inflated to flatten plaque against the artery wall.

Arteriosclerosis

A group of diseases characterized by the thickening and loss of elasticity of arterial walls. Sometime called "hardening of the arteries".

Atherosclerosis (ICD-9 440; ICD-10-CA I70)

A process in which deposits of yellowish plaques (atheromas) containing cholesterol, lipid material, and lipophages are formed within large and medium sized arteries. An atheroma can increase in size and harden (calcify) over time, reducing blood flow. This potentially can result in a thrombosis or bleeding into the plaque, with subsequent obstruction of an artery, resulting in a heart attack.

Body Mass Index (BMI)

A measure of human body size and proportion. It is defined as the weight in kilograms divided by the square of the height in meters (see obesity). Among middle-aged adults, BMI is strongly correlated with fat mass. The risk of diabetes, high blood pressure, or coronary heart disease increases with increasing BMI. Because there is no specific BMI associated with an increased risk of disease, various levels of BMI are used as guidelines for healthy targets. This report uses a level of BMI of 25.0 to 29.9 as overweight, and a level of BMI ≥30 as obesity. Self-reported data used in this report are for respondents age 18+ years. (TABLE G-1)

Table G-1 *Classification of overweight and obesity for adults, by body mass index*

Classification	BMI (kg/m^2)	Risk of health problems
Underweight	<18.5	Low (but risk of other clinical problems increased)
Normal range	18.5 - 24.9	Average
Overweight	25.0 - 29.9	Mildly increased
Obese Class I	30.0 - 34.9	Moderate
Obese Class II	35.0 - 39.9	Severe
Obese Class III	≥40.0	Very severe

♦ Note: - These values are age-independent and correspond to the same degree across different populations. ♦ Source: International Obesity Task Force (www.iotf.org).

Canadian Community Health Survey Cycle . 1 *(CCHS.1)*

The CCHS is conducted by Statistics Canada. This survey provides cross-sectional estimates of health determinants, health status, and health system utilization at a sub-provincial level (health region or combination of health regions). The target population of the CCHS includes household residents in all provinces and territories; with the principal exclusion of populations on Indian Reserves, on Canadian Forces Bases, and in some remote areas. There is one randomly selected respondent per household, although planned over-sampling of youth results in a second member of certain households being interviewed. For the first collection cycle only those 12 years of age and over are eligible for selection.

Canadian Tobacco Use Monitoring Survey *(CTUMS)*

CTUMS was initiated in 1999 to provide Health Canada and its partners with reliable data on tobacco use and related issues. The primary objective is to track changes in smoking status and the amount smoked, especially for populations most at risk for taking up smoking, such as 15 to 24 year olds. The target population for CTUMS is all persons 15 years of age and older living in Canada, excluding residents of the Yukon, Nunavut, and the Northwest Territories, as well as full-time residents of institutions. In order to allow for provincial comparisons of approximately equal reliability, the overall sample size for the survey is divided equally across all ten Canadian provinces.

Cancer *(ICD-10-CA C00-D48)*

Also called neoplasms.

Cardiovascular Diseases

(ICD-9 390-459; ICD-10-CA I00-I99)

All diseases of the circulatory system including congenital and acquired diseases such as acute myocardial infarction (heart attack), ischemic heart disease, valvular heart disease, peripheral vascular disease, arrhythmias, high blood pressure, and stroke.

Carotid Endarterectomy

(CCP 50.12; CCI 1.JE.57, 1.JE.50, 1.JE.87)

The removal of thickened atheromatous areas of the innermost layer of the carotid artery.

Case Fatality Rate

The proportion of persons contracting a disease, who die of that disease within a short, specified period of time.

Cerebrovascular Disease

(ICD-9 430-434, 436-438; ICD-10-CA I60-I69)

Disease of one or more blood vessels of the brain that can result in the sudden development of a focal neurologic deficit.

Cholesterol

A molecule found in animal tissues. It is an important component of cell membranes and a precursor to steroid hormones. Most cholesterol is synthesized by the liver and other tissues but some is acquired through the diet. Transportation of cholesterol in the blood plasma is accomplished by specific lipoproteins. Its level in the bloodstream can influence the development of atherosclerotic plaque especially in the coronary arteries.

Compuscript *(IMS Health, Canada)*

Compuscript provides estimates of the number of prescriptions dispensed on a monthly basis in Canadian retail pharmacies. Information about prescriptions dispensed is collected electronically from a sample panel of almost 2,000 pharmacies. The sample of pharmacies is designed to be representative of pharmacies in Canada and is stratified by province, store type (chain or independent), and store size (large or small). After electronic processing of the raw data to check for completeness, projection factors are applied to estimate the values for all of Canada.

Congenital Diseases

ICD-10-CA codes Q00-Q99.

Congestive Heart Failure

(ICD-9 428.0; ICD-10-CA I50.0)

The inability of the heart to maintain adequate pumping function and therefore blood supply to tissues in the body. This results in several reactions involving hormonal responses, fluid shifts and changes in levels of electrolytes.

Coronary Artery Bypass Grafting

(CCP 48.1; CCI 1.IJ.76)

An operation in which veins or arteries are sewn in around points of obstruction to provide blood flow past blockages in the coronary arteries.

Diabetes (ICD-10-CA E10-E14)

Condition associated with an elevation of blood glucose levels. It is a chronic syndrome of impaired carbohydrate, protein, and fat metabolism resulting from insufficient secretion of insulin from the pancreas (Type 1) or target tissue resistance to insulin (Type 2). A third type (gestational) occurs at the time of pregnancy. Complications from diabetes include CVD. Self-reported data used in this report are for respondents age 12+ years.

Digestive Diseases

ICD-10-CA codes K00-K93.

Economic Burden of Illness in Canada 2000 – Methodological Notes

Introduction

A prevalence-based approach was employed to estimate the direct costs as well as the long-term and short-term disability components of the indirect costs. Mortality costs were estimated using the human-capital approach. All of the direct costs and morbidity costs were attributed to the prevalence of illness and injury in 2000, regardless of when the illness or injury was first diagnosed or incurred. The mortality costs were measured as the lost value of all future productivity as a result of all premature deaths due to illness or injury, which occurred in 2000.

Definitions

Direct costs

Direct costs refer to the value of those goods and services for which a payment was made or resources were used in the treatment, care, or rehabilitation related to illness or injury. Direct costs are comprised of expenditures on hospital care, physician care, and drugs, as well as expenditures for care in other institutions and additional direct health expenditures (such as other professionals, other health spending, capital, and public health and administration).

Indirect costs

Indirect costs refer to the value of economic output lost as a result of illness, injury or premature death. Indirect costs are comprised of short-term and long-term disability (morbidity costs), and premature death (mortality). They were measured in terms of the value of decreased productivity attributable to restricted activity days due to morbidity and lost years due to premature mortality.

Morbidity costs due to short-term disability

The economic burden of short-term disability refers to the lost economic production due to restricted activity days caused by short-term disability. Short-term disability refers to periods of restricted activity of less than six months.

Morbidity costs due to long-term disability

The economic burden of long-term disability refers to the lost economic production due to restricted activity days caused by long-term disability. Long-term disability refers to periods of restricted activity lasting six months or greater.

Costs due to premature mortality

The economic burden of premature mortality refers to the foregone future economic production that otherwise could have been realized by society had death not occurred prematurely.

Unattributable costs

The classification of diagnoses in the Economic Burden of Illness in Canada (EBIC 2000) is based on the charter established by the World Health Organization and used for the Global Burden of Disease study in 2000. Thus, the majority of the classifications for diagnoses in EBIC 2000 differ from the previous versions (1998, 1993, and 1986). In order to be comparable with this charter, expenditures from the ill-defined category, well-patient care, and missing diagnostics were redistributed across all diagnostic categories for hospitals, physicians, drugs, and long-term disability following a diagnostic, sex, and age distribution.

For direct costs, after having distributed some costs as described previously, an unattributable amount was still remaining which was related to the difference between the total NHEX (National Health Expenditures Database) costs and EBIC calculations (includes data which could not be allocated by ICD-9 or ICD-10; it was impossible to specify which type of expenses they were).

For indirect costs, there was only short-term disability (STD) that included an unattributable amount by diagnostic category. This unattributable cost is related to the difference between the total cost and the sum of all diagnostic categories for STD. It was decided not to distribute this amount across the diseases because of the small number of diagnostic categories available for the STD component.

Elevated Serum Cholesterol

Here defined as a total serum cholesterol level greater than or equal to 5.2 mmol/litre.

Embolism

Sudden obstruction of an artery by a clot or foreign material which has been brought to the site by the blood flow.

Ethnicity

Ethnicity in the CCHS was based on the question, "People living in Canada come from many different cultural and racial backgrounds. Are you: 1. White?" 2. Chinese?" 3. South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.)?" 4. Black?" 5. Filipino?" 6. Latin American?" 7. Southeast Asian (e.g., Cambodian, Indonesian, Laotian, Vietnamese, etc.)?" 8. Arab?" 9. West Asian (e.g., Afghan, Iranian, etc.)?" 10. Japanese?" 11. Korean?" 12. Aboriginal Peoples of North America (North American Indian, Métis, Inuit/Eskimo)?" 13. Other – specify.

First Nations

Those persons who are registered as Indians under the terms of the Indian Act and whose names appear in the Indian Register maintained by the Department of Indian Affairs and Northern Development.

High Blood Pressure *(Hypertension)*

Generally defined as systolic (when the heart is contracting) blood pressure (SBP) equal to or greater than 140 mmHg and/or diastolic (when the heart is dilating) blood pressure (DBP) equal to or greater than 90 mmHg. Treatment of high blood pressure can be classified as pharmacologic or non-pharmacologic (e.g. diet including salt restriction or exercise particularly for weight control). Hypertension is a risk factor for CVD. Self-reported data used in this report are for respondents age 20+ years unless otherwise noted, and is derived using a combination of two questions: "Do you have high blood pressure?" and "Are you on medication for high blood pressure?".

Hospitalization Data

Hospitalization data include acute and chronic care facilities. These data are housed at the Canadian Institute for Health Information.

ICD

International Statistical Classification of Diseases and Related Health Problems - 10th Revision, World Health Organization, 2007. This system uses specific numeric codes for each disease. Revisions occur periodically.

Inadequate Consumption of Vegetables and Fruit

Defined as consuming less than five servings of vegetables or fruit per day. Self-reported data used in this report are for respondents age 12+ years.

Incidence

The number of instances of illness commencing, or of persons falling ill, during a given period in a specified population.

Income Adequacy

This variable is derived for two to five categories based on total annual household income and the size of the household. (TABLES G-2 and G-3)

Table G-2 *Five-category definition of income adequacy*

Code	Description	Income	Household size
1	Lowest income	Less than $10,000	1 to 4 persons
		Less than $15,000	5 or more persons
2	Lower middle income	$10,000 to $14,999	1 or 2 persons
		$10,000 to $19,999	3 or 4 persons
		$15,000 to $29,999	5 or more persons
3	Middle	$15,000 to $29,999	1 or 2 persons
		$20,000 to $39,999	3 or 4 persons
		$30,000 to $59,999	5 or more persons
4	Upper middle income	$30,000 to $59,999	1 or 2 persons
		$40,000 to $79,999	3 or 4 persons
		$60,000 to $79,999	5 or more persons
5	Highest income	$60,000 or more	1 or 2 persons
		$80,000 or more	3 or more persons

♦ Source: Statistics Canada (www.statscan.ca).

Table G-3 *Four-category definition of income adequacy*

Code	Description	Income	Household size
1	Lowest income	Less than $15,000	1 or 2 persons
		Less than $20,000	3 or 4 persons
		Less than $30,000	5 or more persons
2	Lower middle income	$15,000 to $29,999	1 or 2 persons
		$20,000 to $39,999	3 or 4 persons
		$30,000 to $59,999	5 or more persons
3	Upper middle income	$30,000 to $59,999	1 or 2 persons
		$40,000 to $79,999	3 or 4 persons
		$60,000 to $79,999	5 or more persons
4	Highest income	$60,000 or more	1 or 2 persons
		$80,000 or more	3 or more persons

♦ Source: Statistics Canada (www.statscan.ca).

Infarction

An area of damage in tissue due to local ischemia resulting from an obstruction of circulation to the area, most commonly by a thrombus or an embolus.

Infectious Diseases

ICD-10-CA codes A00-B99, U04.

Injuries (ICD-10-CA V01-Y98)

Also includes accidents, poisonings, and violence.

Ischemic Heart Disease
(ICD-9 410-414; ICD-10-CA I20-I25)

Any condition in which heart muscle is damaged or works inefficiently because of an absence or relative deficiency of its blood supply. Most often caused by atherosclerosis, it includes angina pectoris, acute myocardial infarction, chronic ischemic heart disease, and sudden death. Also called coronary heart disease (CHD), when the problem occurs within the vessels supplying blood to the heart muscle. 'Other ischemic heart disease' includes the above codes but excludes acute myocardial infarction (ICD-10-CA I21-I22).

Life Expectancy

A summary measure of the health status of a population. It is defined as the average number of years an individual of a given age is expected to live if current mortality rates continue. International comparisons are based on projections at birth.

Lipoproteins

A combination lipid-protein molecule used to transport lipids (or fat molecules) in the blood. They consist of a spherical core of triglycerides or cholesteryl esters surrounded by a layer of phospholipids, cholesterol and apolipoproteins. There are four principal classes of lipoproteins: high-density lipoproteins (HDL), low-density lipoproteins (LDL), very-low-density lipoproteins (VLDL) and chylomicrons. High levels of LDL in blood plasma and low levels of HDL have been found to contribute to atherosclerosis.

Metropolitan Influence Zone (MIZ)

The metropolitan influence zone (MIZ) categorization, developed by Statistics Canada based on census data, facilitates comparisons of CVD and its risk factors in urban and rural settings. 'Urban' cores are defined as Census Metropolitan Areas (CMA) and Census Agglomerations (CA). Other regions are classified based on the proportion of their employed labour force that works in any urban core, as follows:

1. Strong MIZ: 30% works in an urban core
2. Moderate MIZ: Between 5% and 30% work in an urban core
3. Weak MIZ: Fewer than 5% work in an urban core
4. No MIZ: Labour force is less than 40 people and none works in an urban core

Necrosis

Cellular death affecting groups of cells, part of a structure or an organ.

Obesity

Obesity, a relative term for excessive accumulation of fat in the body, is defined in several ways. This report uses the WHO definition: individuals are considered obese if they have a Body Mass Index (BMI) ≥30. Obesity and physical inactivity are risk factors for CVD (see Body Mass Index, Waist-Hip Ratio).

Occlusion

Blockage of flow in a blood vessel. It may be partial or total. Coronary occlusion refers to obstruction of blood flow in an artery of the heart.

Overweight

Individuals are considered overweight if they have a Body Mass Index (BMI) ≥25. Self-reported data used in this report are for respondents age 18+ years and are divided into two overweight categories: (1) Some overweight, defined as BMI of 25 to less than 27, and (2) More overweight, defined as BMI of 27 to less than 30.

Pacemaker Implantation

(CCP 49.7; CCI 1.H*.53, excluding 1.HP.53LAQP, 1.HZ.53LAKP, 1.HD.53GRJA, 1.HB.53LAJA, 1.HZ.53LANN, 1.HZ.53GRNN)

The surgical placement of an electronic device that monitors the electrical function of the heart and generates an electrical impulse when required.

Person-Oriented Hospital Data

Information derived by Statistics Canada by linking together all the hospital discharge records for the same person in order to determine health outcomes.

Physical Inactivity

A relative term, which refers to the lack of exercise, the definition of which varies among researchers. For example, in the Canada Fitness Survey, 1981, and in the National Population Health Surveys of 1994/95 and 1996/97, individuals were considered physically inactive or 'sedentary' if they reported a usual daily leisure-time energy expenditure of less than or equal to 1.5 kilocalories/kilogram/day. Obesity and physical inactivity are risk factors for CVD. Self-reported data used in this report are for respondents age 12+ years.

Potential Years of Life Lost *(PYLL)*

A measure of the relative impact of a disease by calculating the sum of the number of years of life that each individual Canadian 'lost' due to premature death, or the number of years they would have lived had they experienced a normal life expectancy (see Life Expectancy). All similar cases can be added to provide a measure of impact on society. Since the average life expectancy for men is 75 years and 81 years for women, death prior to age 75 can be considered an average for both men and women.

Prevalence

The number of individuals with a given disease or other condition in a given population. The term usually refers to the situation at a specified point in time.

Relative Risk

A measure of the strength of an association. It is calculated as a ratio of the risk of occurrence of a disease or death among those exposed to a factor to the risk among those unexposed. For example, the relative risk of stroke in women who smoke, as compared with those who have never smoked, is 2.8.

Respiratory Diseases

ICD-10-CA codes J00-J99

Risk Factor

An attribute which is positively associated with the development of a disease but is not sufficient to cause the disease. The generally accepted risk factors for CVD include smoking, high blood pressure, high cholesterol, diabetes, obesity, sedentary lifestyle, alcohol, stress, age, and socioeconomic status.

Sedentary Lifestyle

Loosely defined as low levels of physical activity over extended periods of time. (See Physical Inactivity). Lack of physical exercise is a risk factor for CVD.

ST Elevated Myocardial Infarction *(STEMI)*

A heart attack, in which ST elevation is the electrocardiographic criterion for determining eligibility for thrombolysis.

Standard Mortality Ratio *(SMR)*

The ratio of the number of deaths observed in the population to the number of deaths that would be expected if the population had the same specific rates as the standard population, multiplied by 100.

Stenosis

Narrowing or constricting of a duct, canal or blood vessel.

Stress

Stress is identified as a risk factor in this report. Self-reported data used in this report for stress are for those age 15+ years and is defined as those who responded 'quite a bit stressed' or 'extremely stressed'.

Stroke

(ICD-9 430, 431, 434, 436; ICD-10-CA I60, I61, I63, I64)

Condition in which a reduction of blood flow to a region of the brain results in damage to brain tissue. Two major types of stroke are ischemic (i.e. thrombotic/embolic) and hemorrhagic. Thrombotic strokes are due to cerebral thrombosis, often superimposed on a plaque of atherosclerosis, with symptom onset ranging from minutes to days. Embolic strokes are due to cerebral embolism. They usually have a sudden onset of symptoms reflecting abrupt loss of blood flow to the region of the brain supplied by the occluded artery. A hemorrhagic stroke is the result of a ruptured blood vessel in the brain.

Thrombolysis

The action of pharmacologic lysis (break-up) of a clot in a blood vessel. Clots or thrombi are composed of platelets, fibrin, erythrocytes, and leukocytes and are usually superimposed on or adjacent to atherosclerotic plaques. The pharmacologic agent (one of seven currently available in Canada may be used), in combination with other therapy, such as heparin and aspirin.

Thrombus *(thrombosis)*

An aggregation of blood factors, primarily platelets and fibrin with entrapment of cellular elements, frequently causing vascular obstruction at the point of its formation.

Tobacco Smoking

Daily smoker: refers to those who respond "every day" to the question "At the present time do you smoke cigarettes every day, occasionally or not at all?"

Current smoker: includes daily smokers and non-daily smokers (also known as occasional smokers). Determined from the response to the question "At the present time do you smoke cigarettes every day, occasionally, or not at all?"

Smoking is a risk factor for CVD. Self-reported data used in this report are for daily smoking, with respondents age 12+ years (CCHS) or 15+ years (CTUMS).

Transient Ischemic Attack

(ICD-9 435; ICD-10-CA G45)

Reversible neurological or retinal deficits secondary to a temporary deficit in blood flow. Symptoms last for less than 24 hours, usually less than half an hour. There is complete recovery of function within 24 hours.

Valve Surgery

(CCP 47.0 to 47.2; CCI 1.HS.80, 1.HT.80, 1.HU.80, 1.HV.80, 1.HT.89, 1.HS.90, 1.HT.90, 1.HU.90, 1.HV.90)

Repair or replacement of a diseased heart valve.

Waist-Hip Ratio

The ratio of waist circumference (cm) to hip circumference (cm). The risk threshold among men is 1.0 and among women is 0.85. It is used as a measure of obesity (see obesity).

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