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Report from the Canadian Chronic Disease Surveillance System: Hypertension in Canada, 2010

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Executive Summary

Hypertension

Hypertension is a chronic condition that occurs when blood pressure is consistently high for long periods of time. Blood pressure is the pressure or force of blood against the walls of blood vessels as it circulates.

The risk of developing hypertension can be reduced by adopting a healthy lifestyle that includes regular physical activity, maintaining a healthy body weight, managing stress, limiting alcohol consumption, and eating a healthy diet low in sodium, with adequate fresh fruits and vegetables, and limited fat and simple sugars.

In most cases, hypertension has no symptoms and can only be diagnosed through proper blood pressure measurement. If left untreated, hypertension increases a person's risk of stroke, heart attack, dementia, heart and kidney failure and other chronic diseases. However, hypertension can be controlled to lower the risk of developing these serious diseases.

Hypertension and diabetes often co-exist, along with other cardiovascular risk factors such as obesity and high levels of lipids or fats in the blood. The greater the number of cardiovascular risk factors an individual has, the higher the likelihood of having a heart attack, stroke or other serious cardiovascular disease outcome.

Canadian Chronic Disease Surveillance System (CCDSS)

The Canadian Chronic Disease Surveillance System (CCDSS) is a collaborative network of provincial and territorial surveillance systems, supported by the Public Health Agency of Canada (PHAC). It uses provincial/territorial health administrative databases including physician billing, hospitalization and resident registry databases, and was initially used to track diabetes (formerly known as the National Diabetes Surveillance System (NDSS)). In 2009, hypertension was added to the CCDSS and other chronic diseases will be added in the future.

In the CCDSS, diagnosed hypertension is defined based on a minimum requirement of at least *two physician claims within a two-year period, or one inpatient hospital separation abstract listing hypertension as a diagnosis*, and uses the International Classification of Diseases (ICD), 9th or 10th Edition hypertension codes.

Key Findings

This report features the most recent data available, fiscal year 2006/07, as well as trend data from 1998/99 onwards. Where data on both diagnosed hypertension and diabetes are presented, trend data are from 2000/01 onwards as data for diabetes were not available prior to this year. Data for Nunavut and Québec were unavailable for this report but will likely be available in future reports. Data were reported for adults aged 20 years and older.

Prevalence¹

- Nearly 6 million Canadians aged 20 years and older² – more than one in five adults – were living with diagnosed hypertension in 2006/07 (24.0% of women and 21.3% of men, crude prevalence).
- The age-standardized prevalence of diagnosed hypertension increased from 12.9% in 1998/99 to 19.6% in 2006/07.

- Projections indicate that if current age and sex trends continue, by 2011/12, about 7.3 million Canadians will be living with a hypertension diagnosis – an estimated increase of 25.5% since 2006/07.²
- The age-standardized prevalence of diagnosed hypertension in Canada was highest in the Atlantic provinces and lowest in the west and north (Yukon, Northwest Territories, and British Columbia).

Incidence¹

- In 2006/07, about 450,000 adults were newly diagnosed² with hypertension (22.1 per 1,000 population aged 20 years and older – 21.6 per 1,000 women and 22.7 per 1,000 men, crude incidence).
- Age-standardized incidence rates of diagnosed hypertension remained stable throughout the surveillance period with overall incidence rates of 26.2 per 1,000 in 1998/99 and 25.8 per 1,000 in 2006/07.
- Yukon has the highest age-standardized incidence rate of diagnosed hypertension, closely followed by Newfoundland and Labrador. The lowest rates were observed in Ontario and the Northwest Territories. In 1998, in Yukon, a large proportion of claims did not have the reason for the visit or diagnosis coded in the system. The lower number of new cases of diagnosed hypertension that were documented during the earlier years in Yukon likely had an impact on the lower prevalence of diagnosed hypertension during the years under surveillance as prevalent conditions are cumulative.

Hypertension and Diabetes^{1,3}

- In 2006/07, 5.1% of Canadians (about 1 million) aged 20 years and older were living with both diagnosed diabetes and hypertension.
- 22.7% of adults with diagnosed hypertension also had diabetes.
- Adults with diagnosed hypertension were 6 times more often diagnosed with diabetes than those without hypertension.
- 62.8% of adults with diagnosed diabetes also had diagnosed hypertension.
- Adults with diagnosed diabetes were 3 times more often diagnosed with hypertension than those without diabetes.
- Age-standardized prevalence of diagnosed diabetes among adults with diagnosed hypertension increased from 10.9% in 2000/01 to 14.3% in 2006/07.

All-Cause Mortality¹

- Between 1998/99 and 2006/07, all-cause mortality rates for adults with diagnosed hypertension have decreased from 7.3 per 1,000 to 6.7 per 1,000 among women, and from 12.2 per 1,000 to 10.2 per 1,000 among men.
- In 2006/07, all-cause mortality rates were respectively 34% and 44% higher among women and men with diagnosed hypertension than among women and men without diagnosed hypertension.
- In 2006/07, age-standardized all-cause mortality rates were about 2 times higher for adults with both diagnosed hypertension and diabetes compared to adults with diagnosed hypertension only.

CCDSS Future Plans

Future work will include reporting on diagnosed hypertension in Canada on a regular basis. Continuing work with the provinces and territories to expand the CCDSS to other chronic conditions such as heart disease and stroke will allow PHAC to track whether these outcomes of hypertension control are changing among individuals with hypertension.

Introduction

Hypertension

Hypertension is a chronic condition that occurs when blood pressure is consistently high for long periods of time, leading to the damage of arteries and decreased blood flow to affected organs. Blood pressure is the pressure or force of blood against the walls of blood vessels as it circulates. It is expressed as two numbers: systolic blood pressure (the top or higher number) is the pressure in the artery when the heart contracts and diastolic blood pressure (the bottom or lower number) is the pressure in the artery when the heart relaxes between beats. Hypertension is defined as systolic blood pressure greater or equal to 140 mmHg or diastolic blood pressure greater or equal to 90 mmHg.⁴ For individuals with diabetes or chronic kidney disease, hypertension is defined as blood pressure over 130 mmHg systolic or over 80 mmHg diastolic.

Known as the “silent killer”, hypertension is a leading modifiable risk factor for cardiovascular disease and mortality in the world. In most cases, hypertension has no symptoms and can only be diagnosed through proper blood pressure measurement. If left untreated, hypertension can increase a person’s risk of stroke, coronary heart disease, dementia, heart and kidney failure and other chronic diseases.^{5,6}

Hypertension affects all age groups, but the risk of hypertension increases with age. For example, over their remaining lifetime, 90% of middle-aged and older men and women participating in the Framingham Heart Study, a longitudinal cohort study, were likely to develop hypertension.⁷ However, finding high blood pressure early, treating and keeping it in the normal range can reduce the risk of developing complications. Even a small decrease in blood pressure can reduce the risk of developing complications such as heart failure, stroke and other cardiovascular diseases.^{5,8}

The risk of developing hypertension can be reduced through a healthy diet, limiting sodium intake, avoiding excessive alcohol consumption, losing excess weight, managing stress and exercising regularly.

For individuals with hypertension, it can be controlled with lifestyle modifications and/or use of blood pressure lowering medication. Moreover, it is important for these individuals to have cholesterol, blood sugar and kidney function checked on a regular basis as the presence of these risk factors increases the risk of damage from hypertension.

Hypertension and diabetes frequently co-exist, along with other cardiovascular disease risk factors such as obesity and high levels of lipids or fats in the blood. People who have multiple risk factors are more likely to have a heart attack or stroke compared with those who do not.⁹

Canadian Chronic Disease Surveillance System (CCDSS)

The Canadian Chronic Disease Surveillance System (CCDSS) is a collaborative network of provincial and territorial surveillance systems, supported by the Public Health Agency of Canada (PHAC). In each province and territory, the health insurance registry database is linked to the physician billing and hospitalization databases. Started with diabetes surveillance and formerly known as the National Diabetes Surveillance System (NDSS), the CCDSS is currently expanding to include other chronic disease conditions. The CCDSS regularly seeks advice from Aboriginal groups, non-governmental organizations, and researchers in order to enhance and interpret the information from the system.

In 2009, PHAC expanded the CCDSS to track information on the prevalence and incidence of diagnosed hypertension in the Canadian population. Persons were considered cases of diagnosed hypertension if they met the following case criteria:

two or more physician claims within two years, or one inpatient hospital separation abstract listing hypertension as a diagnosis with the International Classification of Diseases (ICD) 9th Edition hypertension codes (ICD-9 or ICD-9-CM: 401-405) or equivalent 10th Edition hypertension codes (ICD-10-CA: I10-I13 and I15). An expert group recommended the CCDSS case criteria based on recent validation studies conducted in Canada.^{10,11,12,13} The CCDSS case criteria exclude women with pregnancy induced hypertension to avoid including cases of hypertension that may resolve after delivery. In addition, the case criteria do not include individuals diagnosed with pulmonary hypertension (ICD-9 or ICD-9-CM code 416 or ICD-10-CA code I27). Full-time members of the Canadian Forces and individuals in the Royal Canadian Mounted Police and federal correctional facilities were not included as they are covered by federal jurisdiction as opposed to the publicly funded health registry administered by the provinces and territories.

Using administrative data for surveillance, as in the CCDSS, generally results in some misclassification of hypertension cases and non-cases. Therefore, the method of determining diagnosed hypertension requires a balance between the possibilities of not identifying people who have been diagnosed with hypertension (false-negatives) and identifying people who do not have hypertension (false-positives). A number of validation studies have indicated that the CCDSS case criteria minimize both false-negatives and false-positives and depict a relatively accurate picture of diagnosed hypertension in Canada.^{10,11,12,13}

The CCDSS does not identify individuals who have hypertension but have not yet been diagnosed with the condition by a physician. Results based on blood pressure measurements from the Canadian Heart Health Surveys in 1986-1992 showed that 42% of the study participants were unaware of their hypertension (47% of men and 35% of women).¹⁴ Likely as the result of intensive efforts to improve the detection and management of hypertension, this has changed. In the 2006 Ontario Survey on the Prevalence and Control of Hypertension a much lower proportion of individuals with hypertension (13.7%) were unaware of their condition.¹⁵ Similarly, national estimates from Cycle 1 of the Canadian Health Measures Survey conducted between 2007 and 2009 indicated that 17% of Canadians with hypertension were unaware.¹⁶ Thus, trends presented in this report might underestimate the true prevalence of hypertension in Canada.

This report features the most recent data available, fiscal year 2006/07, as well as trend data from 1998/99 onwards. Where data on both diagnosed hypertension and diabetes are presented, trend data from 2000/01 onwards are presented as data for diabetes were not available prior to this year. Data for Nunavut and Québec were unavailable for this report but will likely be available in future reports. However, as noted in the applicable data tables and figures, the number of cases for Québec was estimated by applying the Canadian age-specific rates of diagnosed hypertension weighted to the Québec population. The CCDSS case criteria have not been validated for adults younger than 20 years of age; therefore the data presented in this report are only for adults aged 20 years and older.

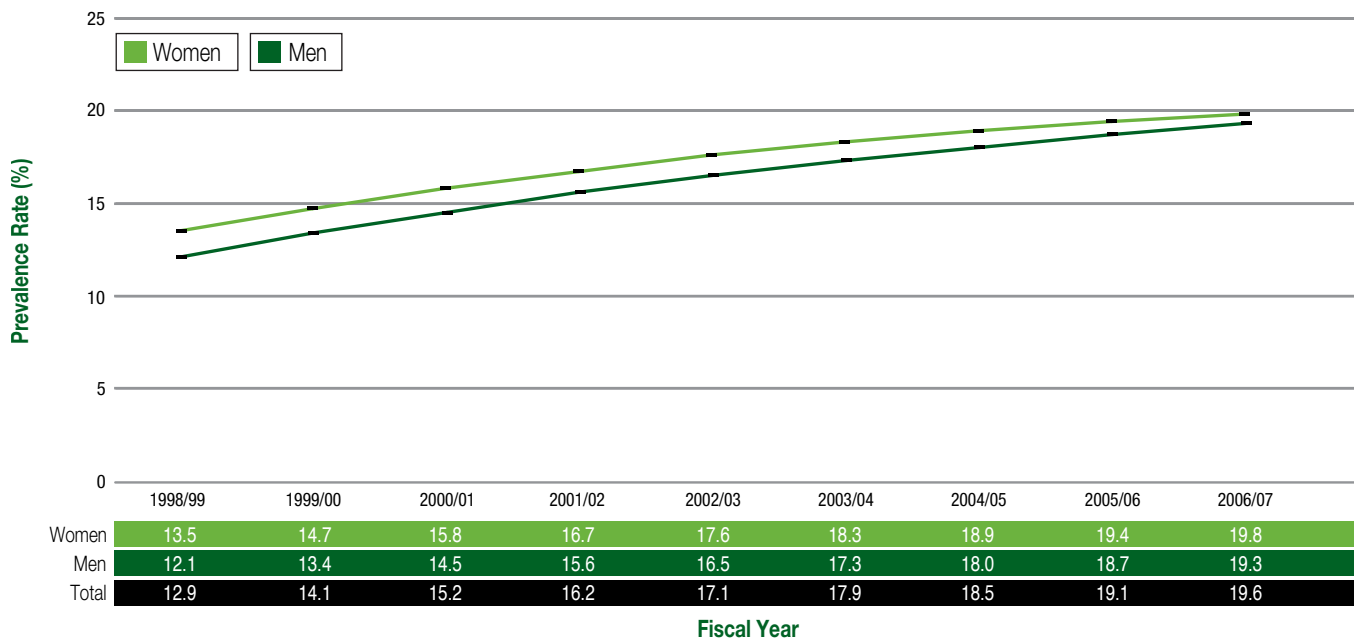
Adults with Diagnosed Hypertension (Prevalence)¹

- In 2006/07, nearly 6 million Canadians aged 20 years and older,² or more than 1 in 5, had diagnosed hypertension (approximately 5.9 million adults; 3.2 million women and 2.7 million men, crude prevalence).
- The prevalence rate of hypertension among Canadians aged 20 years and older was 22.7% in 2006/07 (24.0% for women and 21.3% for men, crude prevalence) (Table 1). This prevalence is consistent but somewhat higher than the self-reported value reported from the 2007/08 Canadian Community Health Survey (19.4%). Self-reported hypertension values may be lower because approximately 5% of people who report drug treatment for hypertension do not report having hypertension in Canadian self-report surveys, possibly because they think that they do not have hypertension or that their hypertension has been cured when their blood pressure is controlled using medication or lifestyle modification.¹³ These surveys also sample only the household population, whereas, CCDSS includes all Canadians residing in the provinces and territories with the previously noted exceptions.

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- After accounting for changes in the age distribution in the population over time, the age-standardized prevalence rate of diagnosed hypertension increased from 12.9% in 1998/99 to 19.6% in 2006/07 (Figure 1). One likely contributor to this rise in hypertension prevalence is the decline in mortality among people with hypertension and other cardiovascular diseases, as noted in other studies.^{17,18} Large reductions in mortality rates from stroke, heart failure, and acute myocardial infarction were found to be significantly associated with increases in antihypertensive prescriptions, especially after the initiation of the Canadian Hypertension Education Program (CHEP) in 1999, a program developed to improve the management of hypertension.¹⁸ Before 1999, total antihypertensive prescriptions among Ontarians newly treated for hypertension were increasing by 2% per year, but after 1999 they were increasing at a rate of 10% per year.¹⁹
- Age-specific prevalence rates were similar between men and women for those under age 50. However, rates for women were increasingly higher than men from age 55 onwards. (Table 2 and Figure 2) This is consistent with other surveys that have found higher rates of hypertension in men in younger ages and higher rates in women in older ages.^{20,21}
- In Canada, the age-standardized prevalence rates of hypertension were highest in the Atlantic provinces and lowest in the west and north (Yukon, Northwest Territories, and British Columbia) (Figure 3). This is similar to the east-west gradient reported in other studies of obesity and diabetes trends across the country.^{22,23} Crude prevalence rates are presented in Table 3.

Figure 1. Age-Standardized Prevalence Rates* of Diagnosed Hypertension among People Aged 20 Years and Older, by Sex, Canada,† 1998/99 to 2006/07



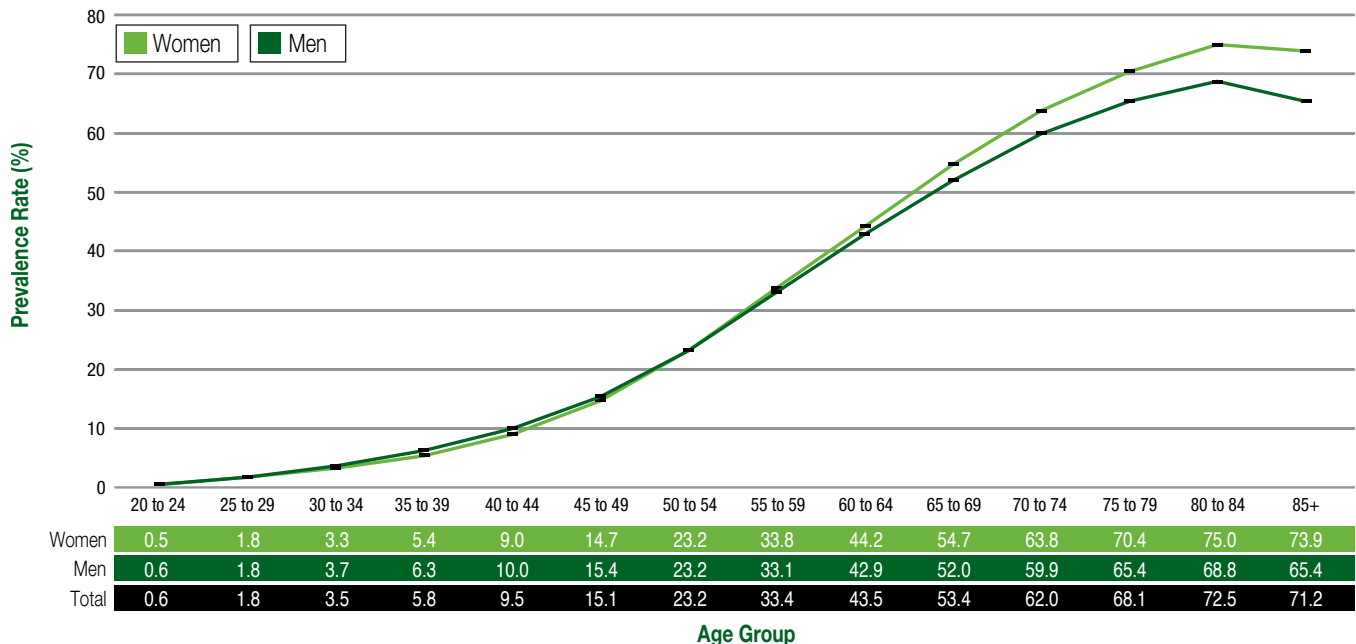
Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.

* Age-standardized to the 1991 Canadian population.

† Data for Nunavut and Québec were unavailable.

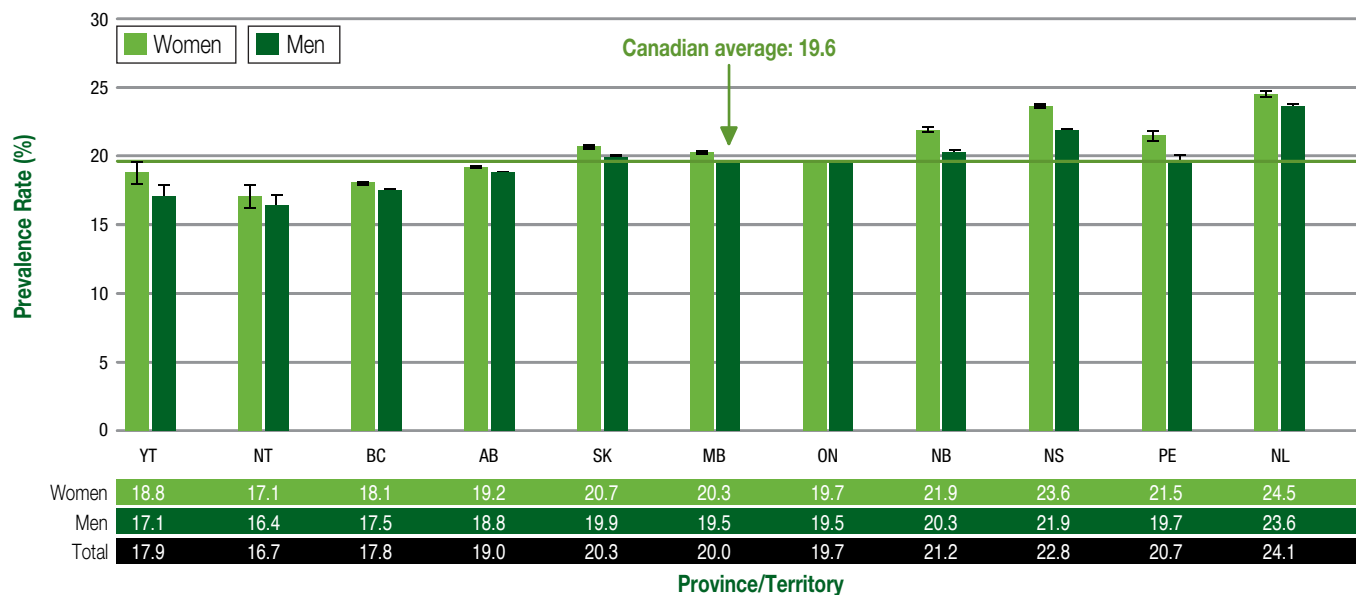
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Figure 2. Prevalence Rates of Diagnosed Hypertension among People Aged 20 Years and Older, by Age Group and Sex, Canada,* 2006/07



Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.
* Data for Nunavut and Québec were unavailable.

Figure 3. Age-Standardized Prevalence Rates* of Diagnosed Hypertension among People Aged 20 Years and Older, by Sex, Province and Territory, Canada,† 2006/07



Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.
* Age-standardized to the 1991 Canadian population. † Data for Nunavut and Québec were unavailable.
‡ The 95% Confidence Interval shows an estimated range of values which is likely to include the true prevalence rate 19 times out of 20.
YT: Yukon, NT: Northwest Territories, BC: British Columbia, AB: Alberta, SK: Saskatchewan, MB: Manitoba, ON: Ontario, NB: New Brunswick, NS: Nova Scotia, PE: Prince Edward Island, NL: Newfoundland and Labrador.

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Table 1. Prevalence Rates, Incidence Rates, and Number of Cases of Diagnosed Hypertension, by Year and Sex, Canada,* 1998/99 to 2006/07

Fiscal Year		Prevalence Rate (%)			Incidence Rate (per 1,000)		
		Women	Men	Total	Women	Men	Total
1998/99	Crude Rates	15.3	12.3	13.8	25.6	22.1	23.8
	Cases	1,781,304	1,365,617	3,146,921	258,613	219,782	478,396
	Population	11,645,517	11,088,924	22,734,441	10,122,826	9,943,090	20,065,916
1999/00	Crude Rates	16.8	13.7	15.3	25.2	22.4	23.8
	Cases	1,984,800	1,541,232	3,526,032	253,673	221,841	475,514
	Population	11,794,275	11,238,530	23,032,805	10,063,148	9,919,139	19,982,286
2000/01	Crude Rates	18.3	15.1	16.7	25.6	23.2	24.4
	Cases	2,185,146	1,720,683	3,905,830	257,052	230,727	487,779
	Population	11,968,953	11,419,133	23,388,086	10,040,859	9,929,176	19,970,035
2001/02	Crude Rates	19.5	16.3	18.0	25.1	23.1	24.1
	Cases	2,375,007	1,894,157	4,269,164	252,047	229,238	481,284
	Population	12,157,311	11,609,975	23,767,286	10,034,351	9,945,055	19,979,406
2002/03	Crude Rates	20.7	17.5	19.1	24.8	22.9	23.9
	Cases	2,555,268	2,061,378	4,616,647	249,154	228,254	477,408
	Population	12,341,930	11,792,606	24,134,536	10,035,816	9,959,482	19,995,297
2003/04	Crude Rates	21.7	18.5	20.2	24.1	22.5	23.3
	Cases	2,723,285	2,220,505	4,943,790	241,987	224,521	466,509
	Population	12,537,082	11,996,925	24,534,007	10,055,784	10,000,941	20,056,726
2004/05	Crude Rates	22.6	19.5	21.1	23.2	22.4	22.8
	Cases	2,877,956	2,375,826	5,253,782	233,435	225,121	458,557
	Population	12,729,881	12,189,561	24,919,442	10,085,360	10,038,856	20,124,217
2005/06	Crude Rates	23.4	20.4	22.0	22.7	22.8	22.7
	Cases	3,025,193	2,532,606	5,557,799	229,887	229,974	459,860
	Population	12,930,898	12,387,986	25,318,884	10,135,592	10,085,353	20,220,945
2006/07	Crude Rates	24.0	21.3	22.7	21.6	22.7	22.1
	Cases	3,161,283	2,687,181	5,848,464	220,128	229,900	450,029
	Population	13,152,159	12,601,762	25,753,921	10,211,005	10,144,481	20,355,486

Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.

* Data for Nunavut were unavailable. Data for Québec were also unavailable. However, the number of cases for Québec was estimated by applying the Canadian age-specific rates of diagnosed hypertension weighted to the Québec population.

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Table 2. Prevalence Rates, Incidence Rates, and Number of Cases of Diagnosed Hypertension, by Sex and Age Group, Canada, * 2006/07

Age Group		Prevalence Rate (%)			Incidence Rate (per 1,000)		
		Women	Men	Total	Women	Men	Total
20 to 24	Crude Rates	0.5	0.6	0.6	1.8	2.2	2.0
	Cases	6,049	6,811	12,859	1,968	2,552	4,520
	Population	1,118,706	1,154,031	2,272,737	1,114,625	1,149,772	2,264,398
25 to 29	Crude Rates	1.7	1.8	1.8	3.0	3.6	3.3
	Cases	19,849	20,150	39,999	3,339	3,998	7,337
	Population	1,136,351	1,131,680	2,268,031	1,119,841	1,115,528	2,235,369
30 to 34	Crude Rates	3.3	3.7	3.5	4.8	6.3	5.6
	Cases	38,209	42,285	80,494	5,326	7,021	12,348
	Population	1,149,220	1,144,965	2,294,185	1,116,337	1,109,702	2,226,039
35 to 39	Crude Rates	5.4	6.2	5.8	7.8	10.2	9.0
	Cases	66,168	77,056	143,223	9,132	11,900	21,032
	Population	1,231,521	1,237,898	2,469,419	1,174,485	1,172,742	2,347,227
40 to 44	Crude Rates	8.9	9.9	9.4	13.2	15.2	14.2
	Cases	125,456	141,165	266,621	17,036	19,742	36,778
	Population	1,404,160	1,419,310	2,823,470	1,295,740	1,297,887	2,593,627
45 to 49	Crude Rates	14.6	15.4	15.0	20.3	22.2	21.3
	Cases	204,370	215,809	420,179	24,828	26,955	51,783
	Population	1,400,517	1,404,849	2,805,366	1,220,975	1,215,995	2,436,970
50 to 54	Crude Rates	23.1	23.2	23.1	29.3	31.8	30.5
	Cases	287,059	285,892	572,951	28,898	31,152	60,050
	Population	1,244,669	1,234,522	2,479,191	986,508	979,782	1,966,290
55 to 59	Crude Rates	33.6	33.0	33.3	38.8	42.9	40.9
	Cases	365,949	354,998	720,947	29,223	32,340	61,563
	Population	1,089,324	1,075,714	2,165,038	752,599	753,055	1,505,654
60 to 64	Crude Rates	44.0	42.8	43.4	52.5	57.6	55.0
	Cases	368,882	350,900	719,782	26,012	28,619	54,631
	Population	838,580	819,559	1,658,139	495,710	497,278	992,988
65 to 69	Crude Rates	54.6	51.9	53.3	68.8	70.6	69.7
	Cases	359,115	320,562	679,678	22,079	22,568	44,648
	Population	657,957	617,542	1,275,499	320,921	319,548	640,469
70 to 74	Crude Rates	63.8	59.9	61.9	82.6	78.9	80.8
	Cases	363,189	304,282	667,471	18,580	17,485	36,065
	Population	569,572	508,323	1,077,895	224,963	221,526	446,489
75 to 79	Crude Rates	70.4	65.4	68.2	92.2	85.6	89.0
	Cases	355,346	263,909	619,255	15,162	13,072	28,235
	Population	504,721	403,535	908,256	164,537	152,698	317,235
80 to 84	Crude Rates	75.1	68.8	72.6	93.7	86.9	90.7
	Cases	304,933	181,092	486,025	10,462	7,803	18,265
	Population	406,117	263,105	669,222	111,646	89,817	201,463
85+	Crude Rates	74.0	65.5	71.3	72.1	67.9	70.5
	Cases	296,709	122,271	418,979	8,082	4,693	12,775
	Population	400,744	186,729	587,473	112,117	69,151	181,268
Total	Crude Rates	24.0	21.3	22.7	21.6	22.7	22.1
	Cases	3,161,283	2,687,182	5,848,465	220,128	229,900	450,028
	Population	13,152,159	12,601,762	25,753,921	10,211,005	10,144,481	20,355,486

Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.

* Data for Nunavut were unavailable. Data for Québec were also unavailable. However, the number of cases for Québec was estimated by applying the Canadian age-specific rates of diagnosed hypertension weighted to the Québec population.

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Table 3. Prevalence Rates, Incidence Rates, and Number of Cases of Diagnosed Hypertension, by Sex, Province and Territory, Canada,* 2006/07

Province/Territory		Prevalence Rate (%)			Incidence Rate (per 1,000)		
		Women	Men	Total	Women	Men	Total
YT	Crude Rates	17.3	17.0	17.1	28.4	30.0	29.2
	Cases	2,135	2,162	4,297	299	327	626
	Population	12,367	12,739	25,106	10,531	10,904	21,435
NT	Crude Rates	13.0	12.9	12.9	14.6	16.1	15.4
	Cases	2,012	2,160	4,172	200	239	439
	Population	15,474	16,782	32,256	13,662	14,861	28,523
BC	Crude Rates	22.5	20.3	21.4	22.9	24.3	23.6
	Cases	385,332	333,112	718,444	31,143	32,598	63,741
	Population	1,712,349	1,639,990	3,352,339	1,358,160	1,339,476	2,697,636
AB	Crude Rates	20.6	18.7	19.6	18.6	20.8	19.7
	Cases	263,410	235,205	498,615	19,291	21,793	41,084
	Population	1,281,442	1,261,103	2,542,545	1,037,323	1,047,691	2,085,014
SK	Crude Rates	26.8	22.9	24.9	22.0	23.5	22.8
	Cases	102,865	84,983	187,848	6,315	6,888	13,203
	Population	383,915	370,939	754,854	287,365	292,844	580,209
MB	Crude Rates	25.7	22.0	23.9	21.5	23.4	22.4
	Cases	116,654	95,111	211,765	7,410	8,096	15,506
	Population	454,193	432,843	887,036	344,949	345,828	690,777
ON	Crude Rates	23.7	21.4	22.6	20.6	21.5	21.0
	Cases	1,254,002	1,087,005	2,341,007	84,870	87,653	172,523
	Population	5,295,333	5,070,185	10,365,518	4,126,201	4,070,833	8,197,034
NB	Crude Rates	27.8	23.7	25.8	24.3	25.6	24.9
	Cases	84,281	67,938	152,219	5,447	5,737	11,184
	Population	303,167	286,259	589,426	224,333	224,058	448,391
NS	Crude Rates	29.6	25.6	27.7	24.9	26.3	25.6
	Cases	117,346	93,801	211,147	7,105	7,375	14,480
	Population	396,074	367,022	763,096	285,833	280,596	566,429
PE	Crude Rates	27.3	23.0	25.2	22.8	24.9	23.9
	Cases	15,381	12,216	27,597	958	1,044	2,002
	Population	56,363	53,094	109,457	41,940	41,922	83,862
NL	Crude Rates	29.4	27.3	28.4	31.1	33.0	32.0
	Cases	60,477	52,529	113,006	4,649	4,780	9,429
	Population	205,433	192,676	398,109	149,605	144,927	294,532

Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.

* Data for Nunavut and Québec were unavailable.

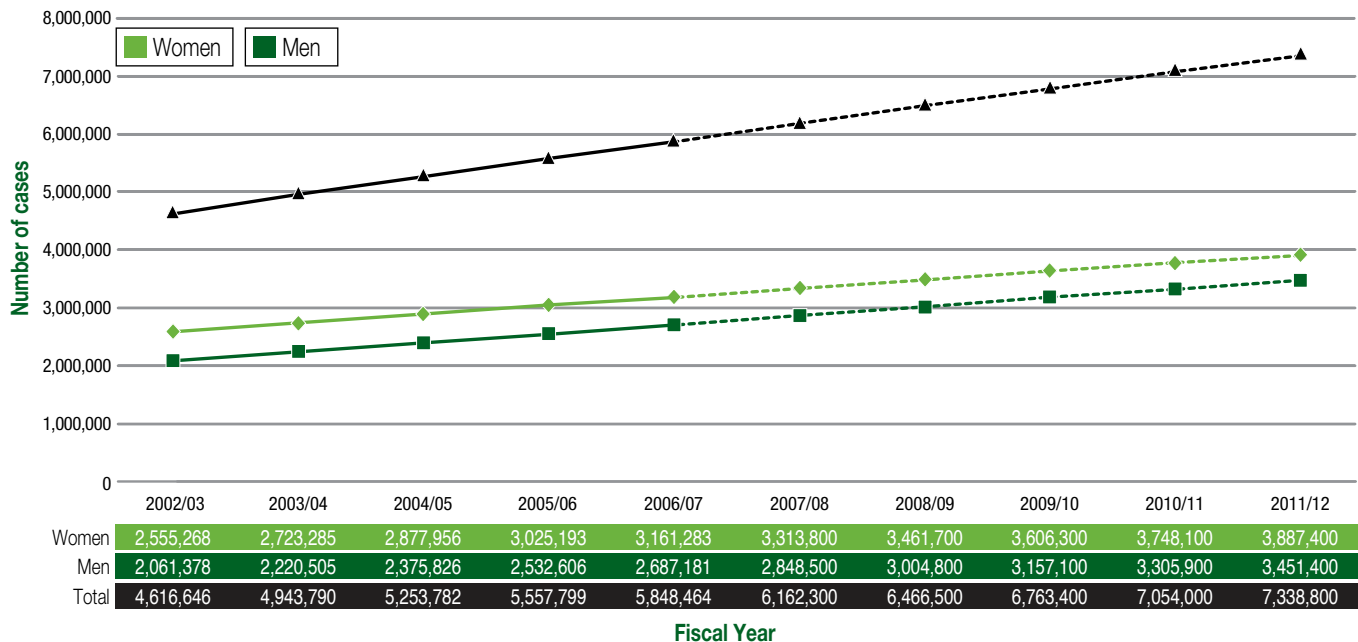
YT: Yukon, NT: Northwest Territories, BC: British Columbia, AB: Alberta, SK: Saskatchewan, MB: Manitoba, ON: Ontario, NB: New Brunswick, NS: Nova Scotia, PE: Prince Edward Island, NL: Newfoundland and Labrador.

Adults with Diagnosed Hypertension (Forecasted Prevalence)^{24, 25}

If current rates of hypertension by age and sex remain constant:

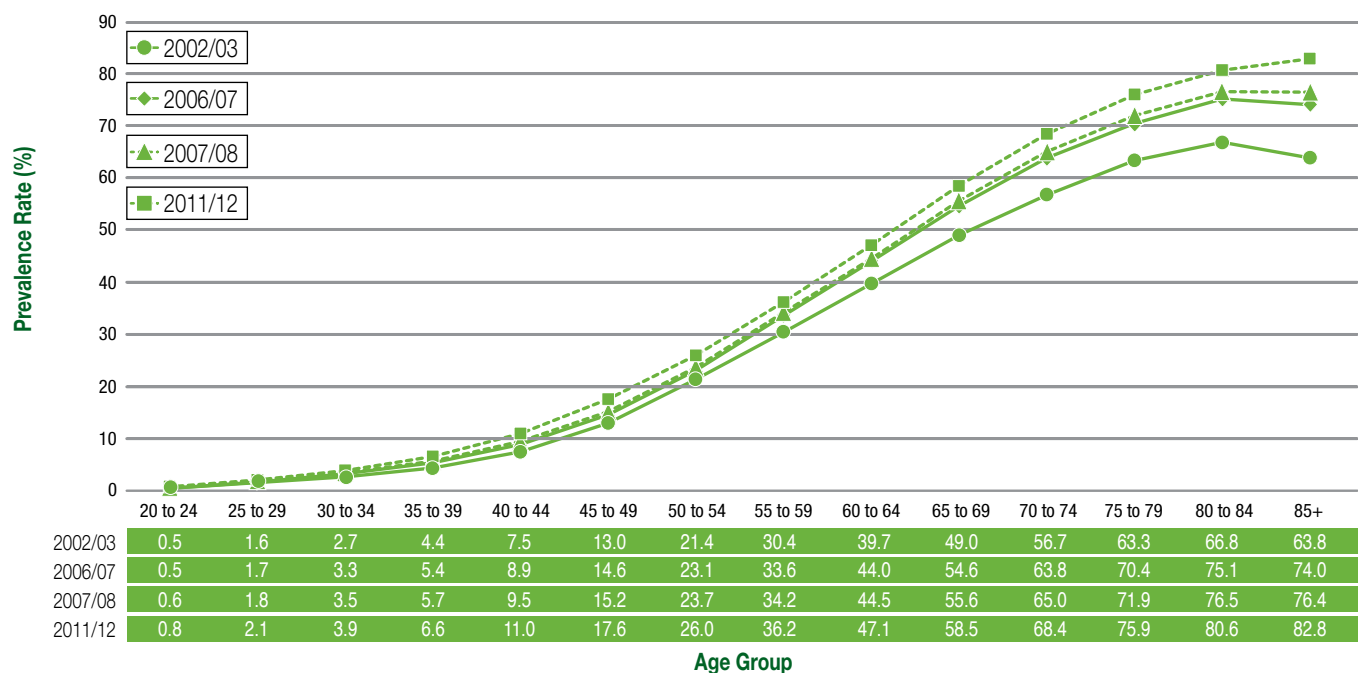
- By 2011/12, the number of Canadians aged 20 and older with diagnosed hypertension is forecasted to be about 7.3 million – an estimated increase of 25.5% from 2006/07 (Figure 4).
- By 2011/12, among all adults with diagnosed hypertension, almost one in two (48.9%) will be in the 55 to 74 year age range (Figures 5 and 6).
- By 2011/12, about 346,300 adults between the ages of 20 to 40 years are forecasted to be living with diagnosed hypertension – an overall increase of about 25.2% from 2006/07 (Figures 5 and 6).

Figure 4. Observed and Projected* Number of Prevalent Cases of Diagnosed Hypertension among People Aged 20 Years and Older, by Sex, Canada,† Observed: 2002/03 to 2006/07, Projected: 2007/08 to 2011/12



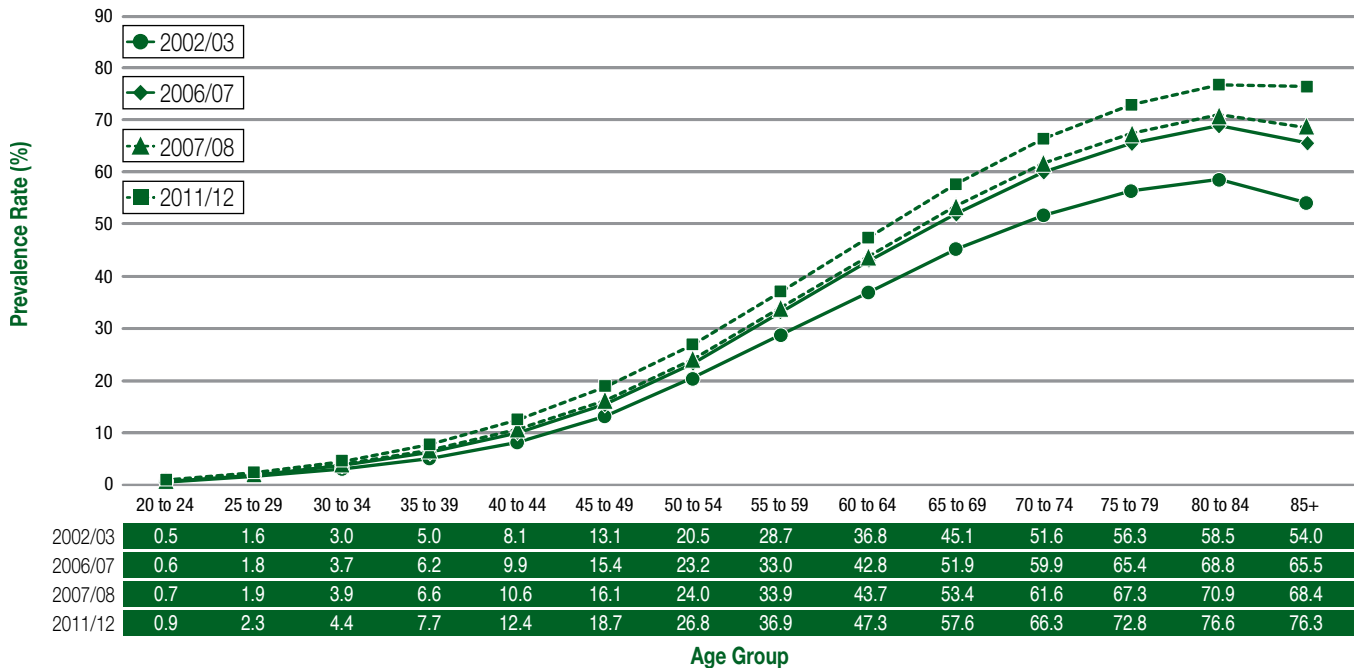
Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.
* Projected number of prevalent cases was rounded to the nearest 100.
† Data for Nunavut were unavailable. Data for Québec were also unavailable. However, the number of cases for Québec was estimated by applying the Canadian age-specific rates of diagnosed hypertension weighted to the Québec population.

Figure 5. Observed and Projected Prevalence Rates of Diagnosed Hypertension among Women Aged 20 Years and Older, by Age Group, Canada,* Observed: 2002/03, 2006/07, Projected: 2007/08, 2011/12



Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.
* Data for Nunavut and Québec were unavailable.

Figure 6. Observed and Projected Prevalence Rates of Diagnosed Hypertension among Men Aged 20 Years and Older, by Age Group, Canada,* Observed: 2002/03, 2006/07, Projected: 2007/08, 2011/12



Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.
* Data for Nunavut and Québec were unavailable.

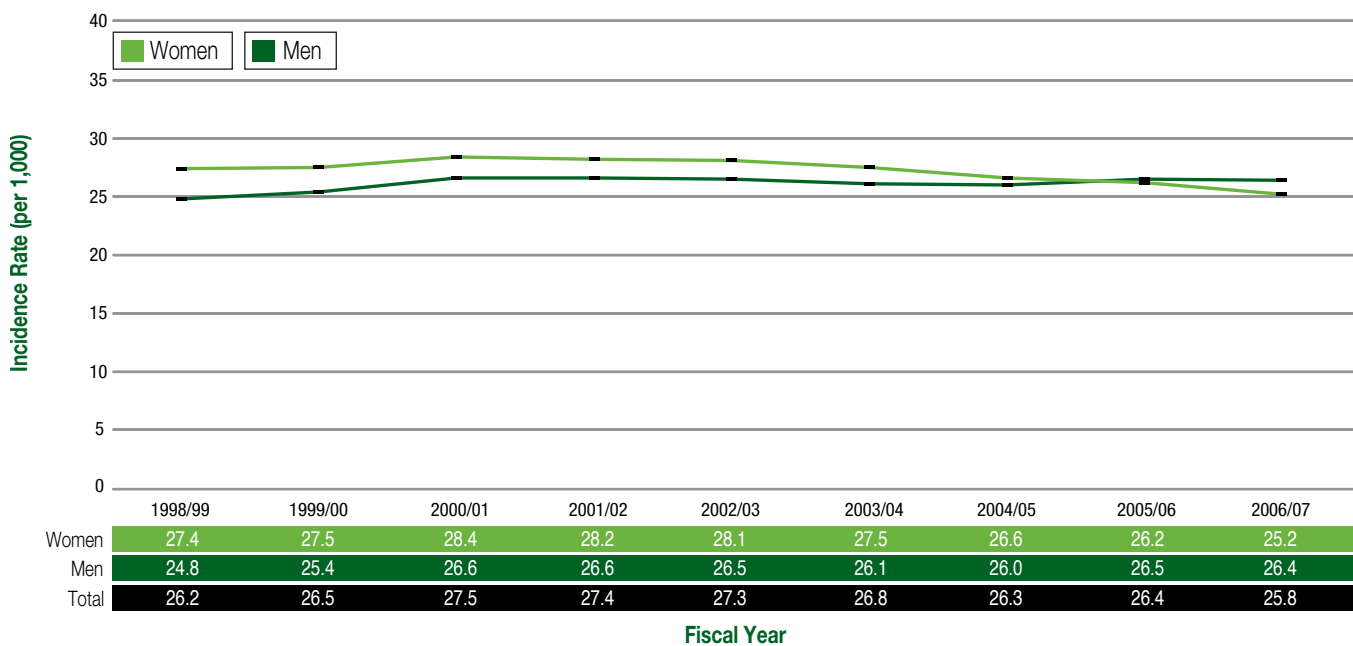
Adults with Newly Diagnosed Hypertension (Incidence)¹

- In 2006/07, 450,029 adults were newly diagnosed² with hypertension (22.1 per 1,000 population aged 20 years and older, 21.6 per 1,000 women and 22.7 per 1,000 men) (Table 1).²
- Overall, age-standardized incidence rates of diagnosed hypertension remained stable throughout the surveillance period with incidence rates of 26.2 per 1,000 in 1998/99 and 25.8 per 1,000 in 2006/07. During that period, incidence rates declined slightly in women and increased slightly in men (Figure 7).
- The rate of newly diagnosed hypertension rose with increasing age (Figure 8). For example, the rate was 5.6 per 1,000 for adults aged 30 to 34 and increased almost 6 times to 30.7 per 1,000 for adults aged 50 to 54.
- The rate of newly diagnosed hypertension was higher in men than women below the age of 70; however, this trend was reversed after age 70 with higher rates in women than men (Figure 8).
- The age-standardized incidence rates of diagnosed hypertension were higher in Yukon (37.7 per 1,000) and the Atlantic provinces (26.5 per 1,000 to 35.3 per 1,000) and lower in Ontario (24.7 per 1,000) and the Northwest Territories (25.0 per 1,000).

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- In 1998/99, Yukon had the lowest age-standardized rate of newly diagnosed hypertension among all provinces and territories (20.0 per 1,000) (data not shown). However, this rate increased significantly to 37.7 per 1,000 in 2006/07, which was greater than the Canadian national rate in 2006/07 (25.8 per 1,000) (Figure 9, crude incidence rates are presented in Table 3). This may reflect a true increase in incidence, improved diagnosis of hypertension in this territory, or improvements in the way hypertension is coded in claims data. In fact, in 1998 in Yukon, a large proportion of claims did not have the reason for the visit or diagnosis coded in the system. Following the implementation of a new claim system, more claims are being coded using the ICD coding system. The lower number of new cases of diagnosed hypertension that were documented in the earlier years likely had an impact on the lower prevalence of diagnosed hypertension in Yukon during the years under surveillance as prevalent conditions are cumulative. Ongoing tracking of hypertension with the addition of future years data will provide a better sense of the prevalence of hypertension in the Yukon.

Figure 7. Age-Standardized Incidence Rates* of Diagnosed Hypertension among People Aged 20 Years and Older, by Sex, Canada,† 1998/99 to 2006/07

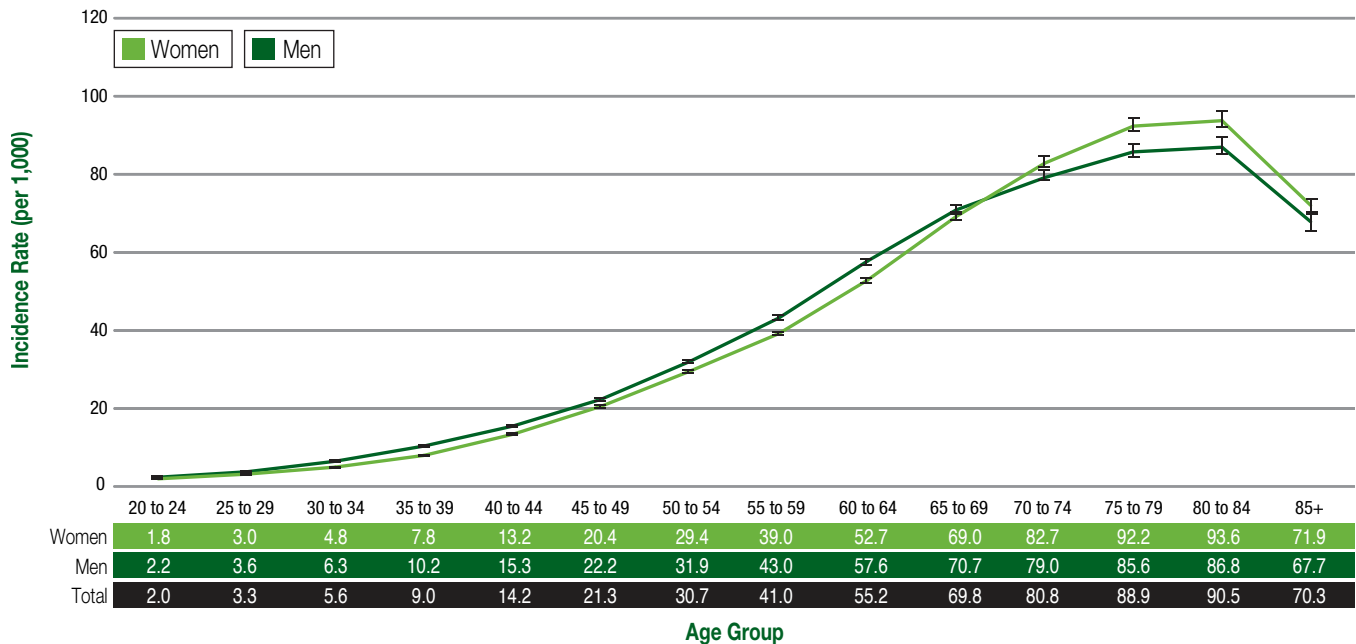


Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.

* Age-standardized to the 1991 Canadian population.

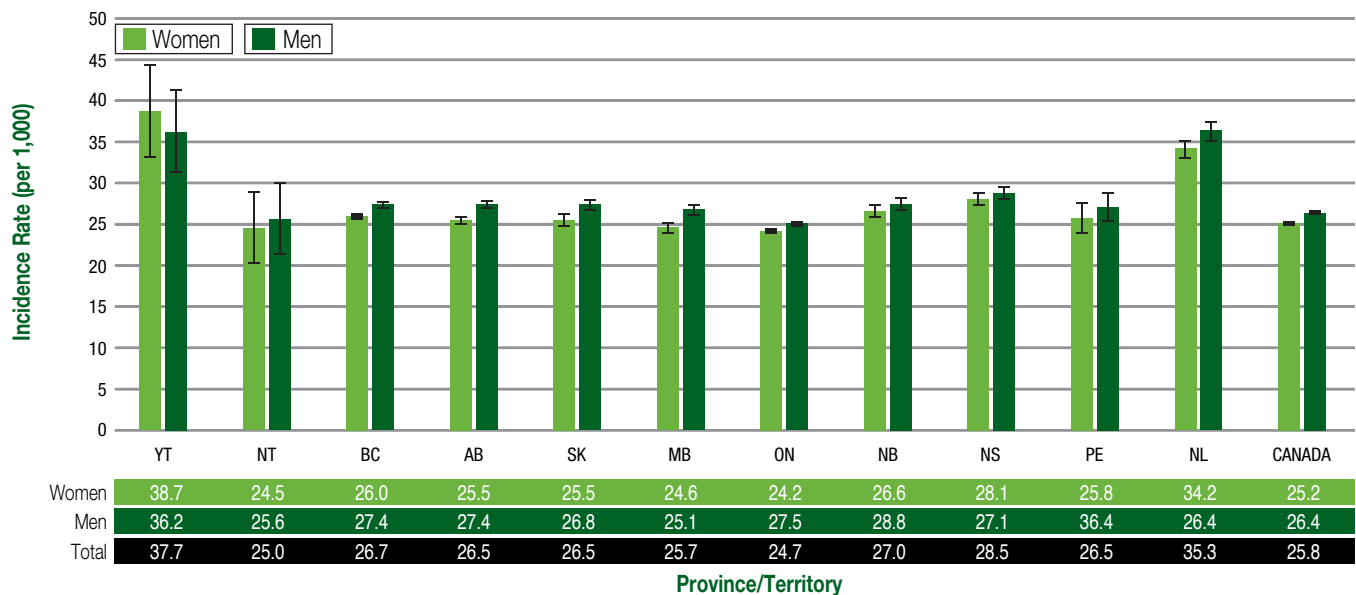
† Data for Nunavut and Québec were unavailable.

Figure 8. Incidence Rates of Diagnosed Hypertension among People Aged 20 Years and Older, by Age Group and Sex, Canada,* 2006/07



Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.
* Data for Nunavut and Québec were unavailable.
† The 95% Confidence Interval shows an estimated range of values which is likely to include the true incidence rate 19 times out of 20.

Figure 9. Age-Standardized Incidence Rates* of Diagnosed Hypertension among People Aged 20 Years and Older, by Sex, Province and Territory, Canada,† 2006/07

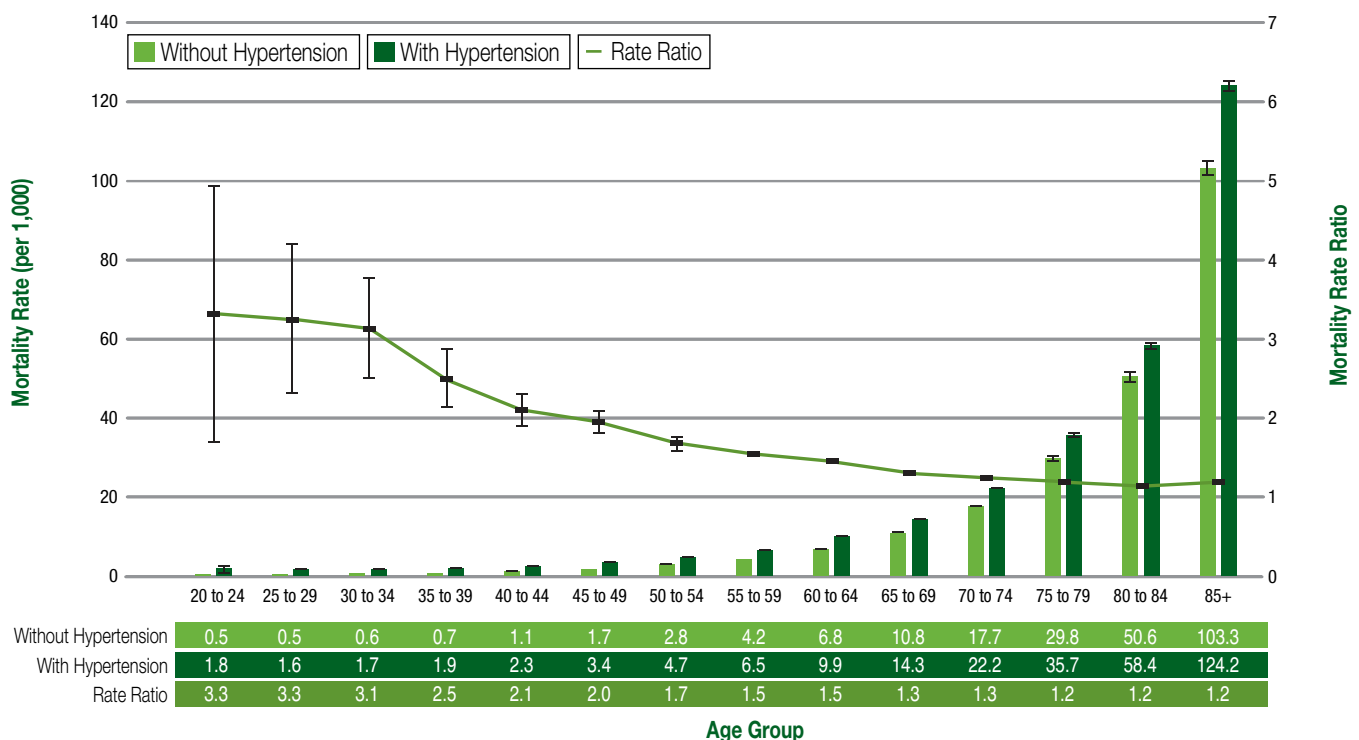


Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.
* Age-standardized to the 1991 Canadian population.
† Data for Nunavut and Québec were unavailable.
† The 95% Confidence Interval shows an estimated range of values which is likely to include the true incidence rate 19 times out of 20.
YT: Yukon, NT: Northwest Territories, BC: British Columbia, AB: Alberta, SK: Saskatchewan, MB: Manitoba, ON: Ontario, NB: New Brunswick, NS: Nova Scotia, PE: Prince Edward Island, NL: Newfoundland and Labrador.

All-Cause Mortality among Adults with Diagnosed Hypertension¹

- In 2006/07 mortality rates were higher for adults with diagnosed hypertension compared to adults without diagnosed hypertension (Figure 10).
- In 2006/07, younger adults aged 20 to 49 with diagnosed hypertension had mortality rates that were 2 to 3 times higher than those without diagnosed hypertension. In contrast, adults aged 50 years and older with diagnosed hypertension had mortality rates 1.2 to 1.7 times higher than adults without diagnosed hypertension (Figure 10). This is in part because in these age groups, other chronic problems develop which increase the risk of dying.
- Overall, all-cause mortality rates have decreased from 1998/99 to 2006/07 for all individuals (Figure 11).
- Between 1998/99 and 2006/07, all-cause mortality rates were higher for men than women and consistently higher for those with diagnosed hypertension when compared to those without (Figure 11). Specifically, in 2006/07, the all-cause mortality rate among women with diagnosed hypertension was 6.7 per 1,000 compared to 5.0 per 1,000 in women without hypertension. Similarly, the rates among men were 10.2 per 1,000 and 7.1 per 1,000.

Figure 10. All-Cause Mortality Rates and Rate Ratios among People Aged 20 Years and Older with Diagnosed Hypertension Compared to those without Diagnosed Hypertension, Canada,* 2006/07

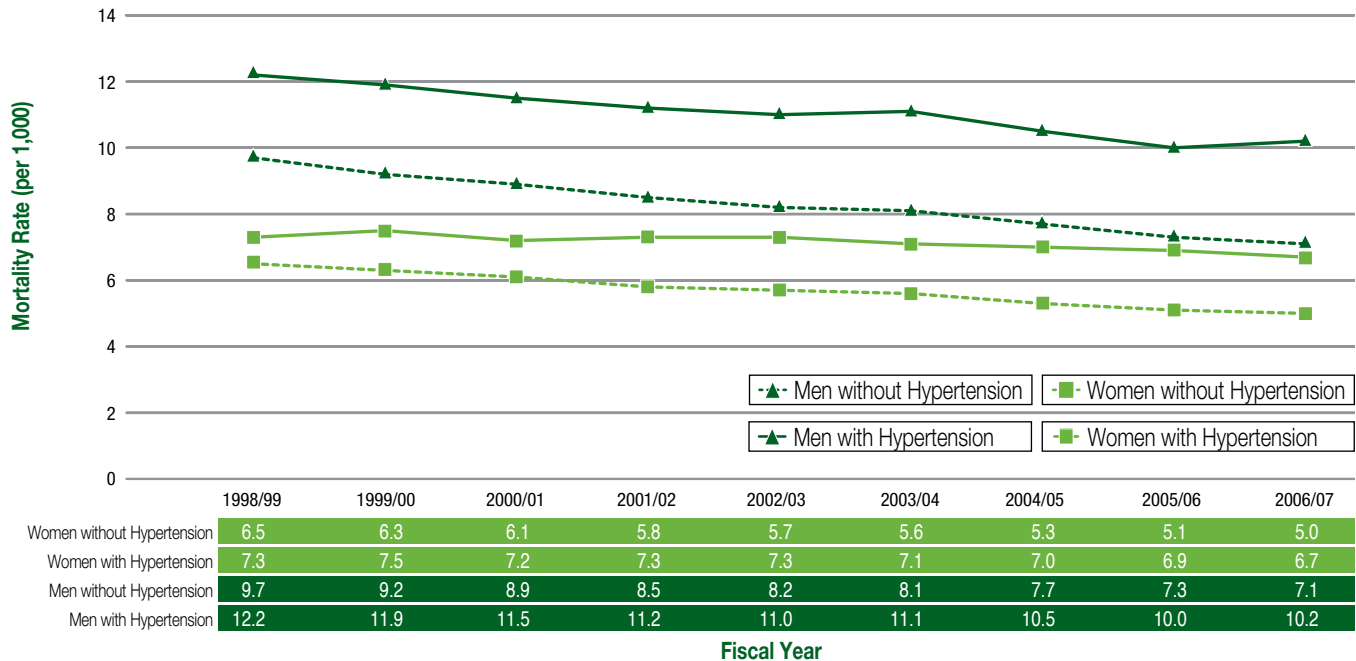


Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.

* Data for Nunavut and Québec were unavailable.

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

Figure 11. Age-Standardized All-Cause Mortality Rates* among People Aged 20 Years and Older with Diagnosed Hypertension Compared to those without Diagnosed Hypertension, by Sex, Canada,† 1998/99-2006/07



Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.

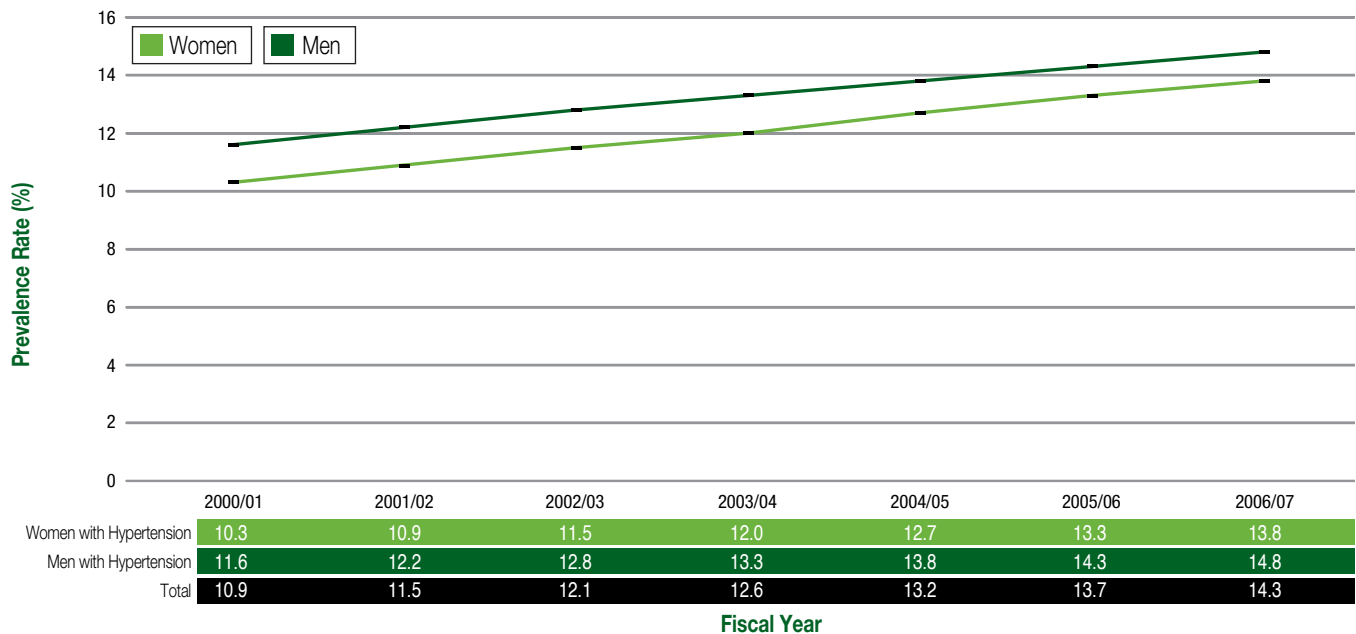
* Age-standardized to the 1991 Canadian population.

† Data for Nunavut and Québec were unavailable.

Adults with Diagnosed Hypertension and Diabetes (Prevalence)¹

- In 2006/07, 5.1% of Canadians (about 1 million) aged 20 years and older were living with both diabetes and hypertension diagnosed by a physician.
- 22.7% of adults with diagnosed hypertension also had diabetes in 2006/07.
- Adults with diagnosed hypertension were diagnosed with diabetes 6 times more often than those without hypertension.
- 62.8% of adults with diagnosed diabetes also had diagnosed hypertension in 2006/07.
- Adults with diagnosed diabetes were diagnosed with hypertension 3 times more often than those without diabetes.
- There was a relative increase of 31.2% in the age-standardized prevalence rates of diagnosed diabetes among adults with diagnosed hypertension from 10.9% in 2000/01 to 14.3% in 2006/07, with a similar increase in both men and women (Figure 12). This is consistent with the increase in the prevalence of diabetes seen in the whole population.

Figure 12. Age-Standardized Prevalence Rates* of Diabetes among People Aged 20 Years and Older with Diagnosed Hypertension, by Sex, Canada,† 2000/01-2006/07



Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.

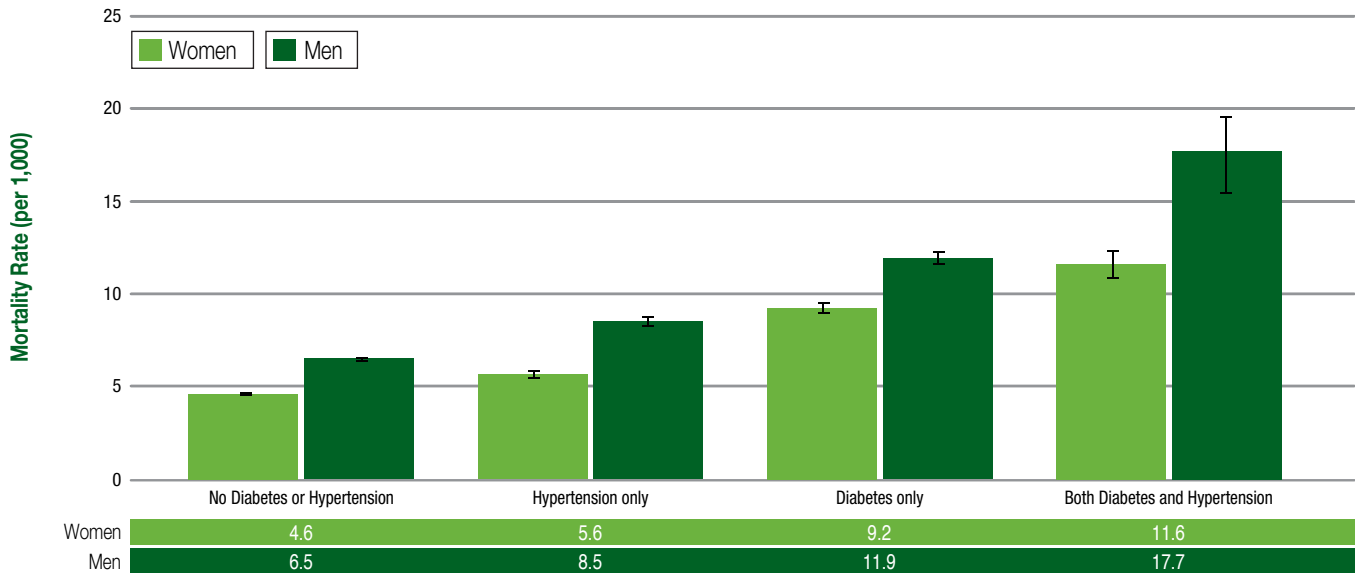
* Age-standardized to the 1991 Canadian population.

† Data for Nunavut and Québec were unavailable.

All-Cause Mortality among Adults with Diagnosed Hypertension and Diabetes in 2006/07¹

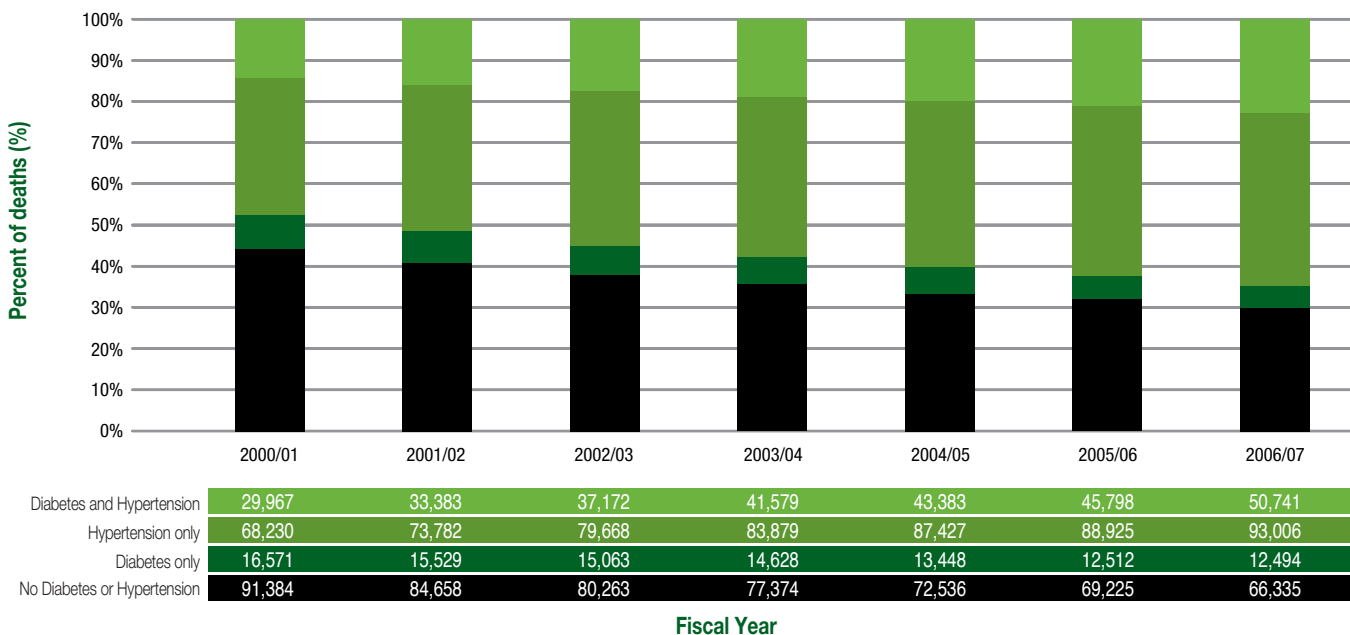
- Age-standardized all-cause mortality rates were about 2 times higher for adults with both diagnosed hypertension and diabetes compared to adults with diagnosed hypertension only (Figure 13).
- Age-standardized all-cause mortality rates were about 1.4 times higher for adults with both diagnosed diabetes and hypertension compared to individuals with diagnosed diabetes only (Figure 13).
- The age-standardized all-cause mortality rate among adults with diagnosed diabetes was higher than among those with diagnosed hypertension (Figure 13).
- The number of adults dying (all causes) with both diagnosed hypertension and diabetes increased from 29,967 or 14.5% in 2000/01 to 50,741 or 22.8% in 2006/07. This reflects the increase in prevalence of both conditions (Figure 14).²

Figure 13. Age-Standardized* All-Cause Mortality Rates among People Aged 20 Years and Older with or without Diabetes and/or Hypertension by Sex, Canada,† 2006/07



Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.
* Age-standardized to the 1991 Canadian population.
† Data for Nunavut and Québec were unavailable.
‡ The 95% Confidence Interval shows an estimated range of values which is likely to include the true mortality rate 19 times out of 20.

Figure 14. Number and Percent of Prevalent Cases of Diabetes and/or Hypertension among People Aged 20 Years and Older Who Died (all causes), Canada,* 2000/01-2006/07



Source: Public Health Agency of Canada, using CCDSS data files contributed by provinces and territories as of September, 2009.
* Data for Nunavut were unavailable. Data for Québec were also unavailable. However, the number of cases for Québec was estimated by applying the Canadian age-specific rates of diagnosed hypertension weighted to the Québec population.

CCDSS Future Plans

The CCDSS provides a valuable source of information about diagnosed hypertension in Canada. Future work will include regular reports on diagnosed hypertension in Canada and continuing work with the provinces and territories to produce CCDSS data on other chronic diseases such as heart disease and stroke. This information will be useful to gain a better understanding of hypertension outcomes among Canadians.

Glossary

Age-Standardized: Rates are adjusted for changes in the age structure of the population over time. Refer to the National Diabetes Surveillance System Methods Documentation²⁵ for more information.

All-Cause Mortality: Mortality rate due to any cause of death.

Confidence Interval: A 95% confidence interval is a range of values around the estimate that has a 95% probability of including the true value. The size of the confidence interval relates to the precision of the estimate.

Crude Rate: Total number of events relative to the population size without any adjustment or standardization.

Diagnosed Hypertension: The CCDSS summarized data about residents of Canada who have used the Canadian health care system. In the CCDSS, to meet the case criteria for hypertension, an insured individual, aged 20 years and older, must have either *one inpatient hospital separation* with an ICD-9 or ICD-9-CM code of 401-405 (hypertension) or equivalent ICD-10-CA code of I10-I13 and I15, selected from all available diagnostic codes in the hospital file, or *two or more physician claims* with a relevant ICD-9 code of 401-405 (hypertension) *within two years*, selected from the *first* diagnosis field available on the claim.

Diagnosed Diabetes: The CCDSS summarized data about residents of Canada who have used the Canadian health care system. In the CCDSS, to meet the case criteria for diabetes, an insured individual, aged one year and older, must have either *one inpatient hospital separation* with an ICD-9 or ICD-9-CM code of 250 (diabetes mellitus) or equivalent ICD-10-CA code of E10 to E14, selected from all diagnostic codes in the hospital file, or *two or more physician claims* with the relevant ICD-9 code of 250 *within two years*, selected from the *first* diagnosis field available on the claim.

False-Negatives: Individuals who have not met the CCDSS case criteria, but who have hypertension. The potential proportion of false negatives was indicated by the CCDSS hypertension validation studies.^{10,11,12,13}

False-Positives: Individuals who have met the CCDSS case criteria, but who do not have hypertension. The potential proportion of false positives was indicated by the CCDSS hypertension validation studies.^{10,11,12,13}

Incidence: The number of individuals newly diagnosed with hypertension during the fiscal year.

Incidence Rate: The proportion of individuals newly diagnosed with hypertension among those at risk during the fiscal year.

Prevalence: The number of individuals that met the case criteria for diagnosed hypertension at a given point in time.

Prevalence Rate: The proportion of individuals that met the case criteria for diagnosed hypertension at a given point in time.

Notes and/or References

1. Data for Nunavut and Québec were unavailable.
2. Data for Nunavut were unavailable. Data for Québec were also unavailable. However, the number of cases for Québec was estimated by applying the Canadian age-specific rates for people with hypertension to the Québec population.
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