

At risk of first or recurring heart disease

Helen Johansen, Mukund Nargundkar, Cyril Nair, Greg Taylor and Susie ElSaadany

Abstract

Objectives

The self-reported prevalence of risk factors for heart disease among Canadians with and without heart disease is estimated. The characteristics associated with these risk factors are examined in order to identify groups to be targeted for primary and secondary prevention.

Data source

The data are from the household component of the 1994/95 National Population Health Survey (NPHS).

Analytical techniques

For the population aged 20 and older with and without heart disease, bivariate and multiple regression analyses were used to determine associations between four risk factors (smoking, high blood pressure, diabetes, and inactivity) and demographic characteristics and socioeconomic status.

Main results

According to the NPHS, 4.4% of people aged 20 and older reported that they had heart disease. However, many more adults had risk factors for this disease. As well, about one-quarter of those without heart disease and half of those with heart disease had two or more risk factors. To some extent, many of these risks are modifiable. The groups particularly at risk were people older than 35, those with less than high school graduation, those in households with inadequate income, people who consumed three or more drinks a day, and residents of the Atlantic provinces, Quebec and Ontario.

Key words

primary prevention, secondary prevention, risk factors, smoking, high blood pressure, diabetes, inactivity

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Relatively few adult Canadians—4.4% of the population aged 20 and older according to the 1994/95 National Population Health Survey (NPHS)—have heart disease. But many more may eventually develop it because they have medical and lifestyle risk factors that have been related to cardiovascular problems. However, some of these risk factors, notably smoking, high blood pressure, diabetes and inactivity, can be modified or controlled.

Although the death rate for heart disease has declined steadily since 1960, the toll is still considerable. Cardiovascular disease is Canada's leading cause of death.¹ In 1995, it was responsible for 36% of male deaths and 39% of female deaths; ischemic heart disease alone accounted for 22% of male deaths and 20% of female deaths. As well, diseases of the circulatory system account for more hospitalizations than any other illness and are a major cause of disability.² Estimates for 1994 of the total annual cost of cardiovascular disease in Canada ranged from \$14.1 billion to \$20.4 billion.³

Methods

Data source

This analysis is based on the household component of the 1994/95 National Population Health Survey (NPHS) for the 10 provinces.⁴ An institutional component of the survey, which covered long-term residents of hospitals and residential care facilities, was excluded from the analysis, as were data for the Yukon and the Northwest Territories.

The NPHS non-institutional sample for the 10 provinces consisted of 27,263 households, of which 88.7% agreed to participate. After the application of a screening rule, 20,725 households remained in scope.

One knowledgeable person in every participating household provided general socio-demographic and health information about each household member. In total, data pertaining to 58,439 individuals were collected.

In addition, one randomly selected person in each of the 20,725 participating households was chosen to provide in-depth information about their own health. In 18,342 of these households, the selected person was aged 12 or older. Their response rate to these in-depth health questions was 96.1%, or 17,626 respondents. In the remaining 2,383 participating households, the randomly selected respondent was younger than age 12. In-depth health information was collected for these individuals as part of the 1994/95 National Longitudinal Survey of Children and Youth.

The analysis in this article is based on the 15,759 respondents to the in-depth health questions who were aged 20 and older and who reported their heart disease status.

NPHS respondents were asked if they had any long-term conditions that had been diagnosed by a health professional. A list of conditions, which included heart disease, was read to them (see *Definitions*). Among respondents aged 20 and older, 866 reported having been diagnosed with heart disease; 14,893 had not.

Analytical techniques

Weighted estimates of the prevalence of major risk factors for heart disease were calculated by age, sex, and self-reported heart disease. Weighted logistic regressions were used to characterize populations with risk factors. The sample weights were adjusted so that they average to 1. A *p* value of <.01 was selected to take design effects into account. This approach permits a less biased estimate of the standard errors. Independent variables were chosen on the basis of their usefulness in describing the population and aiding in the development of health promotion programs. Because of small

sample sizes, the variable describing three or more alcoholic drinks per day was not included in the models for those with heart disease. Respondents with information missing for one or more variables were omitted from the multivariate analysis.

Limitations

Because this analysis is cross-sectional, it cannot identify factors that increase the risk of heart disease. The aim is to describe the prevalence of risk factors that have been identified in other studies among people with self-reported heart disease and among those without it.

Data from the NPHS on the presence of heart disease and other conditions are subject to the problems inherent in self-reported information. Specifically, there was no independent source to verify whether people who reported having been diagnosed with heart disease, diabetes, or high blood pressure actually did have those conditions. Moreover, heart disease is a broad term, covered by ICD codes 390 to 398, 402, 404, and 410 to 429.⁵ Cardiovascular diseases cover an even wider range: 390 to 459. Thus, respondents' heart problems could range from less serious ones such as acute pericarditis (420) to something much more serious such as acute myocardial infarction (410). In addition, some respondents may have been misclassified because they misunderstood what was meant or did not remember receiving the diagnosis.

The NPHS data used in this analysis were collected from people residing in households. Although a relatively small percentage of the population lives in institutions,⁶ their characteristics may differ from those of household residents in ways that would affect the outcomes if the former were included in the analysis. In particular, the prevalence of heart disease and diabetes may be underestimated, as they are more common among institutional residents.⁶ And even for the household population, those who participated in the survey may have been healthier and more likely than non-respondents to engage in health-promoting behaviour.

NPHS variables were not designed to address heart disease risk factors. Cholesterol and blood pressure levels were not measured, and height and weight were self-reported. However, NPHS body mass index results are close to actual measurements taken in the Canadian Heart Health Surveys (1986 to 1992).⁷ Estimates of the prevalence of smoking in the Heart Health Surveys were also similar to NPHS results.⁸ On the other hand, high blood pressure prevalence estimates from the Heart Health Surveys exceeded those derived from the NPHS, probably because they were based on actual measurements rather than on self-reported values and treatment information. As well, the Heart Health Surveys estimated a slightly higher prevalence of diabetes.⁸

This article uses the 1994/95 NPHS to estimate the prevalence of risk factors among the population with and without heart disease (see *Methods* and *Definitions*).

Given the cost of heart disease in both personal and financial terms and the potential for an increase in the number of patients due to the aging of the population, both primary prevention and secondary prevention are of major public health importance. Secondary prevention, which focuses on slowing the progression of established heart disease, is particularly crucial, because people with heart disease are at high risk of having another attack.

Almost a million

In 1994/95, 4.4% of the household population aged 20 and older—an estimated 896,000 people—were reported to have heart disease that had been diagnosed by a health professional. Overall, men were more likely than women to have heart disease (4.7% versus 4.0%).

Heart disease is an affliction of the elderly. People aged 65 and older accounted for six out of ten cases reported to the NPHS. In this age range, 18.6% of men and 15.2% of women reported that they had heart disease.

While fewer than a million Canadians had been diagnosed with heart disease, many more had factors that increase their risk of it: smoking, high blood pressure, diabetes, and an inactive lifestyle. And among those with established heart disease, a large number also reported having these risk factors, which, without modification or treatment, put them in danger of further cardiac problems.^{9,10}

Smoking

Smoking has repeatedly been shown to be a risk factor for heart disease, with higher smoking levels associated with greater rates of disease.¹¹⁻¹⁵ Some of the excess risk of coronary heart disease is eliminated within two to three years of smoking cessation; within 10 to 14 years, the excess risk returns to the level of those who never smoked.¹⁶⁻¹⁹ For people who have heart disease, smoking cessation reduces the risk of future cardiac events.²⁰⁻²²

Definitions

Respondents were considered to have *heart disease*, *diabetes*, or *high blood pressure* if they or their proxy reported that they had any of these conditions “diagnosed by a health professional.” The group with high blood pressure also included people who reported taking medication for that condition within the last month.

Respondents were defined as *smokers* if they currently smoked cigarettes daily. One pack of cigarettes is considered to be 25 cigarettes.

To calculate whether the weight of respondents aged 20 to 64 (excluding pregnant women) was suitable for their height, their weight in kilograms was divided by the square of their height in metres to yield their *body mass index (BMI)*. A value greater than 27 indicates that the respondent was overweight. This corresponds, for example, to 138 lbs. or more for someone 5 feet tall (63 kg, 1.5 metres); 167 lbs. or more at 5.5 ft. (76 kg, 1.7 metres); and 199 lbs. or more at 6 feet (90 kg, 1.8 metres).

To derive respondents' level of *physical activity*, their energy expenditure (EE) was estimated for each activity they engaged in during their leisure time. EE was calculated by multiplying the number of times respondents reported an activity over a 12-month period by the average duration in hours and by the energy cost of the activity (expressed in kilocalories expended per kilogram of body weight per hour of activity). To calculate an average daily EE for the activity, the estimate was divided by 365. This calculation was repeated for all leisure time activities reported, and the resulting estimates were summed to provide an aggregate average daily EE. Respondents with an estimated EE below 1.5 were considered physically inactive. This would represent, for example, half an hour a day or less of walking or gardening at low intensity. As an indicator of total activity, this measure is somewhat limited, since it does not account for workplace activity.

Income adequacy was calculated by taking into account household income and the number of people in the household. *Low income* was defined as an annual income of less than \$30,000 for five or more persons, less than \$20,000 for three or four persons, and less than \$15,000 for one or two persons.

Low education was defined as having less than high school graduation.

Respondents “not working for pay or profit” or not “working/caring for family for pay or profit” were considered to be *unemployed*.

Respondents in one-person households were considered to be *living alone*.

Table 1
Prevalence of selected risk factors, population aged 20 and older, by presence of self-reported heart disease[†], sex and age group, provinces, 1994/95

	Total				Men				Women			
	Total 20+	20-34	35-64	65+	Total 20+	20-34	35-64	65+	Total 20+	20-34	35-64	65+
	'000											
Estimated number[†]												
Without heart disease	19,653	6,445	10,502	2,705	9,534	3,163	5,234	1,137	10,119	3,282	5,268	1,568
With heart disease	896	--	315	541	469	--	202	260	427	--	114	280
	%											
Smoking												
Current smoker												
Without heart disease	31	37	31	15	34	38	35	17	29	37	28	14
With heart disease	23	--	36	11	26	--	36	15	19	--	35	--
% of smokers who smoke 1+ pack/day												
Without heart disease	35	25	42	24	41	31	49	31	27	20	34	18
With heart disease	42	--	47	--	48	--	52	--	33	--	--	--
Blood pressure[§]												
High blood pressure												
Without heart disease	10	1	10	31	8	1	9	25	12	1	11	35
With heart disease	48	--	45	52	44	--	42	47	52	--	50	58
Measured in past year												
Without heart disease	70	64	70	86	62	50	64	86	77	76	75	86
With heart disease	96	--	94	98	95	--	92	98	98	--	97	98
% with high blood pressure not taking medication												
Without heart disease	23	63	29	12	29	--	35	15	20	68	24	10
With heart disease	22	--	23	22	24	--	19	28	21	--	29	17
With diagnosed diabetes												
Without heart disease	3	1	3	10	3	--	3	11	3	--	3	9
With heart disease	15	--	12	17	16	--	--	19	13	--	--	16
Inactive leisure time												
Without heart disease	61	58	62	63	58	54	61	58	64	63	64	67
With heart disease	70	--	62	75	60	--	58	61	81	--	69	86
2+ risk factors^{††}												
Without heart disease	27	23	28	35	27	22	29	32	27	24	27	36
With heart disease	51	--	49	52	46	--	47	45	55	--	53	58

Data source: 1994/95 National Population Health Survey

[†] Diagnosed by a health professional

[‡] Because of rounding, detail may not add to totals.

[§] Diagnosed or taking blood pressure medication

^{††} Smoking, high blood pressure, diabetes, inactivity

-- Number of respondents is too small to provide a reliable estimate.

According to the 1994/95 NPHS, close to a third (31%) of people aged 20 and older without heart disease were daily cigarette smokers (Table 1). Overall, a slightly higher percentage of men than women smoked, but at age 34 and younger, women were as likely as men to be smokers.

Even among people who had been diagnosed with heart disease, a substantial share—23%—were daily smokers. And of these smokers, 42% smoked more than a pack a day, a larger percentage than was the case for smokers without heart disease.

At ages 35 to 64, over a third of men and women with diagnosed heart disease reported that they smoked. About half of the men in this category smoked more than a pack a day. Such heavy cigarette consumption despite the presence of cardiovascular problems suggests considerable nicotine dependency.²³

High blood pressure

High blood pressure is a risk factor for heart disease and also increases the risk of death from kidney failure and stroke. Yet blood pressure is modifiable, not only by drugs, but also by non-pharmacologic practices such as the control of obesity, sodium intake, and alcohol consumption.^{24,25}

About 10% of Canadians without heart disease had high blood pressure. That is, they reported to the NPHS that a health professional had diagnosed them as having it, or that they had taken blood pressure medication within the past month. Not surprisingly, high blood pressure was much more common among people who had heart disease, with 48% reporting it. For both groups, the prevalence of high blood pressure rose with age.

As have other surveys,²⁶⁻²⁸ the NPHS found men with high blood pressure to be less likely than women to be under treatment for it. In fact, about one in five adults who reported having both heart disease and high blood pressure were not taking blood pressure medication. Moreover, men and women aged 65 and older with heart disease and high blood pressure were less likely than their contemporaries who had high blood pressure but not heart disease to be using medication. There may be several explanations for this. They could have

been taking heart disease medications that also affect blood pressure, and so were unaware that they were taking blood pressure medication. They could have been using non-pharmacologic methods of treatment. And of course, they truly may not have been under treatment for high blood pressure.

Diabetes

Diabetes is strongly associated with heart disease^{29,30} and contributes to premature mortality, usually through heart attack and stroke.³¹⁻³⁴ Diabetes also eliminates women's relative protection from ischemic heart disease: women with diabetes have ischemic heart disease rates similar to those of non-diabetic men.³⁵

Multiple risk factor intervention is particularly important for people with diabetes, who are more likely than non-diabetics to have elevated lipid levels, high blood pressure, and obesity.³⁶⁻³⁹

In 1994/95, just 3% of the population aged 20 and older without heart disease reported that they had diabetes. The disease was much more common among those with heart disease: 16% of men and 13% of women. The prevalence of diabetes rose with age among both sexes.

However, it is estimated that only about half the cases of adult onset diabetes, which usually occurs in people who are older than 45 and overweight, are clinically recognized^{38,39} and that surveys may underestimate the prevalence of the disease by 50%.⁴⁰ In addition, new diagnostic standards have lowered the cut-off on the plasma glucose test from 7.7 mmol/L (140 mg/dl) to 6.9 mmol/L (126 mg/dl). At the higher cut-off, about 20% of those diagnosed with diabetes already had complications. It is now recommended that all adults undergo a blood test for diabetes by age 45 and have additional tests every three years thereafter.⁴¹

Inactive leisure time

Participation in vigorous physical activity for at least 30 minutes a day has been recommended for cardiorespiratory fitness.⁴²⁻⁴⁵ And for patients who have heart disease, physical rehabilitation enables them to recuperate more quickly and provides better conditions for their reintegration into professional, social, and family life.^{46,47}

Yet despite the proven benefits of exercise, the majority of Canadians, with and without heart disease, do not engage in active leisure pursuits. In 1994/95, 61% of adults who did not have heart disease, and 70% of those who did, reported leisure time that would be classified as “inactive.” Higher proportions of women than men were inactive.

Physical activity is related to body weight, which is associated with other heart disease risks such as high blood pressure and diabetes. Weight control is, therefore, an important way of reducing these risks.

In 1994/95, a substantial share of people aged 20 to 64 without heart disease—35% of men and 26% of women—were overweight. Among those

with heart disease, the corresponding proportions were considerably higher: 56% and 42%.

Multiple risks

Cardiovascular disease is a multi-factorial disease, with the risk increasing exponentially with the number of risk factors present.^{14,48-52} Even moderate elevations in more than one factor increase the risk.⁵³ Thus, people with two or more risk factors are a prime target for health promotion.

Over a quarter (27%) of Canadians who did not have heart disease, and half (51%) of those who did, reported at least two of the four risk factors. In both groups, the percentage with multiple risk factors rose with age.

Table 2
Odds ratios relating selected characteristics to risk factors for heart disease, population aged 20 and older without self-reported heart disease, provinces, 1994/95

	Smoking		High blood pressure		Diabetes		Inactive leisure time		Two or more risk factors	
	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval
Sex										
Men	1.2*	1.1, 1.4	.8*	.7, .9	1.2	.9, 1.6	.7*	.7, .8	1.0	.9, 1.1
Women†	1.0	...	1.0	...	1.0	...	1.0	...	1.0	...
Age group										
20-34†	1.0	...	1.0	...	1.0	...	1.0	...	1.0	...
35-64	.7*	.7, .8	7.6*	5.5, 10.7	4.3*	2.6, 7.2	1.2	1.0, 1.3	1.2*	1.1, 1.4
65+	.2*	.2, .3	20.1*	14.0, 28.9	11.6*	6.7, 20.2	1.4*	1.2, 1.7	1.4*	1.2, 1.7
Socioeconomic characteristics‡										
Low education	1.7*	1.5, 1.9	1.2	1.0, 1.4	1.3	1.0, 1.8	1.4*	1.3, 1.6	1.8*	1.6, 2.0
Low income	1.6*	1.4, 1.8	1.0	.8, 1.2	1.5*	1.1, 2.0	1.3*	1.1, 1.5	1.4*	1.2, 1.6
Unemployed	1.0	.9, 1.1	1.7*	1.4, 2.1	2.0*	1.4, 2.8	.6*	.6, .7	.9	.8, 1.0
Live alone	1.3*	1.1, 1.5	1.4*	1.2, 1.8	.8	.6, 1.2	.8	.7, 1.0	1.2	1.0, 1.4
Alcohol consumption‡										
3+ drinks/day	2.8*	2.0, 4.0	1.5	.8, 2.6	.6	.2, 2.2	1.2	.9, 1.7	2.4*	1.8, 3.4
Province										
Atlantic	1.4*	1.1, 1.7	1.7*	1.2, 2.4	1.4	.8, 2.6	1.9*	1.5, 2.3	2.0*	1.6, 2.5
Quebec	1.4*	1.2, 1.7	1.2	.9, 1.5	1.4	.9, 2.4	1.9*	1.6, 2.2	1.8*	1.5, 2.2
Ontario	1.1	1.0, 1.3	1.2	.9, 1.6	1.5	.9, 2.4	1.6*	1.4, 1.8	1.4*	1.2, 1.7
Prairies	1.1	.9, 1.3	1.2	.9, 1.6	1.6	.9, 2.7	1.2	1.0, 1.4	1.3	1.0, 1.5
British Columbia†	1.0	...	1.0	...	1.0	...	1.0	...	1.0	...

Data source: 1994/95 National Population Health Survey

Note: The analyses for smoking, high blood pressure and diabetes were based on 14,278 respondents; for inactive leisure time and two or more risk factors, 13,735 respondents.

† Reference category for which odds ratio is always 1.00

‡ The reference category is the absence of the characteristic. For example, the reference category for “low income” is “not low income.”

... Figures not applicable

* p < 0.01

For people without heart disease, there was little difference in the percentages of men and women who had multiple risk factors. By contrast, among those with heart disease, a higher percentage of women than men had multiple risks, principally because of the large percentages of women who were inactive and who were aware of having high blood pressure.

Who is at risk of developing heart disease?

Identification of the characteristics of people without heart disease, but with elevated risk factors, can help health promotion efforts target their messages to the groups that would benefit most.

A multivariate regression analysis showed that advancing age increased the odds that people without heart disease would report most of the risk factors (Table 2). The exception was smoking, as younger people were more likely than older people to smoke.

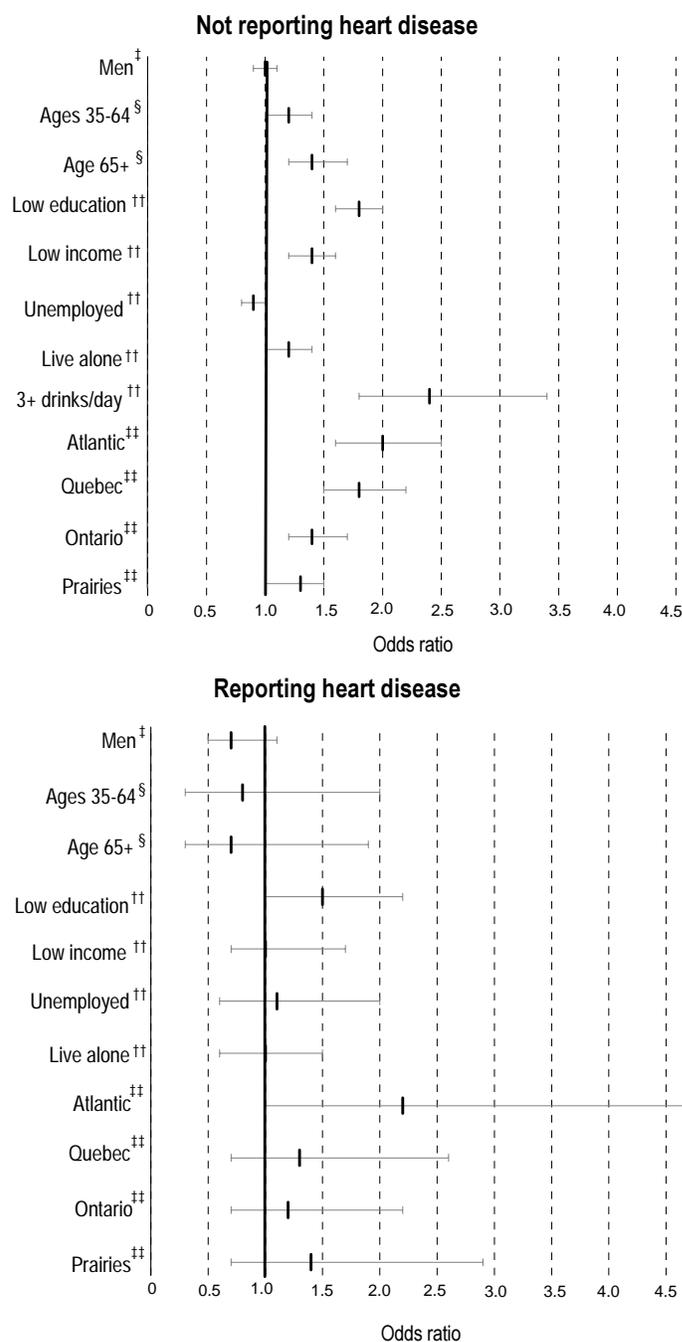
Differences between men and women in their odds of having risk factors were generally not great, although men had significantly higher odds of being smokers and lower odds of being inactive during their leisure time.

Risk factors among people without heart disease tended to be associated with low socioeconomic status. Residents of low-income households, compared with those in other households, had significantly high odds of having three of the four risk factors, and as a result, multiple risk factors (Chart 1). The exception was high blood pressure, which was not significantly related to income.

Income and education are generally correlated, so it is reasonable that people with a low level of education also had elevated odds of smoking, having inactive leisure, and having multiple risk factors.

Being unemployed was significantly and positively associated with high blood pressure and diabetes, perhaps because these conditions can interfere with employment. By contrast, unemployment was negatively associated with inactive leisure.

Chart 1
99% confidence intervals for odds ratios of having two or more risk factors,[†] population aged 20 and older, by self-reported heart disease, provinces, 1994/95



Source: 1994/95 National Population Health Survey
 Note: Because of small sample sizes, the variable describing three or more alcoholic drinks per day was not included in the models for those with heart disease.
[†] Smoking, high blood pressure, diabetes, inactivity
[‡] Reference category is women.
[§] Reference category is ages 20-34.
^{††} Reference category is absence of characteristic.
^{‡‡} Reference category is British Columbia.

People who lived alone had high odds of smoking and having high blood pressure.

High alcohol consumption—three or more drinks a day—was significantly associated with smoking. This level of drinking was also related to increased odds of having multiple risk factors.

After adjusting for other characteristics such as age, education and income, the odds of having most risk factors tended to be high in the Atlantic Provinces, compared with British Columbia. Quebec residents had significantly high odds of smoking, having inactive leisure, and having multiple risks factors. Ontario residents had significantly high odds of inactivity and having multiple risk factors.

Secondary prevention

When other variables were controlled, relatively few characteristics were significantly associated with risk

factors among people already diagnosed with heart disease. While this is due primarily to a smaller sample size, it could also reflect changes that occurred because of having heart disease (for example, quitting smoking and drinking) and participation in rehabilitation programs.

High blood pressure was the only risk factor significantly and positively associated with advancing age among people with heart disease: the odds were at least ten times greater at ages 35 to 64 and at 65 and older than at 20 to 34 (Table 3). However, because of the small number of respondents, the confidence intervals for these odds ratio are very wide. As well, older people had significantly lower odds of smoking than did younger people.

Compared with women, men with heart disease had significantly low odds of having inactive leisure pursuits. However, the odds of having other risk factors did not differ significantly by sex.

Table 3
Odds ratios relating selected characteristics to risk factors for heart disease, population aged 20 and older with self-reported heart disease, provinces, 1994/95

	Smoking		High blood pressure		Diabetes		Inactive leisure time		Two or more risk factors	
	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval
Sex										
Men	1.6	1.0, 2.7	.7	.4, 1.0	1.3	.7, 2.2	.4*	.3, .7	.7	.5, 1.1
Women†	1.0	...	1.0	...	1.0	...	1.0	...	1.0	...
Age group										
20-34†	1.0	...	1.0	...	1.0	...	1.0	...	1.0	...
35-64	.2*	.1, .5	11.4*	2.2, 59.3	2.8	.3, 24.5	.6	.2, 1.9	.8	.3, 2.0
65+	.0*	.0, .1	12.8*	2.5, 66.2	3.2	.4, 27.9	1.2	.4, 3.6	.7	.3, 1.9
Socioeconomic characteristics††										
Low education	1.6	1.0, 2.6	.9	.6, 1.4	1.5	.8, 2.5	1.4	.9, 2.2	1.5	1.0, 2.2
Low income	1.2	.7, 2.1	1.1	.7, 1.8	.9	.5, 1.8	1.1	.7, 2.0	1.0	.7, 1.7
Unemployed	1.0	.6, 2.0	1.8	1.0, 3.2	1.6	.6, 3.8	.6	.3, 1.2	1.1	.6, 2.0
Live alone	1.1	.6, 2.1	.7	.4, 1.1	1.0	.5, 2.1	1.2	.7, 2.2	1.0	.6, 1.5
Province										
Atlantic	1.1	.4, 3.1	1.5	.7, 3.4	.7	.2, 2.0	2.9*	1.1, 7.4	2.2	1.0, 5.1
Quebec	1.2	.5, 2.7	1.0	.5, 2.0	.7	.3, 1.6	2.6*	1.2, 5.5	1.3	.7, 2.6
Ontario	1.0	.5, 2.2	1.2	.7, 2.2	.6	.3, 1.3	1.9	1.0, 3.6	1.2	.7, 2.2
Prairies	1.1	.5, 2.7	1.5	.7, 3.0	.6	.2, 1.5	1.3	.6, 2.7	1.4	.7, 2.9
British Columbia†	1.0	...	1.0	...	1.0	...	1.0	...	1.0	...

Data source: 1994/95 National Population Health Survey

Note: The analyses for smoking, high blood pressure, and diabetes were based on 826 respondents; for inactive leisure time and two or more risk factors, 784 respondents. Because of small sample sizes, the variable describing three or more alcoholic drinks per day was not included in the models for those with heart disease.

† Reference category for which odds ratio is always 1.00

†† The reference category is the absence of the characteristic. For example, the reference category for "low income" is "not low income."

... Figures not applicable

* p < 0.01

The association between risk factors and socioeconomic status was not great among people with heart disease. Low education, low income, and living alone were not significantly associated with any risk factor.

Province of residence was related only to inactive leisure, with the odds rising from west to east.

Implications

A healthy lifestyle can lower the risk of developing heart disease or slow the progression of established heart disease. But according to the National Population Health Survey, many Canadians are not taking adequate measures to protect themselves. Most are inactive during their leisure time, and substantial proportions are daily smokers. In addition, there is some doubt that high blood pressure and diabetes are being detected and adequately treated.

The prevalence of risk factors among the population not diagnosed with heart disease suggests that a large number of people may face such problems in the future. And among people with heart disease, risk factors such as smoking and inactive leisure could lead to further problems.

The prevalence of risk factors also implies some lack of knowledge about their potential consequences. For example, only about half of Canadians are aware that smoking is a risk factor for heart disease.⁸

Moreover, as noted earlier, surveys such as the NPHS may underestimate the population with diabetes by as much as 50%. Because there are usually no overt symptoms, blood pressure may rise for many years without the individual being aware of it.

But the fact that these risk factors are controllable is cause for some optimism. Health promotion efforts may be able to influence individuals to modify their behaviour, and thereby, reduce their risk of premature disability and death. The profile of those with significantly elevated risk factors for heart disease, notably multiple risks, might be taken into account in the design and development of intervention programs. The people with multiple risks tend to be older, have less education and low

income, and live in the Atlantic Provinces, Quebec or Ontario.

Special programs may be needed to reach the elderly who constitute the majority of people with heart disease. The NPHS showed that among people aged 65 and older with heart disease, 11% smoked, 17% reported diabetes, 52% reported high blood pressure, and 75% had inactive leisure pursuits. However, relatively little is known about the effectiveness of risk modification for the secondary prevention of heart disease among older people,⁵⁴ and evidence indicates that they tend to enroll in rehabilitation programs at substantially lower rates than do younger patients.⁵⁵

There is a potential to reduce the risk of heart disease or prevent further cardiovascular problems through regular exercise, keeping blood pressure in the normal range, not smoking, avoiding weight gain, and for those who have diabetes or a tendency toward it, careful monitoring. However, this can only occur if the people most at risk receive the messages and act upon them.

References

- 1 Statistics Canada. *Leading causes of death, 1995* (Catalogue 84-503-XPB) Ottawa: Minister of Industry, 1997.
- 2 Heart and Stroke Foundation of Canada. *Heart Disease and Stroke in Canada*. Ottawa: Heart and Stroke Foundation of Canada, 1995.
- 3 Chan B, Coyte P, Heick D. Economic impact of cardiovascular disease in Canada. *Canadian Journal of Cardiology* 1996; 12(10): 1000-6.
- 4 Tambay J-L, Catlin G. Sample design of the National Population Health Survey. *Health Reports* (Statistics Canada, Catalogue 82-003) 1995; 7(1): 29-38.
- 5 World Health Organization. *Manual of the International Statistical Classification of Disease, Injuries and Death*. Based on the recommendations of the Ninth Revision Conference, 1975. Geneva: World Health Organization, 1977.
- 6 Tully P, Mohl C. Older residents of health care institutions. *Health Reports* (Statistics Canada, Catalogue 82-003) 1995; 7(3): 27-30.
- 7 Macdonald SM, Reeder BA, Chen Y et al. Obesity in Canada: A descriptive analysis. *Canadian Medical Association Journal* 1997; 157(1 suppl): S3-S9.
- 8 Health Canada. *Canadians and Heart Health: Reducing the Risk* (Catalogue H39-328/1995E) Ottawa: Health Canada, 1995.

- 9 Fallen EL, Cairns J, Dafoe W, et al. Management of the postmyocardial infarction patient: A consensus report—Revision of 1991 CCS guidelines. *Canadian Journal of Cardiology* 1995; 11(6): 477-86.
- 10 Smith SC. The challenge of risk reduction therapy for cardiovascular disease. *American Family Physician* 1997; 55(2): 491-500.
- 11 Doll R, Petro D. Mortality in relationship to smoking: Twenty years of observations of male British doctors. *British Medical Journal* 1976; 2(6051): 1525-36.
- 12 Schroll M. Smoking habits in the Glostrup population of men and women born in 1914. Implications for health evaluated from ten-year mortality, incidence of cardiovascular manifestations and pulmonary function, 1964-1974. *Acta Medica Scandinavica* 1980; 208(4): 245-56.
- 13 LaCroix AZ, Lang J, Scherr P, et al. Smoking and mortality among older men and women in three communities. *New England Journal of Medicine* 1991; 324(23): 1619-25.
- 14 The Pooling Project Research Group. Relationship of blood pressure, serum cholesterol, smoking habit, relative weight and ECG abnormalities to the incidence of major coronary events: Final report of the Pooling Project. *Journal of Chronic Disease* 1978; 31(4): 201-306.
- 15 Kannel WB. Update on the role of cigarette smoking in coronary artery disease. *American Heart Journal* 1981; 101(3): 319-28.
- 16 Ben-Shlomo Y, Smith GD, Shipley MJ, et al. What determines mortality risk in male former cigarette smokers? *American Journal of Public Health* 1994; 84(8): 1235-42.
- 17 Negri E, La Vecchia C, D'Avanzo B, et al. Acute myocardial infarction: association with time since stopping smoking in Italy. *Journal of Epidemiology and Community Health* 1994; 48(2): 129-33.
- 18 Kawachi I, Colditz GA, Stampfer MJ, et al. Smoking cessation and time course of decreased risks of coronary heart disease in middle-aged women. *Archives of Internal Medicine* 1994; 154(2): 169-75.
- 19 Kawachi I, Colditz GA, Stampfer MJ, et al. Smoking cessation in relation to total mortality rates in women. A prospective cohort study. *Annals of Internal Medicine* 1993; 119(10): 992-1000.
- 20 Sato I, Nishida M, Okita K, et al. Beneficial effect of stopping smoking on future cardiac events in male smokers with previous myocardial infarction. *Japanese Circulation Journal* 1992; 56(3): 217-22.
- 21 Peters RW, Brooks MM, Todd L, et al. Smoking cessation and arrhythmic death: The CAST experience. The Cardiac Arrhythmia Suppression Trial (CAST) Investigators. *Journal of the American College of Cardiology* 1995; 26(5): 1287-92.
- 22 Omenn GS, Anderson KW, Kronmal RA, et al. The temporal pattern of reduction of mortality risk after smoking cessation. *American Journal of Preventive Medicine* 1990; 6(5): 251-7.
- 23 Stephens M, Siroonian J. Smoking prevalence, quit attempts and successes. *Health Reports* (Statistics Canada, Catalogue 82-003-XPB) 1998; 9(4): 31-7.
- 24 Johansen, HL. Hypertension in Canada: Risk factor review and recommendations for further work. *Canadian Journal of Public Health* 1983; 74(2): 123-31.
- 25 Chockalingam A, Abbott D, Bass M, et al. Recommendations of the Canadian Consensus Conference on Non-Pharmacological Approaches to the Management of High Blood Pressure. *Canadian Medical Association Journal* 1990; 142(12): 1397-409. [Published erratum appears in *Canadian Medical Association Journal*. 1990; 143(3): 177.]
- 26 Health Canada. *Canadian Blood Pressure Survey* (Catalogue H39-143/1989E) Ottawa: Minister of Supply and Services, 1989.
- 27 Plasencia A, Ostfeld AM, Gruber SB. Effects of sex differences in awareness, treatment, and control of high blood pressure. *American Journal of Preventive Medicine* 1988; 4(6): 315-26.
- 28 Joffres MR, Hamet P, Rabkin SW, et al. Prevalence, control and awareness of high blood pressure among Canadian adults. *Canadian Medical Association Journal* 1992; 146(11): 1997-2005.
- 29 Wilkins K, Wysocki M, Morin C, et al. Multiple causes of death. *Health Reports* (Statistics Canada, Catalogue 82-003-XPB) 1997; 9(2): 19-29.
- 30 James R, Young TK, Mustard CA, et al. The health of Canadians with diabetes. *Health Reports* (Statistics Canada, Catalogue 82-003-XPB); 9(3): 47-52.
- 31 Semenciw RM, Morrison HI, Mao Y, et al. Major risk factors for cardiovascular mortality in adults: Results from the Nutrition Canada Survey cohort. *International Journal of Epidemiology* 1988; 17(2): 317-24.
- 32 Barceló A. Monograph series on aging-related diseases. VIII: Non-insulin-dependent diabetes mellitus (NIDDM). *Chronic Diseases in Canada* 1996; 17(1): 1-20.
- 33 Knuiman MW, Welborn TA, Whittall DE. An analysis of excess mortality rates for persons with non-insulin-dependent diabetes in Western Australia using the Cox proportional hazards regression model. *American Journal of Epidemiology* 1992; 135(6): 638-48.
- 34 Schneiler H, Lischinski M, Jutzi E. Survival time after onset of diabetes: 29-year follow-up mortality study in a diabetes cohort from a rural district. *Diabetes Metabolism* 1993; 19(1 Pt 2): 638-48.
- 35 Barrett-Connor E, Wingard DL. Sex differential in ischemic heart disease mortality in diabetics: a prospective population-based study. *American Journal of Epidemiology* 1983; 118(4): 489-96.
- 36 Garcia MJ, McNamara PM, Gordon T, et al. Morbidity and mortality in diabetics in the Framingham population. Sixteen-year follow-up study. *Diabetes* 1974; 23(2): 105-11.
- 37 Stamler J, Vaccaro O, Neaton JD, et al. Diabetes, other risk factors, and 12-year cardiovascular mortality for men screened in the Multiple Risk Factor Intervention Trial. *Diabetes Care* 1993; 16(3): 434-44.
- 38 Orchard TJ, LaPorte RE, Dorman JS. Diabetes. In: Last JM, Wallace RB (editors). *Public Health and Preventive Medicine*. 13th edition. Norwalk, Connecticut: Appleton and Lange, 1992.
- 39 Harris MI, Hadden WC, Knowler WC, et al. Prevalence of diabetes and impaired glucose tolerance and plasma glucose levels in U.S. population aged 20-74 years. *Diabetes* 1987; 36(4): 523-34.
- 40 King H, Zimmet P. Trends in the prevalence and incidence of diabetes: Non-insulin-dependent diabetes mellitus. *World Health Statistical Quarterly* 1988; 41(3-4): 190-6.

- 41 The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care* 1997; 20(7): 1183-97.
- 42 Physical activity and cardiovascular health. NIH Consensus Development Panel on Physical Activity and Cardiovascular Health. *Journal of the American Medical Association* 1996; 276(3): 241-6.
- 43 Blair SN, Kohl HW, Gordon NF, et al. How much physical activity is good for health? *Annual Review of Public Health* 1992; 13: 99-126.
- 44 Francis K. Physical activity in the prevention of cardiovascular disease. *Physical Therapy* 1996; 76(5): 456-68.
- 45 LaCroix AZ, Leveille SG, Hecht JA, et al. Does walking decrease the risk of cardiovascular disease hospitalizations and death in older adults? *Journal of the American Geriatric Society* 1996; 44(2): 113-20.
- 46 Bernadet P. Benefits of physical activity in the prevention of cardiovascular diseases. *Journal of Cardiovascular Pharmacology* 1995; 25(Suppl 1): S3-S8.
- 47 Public health focus: Physical activity and the prevention of coronary heart disease. *Morbidity and Mortality Weekly Report* 1993; 42(35): 669-72.
- 48 Keys A. The seven countries study: 13 multiple variables. *Circulation* 1970; 41(4 suppl): 1138-44.
- 49 Shaper AG, Pocock JJ, Walker M, et al. Risk factors for ischemic heart disease: The prospective phase of the British Regional Heart Study. *Journal of Epidemiology and Community Health* 1985; 39(3): 197-209.
- 50 Neaton JD, Wentworth D. Serum cholesterol, blood pressure, cigarette smoking, and death from coronary heart disease. Overall findings and differences by age for 316,099 white men. Multiple Risk Factor Intervention Trial. *Archives of Internal Medicine* 1992; 152(1): 56-64.
- 51 Kannel WB, Neaton, JD, Wentworth D, et al. Overall and coronary heart disease mortality rates in relation to major risk factors in 325,348 men screened for MRFIT. Multiple Risk Factor Intervention Trial. *American Heart Journal* 1986; 112(4): 825-36.
- 52 Jousilahti P, Toumilehto J, Vartiainen E, et al. Importance of risk factor clustering in coronary heart disease mortality and incidence in eastern Finland. *Journal of Cardiovascular Risk* 1995; 2(1): 63-70.
- 53 Wilhelmsen L. Synergistic effects of risk factors. *Clinical and Experimental Hypertension, Part A, Theory and Practice* 1990; 12(5): 845-63.
- 54 Williams MA. Cardiovascular risk factor reduction in elderly patients with cardiac disease. *Physical Therapy* 1996; 76(5): 469-80.
- 55 Allen JK, Redman BK. Cardiac rehabilitation in the elderly: Improving effectiveness. *Rehabilitation Nursing* 1996; 21(4): 182-6.