Health in mid-life

Highlights

• Most Canadians enjoy good health in the middle years, although, not surprisingly, health declines with age.

• The prevalence of several chronic conditions and activity limitations due to a health problem has declined for those aged 45 to 64 over the past 20 years. At the same time, the prevalence of asthma and migraine headaches has increased for women aged 45 to 64; diabetes and asthma have increased among men in the same age group.

• Lower levels of education and income are associated with an increased likelihood of a decline in health and with chronic illness.

Most Canadians enjoy good health during their middle years. However, as Canadians grow older, they are more likely to report poorer health. In the 1998/99 National Population Health Survey (NPHS), the percentage of respondents who rated their health as fair or poor increased significantly with age (Chart 1). While the percentage of adults who report poorer health increases with age, there are changes in health—improvements as well as declines—for adults in every age group. These changes are associated not only with illness and disability, but also with socioeconomic factors such as level of income and level of education.

This article examines factors associated with changes (declines or improvements) in self-perceived health among Canadians aged 25 to 64, using data from the 1994/95, 1996/97 and 1998/99 NPHS. Research indicates that self-perceived health is a predictor of health problems, the use of health services and longevity, particularly among the elderly.[1-8] Self-ratings of health have also been found to be consistent with more objective ratings made by physicians based on extensive medical and psychiatric evaluations.[9]

This article also explores 20-year trends in chronic conditions and activity limitations among Canadians aged 45 to 64, using data from the 1978/79 Canada Health Survey

(CHS) as well as the NPHS (see *Methods*, *Definitions* and *Appendix*). Adults aged 45 to 64 are twice as likely as those aged 25 to 44 to report poorer health (12% versus 6%). Furthermore, analyses of the factors associated with changes in self-perceived health in mid-life show that decline in self-perceived health is associated with chronic conditions and activity dependence.

Methods

Data sources

This article is based on data from the first three cycles of the National Population Health Survey (NPHS) (see *Annex*) and the 1978/79 Canada Health Survey.

The 1998/99 estimates of prevalence of chronic conditions are based on the 1998/99 NPHS cross-sectional general file. The 1994/95-to-1998/99 longitudinal file was used in the analyses of transitions in health status.

The 1978/79 estimates of prevalence of chronic conditions are based on the 1978/79 Canada Health Survey (CHS). The CHS, conducted by Statistics Canada and Health and Welfare Canada, took place from May 1978 through March 1979. The survey covered the non-institutionalized population, excluding residents of the Territories, Indian reserves and remote areas. The sample size was 12,218 households. An interviewer collected data on chronic conditions and activity limitations for the entire household from a suitable household member. The household response rate to this component was 86%. A subset of sampled individuals were asked to participate in the physical measures component. Part of this component involved measuring blood pressure.

Analytical techniques

This analysis examines four-year transitions in self-perceived health among individuals aged 25 to 64. Data from the longitudinal component of the NPHS for the 10 provinces were used to explore the determinants of declines and improvements in self-perceived health over the four-year period. Two groups were formed: respondents who reported excellent, very good or good health at baseline (1994/95) and respondents who reported fair or poor health at baseline. Multiple logistic regression was used to analyze the first group to determine factors associated with a decline in health versus those whose health status remained stable. The second group was used to determine factors associated with an improvement. When considering health and transitions in health status, it is important to be aware of the interplay of physical, social and environmental factors that may influence health. Therefore, socio-demographic variables, health behaviours, chronic conditions, measures related to psychological well-being, and social support variables were all entered into the multivariate models that were used to explore the determinants of transition. Unless otherwise specified, all determinants were measured at baseline in 1994/95.

Further analyses were conducted on the 45-to-64 age group to compare the prevalence rates of selected chronic conditions and activity limitation in 1978/79 with the rates from 1998/99. The rates for 1998/99 are based on estimates from the cross-sectional household component of the third cycle of the NPHS (1998/99). The 1978/79 Canada Health Survey was used to estimate the rates for 1978/79.

All analyses are based on weighted data. For estimates based on NPHS data, the weighted bootstrap procedure was used to estimate sampling error; that is, in the estimates of standard error of prevalence rates and in the calculation of the confidence intervals for the odds ratios in the logistic regression models.[10-12] This procedure fully accounts for the design effects of the NPHS. For prevalence rates based on data from the CHS, estimates of standard error were calculated with SUDAAN, which uses a Taylor series linearization method to adjust for the complex design of the CHS.[13]

Results at the $p \leq 0.05$ level were considered significant.

Limitations

A number of studies have shown that the prevalence of chronic conditions may be affected by the use of proxy responses. While some studies have documented under-reporting of some chronic conditions by proxies, other studies have reported no under-reporting of chronic conditions by proxies.[14-19] Therefore, some changes in prevalence rates may be partially attributable to proxy response. The prevalence estimates of chronic conditions from the NPHS and the CHS were based on data collected for all members of selected households as reported by one knowledgeable member. However, the exact proxy response rate for the CHS cannot be determined, so it is not possible to assess the potential influence of proxy reporting.

The CHS asked all household members if they had high blood pressure. As well, some members of sampled households participated in the physical measures component of the CHS. All respondents who reported having high blood pressure were considered to have high blood pressure. Respondents who did not report high blood pressure but whose physical measure of blood pressure was high were also defined as having high blood pressure. By contrast, the NPHS data on blood pressure are based only on data reported by the respondent, which may result in a lower prevalence estimate.

Chart 1
Percentage of household population aged 12 or older reporting fair or poor health, Canada excluding territories, 1998/99

% reporting
fair or poor health
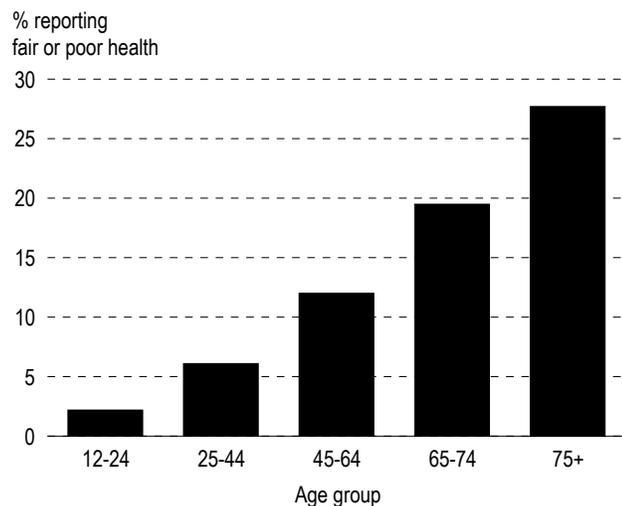
Data source: 1998/99 National Population Health Survey; cross-sectional sample, Health file

Changes in self-perceived health

Using the NPHS longitudinal file, it was possible to examine transitions in health over the four-year period from 1994/95 to 1998/99 among Canadians aged 25 to 64.

During this time period, a small number of individuals in this age group died (just under 2%) and a negligible number were institutionalized. Not surprisingly, health status at baseline in 1994/95 was related to mortality. Of the individuals who reported fair or poor health in 1994/95, approximately 6% had died by 1998/99, six times the rate for individuals who reported excellent, very good, or good health at baseline (data not shown).

The vast majority (98%) of this population were still residing in households in 1998/99. Transitions in health status also occurred for a substantial proportion of these individuals (Table 1). Among the 1.3 million individuals aged 25 to 64 who reported fair or poor health in the 1994/95 survey, more than half (52%) reported an improvement to excellent, very good or good health in 1998/99. By contrast, of the 13.8 million individuals who reported excellent, very good or good health in 1994/95, 5% reported a decline to fair or poor health by 1998/99. This was one-third the rate of decline reported by those aged 65 or older (15%).

Factors associated with changes in self-perceived health

When considering changes in self-perceived health status, it is important to examine the interplay of physical, social and environmental factors that may influence this global measure of health.[20] These include age, income, education, health behaviours (such as smoking and exercise), chronic conditions and other health impairments (arthritis, heart disease and diabetes, for example), psychological well-being (such as depression and chronic stress) and social support (living arrangements and emotional support, for example). To investigate associations between these factors and changes in self-perceived health, multivariate regression analyses were conducted on

Table 1
Four-year transition rates in self-perceived health, household population aged 25 to 64, Canada excluding territories

| Self-perceived health in 1994/95 | Total | | Self-perceived health in 1998/99 | | | | |
| | | | Total | Excellent, very good or good | | Fair or poor | |
	'000	%	%	'000	%	'000	%
Total	**15,120**	**100**	**100**	**13,740**	**91**	**1,390**	**9**
Excellent, very good or good	13,810	91	100	13,060	95 †	760	5
Fair or poor	1,310	9	100	680	52	630	48 ‡

Data source: National Population Health Survey, Longitudinal file, 1994/95 to 1998/99
Note: Based on 7,943 longitudinal respondents aged 25 to 64 in 1994/95 who were still residing in households in 1998/99.
† Significantly higher than fair or poor in 1994/95
‡ Significantly higher than excellent, very good or good in 1994/95

Table 2

Adjusted odds ratios relating selected characteristics to changes in self-perceived health between 1994/95 and 1998/99, household population aged 25 to 64 in 1994/95, Canada excluding territories

	Decline		Improvement	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
Sex				
Men	1.5	1.0, 2.1	1.4	0.8, 2.3
Women†	1.0	...	1.0	...
Age				
25-44†	1.0	...	1.0	...
45-64	1.5*	1.0, 2.2	0.7	0.4, 1.2
Education				
Less than secondary graduation‡	1.8*	1.2, 2.7	1.3	0.8, 2.1
Household income				
Lowest/Lower-middle	1.8*	1.1, 3.0	1.1	0.6, 1.9
Middle†	1.0	...	1.0	...
Upper-middle/Highest	0.8	0.5, 1.1	2.1*	1.2, 3.7
Social support				
Living alone‡	0.9	0.6, 1.3	1.0	0.6, 1.8
Low emotional support‡	1.1	0.7, 1.8	0.8	0.5, 1.3
Health behaviours				
Daily smoker‡	1.1	0.8, 1.6	0.7	0.4, 1.2
Infrequent exercise‡	1.4	0.9, 2.1	0.9	0.6, 1.6
Frequent drinker‡	0.6	0.3, 1.3	1.1	0.4, 3.4
Weight				
Underweight	1.2	0.6, 2.6	1.0	0.4, 2.9
Acceptable weight†	1.0	...	1.0	...
Excess weight	1.1	0.7, 1.6	0.9	0.5, 1.6
Activity dependent‡§	4.7*	2.8, 7.8	0.6	0.4, 1.1
Chronic and other health conditions§				
Arthritis or rheumatism‡	1.9*	1.2, 2.9	0.7	0.4, 1.2
Back problems‡	1.3	0.9, 1.9	0.6	0.4, 1.1
High blood pressure‡	1.4	0.8, 2.2	0.9	0.5, 1.6
Migraine headaches‡	1.3	0.9, 2.0	0.8	0.5, 1.5
Diabetes‡	4.4*	2.0, 10.0	0.8	0.4, 1.8
Heart disease‡	3.4*	1.9, 5.9	0.5	0.3, 1.1
Stomach or intestinal ulcers‡	1.7	0.9, 3.3	1.0	0.5, 2.0
Cancer‡	2.8	1.0, 7.9	--	--
Visual impairment‡	0.9	0.5, 1.7	--	--
Psychological well-being				
Low self-esteem‡	1.1	0.7, 1.8	0.3*	0.2, 0.5
High chronic stress‡	1.3	0.9, 2.0	1.1	0.6, 1.7
Major depressive episode‡§	2.2*	1.4, 3.4	0.8	0.4, 1.5

Data source: *National Population Health Survey, Longitudinal file, 1994/95 to 1998/99*
Notes: *The model for a decline in self-perceived health is based on 6,701 respondents aged 25 to 64 in 1994/95 , who then reported excellent, very good or good health and were still living in households in 1998/99; 357 of them reported fair or poor health in 1998/99; 440 records were removed from the analyses because of missing values. The model for an improvement in self-perceived health is based on 752 respondents aged 25 to 64, in 1994/95, who then reported fair or poor health and were still living in households in 1998/99; 379 of them reported excellent, very good or good health in 1998/99; 50 records were removed from the analyses because of missing values. Missing categories for the income and weight variables were included in the model to maximize sample size, but their odds ratios are not shown.*
† Reference category, for which the odds ratio is always 1.0
‡ Reference category is absence of the characteristic; for example, the reference category for "living alone" is "living with others."
§ For the model on decline in self-perceived health, the variables for activity dependence and chronic and other health conditions included conditions that existed in 1994/95 or in 1996/97. Likewise, major depressive episode included an episode in the year before 1994/95 or the year before 1996/97.
-- Sample size too small to include variable in model
* p ≤ 0.05

individuals aged 25 to 64 who were interviewed in both the 1994/95 and the 1998/99 NPHS. Those who lived in a household in 1994/95 but had either died or begun living in a health care institution by 1998/99 were excluded.

Chronic conditions and disability

As one might expect, chronic conditions and disability were associated with a decline in self-perceived health. Individuals who reported certain chronic conditions in the 1994/95 or 1996/97 NPHS had increased odds of reporting a decline in self-perceived health by 1998/99 (Table 2). These conditions included arthritis or rheumatism, diabetes, and heart disease. Individuals with an activity dependence had almost five times the odds of reporting a decline.

For most people, the presence of a chronic condition or activity dependence is enduring and would tend to influence an individual's perception of an improvement in health. However, based on this analysis, chronic conditions and activity dependence at baseline were not negatively associated with an improvement in self-perceived health among people in mid-life who rated their health as poor or fair in cycle 1. This lack of association may be partly explained by successful treatment for the condition, which in turn leads to a more positive evaluation of one's perceived health. In other cases, individuals may be reporting an episodic illness or disability despite being asked about conditions that have lasted or are expected to last six months or more. Once they have recovered, these respondents will rate their health more positively. Another possibility is that the health of some people with a chronic illness will improve. These potential explanations, along with the lack of information on severity or duration of the chronic illness, would tend to confound the results on the association of chronic condition to improvement in self-perceived health, especially for individuals who have multiple, severe or long-lasting illnesses.

Psychological well-being

Various components of psychological well-being were associated with changes in self-perceived health among people in mid-life. Individuals who were classified as having experienced a major depressive episode in the year prior to the 1994/95 or the 1996/97 NPHS had more than twice the odds of reporting a decline in self-perceived health by 1998/99 (Table 2). Furthermore, individuals who were classified as having low self-esteem in 1994/95

had decreased odds of reporting an improvement in self-perceived health in 1998/99.

Although the association between self-esteem and depression is well-known,[22] this analysis indicates that these two dimensions of psychological well-being are differentially associated with transitions in self-perceived health. When examining the transition to poorer health, excluding self-esteem

from the model does not lessen the association between depression and a decline in health. Furthermore, if depression is removed from this model, self-esteem remains non-significant. Similarly, when the transition to better health is explored, excluding depression does not alter the negative association between low self-esteem and improvement in health. When self-esteem is removed from this second model, depression remains non-significant. This suggests that, despite the correlation between these two dimensions of psychological well-being, depression is predictive of a negative change in self-perceived health, while moderate or high self-esteem is predictive of an improvement in self-perceived health.

Socioeconomic factors

Socioeconomic factors were also associated with changes in self-perceived health (Table 2). Individuals who did not graduate from high school had increased odds of reporting a decline, compared with those with higher levels of education. Likewise, individuals in the lowest or lower-middle income category had increased odds of reporting a decline, compared with those in the middle-income category.

While lower income was associated with a decline in self-perceived health, higher income was associated with an improvement in self-perceived health. Individuals in the upper-middle or highest income category had more than twice the odds of reporting an improvement, compared with those in the middle-income category.

Health behaviours

When controlling for the other variables included in the multivariate model, no significant associations were found between changes in self-perceived health and smoking, physical exercise, body weight and alcohol consumption. The inability to detect significant associations between changes in self-perceived health and these health behaviours may be partly due to correlations with other factors included in the model (education and income, for example). Studies have found significant relationships between low socioeconomic status and smoking, being overweight and lower levels of leisure-time physical activity.[23,24]

## Trends in chronic conditions and activity limitation

Individuals aged 45 to 64 are more likely to report fair or poor health, compared with those aged 25 to 44. Furthermore, individuals aged 45 to 64 have increased odds of reporting a decline in health, compared with those aged 25 to 44, based on data from adults who were interviewed in both the 1994/95 and the 1998/99 NPHS.

Chronic illness and disability are associated with decline in self-perceived health. Are chronic conditions and disability increasing or decreasing among Canadians aged 45 to 64 over time? Comparisons between the 1978/79 Canada Health Survey (CHS) and the first three cycles of the NPHS reveal several trends.

Prevalence of chronic conditions and activity limitation

Over the past 20 years, the prevalence of arthritis or rheumatism, high blood pressure, heart disease, and bronchitis or emphysema has decreased among Canadians aged 45 to 64 (Chart 2). The prevalence of activity limitation has also decreased. On the

Chart 2
Prevalence of chronic conditions or long-term activity limitation, household population aged 45 to 64, Canada excluding territories, 1978/79 and 1998/99
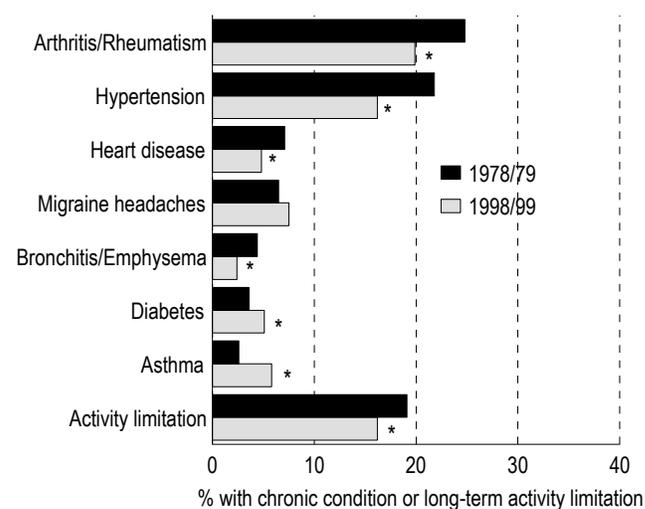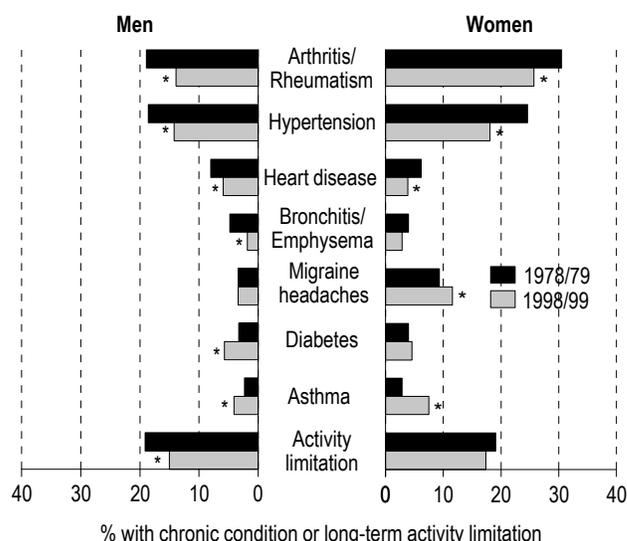

Data sources: 1978/79 Canada Health Survey; 1998/99 National Population Health Survey, cross-sectional sample, General file
* Significantly different from 1978/79, p < 0.05

other hand, the prevalence of asthma and diabetes has increased. These trends are consistent with those in the United States (data not shown).

Differences between men and women

The direction of the trends in chronic conditions and activity limitation has been similar for men and women over the past 20 years, with some exceptions (Chart 3). The prevalence of diabetes has increased significantly among men, but not among women. The increase in the prevalence of asthma has been greater among women than among men, and bronchitis/emphysema has not declined significantly in prevalence among women as it has among men. Migraine headaches have become more prevalent among women, while the prevalence remained the same among men. Activity limitation became less prevalent among men, but there was no significant decrease in the prevalence among women.

Chart 3
Prevalence of chronic conditions or long-term activity limitation, by sex, household population aged 45 to 64, Canada excluding territories, 1978/79 and 1998/99
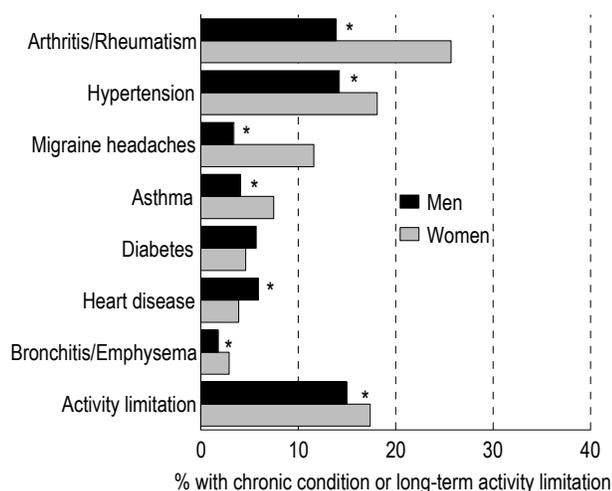

Data sources: 1978/79 Canada Health Survey; 1998/99 National Population Health Survey, cross-sectional sample, General file
* Significantly different from 1978/79, p < 0.05

Table 3
Prevalence of chronic conditions or long-term activity limitation, by age group and region, household population aged 45 or older, Canada excluding territories, 1978/79 and 1998/99

	1978/79						1998/99					
	Canada	Atlantic	Québec	Ontario	Prairies	British Columbia	Canada	Atlantic	Québec	Ontario	Prairies	British Columbia
	%						%					
45-64												
Arthritis/Rheumatism	24.8	26.7	25.0	23.9	28.9*	20.3*	19.9	25.7*	14.8*	21.4	23.0*	18.3
Hypertension	21.8	25.0	21.0	22.8	20.7	19.4	16.2	19.4*	15.0	17.2	16.3	13.9
Heart disease	7.1	9.7	8.7	6.6	5.0*	5.6	4.8	6.1	4.6	6.1*	3.8	2.3*
Diabetes	3.6	3.5	4.7*	4.0	2.6	1.6*	5.1	5.9	4.1	5.7	5.8	4.4
Migraine headaches	6.5	5.6	6.2	6.0	6.7	9.0	7.5	7.1	6.7	7.5	8.0	8.9
Asthma	2.6	2.4	2.6	2.2	2.7	3.8	5.8	5.4	5.7	6.2	4.5*	6.6
Bronchitis/Emphysema	4.4	5.2	5.2	4.4	3.6	2.8	2.4	3.4*	2.1	2.3	2.5	2.6
Activity limitation	19.1	23.7	18.3	18.5	17.2	22.2	16.2	20.4*	13.2*	16.7	17.4	16.9
65+												
Arthritis/Rheumatism	42.7	44.2	37.8	43.3	44.7	46.4	41.5	44.5	34.3*	45.4*	44.1	38.8
Hypertension	39.2	43.8	37.5	39.8	38.7	37.4	35.6	41.0*	35.3	37.9	31.3*	31.4
Heart disease	18.2	21.6	16.6	19.6	15.5	18.0	17.4	19.7	14.6	18.8	16.1	19.0
Diabetes	6.5	8.4	5.1	8.1	6.6	3.3*	11.6	12.7	11.8	12.5	9.6	10.7
Migraine headaches	2.5	2.1	2.7	1.5	4.3	3.1	3.3	2.9	3.1	3.2	2.9	4.7
Asthma	3.9	3.7	3.4	4.6	3.4	4.1	5.7	7.5	4.5	6.0	6.8	4.9
Bronchitis/Emphysema	6.3	8.4	8.9	4.7	4.1	7.8	5.8	6.2	6.4	5.6	4.6	6.5
Activity limitation	35.4	40.0	33.2	32.5	36.4	43.0	29.1	32.3	22.9*	31.4	30.4	29.8

Data sources: 1978/79 Canada Health Survey; 1998/99 National Population Health Survey, cross-sectional sample, General file
* Significantly different from national average, p < 0.05

Chart 4
Prevalence of chronic conditions or long-term activity limitation, by sex, household population aged 45 to 64, Canada excluding territories, 1998/99
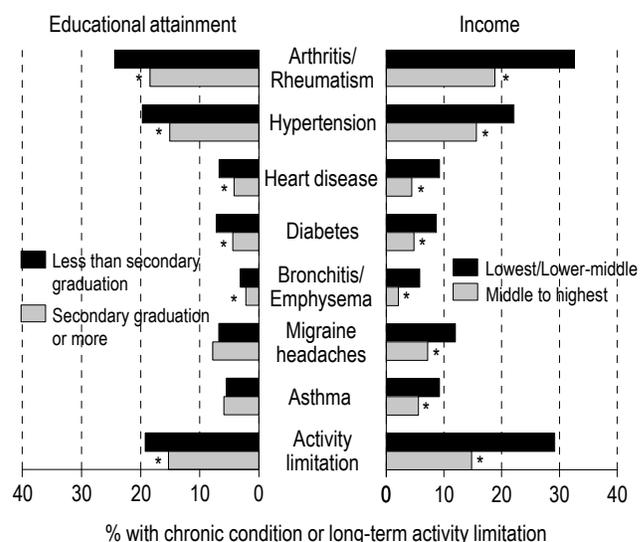
Chart 5
Prevalence of chronic conditions or long-term activity limitation, by educational attainment and household income, household population aged 45 to 64, Canada excluding territories, 1998/99

Data source: *1998/99 National Population Health Survey, cross-sectional sample, General file*
* Significantly different from women, p < 0.05

Data source: *1998/99 National Population Health Survey, cross-sectional sample, General file*
* Significantly different from less than secondary graduation or from lowest/ lower-middle, p < 0.05

In 1998/99, arthritis or rheumatism, high blood pressure, migraine headaches, asthma, and bronchitis or emphysema were more prevalent among women, while heart disease was more prevalent among men (Chart 4). Activity limitation was more prevalent among women than among men.

Regional differences
There are regional differences in the prevalence of chronic conditions and activity limitation among Canadians aged 45 to 64 (Table 3). In 1998/99, the prevalence of arthritis or rheumatism, high blood pressure, bronchitis or emphysema, and long-term activity limitation was highest in the Atlantic region, and the prevalence of heart disease was higher in Ontario than in Canada as a whole. The differences in prevalence of these chronic conditions among regions were less pronounced in 1978/79. In 1998/99, the lowest prevalence of heart disease was in British Columbia, while the lowest prevalence of arthritis or rheumatism and long-term activity limitation was in Québec. The lowest prevalence of asthma was in the Prairies.

Socioeconomic differences
A decline in self-perceived health among individuals aged 25 to 64 was associated with lower levels of education and income. Chronic conditions and activity limitation are also more prevalent among individuals aged 45 to 64 with less education or less income. In 1998/99, arthritis or rheumatism, high blood pressure, heart disease, diabetes, bronchitis or emphysema, and activity limitation were more prevalent among those who had not graduated from high school (Chart 5). These conditions, as well as asthma and migraine headaches, were also more prevalent among those with a low or lower-middle income, compared with those with a middle to high income.

Concluding remarks
Most Canadians enjoy good health in their middle years. Moreover, the prevalence of several chronic conditions, as well as activity limitation due to illness, has declined over the past 20 years. These trends suggest that efforts in disease prevention and health

promotion, along with improvements in treatment of disease,[25,26] have contributed to improved health among recent cohorts aged 45 to 64, many of whom are "baby boomers."

Nevertheless, as Canadians grow older, they are more likely to perceive a decline in their health. When compared with younger adults aged 25 to 44, Canadians aged 45 to 64 have increased odds of reporting a decline in self-perceived health. Such declines in self-perceived health are associated with various factors, including the presence of certain chronic conditions.

While the prevalence of many chronic conditions has declined among Canadians aged 45 to 64 over the past 20 years, the prevalence of some chronic conditions, such as diabetes and asthma, has increased. Similar increases have been observed in the United States.[27,28] In Canada, there are important differences between men and women. The prevalence of diabetes and asthma has increased among men, while the prevalence of asthma and migraine headaches has increased among women.

The increase in diabetes among men is cause for particular concern, since diabetes is a high risk factor for heart disease, stroke, blindness, kidney diseases, disability and mortality. In the United States, the increase in the prevalence of diabetes has been partially attributed to an improvement in the sensitivity of methods to detect the condition, as well as increasing weight and sedentary lifestyle in the population.[27,29,30]

The increased prevalence of migraine headaches among women is also cause for concern. Stress has been identified as a risk factor for migraine headaches,[31] and more Canadian women report work-related stress than men, perhaps because they bear a disproportionate share of unpaid housework compared with men.[32] In addition, women who report migraine headaches have increased odds of experiencing a major depressive episode.

Between 1978/79 and 1998/99, the prevalence of asthma increased among men and women, and the prevalence of bronchitis and emphysema did not decrease among women as it did among men.

Finally, it is noteworthy that lower levels of education and income were associated with a decline in health and with chronic illness. Such socioeconomic disparities have been observed in other measures of health considered in this report. For example, life expectancy is higher in regions with lower levels of unemployment and higher levels of education, and infant mortality rates are highest in the poorest urban neighbourhoods. ●

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Appendix

Socioeconomic, social support, health behaviour and psychological variables

The *education* variable was based on the highest level of education attained and was classified into two groups: less than secondary school graduation and secondary school graduation or more.

In the analyses based on National Population Health Survey (NPHS) data, *income* was defined based on the number of people in the household and total household income from all sources in the 12 months before the survey. The following income groups were used:

Household income group	People in household	Total household income
Lowest	1 to 4	Less than $10,000
	5 or more	Less than $15,000
Lower-middle	1 or 2	$10,000 to $14,999
	3 or 4	$10,000 to $19,999
	5 or more	$15,000 to $29,999
Middle	1 or 2	$15,000 to $29,999
	3 or 4	$20,000 to $39,999
	5 or more	$30,000 to $59,999
Upper-middle	1 or 2	$30,000 to $59,999
	3 or 4	$40,000 to $79,999
	5 or more	$60,000 to $79,999
Highest	1 or 2	$60,000 or more
	3 or more	$80,000 or more

In the analysis based on Canada Health Survey data, income was defined based on a derived economic family income quintile variable.

Social support variables included living arrangements and emotional support. *Living arrangement* categories were defined as living alone or living with at least one other person. Four "yes"/"no" questions were used to measure *emotional support*. Respondents were asked if they had someone they could confide in, count on, who could give them advice, and who could make them feel loved. If the answer to any of these questions was "no," the respondent was classified as having low emotional support.

Health behaviour variables included smoking status, alcohol consumption, frequency of exercise, and body weight. *Smoking status* was defined as less than daily or daily smoking. To measure *alcohol consumption*, respondents were asked the number of drinks they had on each day in the week before the survey. Respondents were classified as frequent drinkers if they had consumed 15 or more drinks over the week (an average of over two drinks per day). Frequency of exercise was based on the number of times in the previous three months that respondents had participated in a leisure-time physical activity lasting more than 15 minutes. Respondents who averaged less than four times per month were classified as having *infrequent exercise*.

The *Canadian Guidelines for Healthy Weights* use body mass index (BMI) to determine an acceptable range of healthy weights and to identify conditions of excess weight and underweight.[33] BMI is calculated by dividing weight in kilograms by height in metres squared. Four *weight categories* were identified based on BMI: underweight (BMI less than 20), acceptable weight (BMI 20 to 24.9), some excess weight (BMI 25 to 27), and overweight (BMI greater than 27). These guidelines are recommended for everyone aged 20 to 64 excluding pregnant women. In accordance with these guidelines, for this analysis, individuals whose BMI was 25 or higher at baseline in 1994/95 were classified as having *excess weight* and those with a BMI of less than 20 were classified as *underweight*.

Activity dependence refers to the need for help (for health reasons) with basic activities of daily living such as personal care (washing, dressing or eating) or moving about inside the house. Activity dependence also includes the need for help with instrumental activities of daily living (IADL) such as preparing meals, shopping for groceries or other necessities, or doing normal everyday housework.

Vision was classified into the following categories: no problem, problem corrected by lenses, uncorrected problem seeing close, uncorrected problem seeing distance, uncorrected problem seeing close and distance, and no sight. Respondents were classified as having a visual impairment if they had an uncorrected problem (that is, the last four categories).

Psychological well-being was assessed with three variables: chronic stress, self-esteem and depression. To measure *chronic stress*, NPHS respondents were asked whether the following statements were true or false:

You are trying to take on too many things at once.
There is too much pressure on you to be like other people.
Too much is expected of you by others.
You don't have enough money to buy the things you need.
Your partner doesn't understand you.
Your partner doesn't show enough affection.
Your partner is not committed enough to your relationship.
You find it is very difficult to find someone compatible with you.
One of your children seems very unhappy.
A child's behaviour is a source of serious concern to you.
Your work around the home is not appreciated.
Your friends are a bad influence.
You would like to move but you cannot.
Your neighbourhood or community is too noisy or too polluted.
You have a parent, a child or partner who is in very bad health and may die.
Someone in your family has an alcohol or drug problem.
People are too critical of you or what you do.

A score of 1 was assigned to each "true" response. Adjustments were made if certain items were not applicable to a respondent (for

example, respondents without a partner) so that total scores were all based on the same denominator. Respondents whose total scores fell in the upper quartile of the distribution for the 18-or-older population (scores greater than or equal to 5) were categorized as having high chronic stress.

Self-esteem measures the "positiveness" with which individuals regard themselves. On a five-point scale from "strongly disagree" (score 0) to "strongly agree" (score 4), NPHS respondents replied to six statements:

    You feel that you have a number of good qualities.
    You feel that you are a person of worth at least equal to others.
    You are able to do things as well as most other people.
    You take a positive attitude toward yourself.
    On the whole, you are satisfied with yourself.

All in all, you are inclined to feel you're a failure (scoring reversed). Respondents whose total scores fell in the lower quartile of the distribution for the 18-or-older population (scores less than or equal to 17) were categorized as having low self-esteem.

Using the methodology of Kessler et al.,[34] the National Population Health Survey defines a *major depressive episode* (MDE) with a subset of questions from the Composite International Diagnostic Interview. These questions cover a cluster of symptoms for depressive disorder, which are listed in the *Diagnostic and Statistical Manual of Mental Disorders*.[35] Responses to these questions were scored and transformed into a probability estimate of a diagnosis of MDE. If the estimate was 0.9 or more, that is, 90% certainty of a positive diagnosis, then the respondent was considered to have experienced an MDE in the 12 months before the survey.