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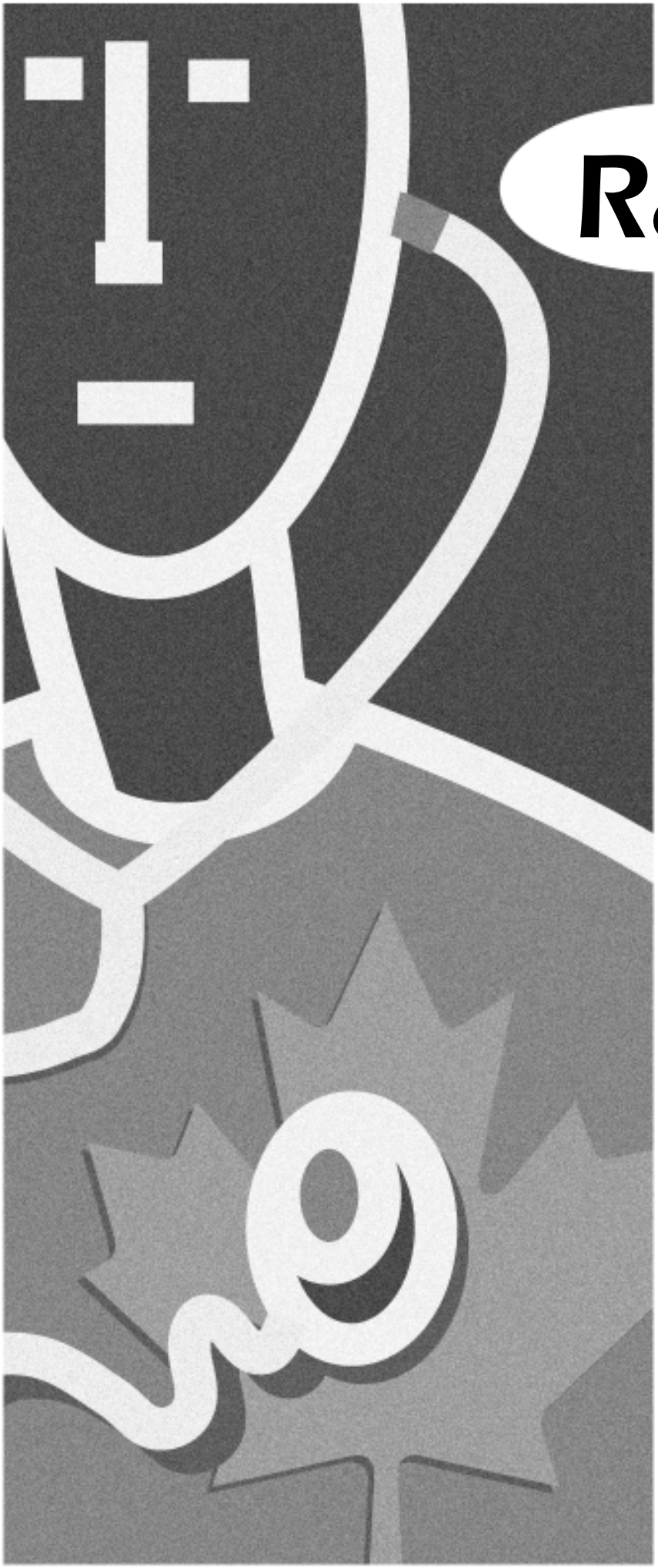

Research Articles

In-depth research and analysis in the fields of health and vital statistics

Patterns of use—alternative health care practitioners

Wayne J. Millar

Abstract

Objectives

This article examines consultations with alternative practitioners and the characteristics of people who use such care.

Data source

The data are from the longitudinal (1994/95 to 1998/99) and cross-sectional (1998/99) household components of Statistics Canada's National Population Health Survey (NPHS).

Analytical techniques

Descriptive information about the use of alternative practitioners is presented. Logistic regression is used to compare the odds of consulting alternative practitioners while controlling for a number of related factors.

Main results

In 1998/99, about 3.8 million people reported having used the services of an alternative practitioner. Relatively high percentages of women, 25- to 64-year-olds, and people in the Western provinces reported seeking alternative care. When related factors, including chronic pain, were taken into account, asthma and back problems were significantly associated with alternative practitioner use.

Key words

alternative medicine, health behaviour, health status, health services accessibility

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In Canada, health care is in transition as governments address escalating costs. At the same time, conventional medicine continues to evolve, and many people are seeking and using a wider array of health care services. Although Canadians continue to rely on mainstream health care, they are increasingly turning to alternatives.[1] Thus, provincial governments are being challenged to understand the full range of current health care practices—for many different types of therapies.

Alternative, or complementary, medicine covers a wide range of approaches to treatment. Generally, it is defined as those treatments and health care practices not widely taught in medical schools, not routinely used in hospitals, and not typically reimbursed by health benefit plans.[2] Such treatments are sometimes used alone, in combination with other alternative therapies, or in addition to conventional medicine.[2] Individuals who consult alternative practitioners may simply be trying to prevent illness or to maintain or improve their overall well-being. Or they may be seeking relief from conditions that are difficult to treat, or that are associated with chronic pain, such as back problems.

Data source

This analysis is based on data from Statistics Canada's National Population Health Survey (NPHS), weighted to represent the population of the 10 provinces. The NPHS, which began in 1994/95, collects information about the health of the Canadian population every two years. It covers household and institutional residents in all provinces and territories, except people living on Indian reserves, on Canadian Forces bases, and in some remote areas. The NPHS has both a longitudinal and a cross-sectional component. Respondents who are part of the longitudinal component will be followed for up to 20 years.

Cross-sectional sample: The 1994/95 and 1996/97 (cycles 1 and 2) NPHS cross-sectional samples are made up of longitudinal respondents and other members of their households, as well as individuals who were selected as part of supplemental samples, or buy-ins, in some provinces. In 1994/95, the large majority of interviews were conducted in person. Most of the 1996/97 interviews were conducted by telephone, and additional respondents for the buy-ins were chosen using the random digit dialling technique. The 1998/99 (cycle 3) cross-sectional sample is made up mostly of longitudinal respondents and their cohabitants. Again, most of the interviews were conducted by telephone. Although no buy-ins were added to the cycle 3 sample, infants born in 1995 or later and immigrants who entered Canada after 1994 were randomly selected and added to keep the sample representative. To replace the sample lost to attrition, individuals in dwellings that were part of the original sampling frame, but whose household members did not respond in 1994/95, were contacted and asked to participate.

NPHS data are stored in two files. The General file contains socio-demographic and some health information obtained for each member of participating households. The Health file contains in-depth health information, which was collected for one randomly selected household member, as well as the information in the General file pertaining to that individual.

In 1994/95, in all selected households, one knowledgeable person provided the socio-demographic and health information about all household members for the General file. As well, one household member, not necessarily the same person, was randomly selected to provide in-depth health information about himself or herself for the Health file.

Among individuals in the longitudinal component in 1996/97 and 1998/99, the person providing in-depth health information about himself or herself for the Health file was the randomly selected person for the household in cycle 1 (1994/95), and was usually the person who provided information on all household members for the General file in cycles 2 and 3, if judged to be knowledgeable to do so. In households that were added to the 1996/97 cross-sectional sample (buy-ins), one knowledgeable household member—not necessarily the randomly selected respondent for the Health file—provided the information for all household members for the General file. For the 1998/99 cross-sectional sample (longitudinal respondents and immigrants, infants, and individuals in households that did not participate in cycle 1), the randomly selected respondent was usually the person who provided information for the General file, again, if judged knowledgeable.

The 1994/95 provincial, non-institutional sample consisted of 27,263 households, of which 88.7% agreed to participate. After applying a screening rule to maintain the representativeness of the sample, 20,725 households remained in scope. In 18,342 of these households, the selected person was aged 12 or older. Their response rate to the in-depth health questions was 96.1% or 17,626 respondents.

In 1996/97, the overall response rate at the household level was 82.6%. The response rate for the randomly selected individuals aged 2 or older in these households was 95.6%. In 1998/99, the overall response rate was 88.2% at the household level. The response rate for the randomly selected respondents aged 0 or older in these households was 98.5%.

Longitudinal sample: Of the 17,626 randomly selected respondents in 1994/95, 14,786 were eligible members of the NPHS longitudinal panel, along with 468 persons for whom only general information was collected. An additional 2,022 of the 2,383 randomly selected respondents under age 12 were also eligible for the longitudinal panel. Thus, 17,276 respondents were eligible for re-interview in 1996/97, and 16,677 were still alive in 1998/99. A response rate of 93.6% was achieved for the longitudinal panel in 1996/97, and a response rate of 88.9%, based on the entire panel, was achieved in 1998/99. Of the 16,168 participants in 1996/97, full information (that is, general and in-depth health information for the first two survey cycles or an outcome of death or institutionalization) was available for 15,670. The corresponding number for 1998/99 was 14,619 respondents. More detailed descriptions of the NPHS design, sample, and interview procedures can be found in published reports.[3,4]

This analysis is restricted to the household population aged 18 or older. The sample size of this population for the cross-sectional component in 1994/95, 1996/97 and 1998/99 was 16,291, 68,282, and 14,150. The sample of longitudinal respondents aged 18 or older with general and health information was 11,161. Longitudinal respondents who died or who were institutionalized were excluded.

With recent data from the National Population Health Survey (NPHS), this article examines Canadians' use of alternative practitioners. This category comprises practitioners such as massage therapists, homeopaths, naturopaths and acupuncturists, among others (see *Definitions*). Consistent with previous studies, chiropractors are also included.[5,6] A brief examination of consultations across the first three NPHS cycles is presented (1994/95 to 1998/99) before the focus shifts to alternative practitioner use in 1998/99. Selected socio-demographic characteristics, health behaviours, and health care utilization among users are explored, and detailed analyses relating certain chronic conditions and pain to use of alternative practitioners are presented (see *Data Source*, *Limitations* and *Analytical Techniques*). The appropriateness, effectiveness and costs of alternative therapies are not addressed.

Limitations

National Population Health Survey (NPHS) data are self- or proxy-reported, and the degree to which they are inaccurate because of reporting error is unknown. Most of this analysis is based on cross-sectional data; therefore, relationships between variables can be described, but causality cannot be inferred. A potential for bias exists if groups with different socio-demographic characteristics vary in their willingness to report their health status or their use of health care services. An additional potential source of bias is that the household component of the NPHS excludes persons living in isolated northern communities and on Indian reservations, the homeless, and those who are institutionalized such as the mentally ill, the elderly and patients in hospitals. These exclusions preclude consideration of the health care received by persons who are at high risk of sickness.[7]

In this analysis, as is commonly done,[5,6] chiropractors are classified as "alternative practitioners." Although the NPHS collects information on several other specific types of practitioners (massage therapists, acupuncturists, Feldenkrais, Alexander or biofeedback teachers, or relaxation therapists, for example), these groups are relatively small, and detailed data by category of practitioner are not presented in this analysis.

The NPHS questions relate to the use of alternative practitioners, not to the broader use of alternative therapies. Therefore, even though individuals may not be using the services of an alternative practitioner, they may still be using some form of alternative therapy.

Although the NPHS collected information about the use of alternative practitioners and about the prevalence of various chronic diseases, there is no direct link between the two. The inability to categorize respondents according to the specific condition for which they are consulting alternative practitioners limits the interpretation of the data.

A further limitation of this analysis is that information is not available on all factors that motivate individuals to consult alternative practitioners. In particular, nothing is known about the severity of chronic disease and the factors that govern patient decisions about seeking care from alternative practitioners. For example, in some instances, patients may be directly referred by attending physicians, while in others, the decision may be motivated by factors such as disillusionment with conventional medical treatment.

Analyzing the use of alternative health care practitioners at the national or provincial level may conceal specific groups among whom alternative medicine use is more prevalent. For example, the survey does not permit examination of acupuncture or herbalists by the Chinese community, or the use of traditional medicine by Aboriginal peoples.

Because the survey does not provide information about the health care costs associated with the use of alternative practitioners, this issue could not be addressed.

Provincial differences in use of alternative health care practitioners may reflect the funding of various alternative health care services under provincial health care plans. Saskatchewan, Manitoba, British Columbia, Alberta and Ontario provide at least some form of payment for chiropractic services under provincial health legislation. Provincial insurance in Québec does not extend to chiropractic services, and in the Atlantic provinces, chiropractor services are either not funded, or the scope of services that are reimbursed is restricted. Private or public employers may also share or pay for the cost of consulting some alternative practitioners. Massage therapy, acupuncture and chiropractor services are the most common services covered under employer-sponsored plans.

Table 1
Use of alternative practitioners, by sex, household population aged 18 or older, Canada excluding territories, 1994/95, 1996/97 and 1998/99

	Total population			Consulted alternative practitioner in past year					
	1994/95	1996/97	1998/99	Cycle 1 (1994/95)		Cycle 2 (1996/97)		Cycle 3 (1998/99)	
		'000		'000	%	'000	%	'000	%
Both sexes	**21,388**	**22,160**	**22,568**	**3,164**	**15**	**3,464**	**16**	**3,779**	**17***
Men	10,487	10,836	11,030	1,353	13	1,488	14	1,570	14*
Women	10,901	11,324	11,538	1,811	17	1,976	17	2,209	19*

Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, cross-sectional sample, Health file*
** Significantly higher than 1994/95 ($p < 0.05$)*

Use rising

According to the 1998/99 NPHS, an estimated 3.8 million Canadians aged 18 or older reported that they had consulted an alternative health care provider in the previous year. This represented 17% of the population, a significant increase over the 15% estimated in 1994/95, when the first cycle of the NPHS was conducted (Table 1; Appendix Table A). Use of chiropractors alone remained stable over this period; the increase in use of other alternative practitioners (excluding chiropractors) accounted for the overall rise in consultations (data not shown).

Use among women rose from 17% in 1994/95 to 19% in 1998/99. Although the percentage of men consulting alternative practitioners also rose significantly, the increase was less pronounced (13% to 14%).

For many people, consultation with alternative practitioners may be episodic rather than ongoing. Between 1994/95 and 1998/99, about 3 in 10 people aged 18 or older consulted an alternative practitioner (Table 2). Among these users, over half (54%)

Analytical techniques

Cross-sectional data from the National Population Health Survey (NPHS) were weighted to represent the population at the date of each survey cycle. Longitudinal data were weighted to represent the population when the survey began (1994/95). To account for survey design effects, estimates of the variance were generated using the bootstrap technique.[8-10]

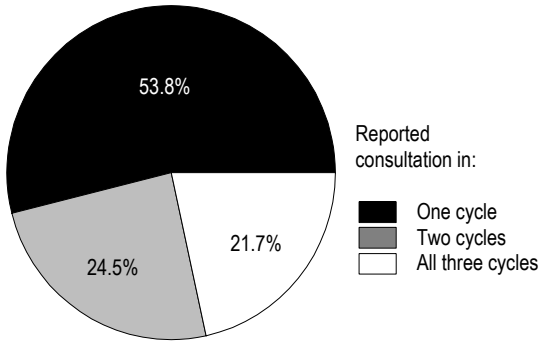
This analysis provides descriptive information about the use of alternative practitioners. The selection of variables was guided by a review of the literature, and by the availability of indicators from the NPHS. Logistic regression models are used to compare the odds of consulting alternative practitioners. To assess the association between specific chronic conditions, chronic pain and alternative practitioner use, the analysis first considers diseases that are associated with alternative practitioner use when controlling for sex, age, province, education, household income, number of chronic conditions, attitude toward self-care, and perceived unmet health care needs. Although all chronic conditions for which NPHS data were available were considered, this analysis reports only on those for which there was a positive association. Then chronic pain is introduced into the model to determine if the association between chronic illness and alternative practitioner use remains. Finally, the analysis considers whether users of alternative practitioners differ from non-users in certain, possibly preventive, health behaviours, or in the use of selected health care services.

Table 2
Use of alternative practioners, household population aged 18 or older,† Canada excluding territories, cycles 1 (1994/95) to 3 (1998/99)

	Population	%
	'000	
Total	**20,195**	**100.0**
Used alternative practitioner		
One cycle	3,201	15.9
Two cycles	1,462	7.2
All three cycles	1,292	6.4
Non-user (all three cycles)	14,240	70.5

Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, longitudinal sample, Health file*
† Based on respondents who were alive in 1998/99, who were not living in an institution, and for whom complete responses for all three survey cycles were available.

Chart 1
Percentage of alternative practitioner users who reported a consultation in one, two, or all three NPHS cycles, household population aged 18 or older,† Canada excluding territories, 1994/95 to 1998/99



Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, longitudinal sample, Health file*
† Based on 3,061 respondents who were alive in 1998/99, who were not living in an institution, for whom complete responses for all three survey cycles were available, and who reported at least one consultation with an alternative practitioner.

reported having done so in only one survey cycle (Chart 1). One-quarter reported using the services of an alternative practitioner in two of the three survey cycles; 22% in all three. As these results are based on responses from the *same* individuals through all three survey cycles, they suggest that alternative care is not necessarily a regular practice. There may be several reasons for such short-term use, including finding a solution to the problem, finding that the treatment was ineffective, or being unable to carry on with treatment for financial or other reasons. But alternative care is also obviously a longer-term option for many people, as 1.3 million reported that they used the services of an alternative practitioner in the previous year for each of the three cycles.

Women more likely to consult alternative practitioners

In 1998/99, a higher percentage of women than men reported having consulted an alternative practitioner in the past year: 19% compared with 14% (2.2 million versus 1.6 million) (Table 3). Of course, many factors may be related to the use of alternative care. Such factors include province, education, household income, number of chronic

Table 3
Use of alternative practitioners, by selected characteristics, household population aged 18 or older, Canada excluding territories, 1998/99

	Estimated population	Consulted alternative practitioner in past year	
	'000	'000	%
Total	**22,568**	**3,779**	**17**
Sex			
Men†	11,030	1,570	14
Women	11,538	2,209	19*
Age group			
18-24	2,855	321	11
25-44	9,548	1,793	19*
45-64	6,677	1,270	19*
65+†	3,488	395	11
Province			
Newfoundland†	405	13	3‡
Prince Edward Island	100	5	6
Nova Scotia	698	58	8*
New Brunswick	568	51	9*
Québec	5,581	856	15*
Ontario	8,544	1,273	15*
Manitoba	805	170	21*
Saskatchewan	726	155	21*
Alberta	2,094	522	25*
British Columbia	3,047	676	22*
Education			
Less than high school graduation†	5,096	619	12
High school graduation	3,596	554	15*
Some postsecondary	6,159	1,053	17*
College diploma/University degree	7,690	1,551	20*
Missing	27	--	--
Household income			
Low†	2,848	332	12
Lower-middle	5,568	789	14*
Upper-middle	7,839	1,488	19*
High	4,750	947	20*
Missing	1,562	223	14
Chronic conditions			
None†	8,640	990	11
One	5,981	1,030	17*
Two	3,739	698	19*
Three+	4,131	1,044	25*
Missing	78	--	--
Chronic pain			
Yes	3,358	885	26*
No†	19,200	2,895	15
Missing	9	--	--
Attitude toward self-care			
Low†	5,801	684	12
Medium	11,190	1,884	17*
High	4,818	1,139	24*
Missing	758	73	10‡
Perceived unmet health care needs			
No†	21,053	3,343	16
Yes	1,494	433	29*
Missing	20	--	--

Data source: *1998/99 National Population Health Survey, cross-sectional sample, Health file*
† Reference category
‡ Coefficient of variation between 16.% and 25.0%
** Significantly higher than reference category (p < 0.05)*
-- Sample size too small to provide reliable estimate

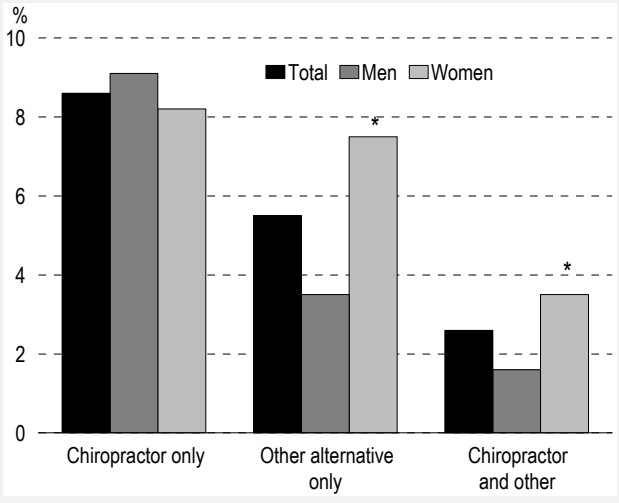
Alternative practitioners

For this analysis, consultation with *alternative health care practitioners* was determined from two National Population Health Survey (NPHS) questions. Most alternative practitioners were covered by the following question: "In the past 12 months, have you seen or talked to an alternative health care provider such as an acupuncturist, naturopath, homeopath or massage therapist about your physical, emotional or mental health?" Those who answered "yes" were asked what type of practitioner had been consulted or visited.

Chiropractors were not listed among the alternative health care providers, but they were among the response options in the question relating to contacts with various health care professionals: "In the past 12 months, how many times have you seen or talked on the telephone with [fill category] about your physical, emotional or mental health."

A recent study based on NPHS data found that chiropractors were the most commonly consulted alternative practitioners.[1] Similar results were found in this analysis. In 1998/99, among Canadians aged 18 or older of both sexes, chiropractors were the alternative practitioners most frequently consulted. Men and women were equally likely to have reported a consultation with a chiropractor in the past year. But a much higher percentage of women than men reported that they had consulted another type of alternative practitioner. Similarly, women were more likely than men to report having seen both a chiropractor and another alternative practitioner in the previous year.

Use of alternative practitioners, household population aged 18 or older, by sex, Canada excluding territories, 1998/99



Data source: *1998/99 National Population Health Survey, cross-sectional sample, Health file*
** Significantly higher than value for men ($p < 0.01$)*

Chiropractic techniques focus on the relationship between the structure (primarily of the spine) and function (primarily of the nervous system) of the human body to restore and preserve health.[11] Chiropractors use manual procedures and interventions rather than surgery or drugs. Chiropractic speciality areas are relevant to other medical specialities such as orthopedics, neurology, and sports medicine.[12] In several Canadian provinces (British Columbia, Alberta, Saskatchewan, Manitoba and Ontario), chiropractic services are included and partially funded under the provisions of the provincial health care plans.[11]

Massage therapy is based on the assumption that a dysfunction in one part of the body may have implications for function in other discrete, not necessarily directly connected, body parts. Massage consists of manual techniques, including the application of fixed or movable pressure and holding or causing the body to move. Hand massage is most commonly employed, but the forearms, elbows and feet may also be used. These techniques may affect the musculo-skeletal, circulatory-lymphatic, and nervous systems.[12]

Acupuncture is a component of Chinese health care that can be traced back for at least 2,500 years. This therapy is based on the premise that patterns of energy flow through the body. Practitioners of acupuncture argue that disruption of the energy flow has negative implications for health. Acupuncture describes a system of procedures (including tiny needles) that stimulates various anatomical sites on the skin by a variety of techniques.[13]

Homeopathy is based on two key principles. One is the "law of similars"; that is, a substance that produces certain symptoms in a healthy person can be used to treat the same symptoms in a person who is sick.[14] The other involves using minimum doses of remedies to stimulate the body's own healing mechanisms.[14] Homeopathic remedies are made from naturally occurring plant, animal, or mineral substances.[12] Homeopathy tends to be based on the individual rather than common symptomology.[15]

Naturopathy is a drug-free system of treatment that often uses physical forces such as air, light, heat or water. Naturopathic medicine encompasses various healing therapies, including clinical nutrition, hydrotherapy, botanical medicine, and lifestyle counselling.[16]

Definitions

Four *age groups* were used for this analysis: 18 to 24, 25 to 44, 45 to 64, and 65 or older.

Education was based on the highest level attained, and four groups were established: less than high school graduation; high school graduation; some postsecondary; and college diploma/university degree.

Household 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 interview. The following income groups were used:

Household income group	People in household	Total household income
Lowest	1 or 2	Less than $15,000
	3 or 4	Less than $20,000
	5 or more	Less than $30,000
Lower-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
Unknown	Not applicable	Not stated

To determine the presence and *number of chronic conditions*, respondents were asked if they had any "long-term conditions that have lasted or are expected to last six months or more and that have been diagnosed by a health professional." Those considered for this analysis are: asthma, arthritis or rheumatism, back problems (excluding arthritis), high blood pressure, migraine, chronic bronchitis or emphysema, diabetes, heart disease, cancer, stomach or intestinal ulcers, bowel disorder such as Crohn's disease or colitis, and thyroid condition.

Respondents who said that they were not usually free from pain or discomfort were considered to have *chronic pain*.

Five statements from the 1998/99 National Population Health Survey (NPHS) were used to derive respondents' *attitude toward self-care*:

- I prefer doctors who give me choice or options and let me decide for myself what to do (reverse scoring).
- Patients should never challenge the authority of the doctor.
- I prefer that the doctor assume all of the responsibility for my medical care.
- Except for serious illness, it is generally better to take care of your own health than go to a doctor (reverse scoring).
- It is almost always better to go to a doctor than to try to treat yourself.

Respondents were asked to rate their agreement or disagreement with each item on a five-point scale, with 1 being "strongly agree" and 5, "strongly disagree." The values were then recoded in the 0-to-4 range to calculate scores: 0 indicates a preference to rely on the doctor; 4, a preference for self-care. The scores of the first and fourth items were reversed. The scores ranged from 0 to 20, with 0 to 9 representing low; 10 to 14, medium. Respondents who scored between 15 and 20 were considered to strongly believe in self-care (about 25% of respondents were in this category).

Respondents were asked if there was ever a time in the last 12 months when they felt they needed, but did not receive, health care. Positive responses were considered to indicate *perceived unmet health care needs*.

Smoking status was established by asking individuals if they smoked cigarettes daily, occasionally, or not at all. For this analysis, two categories were used: current *smoker* (daily or occasional) and non-smoker (former and never smokers).

To derive physical activity level, respondents' energy expenditure (EE) was estimated for each activity they engaged in during leisure time. EE was calculated by multiplying the number of times a respondent engaged in 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 whose estimated leisure-time EE was below 1.5 kcal/kg/day were considered physically inactive. A value between 1.5 and 2.9 kcal/kg/day indicated moderate physical activity. Respondents with an estimated EE of 3.0 or more kcal/kg/day were considered *physically active*. This measure may underestimate total physical activity, as it does not account for activity at work or while doing household chores.

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.[17] BMI is calculated by dividing weight in kilograms by the square of height in metres. Pregnant women were excluded. For this analysis, *overweight* was based on a BMI value of 27 or greater.

Multiple medication use was determined by asking respondents how many different medications they had taken in the last two days. Those who took more than three were classified as multiple medication users.

Use of vitamin/mineral supplements was based on questions about use of supplements in the four weeks before the survey interview, as well as questions on weekly and daily use. Respondents were grouped as regular users (those who took vitamins/minerals regularly in the past four weeks, and for five or more days in the previous week) and infrequent or non-users (non-users, occasional users, regular users in past four weeks, but for less than five days in the previous week).

Concern about nutrition to maintain/improve health was established using positive responses to the question: "Do you choose certain foods or avoid others because you are concerned about maintaining or improving your health?"

Positive responses to questions about food selection were used to establish those who tended to *avoid foods high in fat/salt/sugar*.

Several aspects of *health care utilization* were selected.

Respondents were asked if they *had a regular physician.* To determine the number of contacts with health care professionals, NPHS respondents were asked how often they had consulted certain practitioners, including family doctors or general practitioners. A variable was constructed to measure the number of contacts with the family doctor/general practitioner, or with a specialist, in the 12 months before the interview.

To establish *blood pressure check in past year*, respondents were asked, "When was the last time you had your blood pressure taken?"

conditions, chronic pain, attitudes toward self-care, and perceived unmet health care needs. When all of these factors were taken into account, women still had higher odds of consulting alternative practitioners (Table 4).

The use of alternative care appears to be somewhat of a "mid-life" phenomenon. Among individuals aged 25 to 44 and 45 to 64, the proportion who consulted alternative practitioners was 19%. This compares with about 11% for both the younger (18 to 24) and older (65 or older) age groups. This pattern remained when all of the other available factors thought to be related to use of alternative care were taken into account. Compared with seniors, the middle age groups (25-to-44 and 44-to-64) had higher odds of reporting consultations with alternative practitioners.

Largely western phenomenon

There are marked provincial differences in the use of alternative health care, which is not surprising, given that public health care coverage varies across the country. Between 3% to 9% of people in the Atlantic provinces consulted alternative health care providers in 1998/99, compared with 15% in Québec and Ontario, and 21% to 25% in the western provinces (Table 3). Compared with the reference population of Newfoundland, the odds of using alternative practitioners were significantly higher in all other provinces except Prince Edward Island (Table 4). The higher use in western Canada may partly reflect the four provinces' health care plans, which offer some coverage for chiropractic services, one of the most commonly used alternative therapies (see *Alternative practitioners*). In fact, when provincial health care funding for chiropractic is taken into account, the odds of consulting a chiropractor are higher for individuals who live in provinces that offer some coverage (data not shown).

Variations by education, income

Alternative practitioner use rose with education: close to one in five people (20%) with a college diploma or university degree reported contact with an alternative practitioner. By contrast, 12% of

Table 4
Adjusted odds ratios for use of alternative practitioners, by selected characteristics, household population aged 18 or older, Canada excluding territories, 1998/99

	Odds ratio	95% confidence interval
Sex		
Men†	1.00	...
Women	1.30*	1.16, 1.46
Age group		
18-24	1.25	0.94, 1.67
25-44	1.91*	1.56, 2.33
45-64	1.75*	1.42, 2.17
65+†	1.00	...
Province		
Newfoundland†	1.00	...
Prince Edward Island	1.57	0.85, 2.91
Nova Scotia	2.25*	1.24, 4.10
New Brunswick	2.84*	1.61, 5.00
Québec	5.77*	3.43, 9.73
Ontario	4.40*	2.65, 7.32
Manitoba	7.27*	4.24, 12.46
Saskatchewan	7.84*	4.55, 13.48
Alberta	8.35*	4.88, 14.28
British Columbia	7.47*	4.39, 12.71
Education		
Less than high school graduation†	1.00	...
High school graduation	1.16	0.93, 1.46
Some postsecondary	1.23*	1.01, 1.49
College diploma/University degree	1.42*	1.18, 1.71
Household income		
Low†	1.00	...
Lower-middle	1.33*	1.05, 1.69
Upper-middle	1.76*	1.40, 2.21
High	1.69*	1.33, 2.14
Chronic conditions		
None†	1.00	...
One	1.56*	1.32, 1.84
Two	1.71*	1.41, 2.07
Three+	2.39*	1.96, 2.91
Chronic pain		
No†	1.00	...
Yes	1.75*	1.47, 2.08
Attitude toward self-care		
Low†	1.00	...
Medium	1.27*	1.08, 1.50
High	1.72*	1.44, 2.06
Perceived unmet health care needs		
No†	1.00	...
Yes	1.51*	1.21, 1.90

Data source: *1998/99 National Population Health Survey, cross-sectional sample, Health file*
Notes: *Based on 13,746 respondents. A "missing" category for household income was included in the model to maximize sample size, but the odds ratio is not shown.*
† Reference category for which odds ratio is always 1.00
** $p < 0.05$*
··· Not applicable

those with less than high school graduation had consulted an alternative health care provider (Table 3).

Not surprisingly, because many of the costs associated with alternative health care are out-of-pocket, use tends to be greater in the higher household income groups. While 20% of those belonging to the upper-middle and high income groups had sought alternative care, 12% of people belonging to the lowest income group reported using alternative practitioners.

When sex, age, province, number of chronic conditions, chronic pain, and the other factors were taken into account, these relationships between education and income levels and use of alternative care held. Individuals with at least some postsecondary education had higher odds of using alternative care, compared with those with less than high school graduation. And, compared with people in the low-income category, those belonging to the three higher household income groups had higher odds of consulting alternative practitioners.

With respect to use of chiropractic services, when household income level was considered along with the availability of provincial funding, both were significantly associated with chiropractor use (data not shown).

Chronic conditions, chronic pain

Individuals' use of alternative practitioners increased as the number of reported chronic conditions rose. Among people with three or more diagnosed chronic conditions, the proportion who consulted alternative practitioners was more than twice that for those who reported no conditions (25% versus 11%). Chronic pain was also a major factor. Over one-quarter (26%) of individuals who suffered from chronic pain had used the services of an alternative practitioner, compared with 15% who did not report chronic pain.

Controlling for the other factors reveals associations between the number of chronic conditions, as well as chronic pain, and use of alternative practitioners. Individuals with three or more chronic conditions had over twice the odds of consulting an alternative practitioner, compared with those with no chronic conditions. The odds were also high for people with one or two chronic conditions. And respondents with chronic pain had almost twice the odds of using an alternative practitioner, compared with their "pain free" counterparts.

Self-care/Unmet needs

Attitudes toward physician authority versus orientation to self-care are associated with the use of alternative practitioners. Among people who believed strongly in self-care, 24% reported having consulted an alternative practitioner in the past year. By contrast, 12% of those with lower scores did so (Table 3). Further, those who thought that the traditional, or mainstream, health care system did not meet their needs were more likely to seek alternative therapy. About 29% of such people had consulted alternative practitioners, compared with 16% who did not report this perception.

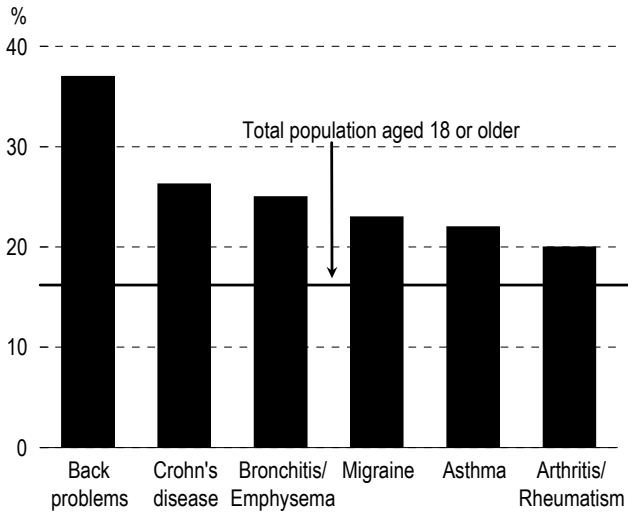
When all the other factors were considered, individuals who believed more strongly in self-care (medium/high scores) had higher odds of consulting alternative practitioners, compared with individuals who had low scores (Table 4). And individuals with perceived unmet health care needs had about one and a half times the odds of using the services of an alternative practitioner than did those who did not report unmet health care needs.

Pain management

The use of alternative practitioners was particularly high among people who had specific chronic conditions. For example, 37% of people with back problems had consulted an alternative practitioner, compared with 17% of the population aged 18 or older overall (Chart 2). The proportions who had used alternative care were also high among people with Crohn's disease, bronchitis/emphysema, migraine, asthma, and arthritis/rheumatism. And even when other factors—sex, age, province, education, household income, attitude toward self-care, and perceived unmet health care needs—were taken into account, people with these conditions still had significantly high odds of consulting alternative practitioners, compared with individuals who did not report such problems (Table 5; Model 1).

However, many of these conditions entail considerable pain, and chronic pain may lead to greater use of health services.[18-20] When chronic pain was added to the model, the association between specific chronic diseases and alternative practitioner use remained statistically significant only for asthma and back problems. This suggests that management of pain and discomfort may be an important factor in seeking alternative care.

Chart 2
Use of alternative practitioners, by presence of selected chronic conditions, household population aged 18 or older, Canada excluding territories, 1998/99



Data source: *1998/99 National Population Health Survey, cross-sectional sample, Health file*
Note: *All rates are significantly higher than the national rate ($p < 0.05$).*

Table 5
Adjusted odds ratios for use of alternative practitioners, by selected chronic conditions and chronic pain, household population aged 18 or older, Canada excluding territories, 1998/99

	Consulted alternative practitioner in last year			
	Model 1†		Model 2‡	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Back problems	3.77*	3.25, 4.39	3.39*	2.90, 3.96
Crohn's disease	1.65*	1.11, 2.44	1.48	0.99, 2.20
Bronchitis/Emphysema	1.54*	1.08, 2.21	1.31	0.90, 1.90
Migraine	1.36*	1.09, 1.70	1.22	0.98, 1.52
Asthma	1.39*	1.12, 1.73	1.29*	1.04, 1.60
Arthritis/Rheumatism	1.41*	1.17, 1.69	1.09	0.90, 1.32

Data source: *1998/99 National Population Health Survey, cross-sectional sample, Health file*
Note: *Reference category is those who have not been diagnosed with the specific disease.*
† Controls for sex, age (continuous), province, education, household income, attitude toward self-care, and perceived unmet health care needs.
‡ Controls for sex, age (continuous), province, education, household income, attitude toward self-care, perceived unmet health care needs, and chronic pain.
** $p < 0.05$*

Behaviour, health care use

People who consulted alternative practitioners appeared to be more concerned about certain health practices than were individuals who did not seek alternative health care. In 1998/99, relatively high percentages of those who had consulted an alternative practitioner reported that they were concerned about the role of nutrition in maintaining and improving health (Table 6). They also had a comparatively high likelihood of taking vitamins and minerals and avoiding foods high in fat, salt and sugar. Even when other factors that might be associated with health behaviour such as sex, age, household income, number of chronic conditions, attitude to self-care, perceived unmet health care needs and chronic pain were taken into consideration, the odds that alternative care users would engage in the majority of these practices were significantly higher than those for people who had not consulted alternative practitioners (Table 7). However, individuals who used alternative care did not have significantly lower odds of smoking, higher odds of being physically active, or lower odds of using multiple medications, compared with non-users.

If users of alternative practitioners were rejecting conventional medical care, they should show lower use of established health care services. However, this was not the case in 1998/99. Alternative health care users were more likely than non-users to have a regular physician, to have seen a specialist in the past year, to have had 10 or more physician visits in that time, and to have had their blood pressure checked in the previous two years (Table 6). Of course, since those who had consulted an alternative health care provider were also more likely than non-users to have chronic conditions and experience pain, the use of conventional medicine is not

Table 6
Prevalence of selected health behaviours and health care utilization, by use of alternative practioners, household population aged 18 or older, Canada excluding territories, 1998/99

	Users of alternative practitioner in past year	Non-users of alternative practitioner in past year
	%	%
Health behaviour		
Current smoker	26	28
Physically active	22*	19
Overweight	29	32
Multiple medication use	14	12
Used vitamin/mineral supplement in past four weeks	57*	38
Concerned about nutrition to maintain/improve health	82*	71
Avoid foods high in:		
Fat	73*	65
Salt	51*	45
Sugar	52*	44
Health care utilization		
Has regular physician	89*	86
Ten or more physician visits in past year	16*	11
Consulted specialist in past year	34*	25
Blood pressure test in past two years	90*	84

Data source: *1998/99 National Population Health Survey, cross-sectional sample, Health file*
** Significantly higher than non-users ($p < 0.05$)*

Table 7
Adjusted odds ratios for selected health behaviours and health care utilization by use of alternative practitioners, household population aged 18 or older, Canada excluding territories, 1998/99

	Odds ratio	95% confidence interval
Health behaviour		
Current smoker	0.93	0.80, 1.07
Physically active	1.11	0.97, 1.28
Overweight	0.85*	0.73, 0.99
Multiple medication use	0.91	0.73, 1.13
Used vitamin/mineral supplements in past four weeks	1.73*	1.52, 1.96
Concerned about nutrition to maintain/improve health	1.44*	1.23, 1.68
Avoid foods high in fat	1.59*	1.01, 1.33
Avoid foods high in salt	1.12	0.99, 1.27
Avoid foods high in sugar	1.21*	1.07, 1.37
Health care utilization		
Has regular physician	1.18	0.96, 1.45
Ten or more physician visits in past year	1.28*	1.05, 1.56
Consulted specialist in past year	1.17*	1.01, 1.35
Blood pressure test in past two years	1.28*	1.02, 1.61

Data source: *1998/99 National Population Health Survey cross-sectional sample, Health file*
Note: *Controls for sex. age, province, education, household income, number of chronic conditions, attitude toward self-care, perceived unmet health care needs, and chronic pain. Reference category is non-users of alternative practitioners.*
** $p < 0.05$*

surprising. However, even when chronic conditions and pain were taken into account, those who had sought alternative care still had higher odds of reporting most of these forms of conventional health care, compared with non-users.

Concluding remarks

The estimated 3.8 million Canadians who reported in 1998/99 that they had used the services of an alternative practitioner are supplementing, not rejecting, conventional health care. This interpretation, based on recent National Population Health Survey data, is consistent with the results of other studies.[21,22]

Analyses based on 1998/99 cross-sectional data suggest that pain management may be a factor in the use of alternative practitioners. The relationship between certain chronic conditions such as arthritis and migraine disappears when pain is taken into account. In such cases, pain may be episodic, or it may vary in intensity, thereby influencing the pattern of use of alternative care over time.

However, as in previous reports,[5,22-25] when pain is considered, the association between asthma and back problems and use of alternative practitioners remained.

People who consult alternative practitioners may be more proactive in terms of their own health care. For example, they had higher odds of taking vitamin/mineral supplements, and of avoiding foods with high fat and sugar content, compared with non-users.

Patients tend to choose specific types of practitioners for particular problems, or a mixture of practitioners to treat specific complaints.[26] The choice involves many factors and cannot be explained solely by disenchantment with traditional medicine.[20]

This analysis cannot identify the process by which people move between conventional and alternative practitioners. In some cases, such as massage therapy, acupuncture, or chiropractic care, patients may receive referrals from their physicians, who may monitor their care. In other cases, there may be no referral, and the physician may not be aware the patient is using alternative care.[27] Concern has been

expressed about the importance of physicians knowing about the use of alternative practitioners so they can take such practices into account during case management.[28] Some researchers have suggested that, in some instances, a physician's lack of knowledge about the use of alternative practitioners could be detrimental to a patient's health.[29,30]

According to estimates based on longitudinal data, the use of alternative practitioners continues to grow, but no consistent pattern appears. Over half of users reported having consulted a practitioner in only one NPHS cycle, while others did so in all three. Because the prevalence of multiple chronic diseases increases with age, and pain often accompanies certain conditions, the demand for alternative therapies could increase even further. ●

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Appendix

Table A

Use of chiropractors and other alternative practitioners, household population aged 18 or older, Canada excluding provinces, 1998/99

	Sample size	Estimated population	Consulted alternative practioner in past year			
			Chiropractor		Other	
		'000	'000	%	'000	%
Both sexes†	**14,150**	**22,568**	**2,530**	**11**	**1,832**	**8**
Men	6,446	11,030	1,182	11	563	5
Women	7,704	11,538	1,348	12	1,268	11
Age group						
18-24	1,427	2,855	197	7	173	6
25-44	5,775	9,548	1,172	12	900	9
45-64	4,097	6,677	858	13	622	9
65+	2,851	3,488	303	9	136	4
Province						
Newfoundland	783	405	--	--	7	2‡
Prince Edward Island	785	100	4	4§	2	2‡
Nova Scotia	877	698	30	4§	38	6§
New Brunswick	888	568	24	4§	31	5
Québec	2,386	5,581	466	8	484	9
Ontario	3,853	8,544	884	10	554	6
Manitoba	951	805	146	18	63	8
Saskatchewan	916	726	106	15	81	11
Alberta	1,291	2,094	385	18	240	11
British Columbia	1,420	3,047	478	16	333	11
Education						
Less than high school graduation	3,613	5,096	465	9	231	5
High school graduation	2,104	3,596	377	10	246	7
Some postsecondary	3,738	6,159	726	12	526	9
College diploma/University degree	4,683	7,690	960	12	830	11
Missing	12	27	--	--	--	--
Household income						
Low	2,289	2,848	197	7	169	6
Lower-middle	3,780	5,568	551	10	358	6
Upper-middle	4,737	7,839	1,040	13	673	9
High	2,465	4,750	947	20	521	11
Missing	879	1,562	140	9	110	7
Number of chronic conditions						
None	5,092	8,640	633	7	479	6
One	3,701	5,981	668	11	483	8
Two	2,333	3,739	481	13	337	9
Three+	2,971	4,131	733	18	529	13
Missing	53	78	--	--	--	--
Chronic pain						
Yes	2,252	3,358	586	17	489	15
No	11,892	19,200	1,945	10	1,343	7
Missing	6	9	--	--	--	--
Attitude toward self-care						
Low	3,622	5,801	450	8	298	5
Medium	7,037	11,190	1,251	11	878	8
High	3,099	4,818	768	16	625	13
Missing	392	758	61	8‡	--	--
Perceived unmet health care needs						
No	13,182	21,053	2,292	11	1,556	7
Yes	961	1,494	235	16	276	18
Missing	7	20	--	--	--	--

Data source: *1998/99 National Population Health Survey, cross-sectional sample, Health file*
Note: *Because of rounding, detail may not add to totals.*
† Adds to more than 17% because some respondents consulted both chiropractors and other alternative practitioners.
‡ Coefficient of variation between 25.1% and 33.3%
§ Coefficient of variation between 16.6% and 25.0%
- - Coefficient of variation greater than 33.3%

Five-year relative survival from prostate, breast, colorectal and lung cancer

*Larry F. Ellison, Laurie Gibbons, and the Canadian Cancer Survival Analysis Group**

Abstract

Objectives

This article presents five-year relative survival rates for prostate, breast, colorectal and lung cancer diagnosed in 1992. Provincial variations are also examined.

Data sources

Data are from the Canadian Cancer Registry, the National Cancer Incidence Reporting System, the Canadian Mortality Data Base, and life tables.

Analytical techniques

Analysis was conducted using the maximum likelihood method of Estève. Provincial rates were standardized to the age distribution of patients diagnosed with the specific cancer. Statistical tests were conducted to determine if the site-specific age-standardized provincial relative survival rates should be regarded as heterogeneous. (National estimates exclude Québec.)

Main results

Five-year relative survival rates for ages 15 to 99 were highest for prostate cancer (88%) and lowest for lung cancer (17%, women; 14%, men). Relative survival rates for prostate, breast and male lung cancer differ among provinces. There was little inter-provincial variation in relative survival rates for colorectal cancer.

Key words

survival analysis, survival rate

Authors

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The burden of cancer in a population is generally measured by three main indicators: incidence (the number of new cases diagnosed in a year); mortality (the number of deaths attributed to cancer); and five-year survival after diagnosis. While cancer incidence and mortality can reflect how effective public health strategies have been in reducing the burden of the disease, survival time after diagnosis is typically used to evaluate treatments in clinical trials of selected cancer patients. But cancer survival rates can also be compared across large population groups, and this may provide some insight into changing diagnostic patterns, the use of early-detection strategies, and the availability of effective treatments for the general population.[1,2]

Relative survival is the preferred method for analyzing the survival of cancer patients in population studies. It compares the observed survival for a group of cancer patients to the survival that would have been expected for

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Analytical techniques

All invasive cancer cases diagnosed in 1992 and reported to the Canadian Cancer Registry (CCR) as of December 20, 1999 were included in the analysis file. An internal record linkage identified and deleted duplicates. Vital status during the first five years was then determined through record linkage to the Canadian Mortality Data Base, or from information reported to the CCR by provincial/territorial cancer registries. Although computerized record linkage for follow-up precludes a definitive answer about completeness of mortality tracing, a previous study that used both active follow-up and the computerized record linkage system employed in this analysis concluded that the latter was comparable with, or even superior to, active follow-up.[3]

If a patient was diagnosed with more than one invasive tumour in 1992, only the record with the earliest date of diagnosis was retained. Records for individuals who had been diagnosed with a primary invasive cancer before 1992 were excluded. Historic information covering 1969 to 1992 was obtained by linking the 1992 CCR data with the National Cancer Incidence and Reporting System on a regional basis (British Columbia and the North; Alberta and Saskatchewan; Manitoba; and the Atlantic). For Ontario, the provincial tumour sequence number was used to determine if an individual had been diagnosed with a primary invasive tumour before 1992.

The analysis was restricted to prostate, female breast, colorectal, and lung cancer cases. Records were excluded when: the year of birth or death was unknown; individuals were younger than 15 or older than 99 when diagnosed; diagnosis was established either through autopsy or death certificate only (DCO); the date of cancer diagnosis was after the date of death. The majority of exclusions were autopsy or DCO cases (see Appendix A, Tables A and B). Québec data were excluded from national estimates and are presented separately (see *Limitations* and Appendix B).

In general, survival time was calculated as the difference in days between the date of diagnosis and the date of last observation (date of death or December 31, 1997, whichever was earliest) to a maximum of five years. For a small percentage of subjects (2.6%) with missing information on day/month of diagnosis (Event 1) and/or day/month of death (Event 2), survival time was estimated (see Appendix A,Table C). For deaths reported by a provincial registry but not confirmed by record linkage with the Canadian Mortality Data Base, it was assumed that the individual died on the date submitted by the reporting province. These represent 0.7% of the total number of deaths, with the following provincial breakdown: Newfoundland (7), Nova Scotia (1), New Brunswick (10), Ontario (69), Manitoba (9), Saskatchewan (11), Alberta (10), and British Columbia (33).

The analysis was conducted in STATA 6.0 using the strel module,[4,5] a user-written module that follows Estève's maximum likelihood method.[6] Because the program automatically excludes cases with zero days of survival, one day of survival was added to cases with the same date of diagnosis and death (not including those cases previously excluded because they were diagnosed through autopsy or DCO). Excluding subjects whose true recorded survival was zero would have tended to inflate estimates of relative survival.[5] In addition to point estimates for relative survival, 95% confidence intervals are given to provide an estimate of the stability, or lack thereof, in point estimates.

To estimate relative survival, observed and expected survival rates must be compared. The expected survival rates used to calculate national and provincial relative survival estimates were derived, by single year of age up to 85, from sex-specific provincial life tables (1990 to 1992) provided by Statistics Canada.[7] Using the method suggested by Dickman et al.,[8] each life table was extended to age 99.

Deaths were grouped into intervals of arbitrary length, following the actuarial method for survival analysis: 3 months for the first year of follow-up, then 6 months for the remaining 4 years for a total of 12 intervals. Because the strel module does not produce survival estimates when the number of intervals exceeds the number of incident cases, it was sometimes necessary to reduce the number of intervals.

Age-standardized rates for a given cancer were calculated by weighting age-specific rates to the age distribution of eligible patients diagnosed with that cancer (see Appendix A, Table D for standard population figures). For example, the standard cancer population for any analysis (national or provincial) of the survival of lung cancer patients would be formed by the eligible lung cancer patients included in the study. Another option for a standard cancer population would be to use the age distribution of all eligible cancer patients diagnosed in 1992, regardless of site. While this would permit direct comparisons of standardized survival rates across cancer sites, it leads to age-standardized survival rates that differ widely from the non-standardized rates because the age distribution of patients can vary widely between cancers.[5] In two circumstances—prostate cancer in 15- to 54-year-olds in Newfoundland and Manitoba—there were no deaths in the first five years of follow-up, so to calculate age-standardized rates, the 15-to-54 and 55-to-64 age groups were collapsed into one group. Confidence intervals for age-standardized rates were based on the log (–log) transformation.

Tests of heterogeneity were used to determine whether age-standardized provincial relative survival rates, as a group, could be regarded as homogeneous, in that they could differ from each other by random variation, or whether they should be regarded as heterogeneous, in that random variation is unlikely to explain the differences. Testing was performed using the method of weighting[9] for each of the six cancer site–sex combinations. This test assumes that the log (–log) transformation of the age-standardized relative survival rates is normally distributed with a known variance estimated by the variance of the log (–log) transformation of the age-standardized relative survival rates. In each case, the chi-square test statistic was compared with a critical value of 14.07, based on a one-sided test with alpha set at 0.05 and 7 degrees of freedom.

members of the general population who have the same characteristics—such as sex, age and province of residence—as the cancer patients. Relative survival allows for the measurement of the extra risk of death due to cancer, as does cause-specific survival, but without the need for information on specific causes of death.

This article presents five-year relative survival rates, by age and sex, for each of the four most common cancers diagnosed in Canada in 1992: prostate, breast, colorectal and lung. Relative survival by province is also presented; analyses have been performed to determine statistically significant variations among provincial rates (see *Analytical techniques*, *Data sources*, and *Limitations*).

Rates highest for prostate, breast cancer

Five-year relative survival rates were highest for prostate and breast cancer (Table 1). Men diagnosed with prostate cancer in 1992 were 88% as likely to

Data sources

Cancer incidence data are from the Canadian Cancer Registry (CCR), a database that has information based on reports from every provincial/territorial cancer registry since 1992. This database is maintained by Statistics Canada, and it succeeds the National Cancer Incidence and Reporting System (1969 through 1991). Mortality data are from the Canadian Mortality Data Base (also maintained by Statistics Canada), which is based on information provided by the vital statistics registrars in each province and territory. Canadian and provincial life tables from Statistics Canada were also used.

Table 1
Five-year relative survival rates for prostate, breast, colorectal and lung cancer cases diagnosed in 1992, by sex and age group, Canada†

	Men					Women			
Cancer site/ Age group	Relative survival rate	95% confidence interval	Number of cases	Number of deaths‡	Cancer site/ Age group	Relative survival rate	95% confidence interval	Number of cases	Number of deaths‡
	%					%			
Prostate					**Breast**				
15-54	81	75, 85	242	53	15-39	73	70, 77	663	178
55-64	89	87, 91	1,947	363	40-49	83	81, 85	1,947	345
65-74	89	88, 91	4,752	1,273	50-59	83	81, 84	2,107	410
75-84	86	83, 88	3,585	1,663	60-69	83	81, 84	2,749	620
85-99	67	58, 75	763	577	70-79	86	83, 88	2,405	674
15-99	88	87, 89	11,289	3,929	80-99	78	72, 82	1,137	623
					15-99	82	81, 83	11,008	2,850
Colorectal					**Colorectal**				
15-49	58	53, 63	424	182	15-49	64	58, 68	362	134
50-59	59	56, 63	828	361	50-59	64	59, 68	551	210
60-69	56	54, 59	1,647	827	60-69	62	59, 65	1,127	477
70-79	56	53, 60	1,673	976	70-79	59	56, 62	1,389	703
80-99	50	44, 56	786	594	80-99	52	47, 56	1,076	752
15-99	56	55, 58	5,358	2,940	15-99	59	57, 61	4,505	2,276
Lung					**Lung**				
15-49	17	14, 21	409	340	15-49	24	20, 29	402	305
50-59	16	14, 18	1,041	881	50-59	20	17, 23	684	549
60-69	15	13, 16	2,464	2,147	60-69	17	15, 20	1,291	1,081
70-79	13	12, 15	2,196	1,980	70-79	15	13, 17	1,142	995
80-99	8	5, 11	743	713	80-99	10	7, 14	410	384
15-99	14	13, 15	6,853	6,061	15-99	17	16, 19	3,929	3,314

Data source: *Canadian Cancer Registry*
† Excluding Québec
‡ Within first five years of follow-up

live another five years as were men of the same age and in the same province. Women diagnosed with breast cancer in 1992 had 82% the chance of living another five years as did women with similar characteristics. Men with colorectal cancer had a relative survival rate of 56%, and for women the rate was 59%. By contrast, relative survival rates for lung cancer were low: 14% for men and 17% for women.

Limitations

Some provincial cancer registries differ with respect to methods of data collection and registration of multiple primaries (more than one diagnosis of a primary cancer). There are also variations in the percentage of "death certificate only" (DCO) cases, and the aggressiveness of follow-up. For example, there is an under-registration of cancer cases in Newfoundland; Alberta aggressively follows-up DCO cases; Ontario's registration process is passive, relying almost completely on records collected for other purposes; and Newfoundland does not use information from their vital statistics registries to update their cancer registry database.

Québec data were not included in the national estimates of five-year relative survival because their method of ascertaining the date of diagnosis of cancer cases differs substantially from that of other provincial cancer registries. While other provinces use a variety of sources (pathology reports, laboratory test results, etc.) to ascertain the date of diagnosis of new cancer cases, the Québec cancer registry relies solely on hospital discharge records. Any patient originally diagnosed outside the hospital, and in fact, even patients diagnosed in the hospital, would have their survival time underestimated because their date of diagnosis is registered as the date of discharge. (Five-year relative survival rates for Québec are presented separately in Appendix B).

Cases diagnosed outside Québec, but who died in that province, could not be identified through national death linkage given the absence of signed legal agreements allowing for the exchange of information between Québec and the other provinces/territories. This may result in slightly increased survival estimates for the affected provinces.

Results for Prince Edward Island, the Yukon, and the Northwest Territories are not shown because of an insufficient number of cases for analysis. Cases from these areas are, however, included in the national estimates. Expected survival rates for Prince Edward Island, the Yukon and the Northwest Territories were derived from the Canadian life tables, as stable estimates for single ages could not be produced because of small populations. This substitution should not introduce bias in national estimates, as these three areas combined accounted for just 0.9% of all eligible cases.

While a few provinces collect information on stage of disease at diagnosis, this is not available in the Canadian Cancer Registry. If such information were available, it would be possible to learn more about the effectiveness and use of early cancer detection from stage-specific survival rates. Until staging information is available at a national level, inferences can be made only about the possible effects of diagnosis and treatment together.

Because the diagnosis of cancer in the sites studied in this report is a rare occurrence in very young adults, it is important to consider the possibility of a miscoded primary cancer for these patients. However, less than 0.1% of the breast, colorectal, and lung cancer cases, and none of the prostate cancer cases, were aged 15 to 24. The extremely small case contribution of this group meant that diagnostic miscoding in very young adults, if present at all, had a negligible impact on the results.

Unless they have been age-standardized to the same population (see Appendix A, Table D), relative survival rates from other sources should not be compared with those presented in this analysis.

DCO cases were excluded from estimates of relative survival because the date of diagnosis, and hence survival time, was unknown. The "true" survival of cases registered by DCO is generally poorer than that of those in the registry population.[10] The necessity of excluding DCO cases may have led to increases in observed survival rates, particularly in provinces with proportionately more DCO cases. However, the magnitude is generally minor.[10]

Tests to determine if the difference between two relative survival rates is statistically significant were not conducted for several reasons. Comparing a province's age-standardized relative survival rate for a given cancer site/sex combination to the corresponding rate for Canada would not test two independent groups. Such tests could also involve a very large number of multiple comparisons; for example, nearly 300 site-specific pairwise comparisons could be made between provinces alone. And finally, highlighting small differences that may be statistically significant but not practically meaningful, while ignoring larger, potentially more meaningful differences simply because they approach but do not achieve statistical significance, did not seem appropriate.

Age patterns vary

Age-related patterns of relative survival varied by cancer site. At ages 55 to 64 and 65 to 74, the relative survival rate for men with prostate cancer was 89%. Prostate cancer prognoses were poorer at younger and older ages. For patients aged 15 to 54, the five-year relative survival rate was 81%, and at ages 85 to 99, 67% (Table 1). Findings from other studies inicate that younger men with prostate cancer have poorer survival,[11,12] perhaps because of biological features of prostate tumours presenting in younger men.[12] Studies have also found that older men with prostate cancer are less likely to receive aggressive therapy,[11,13] even when co-morbidity is taken into account.[13]

Similarly, breast cancer survival was considerably less favourable among women diagnosed at very young or very old ages. Patients aged 15 to 39 had a five-year relative survival rate of 73%, even less than the 78% rate among their counterparts aged 80 to 99. By contrast, for women in the 40-to-79 age range, relative breast cancer survival rates were at least 83%. It is thought that women diagnosed with breast cancer when they are relatively young have a poorer prognosis because of certain genetic and biological characteristics.[11,14-17] Women who are older may be diagnosed at more advanced stages of the disease,[18] when treatment is often less effective. Physicians may also be reluctant to initiate aggressive treatment in elderly patients, who may have frail health and other medical conditions.[13,18,19]

Among patients of both sexes, colorectal cancer relative survival rates varied little by age. From the 15-to-49 to the 70-to-79 age groups, rates ranged between 56% and 59% for men, and declined slightly, from 64% to 59%, for women. Relative survival rates dropped to about 50% in the oldest age group (80 to 99) for both sexes.

Relative survival rates for lung cancer decreased with age for both sexes, but were consistently higher for women. For male and female lung cancer patients, survival rates at ages 80 to 99 were less than half those for patients aged 15 to 49. These findings are similar to those from a recent US study,[11] which also found that older lung cancer patients were less likely than their younger counterparts to undergo surgical treatment.

Provincial variations in prostate, breast and lung cancer

Statistical tests of heterogeneity revealed that age-standardized relative survival rates for prostate, breast and male lung cancer varied by province (chi-squares = 36.77, 18.83, and 21.37, respectively).

For prostate cancer, age-standardized relative survival rates stood out in British Columbia and Newfoundland. In British Columbia, men diagnosed with prostate cancer in 1992 had 91% the chance of surviving five years as did men of the same age and province (Table 2). The corresponding figure for men in Newfoundland was 67%. In other provinces, prostate cancer survival rates ranged from 82% to 86%.

While interprovincial variation in prostate cancer survival rates is likely influenced by many factors, the use of prostate-specific antigen (PSA) screening for prostate cancer has led to dramatic increases in prostate cancer incidence in Canada[20] and the United States.[21,22] This has led in turn to increases in prostate cancer survival rates.[2,23] In Saskatchewan, from 1990 to 1994, rates of PSA screening and prostate cancer incidence both rose dramatically, and the five-year relative survival rate increased from 69% in the 1985-to-1989 period to 83% in 1990-to-1994.[23] In the absence of information on PSA testing from other provinces, 1992 provincial prostate cancer incidence rates may provide an indication of rates of screening and thus a possible explanation for the variation in observed relative survival rates. In 1992, prostate cancer incidence rates were highest in Manitoba and British Columbia and lowest in Newfoundland.[24]

Similar to prostate cancer, age-standardized relative survival rates for breast cancer were highest in British Columbia (85%) and lowest in Newfoundland (76%). Differing use of mammography for early diagnosis may explain some of the provincial variation in survival rates for breast cancer. According to the 1994/95 National Population Health Survey,[25] the proportion of women aged 40 or older who reported ever having had a mammogram was highest in British Columbia (69%) and lowest in Newfoundland (43%).

Because of the lack of national data on the stage of cancer at diagnosis, it is not possible to truly

ascertain the impact of screening and early diagnosis on survival rates.

For men with lung cancer, five-year age-standardized relative survival rates ranged from 12% to 15%, except in Saskatchewan (8%) and Alberta (10%). Survival rates for women with lung cancer ranged from 11% in New Brunswick to 20% in Newfoundland; however, as a group, variations among the provinces were not statistically significant (chi square = 12.62). Except in New Brunswick, rates were equal or slightly higher for women than men in each province. The male–female difference was greatest in Newfoundland and Saskatchewan.

Colorectal cancer rates vary little by province

There was little interprovincial variation in relative survival rates for colorectal cancer (chi squares = 7.23, males; 8.39, females). The lowest age-standardized relative survival rates for this cancer

Table 2
Age-standardized† five-year relative survival rates for prostate, breast, colorectal and lung cancer cases diagnosed in 1992, ages 15 to 99, by sex and province

	Men					Women			
Cancer site	Relative survival rate	95% confidence interval	Number of cases	Number of deaths§	Cancer site	Relative survival rate	95% confidence interval	Number of cases	Number of deaths§
	%					%			
Prostate					**Breast**				
Canada‡	**87**	**85, 88**	**11,289**	**3,929**	**Canada‡**	**82**	**81, 83**	**11,008**	**2,850**
Newfoundland	67	55, 77	133	65	Newfoundland	76	68, 82	217	64
Nova Scotia	82	75, 87	445	172	Nova Scotia	84	79, 88	456	110
New Brunswick	83	76, 89	408	145	New Brunswick	77	71, 82	345	102
Ontario	86	84, 88	5,363	1,889	Ontario	82	81, 83	5,688	1,468
Manitoba	85	80, 89	842	314	Manitoba	79	74, 83	580	176
Saskatchewan	83	77, 87	621	230	Saskatchewan	83	78, 86	550	147
Alberta	82	78, 85	1,084	405	Alberta	81	78, 84	1,203	307
British Columbia	91	88, 93	2,304	669	British Columbia	85	83, 87	1,884	447
Colorectal					**Colorectal**				
Canada‡	**56**	**54, 58**	**5,358**	**2,940**	**Canada‡**	**59**	**58, 61**	**4,505**	**2,276**
Newfoundland	56	46, 66	145	75	Newfoundland	56	46, 65	135	66
Nova Scotia	54	45, 62	237	135	Nova Scotia	56	49, 63	243	128
New Brunswick	47	39, 55	192	111	New Brunswick	52	43, 60	178	99
Ontario	55	53, 58	2,831	1,564	Ontario	59	57, 61	2,339	1,191
Manitoba	53	46, 60	303	170	Manitoba	60	53, 66	284	139
Saskatchewan	54	46, 61	256	144	Saskatchewan	65	56, 72	190	87
Alberta	54	48, 59	503	283	Alberta	55	49, 60	379	204
British Columbia	59	54, 63	842	426	British Columbia	61	56, 65	705	335
Lung					**Lung**				
Canada‡	**14**	**13, 15**	**6,853**	**6,061**	**Canada‡**	**17**	**16, 18**	**3,929**	**3,314**
Newfoundland	13	8, 20	136	121	Newfoundland	20	10, 33	50	42
Nova Scotia	13	10, 17	334	297	Nova Scotia	16	11, 23	169	143
New Brunswick	15	11, 20	296	259	New Brunswick	11	6, 17	143	129
Ontario	15	14, 16	3,765	3,290	Ontario	18	17, 20	2,065	1,714
Manitoba	15	11, 20	371	325	Manitoba	15	10, 20	217	187
Saskatchewan	8	6, 12	320	297	Saskatchewan	17	12, 23	174	146
Alberta	10	7, 13	607	557	Alberta	13	10, 17	374	323
British Columbia	12	10, 15	967	862	British Columbia	15	12, 18	699	598

Data source: *Canadian Cancer Registry*
Notes: *Tests of heterogeneity for prostate, breast and male lung cancer show statistically significant differences in age-standardized survival rates among provinces as a group. Results for Prince Edward Island, the Yukon and the Northwest Territories not shown because of insufficient number of cases, but cases from these areas are included in national totals.*
† Age-standardized to the 1992 Canadian case distribution of the cancer site under study (see Appendix A, Table D).
‡ Excluding Québec
§ Within first five years of follow-up

were in New Brunswick: 47% for men and 52% for women. It is possible that diagnostic practices and/or delivery of treatment may differ in New Brunswick to the extent that they affect five-year relative survival from colorectal cancer. Among men with colorectal cancer, British Columbia's relative survival rate was highest (59%). For women, the highest rate was in Saskatchewan (65%). The largest male–female difference between colorectal cancer survival rates was in Saskatchewan.

Because reporting procedures vary across the country, provincial differences in survival rates should be interpreted with caution (see *Limitations*). (Non-standardized provincial rates are presented in Appendix A, Table E.)

Concluding remarks

Five-year relative survival rates decline dramatically with age among lung cancer patients. This may reflect a reluctance to use aggressive therapy for older patients. Comparatively low rates were also observed among the youngest and oldest age groups with prostate and breast cancer.

When new screening techniques enable physicians to detect cancers earlier, then survival rates for these cancers should increase.[1,2] If, however, cancers are detected early, but treatment is no more effective at early than at later stages, survival rates will increase with no decrease in mortality. Patients diagnosed early will appear to live longer with their disease, thus increasing their survival time, but will not actually benefit from this early diagnosis; this is often referred to as lead-time bias. Indeed it has been argued that new diagnostic techniques may be responsible for much of the recent change in cancer incidence and survival.[2]

Although techniques are available to detect prostate, colorectal and breast cancer at early stages, not all have proven effective in reducing mortality from these diseases. While PSA testing leads to an earlier diagnosis of prostate cancer and thus increases survival rates, it has not yet been shown to effectively reduce mortality. On the other hand, mortality from colorectal cancer can be reduced if the disease is detected early,[26-28] either before the benign polyp becomes cancerous, or while the tumour remains localized in the colon. But screening for colorectal cancer in the Canadian population was not widespread in 1992.

Some studies have argued that mammography screening in women aged 50 to 69 has reduced breast cancer mortality by detecting tumours at earlier, more treatable stages.[29-32] Varying use of mammography screening may explain some of the provincial differences in breast cancer relative survival rates.

The extent to which differences in the use and diffusion of screening, diagnostic and/or treatment practices have affected differences in five-year relative survival rates across the provinces is not known. In fact, the reasons behind the provincial variations are not evident, nor is there any discernible pattern behind the differences. Although they may partly reflect the availability and level of screening being used across the country, the results of this analysis cannot be considered a reflection of the effectiveness of screening tests. ●

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Appendix A

Table A
Records remaining after exclusions,† prostate, breast, colorectal and lung cancer cases diagnosed in 1992, by province

Restricted to …	Canada‡	NFLD	PEI	NS	NB	ONT	MAN	SASK	ALTA	BC
Prostate cancer										
First tumour only	11,413	137	83	463	410	5,407	848	628	1,090	2,339
Year of birth and/or death available	11,399	133	83	462	410	5,398	848	628	1,090	2,339
Age at diagnosis ≥ 15 and ≤ 99	11,394	133	83	462	410	5,394	848	628	1,089	2,339
Cancer not diagnosed by autopsy or by DCO	11,289	133	82	445	408	5,363	842	621	1,084	2,304
Breast cancer										
First tumour only	11,095	219	66	468	346	5,730	583	551	1,203	1,910
Year of birth and/or death available	11,089	217	66	467	346	5,727	583	551	1,203	1,910
Age at diagnosis ≥ 15 and ≤ 99	11,087	217	66	466	346	5,726	583	551	1,203	1,910
Cancer not diagnosed by autopsy or by DCO	11,008	217	66	456	345	5,688	580	550	1,203	1,884
Colorectal cancer										
First tumour only	10,073	285	91	514	376	5,252	601	461	888	1,592
Year of birth and/or death available	10,067	282	91	513	376	5,250	601	461	888	1,592
Age at diagnosis ≥ 15 and ≤ 99	10,060	281	91	511	376	5,246	601	461	888	1,592
Cancer not diagnosed by autopsy or by DCO	9,863	280	88	480	370	5,170	587	446	882	1,547
Lung cancer										
First tumour only	11,355	195	70	600	449	6,012	618	529	991	1,858
Year of birth and/or death available	11,345	190	70	600	449	6,008	618	528	991	1,858
Age at diagnosis ≥ 15 and ≤ 99	11,339	189	70	599	449	6,005	618	528	991	1,857
Cancer not diagnosed by autopsy or by DCO	10,782	186	63	503	439	5,830	588	494	981	1,666

Data source: *Canadian Cancer Registry*
Note: *Yukon and Northwest Territories not displayed because of small numbers.*
† There were no exclusions resulting from date of diagnosis after date of death.
‡ Excluding Québec

Table B
Percentage of death certificate only (DCO) cases,† prostate, breast, colorectal and lung cancer diagnosed in 1992, by province

	Canada‡	NFLD§	PEI	NS	NB	ONT	MAN	SASK	ALTA	BC
Prostate cancer										
Eligible cases + DCOs	11,367	133	83	459	409	5,389	848	625	1,085	2,328
DCOs	78	...	1	14	1	26	6	4	1	24
% of otherwise eligible cases	0.7	...	1.2	3.1	0.2	0.5	0.7	0.6	0.1	1.0
Breast cancer										
Eligible cases + DCOs	11,086	217	66	466	346	5,726	583	551	1,203	1,909
DCOs	78	...	0	10	1	38	3	1	0	25
% of otherwise eligible cases	0.7	...	0.0	2.1	0.3	0.7	0.5	0.2	0.0	1.3
Colorectal cancer										
Eligible cases + DCOs	10,017	280	89	508	372	5,234	599	454	883	1,585
DCOs	154	...	1	28	2	64	12	8	1	38
% of otherwise eligible cases	1.5	...	1.1	5.5	0.5	1.2	2.0	1.8	0.1	2.4
Lung cancer										
Eligible cases + DCOs	11,235	186	65	590	441	5,990	617	517	983	1,813
DCOs	453	...	2	87	2	160	29	23	2	147
% of otherwise eligible cases	4.0	...	3.1	14.7	0.5	2.7	4.7	4.4	0.2	8.1

Data source: *Canadian Cancer Registry*
Note: *Yukon and Northwest Territories not displayed because of small numbers.*
*† Calculated as death certificate only cases (DCOs) * 100 / (eligible cases + DCOs)*
‡ Excluding Québec
§ Could not have any DCO cases as the province did not use information from their vital statistics registries to update their data.
... Not applicable

Table C
Estimating intervals

	Interval between Event 2 and Event 1
Date event 1 **Date event 2**	**d1/m1/y1** **d2/m2/y2**
If both dates complete:	Interval = d2/m2/y2 – d1/m1/y1
If d1 missing, all others complete:	
If m1 = m2 and y1 = y2	Interval = ½ (d2/m2/y2 – 1/m1/y1)
Else	Interval = d2/m2/y2 – z/m1/y1
If d1 and d2 missing:	
If m1 = m2 and y1 = y2	Interval = 8
Else	Interval = z/m2/y2 – z/m1/y1
If d2 missing:	
If m1 = m2 and y1 = y2	Interval = ½ (x/m2/y2 – d1/m1/y1)
Else	Interval = z/m2/y2 – d1/m1/y1
If d1 and m1 missing:	
y1 = y2	Interval = ½ (d2/m2/y2 – 1/1/y1)
y1 < y2	Interval = d2/m2/y2 – 2/7/y1
If d2 and m2 missing:	
y1 = y2	Interval = ½ (31/12/y2 – d1/m1/y1)
y1 < y2	Interval = 2/7/y2 – d1/m1/y1
If m1, d1, and d2 missing:	
y1 = y2	Interval = ½ (z/m2/y2 - 1/1/y1)
y1 < y2	Interval = z/m2/y2 - 2/7/y1
If m2, d2, and d1 missing:	
y1 = y2	Interval = ½ (31/12/y2 - z/m1/y1)
y1 < y2	Interval = 2/7/y2 - z/m1/y1
If m1, d1, m2, d2 missing:	
y1 = y2	Interval = 91
y1 < y2	Interval = 365*(y2-y1)

Notes: *Calculated survival time should be rounded to the nearest integer value where applicable. Where x = 28, 29, 30, or 31 depending on the month and z = 16 (or 15 if February).*

Table D
Standard age populations

Cancer site	Number of cases
Prostate	
15-54	242
55-64	1,947
65-74	4,752
75-84	3,585
85-99	763
Breast	
15-39	663
40-49	1,947
50-59	2,107
60-69	2,749
70-79	2,405
80-99	1,137
Colorectal	
15-49	786
50-59	1,379
60-69	2,774
70-79	3,062
80-99	1,862
Lung	
15-49	811
50-59	1,725
60-69	3,755
70-79	3,338
80-99	1,153

Data source: *Canadian Cancer Registry (after exclusions)*

Table E

Non-standardized five-year relative survival rates for prostate, breast, colorectal and lung cancer cases diagnosed in 1992, ages 15 to 99, by sex and province

Cancer site	Men: Relative survival rate	Men: 95% confidence interval	Men: Number of cases	Men: Number of deaths†	Cancer site	Women: Relative survival rate	Women: 95% confidence interval	Women: Number of cases	Women: Number of deaths†
	%					%			
Prostate					**Breast**				
Newfoundland	72	58, 81	133	65	Newfoundland	78	71, 84	217	64
Nova Scotia	84	77, 89	445	172	Nova Scotia	86	81, 89	456	110
New Brunswick	87	80, 92	408	145	New Brunswick	78	73, 83	345	102
Ontario	87	85, 88	5,363	1,889	Ontario	82	81, 83	5,688	1,468
Manitoba	86	82, 90	842	314	Manitoba	80	76, 84	580	176
Saskatchewan	85	80, 89	621	230	Saskatchewan	84	79, 87	550	147
Alberta	84	80, 87	1,084	405	Alberta	81	78, 83	1,203	307
British Columbia	93	91, 95	2,304	669	British Columbia	85	83, 87	1,884	447
Colorectal					**Colorectal**				
Newfoundland	60	50, 69	145	75	Newfoundland	58	49, 67	135	66
Nova Scotia	56	48, 64	237	135	Nova Scotia	58	50, 65	243	128
New Brunswick	52	43, 60	192	111	New Brunswick	56	46, 64	178	99
Ontario	56	53, 58	2,831	1,564	Ontario	58	56, 61	2,339	1,191
Manitoba	55	48, 62	303	170	Manitoba	60	53, 67	284	139
Saskatchewan	55	47, 62	256	144	Saskatchewan	67	58, 75	190	87
Alberta	54	49, 59	503	283	Alberta	55	49, 61	379	204
British Columbia	61	57, 65	842	426	British Columbia	62	58, 66	705	335
Lung					**Lung**				
Newfoundland	14	8, 22	136	121	Newfoundland	17	8, 29	50	42
Nova Scotia	14	10, 19	334	297	Nova Scotia	17	11, 23	169	143
New Brunswick	15	11, 20	296	259	New Brunswick	11	6, 17	143	129
Ontario	15	14, 16	3,765	3,290	Ontario	19	17, 21	2,065	1,714
Manitoba	16	12, 20	371	325	Manitoba	15	11, 21	217	187
Saskatchewan	9	6, 13	320	297	Saskatchewan	18	12, 24	174	146
Alberta	10	8, 13	607	557	Alberta	15	11, 19	374	323
British Columbia	13	11, 16	967	862	British Columbia	16	13, 19	699	598

Data source: *Canadian Cancer Registry*
† Within first five years of follow-up

Appendix B

Five-year relative survival rates, Québec

Five-year relative survival rates for Québec are presented separately because the province's method of ascertaining the date of diagnosis of cancer cases differs sufficiently from that of the other provinces to render Québec data not comparable with those from the other provinces (see *Limitations*).

Non-standardized five-year relative survival rates for prostate, breast, colorectal and lung cancer cases diagnosed in 1992, ages 15 to 99, by sex, Québec

Cancer site	Relative survival rate	95% confidence interval	Number of cases	Number of deaths
	%			
Prostate	88	85, 90	2,702	953
Breast	82	80, 83	3,579	931
Colorectal				
Men	61	58, 63	1,698	869
Women	61	58, 64	1,619	782
Lung				
Men	23	22, 25	2,545	2,050
Women	26	23, 29	1,203	919

Data source: *Canadian Cancer Registry*

The same exclusion criteria employed in this report (see *Analytical techniques*) were also used for Québec. Information about whether a patient had been diagnosed with a primary invasive tumour before 1992 was obtained directly from the Québec cancer registry. All cases had both the birth and death year recorded; one colorectal cancer case whose age at diagnosis was outside the 15-to-99 age parameters was excluded; and no cases were identified through autopsy. Because Québec does not use information from their vital statistics data base to update their cancer registry, there were no exclusions based on cases diagnosed by DCO. There were, however, 2 cases of colorectal cancer and 11 of lung cancer excluded because the date of cancer diagnosis was after the date of death.

The Québec cancer registry relies solely on hospital discharge records to identify new cancer cases. Thus, a patient diagnosed with cancer outside of a hospital will not be registered as a new cancer case unless he or she enters a hospital and is discharged with a diagnosis of cancer. It is not possible to determine whether the missed cases differ from those who are registered in terms of their survival, so it is unclear what effect this under-registration of cases has on survival estimates.

One consequence of relying solely on hospital discharge records is that if a patient is admitted to a hospital in Québec, diagnosed with cancer, and dies while still in the hospital, the date of diagnosis is reported as the day of death (date of discharge). Restricting to cases otherwise eligible for the current study, Québec reported 1,357 non-autopsy, non-DCO cancer cases with identical dates of diagnosis and death (94 prostate, 93 breast, 296 colorectal, and 874 lung). Because the dates of diagnosis of these cases were based exclusively on hospital discharge records, the "true" dates of diagnosis were not known. As such, these records were excluded from the analysis. In all other regards, the methods of analysis employed for Québec were the same as those used for the rest of the country (see *Analytical techniques*). ●

Determinants of self-perceived health

Margot Shields and Shahin Shooshtari

Abstract

Objectives

This article examines determinants of self-perceived health. Factors associated with very good/excellent rather than good health are compared with those associated with fair/poor rather than good health.

Data source

The data are from the household cross-sectional and longitudinal components of the first three cycles (1994/95, 1996/97 and 1998/99) of Statistics Canada's National Population Health Survey (NPHS).

Analytical techniques

Cross-tabulations from the 1998/99 NPHS cross-sectional file were used to estimate the prevalence of very good/excellent and fair/poor health by sex and age group. Based on the longitudinal file, predictors of health perceptions in 1998/99 were studied in a multivariate model using generalized logistic regression.

Main results

While physical conditions were strongly related to health perceptions, some lifestyle, socio-economic and psycho-social factors were also statistically significant. Heavy smoking, irregular exercise and overweight were associated with fair/poor health ratings. Unhealthy changes in lifestyle were associated with fair/poor rather than good health. Distress, low self-esteem and low socio-economic status were negatively associated with very good/excellent health.

Key words

health status indicators, health behaviour, functional health, longitudinal studies, health surveys

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A crucial issue for population health surveys is identifying measures that are reliable, valid and straightforward to administer. Self-perceived health meets these criteria. Most surveys that assess health ask respondents for a global evaluation—usually a rating of their health along a four- or five-point scale from poor to excellent.

The reliability of such self-assessments has been found to be as good as or better than measures such as functional ability, chronic diseases and psychological well-being.[1] Relatively high four-week test/re-test reliability measures have been reported across various sub-populations.[1,2] Based on longer periods, self-reported health has been shown to be more stable than physicians' ratings.[3]

Self-perceived health is also strongly correlated with more extensive health scales, such as the Sickness Impact Profile,[4] the Perceived Well-Being Scale,[2] and various sub-scales of the Short Form 36 Health Survey Questionnaire,[5] which indicates a high degree of construct validity. Significant associations with physicians' ratings[3,6] further demonstrate the validity of self-perceived health.

Data source

This analysis is based on Statistics Canada's National Population Health Survey (NPHS). The NPHS, which began in 1994/95, collects information about the health of Canadians every two years. It covers household and institutional residents in all provinces and territories, except persons living on Indian reserves, on Canadian Forces bases, and in some remote areas. The NPHS has a longitudinal and a cross-sectional component.

Cross-sectional sample: The 1994/95 and 1996/97 (cycles 1 and 2) cross-sectional samples are made up of longitudinal respondents and other members of their households, as well as individuals who were selected as part of supplemental samples, or buy-ins, in some provinces. In 1994/95, the large majority of interviews were conducted in person. Most of the 1996/97 interviews were conducted by telephone, and additional respondents for the buy-ins were chosen using the random digit dialling technique. The 1998/99 (cycle 3) cross-sectional sample is made up mostly of longitudinal respondents and their cohabitants. Again, most of the interviews were conducted by telephone. Although no buy-ins were added to the cycle 3 sample, infants born in 1995 or later and immigrants who entered Canada after 1994 were randomly selected and added to keep the sample representative. To replace sample lost to attrition, individuals in dwellings that were part of the original sampling frame but whose household members did not respond in 1994/95 were asked to participate.

NPHS data are stored in two files. The General file contains socio-demographic and some health information obtained for each member of participating households. The Health file contains in-depth health information, which was collected for one randomly selected household member, as well as the information in the General file pertaining to that individual.

In 1994/95, in all selected households, one knowledgeable person provided the socio-demographic and health information about all household members for the General file. As well, one household member, not necessarily the same person, was randomly selected to provide in-depth health information about himself or herself for the Health file.

Among individuals in the longitudinal component in 1996/97 and 1998/99, the person providing in-depth health information about himself or herself for the Health file was the randomly selected person for the household in cycle 1 (1994/95), and was usually the person who provided information on all household members for the General file in cycles 2 and 3, if judged to be knowledgeable to do so. In households added to the 1996/97 cross-sectional sample (buy-ins), one knowledgeable household member—not necessarily the randomly selected respondent for the Health file—provided information for all household members for the General file. For the 1998/99 cross-sectional sample (longitudinal respondents and immigrants, infants, and individuals in households that did not participate in cycle 1), the randomly selected respondent was usually the person who provided information for the General file, again, if judged knowledgeable.

The 1994/95 provincial, non-institutional sample consisted of 27,263 households, of which 88.7% agreed to participate. After the application of a screening rule to maintain the representativeness of the sample, 20,725 households remained in scope. In 18,342 of these households, the selected person was aged 12 or older. Their response rate to the in-depth health questions was 96.1%, or 17,626 respondents.

In 1996/97, the overall response rate at the household level was 82.6%. The response rate for the randomly selected individuals aged 2 or older in these households was 95.6%. In 1998/99, the overall response rate was 88.2% at the household level. The response rate for the randomly selected respondents (aged 0 or older) in these households was 98.5%.

Longitudinal sample: Of the 17,626 randomly selected respondents in 1994/95, 14,786 were eligible members of the longitudinal panel, along with 468 persons for whom only general information was collected. An additional 2,022 of the 2,383 randomly selected respondents under age 12 were also eligible for the longitudinal panel. Thus, 17,276 respondents were eligible for re-interview in 1996/97, and 16,677 were still alive in 1998/99. A response rate of 93.6% was achieved for the longitudinal panel in 1996/97, and a response rate of 88.9%, based on the entire panel, was achieved in 1998/99. Of the 16,168 participants in 1996/97, full information (that is, general and in-depth health information for the first two survey cycles or an outcome of death or institutionalization) was available for 15,670. The corresponding number for 1998/99 was 14,619. More detailed descriptions of the NPHS design, sample, and interview procedures can be found in published reports.[7,8]

The longitudinal sample analyzed in this article consists of 9,371 respondents (3,991 men and 5,380 women) aged 25 or older in 1994/95 who were still residing in households in 1998/99. Every effort is made to collect the in-depth health information for the health component directly from the randomly selected individuals. However, in some cases, proxy responses were accepted. Because this article focuses on factors associated with self-perceived health and many of the variables included in the multivariate model were from multivariate sections of the health component that were skipped for proxy respondents, records for which a proxy response was accepted for this component were excluded. In total, 493 records (5%) were excluded because of a proxy response in one or more of the three NPHS cycles. Records for which proxy responses were accepted for the general component are included, since the information is more objective and can be accurately provided by a knowledgeable household member. The percentage of records included in the analyses for which proxy responses were accepted for the general component is 21% for 1994/95 data, 12% for 1996/97 data, and 9% for 1998/99 data.

When individuals rate their own health, they tap into information that has important prognostic power. Based on findings from longitudinal analyses, it can be concluded that self-perceived health is predictive of chronic disease incidence,[9-12] recovery from illness,[13] functional decline,[9,14-19] and the use of medical services,[20-23] even when more objective health measures are taken into account.

Self-perceived health has also been found to be predictive of mortality.[10,18,21,24-36] Again, the association persists even when measures such as clinical evaluation are considered. This is surprising, as the research was based on populations from different cultures and involved several age groups, and the question wording varied. The robustness of the concept, "self-perceived health," seems to override semantic and translation difficulties.[35]

The reliability, validity and predictive power of self-perceived health suggest that it is important to understand the factors that underlie it. Growing interest is focused on the meaning of self-perceived health; specifically, whether the positive end of the scale is a mirror-image of the negative end, or whether each represents different dimensions. In other words, what are the factors associated with someone evaluating their overall health as better or poorer than "good"?

Earlier research indicates that individuals' ratings of their health are based on more than physical status. People without specific health problems do not automatically rate their health at the top of the scale; many describe it as "good," rather than "very good" or "excellent."[37] Some studies have suggested that poor ratings are primarily related to physical problems, while favourable ratings reflect an expanded view of health.[38-40] Qualitative research has revealed that health perceptions often include factors such as fitness and general well-being.[41-43]

Since it began in 1994/95, the biennial National Population Health Survey (NPHS) has asked respondents: "In general, would you say your health is excellent, very good, good, fair or poor?" With data from the first three NPHS cycles, this analysis examines the determinants of self-perceived health in 1998/99 and whether ratings at the positive and negative ends of the scale are associated with different determinants. Individuals selecting the top two categories (very good/excellent) and those choosing the bottom two (fair/poor) are compared with people at the midpoint (good) (see *Data source* and *Analytical techniques*).

Analytical techniques

Cross-tabulations based on data from the 1998/99 cross-sectional Health file of the National Population Health Survey (NPHS) were used to estimate the prevalence rates of very good/excellent and fair/poor health.

Multiple logistic regression models, based on the longitudinal file, were used to explore the relationship between self-perceived health and various physical, socio-economic, lifestyle, and psycho-social factors. Self-perceived health in 1998/99 (Appendix Table A) was examined in conjunction with these factors at baseline in 1994/95 and with changes in these factors between 1994/95 and 1996/97. Two sets of regressions were fitted separately for men and women. In the first set, factors associated with reporting very good/excellent rather than good health in 1998/99 were examined. In the second set, factors associated with reporting fair/poor rather than good health were examined (based on respondents who reported good or fair or poor health in 1998/99). Sample sizes and distributions for the factors included in the regression models can be found in the Appendix (Tables B through E).

The outcome variables considered in the regression models were dichotomized (very good/excellent versus good health and fair/poor versus good health). All explanatory variables were also treated as dichotomous variables. Some consideration was given to treating the self-esteem and emotional distress scales as continuous variables. When the models were rerun in this way, the conclusions that could be drawn from these analyses were similar to those presented here (data not shown).

Cross-sectional data were weighted to represent the Canadian population in the 10 provinces in 1998/99. Longitudinal estimates were weighted to represent the Canadian population in the 10 provinces in 1994/95. To account for survey design effects, standard errors and coefficients of variation were estimated with the bootstrap technique.[44-46]

Based on the NPHS longitudinal file, for men, the correlation of the five-point self-perceived health scale across survey cycles was 0.55 between 1994/95 and 1996/97, 0.55 between 1996/97 and 1998/99, and 0.49 for the four years between 1994/95 and 1998/99. For women, the corresponding correlations were 0.59, 0.58 and 0.56.

Compared with men, women consider a broader set of factors when making general ratings of health.[47] Women are more likely to consider psychological factors and the presence of non-life-threatening illnesses. Because of the tendency for men and women to include different elements in their health assessments, the analyses in this article were conducted separately for each sex.

Most report very good or excellent health

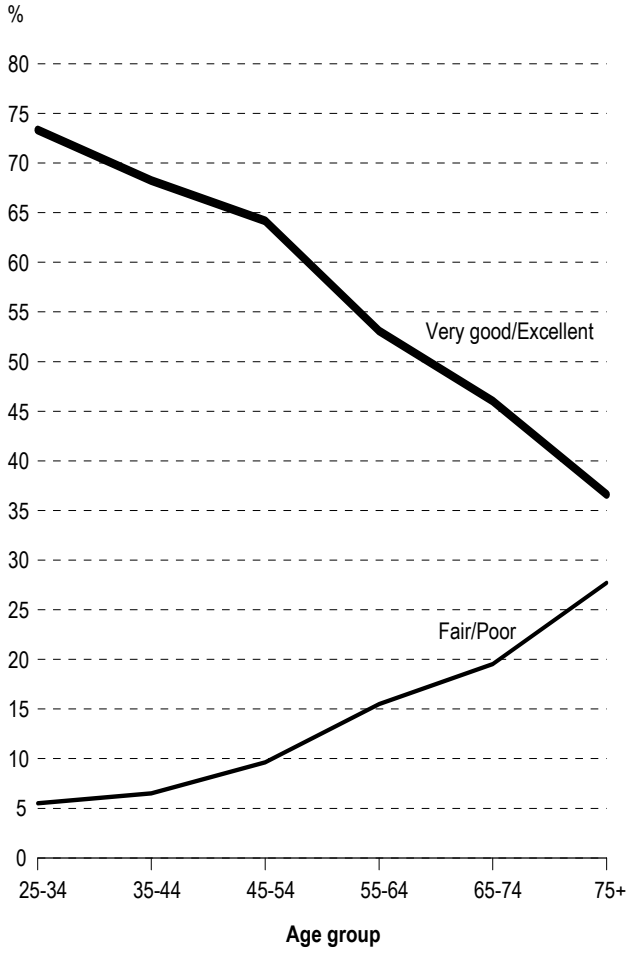
In 1998/99, the majority of Canadians aged 25 or older—62%—reported very good or excellent health. Just 11% reported fair or poor health, and the remaining 27% described their health as good.

Not surprisingly, at older ages the prevalence of very good/excellent health declined, and the prevalence of fair/poor health rose (Chart 1). By age 65, individuals reporting very good/excellent health were in the minority (46% at ages 65 to 74; 37% at age 75 or older). Nonetheless, the percentage of seniors reporting very good/excellent health exceeded the percentage reporting fair/poor health.

Overall, men were more likely than women to describe their health as very good/excellent (63% versus 60%). However, the only age group at which the difference was significant was 45 to 54 (Chart 2). Conversely, a higher percentage of women than men described their health as fair/poor (12% and 10%). This reflected the situation at ages 25 to 34 and 35 to 44, when women were significantly more likely than men to report fair/poor health. At older ages, differences in the percentages of men and women describing their health as fair/poor were not significant.

Less positive perceptions of health are expected at older ages, given that physical problems tend to increase with age. To get a clearer picture of the determinants of self-perceived health, multivariate models that control for age were used. The models also included factors related to functional ability in everyday life.[48,49] Four major groups of variables were considered: physical, socio-economic, lifestyle, and psycho-social.

Chart 1
Prevalence of very good/excellent and fair/poor health, by age group, household population aged 25 or older, Canada excluding territories, 1998/99

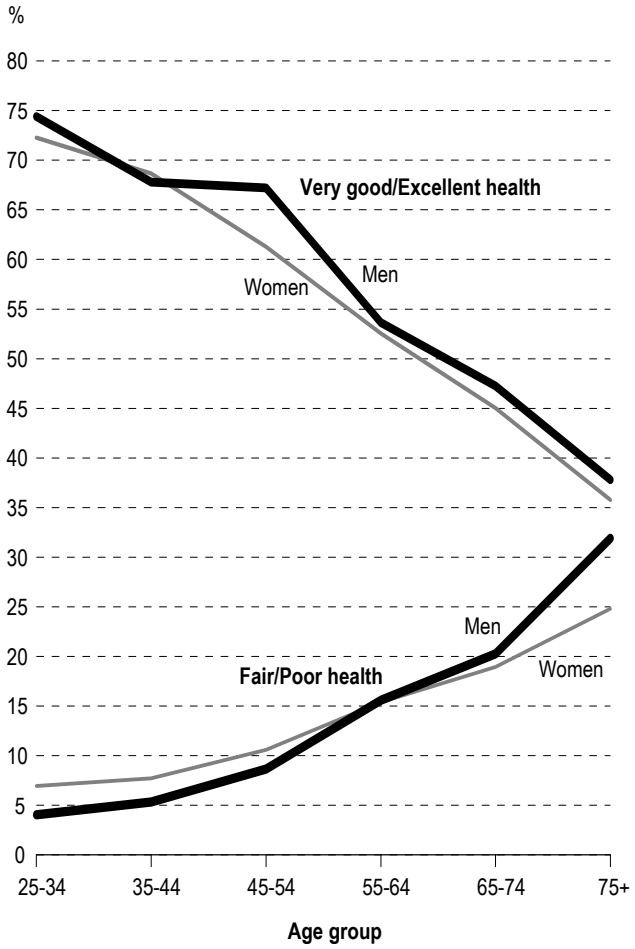


Data source: *1998/99 National Population Health Survey, cross-sectional sample, Health file*
Notes: *The prevalence of very good/excellent health decreases significantly as age increases ($p \leq 0.05$ adjusted for multiple comparisons), with the following exception: no significant difference between age groups 35 to 44 and 45 to 54. The prevalence of fair/poor health increases significantly as age increases ($p \leq 0.05$), with the following exceptions: no significant differences between age groups 25 to 34 and 35 to 44; 55 to 64 and 65 to 74.*

Key age groups

When physical status, socio-economic variables, health behaviours, and psycho-social characteristics in 1994/95 and 1996/97 were taken into consideration, the association between self-perceived health and age in 1998/99 largely disappeared (Tables 1 and 2). This suggests that the association between age and self-perceived health is often not actually attributable to age, but to these other factors.

Chart 2
Prevalence of very good/excellent and fair/poor health, by sex and age group, household population aged 25 or older, Canada excluding territories, 1998/99



Data source: *1998/99 National Population Health Survey, cross-sectional sample, Health file*
Notes: *For age group 45 to 54, the prevalence rate of very good/excellent health is significantly higher ($p \leq 0.05$ adjusted for multiple comparisons) for men. For age groups 25 to 34 and 35 to 44, the prevalence rate of fair/poor health is significantly higher ($p \leq 0.05$ adjusted for multiple comparisons) for women.*

There were, however, exceptions. Men aged 65 to 74 had high odds of reporting fair/poor health, compared with men aged 35 to 44. Women aged 45 to 54 or 65 to 74 had low odds of reporting very good/excellent health, compared with women aged 35 to 44.

The findings for these age groups may partly result from individuals assessing their health in relation to social roles.[50,51] If people feel they are not fulfilling these roles, their health perceptions may be more negative. Changes that occur between ages 65 and 74, such as leaving the labour force, may create more pessimistic perceptions of health. To some degree, the diminished health perceptions of women aged 45 to 54 may be attributable to menopause.

The self-perceived health of people aged 75 or older did not differ significantly from that of 35- to 44-year-olds. Several studies have found that the older elderly often have more favourable health perceptions than do those aged 65 to 74.[52-55] It may be that health expectations are diminished in the later years, and simply surviving to such an age is evidence of at least good, if not very good, health.[56] Another possible explanation is a "healthy survivor" effect. By the time individuals reach their seventies, many of the sick have died or have been institutionalized, and the surviving cohort is more robust and healthy.[57]

Physical status crucial

The ability to carry out daily activities without limitation or dependence on others has been found to be a powerful determinant of self-perceived health.[55,58] This analysis of NPHS data also shows a strong association between functional status and health perceptions (see *Physical health*). Men and women with functional restrictions in 1994/95 had higher odds of reporting fair/poor health in 1998/99, and lower odds of reporting very good/excellent health, compared with people without restrictions (Tables 1 and 2).

Changes in functional status between 1994/95 and 1996/97 were also significant predictors of health perceptions in 1998/99. For both sexes, if functional status declined, the odds of reporting poor/fair health were high, and for men, the odds of reporting very/good excellent health were low. Conversely, if functional status improved, the odds of reporting poor/fair health were low for both sexes, and for the men, the odds of reporting very good/excellent health were high.

Chronic conditions were important influences on health perceptions at the positive end of the scale. Men and women with two or more chronic conditions in 1994/95 had lower odds of reporting very good/excellent health in 1998/99 than did those who did not have chronic conditions. By

Table 1

Adjusted odds ratios relating selected characteristics to very good/excellent and fair/poor versus good health in 1998/99, male household population aged 25 or older in 1994/95, Canada excluding territories

	Very good/ Excellent versus good health			Fair/Poor versus good health		
	Odds ratio	95% confidence interval		Odds ratio	95% confidence interval	
Age 1994/95						
25-34	1.2	0.9,	1.6	0.7	0.3,	1.6
35-44†	1.0	…		1.0	…	
45-54	1.1	0.8,	1.6	1.9	0.9,	3.7
55-64	0.7	0.5,	1.0	1.3	0.7,	2.7
65-74	1.0	0.6,	1.6	2.5*	1.2,	5.1
75+	0.6	0.3,	1.2	1.4	0.6,	3.5
Physical health						
Functional status 1994/95						
Restricted	0.3**	0.2,	0.5	4.6**	2.6,	8.2
No restrictions†	1.0	…		1.0	…	
Change in functional status						
Decline	0.5**	0.3,	0.8	2.9**	1.6,	5.0
Improvement	1.8*	1.1,	3.0	0.3**	0.2,	0.6
No change†	1.0	…		1.0	…	
Chronic conditions 1994/95						
None†	1.0	…		1.0	…	
One	0.8	0.6,	1.0	1.2	0.7,	1.9
Two+	0.6**	0.4,	0.8	1.3	0.7,	2.2
New chronic condition(s)‡	0.7*	0.6,	1.0	1.6*	1.0,	2.5
Pain 1994/95						
Moderate/Severe	0.8	0.5,	1.3	1.4	0.8,	2.6
Mild or no pain†	1.0	…		1.0	…	
Change in pain level						
Increase	0.5**	0.4,	0.8	1.1	0.6,	1.9
Decrease	1.1	0.7,	1.8	1.1	0.6,	2.1
No change†	1.0	…		1.0	…	
Premature death of parent‡	0.9	0.7,	1.2	1.1	0.7,	1.9
Socio-economic factors						
Education 1994/95						
Less than secondary graduation	0.8	0.6,	1.1	1.6*	1.0,	2.5
Secondary graduation or more†	1.0	…		1.0	…	
Household income 1994/95						
Lowest/Lower-middle/Middle	0.9	0.7,	1.1	1.5	1.0,	2.4
Upper-middle/Highest†	1.0	…		1.0	…	
Marital status 1994/95						
Married†	1.0	…		1.0	…	
Never married	1.1	0.8,	1.5	0.6	0.3,	1.2
Previously married	0.9	0.7,	1.2	1.0	0.6,	1.7
Health behaviours						
Smoking 1994/95						
Heavy smoker	0.5**	0.4,	0.7	0.7	0.3,	1.3
Light smoker	0.9	0.6,	1.3	0.5	0.2,	1.3
Former daily smoker	0.9	0.7,	1.2	0.7	0.4,	1.1
Never smoked daily†	1.0	…		1.0	…	
Change in smoking						
Decrease	0.8	0.5,	1.2	0.8	0.4,	1.6
Increase	0.8	0.5,	1.2	2.9*	1.2,	6.7
No change†	1.0	…		1.0	…	
Type of drinker 1994/95						
Weekly	1.1	0.9,	1.5	0.5*	0.3,	0.9
Former	1.3	0.9,	1.9	1.0	0.5,	1.8
Less than weekly/Abstainer†	1.0	…		1.0	…	
New weekly drinker‡	1.0	0.7,	1.5	0.5	0.2,	1.4
Physical activity 1994/95						
Regular†	1.0	…		1.0	…	
Occasional/Infrequent	0.7*	0.6,	0.9	1.3	0.8,	2.2
Change in physical activity						
Increase	1.2	0.9,	1.7	0.6	0.3,	1.0
Decrease	1.0	0.8,	1.3	0.9	0.5,	1.4
No change†	1.0	…		1.0	…	
Weight 1994/95						
Underweight	0.5	0.2,	1.1	1.0	0.3,	3.3
Acceptable†	1.0	…		1.0	…	
Some excess	1.0	0.8,	1.4	0.6	0.3,	1.2
Overweight	0.7*	0.6,	1.0	1.1	0.6,	1.9
Unhealthy weight gain‡	0.9	0.6,	1.2	0.9	0.4,	2.1
Psycho-social factors						
Low emotional support 1994/95‡	0.8	0.5,	1.2	1.0	0.4,	2.1
Change in emotional support						
Increase	1.2	0.7,	1.9	1.3	0.5,	3.2
Decrease	0.8	0.6,	1.1	0.5*	0.3,	1.0
No change†	1.0	…		1.0	…	
Distress 1994/95						
High	1.1	0.7,	1.7	1.7	0.8,	3.9
Low/Moderate†	1.0	…		1.0	…	
Change in distress						
Increase	1.0	0.6,	1.5	2.1*	1.0,	4.2
Decrease	0.9	0.6,	1.3	0.6	0.2,	1.3
No change†	1.0	…		1.0	…	
Low self-esteem 1994/95‡	0.6*	0.4,	1.0	1.4	0.8,	2.5

Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, longitudinal sample, Health file*

Notes: *The model for fair/poor health is based on 1,460 male respondents (413 reported fair/poor health; 1,047 reported good health). The model for very good/excellent health is based on 3,412 male respondents (2,365 reported very good/excellent health; 1,047 reported good health). Because of missing values, 92 respondents were dropped from the fair/poor model (40 reported fair/poor health; 52 reported good health) and 126 from the very good/excellent model (74 reported excellent/very good health; 52 reported good health). "Missing" categories for the household income and weight variables were included in the models to maximize sample sizes; however, their odds ratios are not shown. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant. Variables relating to change (for example, physical activity, chronic conditions) refer to changes between 1994/95 and 1996/97.*

† Reference category, for which odds ratio is always 1.0

‡ Reference category is absence of characteristic.

** $p < 0.05$*

*** $p < 0.01$*

… Not applicable

Table 2

Adjusted odds ratios relating selected characteristics to very good/excellent and fair/poor versus good health in 1998/99, female household population aged 25 or older in 1994/95, Canada excluding territories

	Very good/ Excellent versus good health			Fair/Poor versus good health		
	Odds ratio	95% confidence interval		Odds ratio	95% confidence interval	
Age 1994/95						
25-34	1.3	1.0,	1.7	1.0	0.6,	1.7
35-44†	1.0	…		1.0	…	
45-54	0.7*	0.6,	1.0	1.4	0.8,	2.4
55-64	0.9	0.7,	1.2	1.2	0.7,	1.8
65-74	0.6**	0.4,	0.8	1.1	0.6,	1.9
75+	0.8	0.5,	1.3	1.1	0.6,	2.0
Physical health						
Functional status 1994/95						
Restricted	0.5**	0.4,	0.8	2.3**	1.5,	3.3
No restrictions†	1.0	…		1.0	…	
Change in functional status						
Decline	0.7	0.5,	1.0	1.7*	1.1,	2.4
Improvement	1.1	0.7,	1.8	0.4**	0.3,	0.7
No change†	1.0	…		1.0	…	
Chronic conditions 1994/95						
None†	1.0	…		1.0	…	
One	0.7**	0.6,	0.9	1.0	0.7,	1.6
Two+	0.5**	0.4,	0.6	1.5	1.0,	2.4
New chronic condition(s)‡	0.7**	0.6,	0.9	1.7**	1.2,	2.2
Pain 1994/95						
Moderate/Severe	0.5**	0.4,	0.8	1.7*	1.1,	2.7
Mild or no pain†	1.0	…		1.0	…	
Change in pain level						
Increase	0.6*	0.4,	0.9	1.3	0.8,	2.0
Decrease	1.1	0.8,	1.6	0.9	0.5,	1.4
No change†	1.0	…		1.0	…	
Premature death of parent‡	1.1	0.9,	1.4	1.4*	1.0,	2.0
Socio-economic factors						
Education 1994/95						
Less than secondary graduation	0.8*	0.6,	1.0	1.3	1.0,	1.9
Secondary graduation or more†	1.0	…		1.0	…	
Household income 1994/95						
Lowest/Lower-middle/Middle	0.7**	0.6,	0.8	1.4*	1.0,	2.1
Upper-middle/Highest†	1.0	…		1.0	…	
Marital status 1994/95						
Married†	1.0	…		1.0	…	
Never married	0.9	0.7,	1.2	1.8	0.9,	3.7
Previously married	1.2	0.9,	1.6	1.3	0.9,	1.8
Health behaviours						
Smoking 1994/95						
Heavy smoker	0.6*	0.5,	0.9	1.2	0.7,	1.9
Light smoker	0.9	0.6,	1.3	0.8	0.5,	1.4
Former daily smoker	1.0	0.8,	1.2	0.8	0.6,	1.2
Never smoked daily†	1.0	…		1.0	…	
Change in smoking						
Decrease	1.0	0.6,	1.5	1.2	0.7,	2.0
Increase	1.2	0.8,	1.9	1.6	0.8,	3.2
No change†	1.0	…		1.0	…	
Type of drinker 1994/95						
Weekly	1.3*	1.0,	1.6	0.6*	0.4,	1.0
Former	1.1	0.8,	1.4	1.1	0.8,	1.6
Less than weekly/Abstainer†	1.0	…		1.0	…	
New weekly drinker‡	1.3	0.9,	1.9	1.1	0.6,	2.1
Physical activity 1994/95						
Regular†	1.0	…		1.0	…	
Occasional/Infrequent	0.7**	0.5,	0.9	1.2	0.8,	1.7
Change in physical activity						
Increase	1.1	0.9,	1.5	0.9	0.5,	1.4
Decrease	1.0	0.8,	1.3	1.5*	1.0,	2.3
No change†	1.0	…		1.0	…	
Weight 1994/95						
Underweight	0.8	0.6,	1.2	1.2	0.7,	2.0
Acceptable weight†	1.0	…		1.0	…	
Some excess weight	0.8	0.6,	1.1	1.2	0.8,	2.0
Overweight	0.6**	0.5,	0.7	1.2	0.8,	1.8
Unhealthy weight gain‡	0.8	0.6,	1.2	1.6*	1.0,	2.6
Psycho-social factors						
Low emotional support 1994/95‡	1.2	0.7,	2.1	1.6	1.0,	2.7
Change in emotional support						
Increase	1.0	0.6,	1.8	0.6	0.3,	1.2
Decrease	0.8	0.6,	1.2	0.8	0.5,	1.3
No change†	1.0	…		1.0	…	
Distress 1994/95						
High	0.7*	0.5,	1.0	1.7*	1.1,	2.6
Low/Moderate†	1.0	…		1.0	…	
Change in distress						
Increase	0.6*	0.4,	0.9	1.3	0.8,	2.1
Decrease	1.0	0.7,	1.4	1.0	0.6,	1.5
No change†	1.0	…		1.0	…	
Low self-esteem 1994/95‡	0.6**	0.5,	0.9	1.5*	1.1,	2.2

Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, longitudinal sample, Health file*

Notes: *The model for fair/poor health is based on 2,118 female respondents (655 reported fair/poor health; 1,463 reported good health). The model for very good/excellent health is based on 4,541 female respondents (3,078 reported very good/excellent health; 1,463 reported good health). Because of missing values, 118 respondents were dropped from the fair/poor model (50 reported fair/poor health; 68 reported good health) and 134 from the very good/excellent model (66 reported very good/excellent health; 68 reported good health). "Missing" categories for the household income and weight variables were included in the models to maximize sample sizes; however, their odds ratios are not shown. Because of rounding, some confidence intervals with 1.0 as the upper/lower limit were significant. Variables relating to change (for example, physical activity, chronic conditions) refer to changes between 1994/95 and 1996/97.*

† Reference category, for which odds ratio is always 1.0

‡ Reference category is absence of characteristic.

** $p < 0.05$*

*** $p < 0.01$*

… Not applicable

Physical health

Questions on activity limitation and activity dependency were used to define *functional status*. If respondents indicated that, because of a long-term physical or mental condition or health problem (one that had lasted or was expected to last six months or more), they were limited in the kind or amount of activity they could do at home, at school, at work or in other venues, they were considered to have an activity limitation. If respondents indicated that, because of health reasons, they required help preparing meals, shopping for groceries or other necessities, doing everyday housework, moving about inside the house, or in personal care such as washing, dressing or eating, they were classified as being activity dependent. Respondents were categorized as being functionally restricted in 1994/95 if they reported an activity limitation and/or activity dependency.

To assess change in functional status, respondents were assigned to one of the following three categories in 1994/95 and 1996/97: activity dependent, activity limited but not dependent, or free of activity limitation and dependency. Respondents were assessed as having an improvement if they moved up a value in this three-point scale by 1996/97, and as having a decline if they moved down.

To determine the presence of *chronic conditions*, respondents were asked if they had "any long-term health conditions that have lasted or are expected to last six months or more that have been diagnosed by a health professional." A checklist of conditions was read to them. Conditions considered in this analysis were: asthma, arthritis or rheumatism, back problems (excluding arthritis), high blood pressure, migraine, chronic bronchitis or emphysema, diabetes, epilepsy, heart disease, cancer, stomach or intestinal ulcers, the effects of stroke, urinary incontinence, Alzheimer's disease, cataracts, and glaucoma. Respondents were classified as having none, one, or two or more of these conditions in 1994/95. Respondents were classified as having a new chronic condition if they reported at least one condition from the checklist in 1996/97 that they had not reported in 1994/95.

Pain was assessed by asking, "Are you usually free from pain or discomfort?" Those who answered "no" were asked to rank their usual pain intensity as mild, moderate or severe. Pain level in 1994/95 was classified as "mild or no pain" versus "moderate or severe pain." A change in pain level between 1994/95 and 1996/97 was defined as an increase or decrease.

Premature death of parent was assessed by asking respondents if their biological parents were still alive. If either parent was no longer living, the age at death was asked. If either parent had died before age 65, the respondent was classified as having had a parent die prematurely. These questions on family history were asked in 1998/99.

contrast, the odds that men and women with chronic conditions in 1994/95 would report fair/poor health in 1998/99 were not significantly different from the odds for people who did not have chronic conditions. However, a newly diagnosed chronic condition was associated with high odds of fair/poor perceptions of health and low odds of very good/excellent perceptions.

Pain was linked to self-perceived health independent of functional status and chronic conditions, although the association was present more consistently for women. Moderate or severe pain in 1994/95 increased the odds that women would report fair/poor health and decreased the odds that they would report very good/excellent health in 1998/99, compared with women who were free of pain or had only mild pain. For men, pain in 1994/95 was a not a significant predictor of perceived health in 1998/99. But for both sexes, increased pain between 1994/95 and 1996/97 was associated with lower odds of reporting very good/excellent health in 1998/99. By contrast, a decrease in pain was not associated with health perceptions.

Parents' longevity

The link between self-perceived health and mortality may derive not only from one's own health, but also from the knowledge of familial risk factors.[27,35] According to the NPHS, this was the case for women. Those who had a biological parent die before age 65 had high odds of reporting fair/poor health, compared with women whose parents were still living or who had been at least 65 when they died. For men, there was no association between health perceptions and parents' longevity.

Socio-economic status

Abundant evidence shows that people with higher socio-economic status report better health than do those at lower levels. Similarly, in this analysis, even

when other factors were taken into account, the relationship between socio-economic status and health perceptions persisted (see *Socio-economic factors*). Men who had not completed secondary school had high odds of reporting fair/poor health, compared with those who had more education. Women who had not completed secondary school had low odds of reporting very good/excellent health. As well, women in lower-income households had high odds of reporting fair/poor health and low odds of reporting very good/excellent health, compared with those in more affluent households. Marital status was not significantly associated with health perceptions for either sex.

Socio-economic factors

Respondents were grouped into two *education* categories based on the highest level attained as of 1994/95: less than secondary graduation or secondary graduation or more.

Household 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 1994/95 interview.

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 1994/95, respondents were asked their *marital status*. Those who indicated "now married," "common-law" or "living with a partner" were grouped as "married." Individuals who answered "single" were classified as "never married." "Widowed," "separated" and "divorced" were combined into "previously married."

Tied to lifestyle

Exercise, maintaining a healthy weight, and refraining from smoking have been shown to positively affect health perceptions.[38,39,42,51,54,59-64] Studies have also suggested that such factors are more likely to be associated with the upper than the lower end of the self-perceived health scale.[38,39,42] It may be that a view of health encompassing lifestyle is possible only in the absence of poor physical health.[39] NPHS results support the notion that health behaviours are important in perceptions at the positive end of the scale. But health behaviours, particularly changes in them, are also linked to negative health perceptions (see *Health behaviours*).

Men and women who were heavy cigarette smokers in 1994/95 had reduced odds of reporting very good/excellent health in 1998/99, compared with those who had never smoked daily. Similarly, people who were overweight in 1994/95 had reduced odds of reporting very good/excellent health, compared with those whose weight was in the acceptable range. The same was true for people who engaged in physical activity occasionally or infrequently, compared with those who did so regularly. These relationships did not prevail at the fair/poor end of the self-perceived health scale.

Some unhealthy lifestyle changes were related to perceptions of fair/poor health. Men who reported increased cigarette consumption had close to three times the odds of reporting fair/poor health in 1998/99, compared with men whose consumption did not change. For women, both an unhealthy weight gain and a reduction in physical activity increased the odds of reporting fair/poor health. However, neither men's nor women's health perceptions were affected by improved health behaviour, specifically, decreased cigarette consumption or increased physical activity.

While heavy drinking is known to adversely affect health, moderate alcohol consumption may have some beneficial effects.[65-67] A study based on data

Health behaviours

Respondents were classified into four groups based on their *smoking* status in 1994/95. Those who usually smoked 20 or more cigarettes a day were defined as heavy smokers. Daily smokers who smoked less than 20 cigarettes a day were classified as light smokers. Former daily smokers were those who had smoked daily at some point in the past, but not at the time of their interview. The last group comprised those who never smoked daily.

Respondents were classified as having a change in smoking status if they increased or reduced consumption. An increase means they smoked cigarettes daily in 1996/97 but not in 1994/95, or they were daily smokers in both surveys and the number of cigarettes smoked per day increased by three or more (a pack a week). Respondents were classified as having a decrease if they were daily smokers in 1994/95 but no longer smoked daily in 1996/97, or if the number of cigarettes smoked per day decreased by three or more. Non-smokers in 1994/95 and 1996/97 were included in the no-change group.

To establish *type of drinker* in 1994/95, respondents were asked, "During the past 12 months, how often did you drink alcoholic beverages?" Individuals were categorized as being weekly drinkers, former drinkers (those who did not drink in the past 12 months, but did drink at some point in the past) or occasional drinkers/abstainers (less than once a week or never drank). A new weekly drinker was someone who drank on a weekly basis in 1996/97, but had not done so in 1994/95.

Physical activity in 1994/95 was based on the number of times in the previous three months that respondents had participated in leisure-time physical activity lasting more than 15 minutes. Monthly frequency was derived as the number of times in the past three months divided by 3. Respondents were classified as regular if the number of times per month was 12 or more; occasional if the number was 4 to 11, and infrequent if the number was 3 or less. Respondents were classified as having a change in physical activity between 1994/95 and 1996/97 if they moved up or down between these three levels.

The *Canadian Guidelines for Healthy Weights* use body mass index (BMI) to determine an acceptable range of *weights* and to identify excess weight and underweight.[70] BMI is calculated by dividing weight in kilograms by the square of height in metres. Four weight categories were identified in 1994/95: underweight (BMI less than 20); acceptable weight (20 to less than 25); some excess weight (25 to 27); and overweight (greater than 27). Respondents were classified as having an unhealthy weight gain between 1994/95 and 1996/97 if they moved from underweight or acceptable weight to some excess weight or overweight, or if they moved from some excess weight to overweight. Respondents who were pregnant were excluded from BMI measures.

from Finland[68] found that sub-optimal health ratings were most likely among heavy drinkers and abstainers and least likely among moderate drinkers. (In this analysis of NPHS data, small sample sizes prohibited considering heavy drinkers as a separate group.) According to the NPHS, men and women who were weekly drinkers in 1994/95 had lower odds of reporting fair/poor health in 1998/99, compared with those who were lifetime abstainers or who drank, but less than once a week. As well, women who were weekly drinkers in 1994/95 had high odds of reporting very good/excellent health in 1998/99.

Psychological well-being plays a role

Consistent with other research,[12,15,26,51,61,69] NPHS findings indicate that psychological factors play a role in health perceptions (see *Psycho-social factors*). Men and women categorized as having low self-esteem in 1994/95 had low odds of reporting very good/excellent health in 1998/99, compared with people whose self-esteem was not low. For women, self-esteem was also significant at the negative end of the scale—those with low self-esteem in 1994/95 had increased odds of reporting fair/poor health four years later.

Among women, feelings of distress in 1994/95 were associated with high odds of fair/poor health and low odds of very good/excellent health in 1998/99. For men, distress in 1994/95 was not significantly related to health perceptions in 1998/99. However, men who experienced an increase in distress had high odds of reporting fair/poor health in 1998/99. And for women, an increase in distress reduced the odds of reporting very good/excellent health. On the other hand, a decrease in

Psycho-social factors

Four "yes/no" questions were used to measure *emotional support* in 1994/95:

- Do you have someone you can talk to about your private feelings or concerns?
- Do you have someone you can really count on in a crisis situation?
- Do you have someone you can really count on to give you advice when you are making important personal decisions?
- Do you have someone who makes you feel loved and cared for?

If the answer to any of these questions was "no" in 1994/95, the respondent was classified as having low emotional support. Respondents were classified as having a change in emotional support between 1994/95 and 1996/97 if the number of "no" responses increased or decreased.

Distress in 1994/95 was based on responses to the following questions:

- During the past month, about how often did you feel so sad that nothing could cheer you up?
- During the past month, how often did you feel
  ... nervous?
  ... restless or fidgety?
  ... hopeless?
  ... worthless?
- During the past month how often did you feel that everything was an effort?

Each question was answered on a five-point scale: "all of the time" (score 4), "most of the time" (3), "some of the time" (2), "a little of the time" (1) or "none of the time" (0). Responses to all items were scored and summed; the possible range of scores was 0 to 24, with a higher score indicating more distress. Respondents scoring 7 or more in 1994/95 (an average score of more than 1 per item) were categorized as a having high distress. The average score was 3.5, with a standard deviation of 3.4. Based on the 1994/95 cross-sectional file, high distress scores made up 16% of the weighted distribution. Respondents were classified as having a change in distress if their overall score went up or down by 4 or more points between 1994/95 and 1996/97 (an increase or decrease of more than one standard deviation).

Self-esteem in 1994/95 was defined using six items. Respondents answered the following questions on a five-point scale: "strongly disagree" (score 0), "disagree" (1), "neither agree nor disagree" (2), "agree" (3) or "strongly agree" (4).

- You feel that you have a number of good qualities.
- You feel that you're a person worth at least equal to others.
- You are able to do things at least as well as most other people.
- You take a positive attitude towards yourself.
- On the whole, you are satisfied with yourself.
- All in all, you're inclined to feel you're a failure (reverse scale on this item.)

Respondents scoring 17 or less were considered to have low self-esteem (an average score per item of less than 3). Low self-esteem scores made up 13% of the weighted distribution based on the 1994/95 cross-sectional file.

distress had no significant association with self-perceived health for either sex.

Although some research has found a link between emotional support and health,[71-73] in this analysis, low emotional support in 1994/95 was not significantly linked to health perceptions in 1998/99. This may, in part, result from the limited scope of the NPHS questions (see *Limitations*). A rather unexpected finding was that men who experienced a decrease in emotional support between 1994/95 and 1996/97 actually had lower odds of reporting fair/poor health in 1998/99, compared with men who did not experience such a decrease. A possible explanation may lie in the relationship with marital status. The loss of a spouse through divorce, separation or death was related to a decrease in emotional support (data not shown). If the decline in emotional support was associated with such a loss, self-perceived health may have improved because the stressful period surrounding the marital break-up or death was over. Sample sizes, however, were not large enough to consider loss of spouse as factor in the multivariate analysis.

Concluding remarks

Findings from the National Population Health Survey indicate that although physical factors were significantly related to self-perceived health, so were health behaviours, psycho-social characteristics and socio-economic status. Some variables affected

perceptions at only one end of the self-perceived health scale, while others were "double-risk" factors, in that they were significantly associated with both positive and negative perceptions (Table 3). Moreover, what was significant for one sex was not necessarily significant for the other.

Not surprisingly, several aspects of physical health were important double-risk factors. For both sexes, restricted functional status at baseline was associated with low odds of reporting very good/excellent health and high odds of reporting fair/poor health. Diagnosis of a new chronic condition between 1994/95 and 1996/97 had the same effect on health perceptions.

Two other physical health variables were double-risk factors only for men. A decline in functional status lowered men's odds of reporting very good/excellent health and raised the odds of reporting fair/poor health; an improvement in functional status had the opposite effect. For women, but not men, moderate or severe pain was a double-risk factor.

While men's double-risk factors had to do solely with physical health, this was not the case for women. Relatively low household income, low self-esteem and high distress were double-risk factors for women. As well, women who were weekly drinkers had high odds of reporting very good/excellent

Limitations

This analysis explores factors associated with opposite ends of the self-perceived health spectrum (very good/excellent and fair/poor) versus the mid-point (good). Further insights might have been gained by making more detailed comparisons across the five-point scale. For example, are the factors associated with fair versus good ratings the same as those associated with poor versus good ratings? Small sample sizes prohibited analysis at this level of detail.

Despite efforts to maximize response, some members selected for the longitudinal panel in 1994/95 did not respond in subsequent survey cycles (1996/97 and/or 1998/99), and were not included in this analysis. Adjustments to survey weights were applied to people who responded in all three cycles (continuers) to compensate for those who did not respond (dropouts).[8] Although this weight adjustment reduced the bias among continuers for many NPHS variables, it is possible that some bias may still exist.

National Population Health Survey data are self- or proxy-reported by a knowledgeable household member. Cases for which a proxy reporter provided the health component data were excluded from this analysis (see *Methods*). Exclusion of these cases may have weakened or distorted some associations. Individuals whose health component data were provided by proxy tended to be less healthy, since proxy responses for this component were only accepted if the selected respondent was unable to answer because of special circumstances such as a medical problem.

Cases where the responses to the general component component of the questionnaire were provided by a proxy reporter were included in this analysis, and the degree to which they are inaccurate because of reporting error is unknown. For example, the incidence of chronic conditions may be affected by the use of proxy responses.[74] At the same time, self-reported data may not be accurate, since the responses were not verified by an independent source. For example, it is not possible to know if respondents who reported a diagnosed chronic condition had actually received a professional diagnosis.

Respondents may give socially desirable answers to questions on issues such as smoking, alcohol consumption and weight. For instance, in exploring the relationship between alcohol consumption and self-perceived health, it was not possible to consider heavy drinkers as a separate group because of small sample size. This may, in part, have resulted from some individuals underestimating their alcohol consumption. As well, self-reported height and weight (used to calculate body mass index) may underestimate the prevalence of overweight.[75,76] Inaccurate self-reporting of height is particularly common among the elderly, who frequently experience the loss of height that occurs with aging.[76] Such individuals often cite their height as measured in their younger years. As a result, BMI for the elderly may be more prone to underestimation.

It was not possible to consider changes in self-esteem between 1994/95 and 1996/97 in relation to self-perceived health, since self-esteem questions were not asked in 1996/97.

The data on emotional support were limited, because just four "yes/no" questions were asked. Consequently, the range of scores was restricted, and this may have affected the relationship between emotional support and self-reported health.

Finally, it is possible that factors related to self-reported health that were not included in this analysis may have confounded some of the associations that were found. For example, an individual with undiagnosed heart disease may not feel up to engaging in physical activity. In such a case, the relationship between self-reported health and exercise levels may have resulted from the confounding factor.

Table 3
Summary of significant odds ratios relating selected characteristics to very good/excellent and fair/poor versus good health in 1998/99, by sex, household population aged 25 or older in 1994/95, Canada excluding territories

	Men		Women	
	Very good/ Excellent health	Fair/ Poor health	Very good/ Excellent health	Fair/ Poor health
Age 1994/95				
45-54			–	
65-74		+	–	
Physical health				
Functional restriction 1994/95	–	+	–	+
Decline in functional status†	–	+		+
Improved functional status†	+	–		–
Chronic conditions				
One			–	
Two+	–		–	
New chronic conditions(s)†	–	+	–	+
Moderate/Severe pain 1994/95			–	+
Increased pain†	–		–	
Premature death of parent				+
Socio-economic factors				
Less than high school graduation 1994/95		+	–	
Low/Lower-middle/Middle household income 1994/95			–	+
Health behaviours				
Heavy smoker 1994/95	–		–	
Increased smoking†		+		
Weekly drinker		–	+	–
Occasional/Infrequent physical activity 1994/95	–		–	
Decreased physical activity†				+
Overweight 1994/95	–		–	
Unhealthy weight gain†				+
Psycho-social factors				
Decreased emotional support†		–		
High distress 1994/95			–	+
Increased distress†		+	–	
Low self-esteem 1994/95	–		–	+

Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, Longitudinal sample, Health file*
Notes: *Summary of significant odds ratios presented in Tables 1 and 2;* **+** *indicates odds ratio significantly higher than 1, and* **–** *indicates odds ratio significantly lower than 1 ($p < 0.05$)*
† Between 1994/95 and 1996/97
Represents double-risk factor.

health and low odds of reporting fair/poor health. This supports other research suggesting that women take account of a broader range of items than do men when they assess their health.[47]

Of course, this is not to say that socio-economic status, psycho-social characteristics and lifestyle were significant for only women's health perceptions. For instance, among men, having less than secondary school graduation, an increase in distress, and an increase in smoking were associated with high odds of reporting fair/poor health. And for both sexes, heavy smoking, physical inactivity and being overweight significantly reduced the odds of reporting very good/excellent health.

Notable among the factors related to self-perceived health were those that involved change. When people rate their health, they think not only of their current situation, but also of trajectories—declines and improvements.[35] This analysis indicates that change—in physical status, lifestyle, psycho-social factors, or even being in an age group associated with change—was important.

This analysis emphasizes the complexity of an individual's assessment of his or her health. The links between health perceptions and psychological factors suggest that such ratings encompass both the mind and the body. The links with lifestyle suggest that health perceptions have a normative component (an awareness of how one "should" behave to be "healthy"), particularly for women. And even when the effects of physical health, psycho-social characteristics and lifestyle were considered, the socio-economic gradient did not disappear.

Understanding the determinants of self-perceived health may reveal its predictive power and provide relevant information for health promotion practices. Self-perceived health may also be an underexploited source of information for clinicians. When individuals rate their health, they consider a wide spectrum of factors, some of which may not be easily detected by health care professionals. ●

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Appendix

Table A
Distribution of levels of self-perceived health in 1998/99, by sex, household population aged 25 or older in 1994/95, Canada excluding territories

	Men			Women		
	Sample size	Estimated population		Sample size	Estimated population	
		'000	%		'000	%
Total	**3,991**	**7,832**	**100.0**	**5,380**	**8,812**	**100.0**
Very good/Excellent	2,439	4,983	63.6	3,144	5,246	59.5
Good	1,099	2,065	26.4	1,531	2,552	29.0
Fair/Poor	453	785	10.0	705	1,013	11.5

Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, longitudinal sample, Health file*
Note: *Because of rounding, detail may not add to totals.*

Table B
Distribution of age and physical health factors, by sex, household population aged 25 or older in 1994/95, Canada excluding territories

	Men			Women		
	Sample size	Estimated population		Sample size	Estimated population	
		'000	%		'000	%
Total	**3,991**	**7,832**	**100.0**	**5,380**	**8,812**	**100.0**
Age 1994/95						
25-34	995	2,068	26.4	1,317	2,247	25.5
35-44	1,027	2,279	29.1	1,230	2,377	27.0
45-54	799	1,580	20.2	896	1,549	17.6
55-64	536	976	12.5	790	1,240	14.1
65-75	459	675	8.6	717	974	11.1
75+	175	254	3.2	430	426	4.8
Functional status 1994/95						
Restricted	685	1,165	14.9	1,149	1,666	18.9
No restrictions	3,305	6,664	85.1	4,231	7,146	81.1
Missing	1	--	--	0	--	--
Change in functional status						
Decline	326	630	8.0	539	798	9.1
Improvement	330	561	7.2	517	775	8.8
No change	3,322	6,617	84.5	4,305	7,219	81.9
Missing	13	--	--	19	20†	0.2†
Chronic conditions 1994/95						
None	2,221	4,610	58.9	2,620	4,640	52.7
One	1,080	2,085	26.6	1,417	2,300	26.1
Two+	683	1,124	14.3	1,339	1,868	21.2
Missing	7	--	--	4	--	--
New chronic condition(s)						
None	2,959	5,841	74.6	3,773	6,260	71.0
One+	1,015	1,954	25.0	1,587	2,528	28.7
Missing	17	37†	0.5†	20	25†	0.3†
Pain 1994/95						
Moderate/Severe	428	807	10.3	805	1,332	15.1
Mild or no pain	3,545	6,989	89.2	4,559	7,440	84.4
Missing	18	37†	0.5†	16	40†	0.5†
Change in pain level						
Increase	292	557	7.1	462	691	7.8
Decrease	387	722	9.2	667	1,151	13.1
No change	3,292	6,504	83.0	4,234	6,928	78.6
Missing	20	49†	0.6†	17	42†	0.5†
Premature death of parent						
Yes	990	1,940	24.8	1,512	2,449	27.8
No	2,994	5,868	74.9	3,861	6,345	72.0
Missing	7	--	--	7	--	--

Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, longitudinal sample, Health file*
Notes: *Because of rounding, detail may not add to totals. Variables relating to change refer to changes between 1994/95 and 1996/97.*
† Coefficient of variation between 25.1% and 33.3%
-- Sample too small to provide reliable estimate

Table C
Distribution of socio-economic factors, by sex, household population aged 25 or older in 1994/95, Canada excluding territories

	Men			Women		
	Sample size	Estimated population		Sample size	Estimated population	
		'000	%		'000	%
Total	**3,991**	**7,832**	**100.0**	**5,380**	**8,812**	**100.0**
Education 1994/95						
Less than secondary graduation	1,121	1,810	23.1	1,514	2,158	24.5
Secondary graduation or more	2,862	6,004	76.7	3,859	6,640	75.4
Missing	8	--	--	7	--	--
Household income 1994/95						
Lowest/Lower-middle/Middle	1,734	3,011	38.4	2,822	4,068	46.2
Upper-middle/Highest	2,092	4,450	56.8	2,354	4,366	49.6
Missing	165	371	4.7	204	377	4.3
Marital status 1994/95						
Married	2,756	5,980	76.3	3,201	6,146	69.7
Never married	689	1,177	15.0	624	872	9.9
Previously married	546	676	8.6	1,555	1,794	20.4

Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, longitudinal sample, Health file*
Note: *Because of rounding, detail may not add to totals.*
-- Sample too small to provide reliable estimate

Table D
Distribution of health behaviours, by sex, household population aged 25 or older in 1994/95, Canada excluding territories

	Men			Women		
	Sample size	Estimated population		Sample size	Estimated population	
		'000	%		'000	%
Total	**3,991**	**7,832**	**100.0**	**5,380**	**8,812**	**100.0**
Smoking 1994/95						
Heavy smoker	752	1,372	17.5	629	1,001	11.4
Light smoker	411	794	10.1	684	1,060	12.0
Former daily smoker	1,390	2,601	33.2	1,368	2,144	24.3
Never smoked daily	1,434	3,052	39.0	2,693	4,594	52.1
Missing	4	--	--	6	--	--
Change in smoking						
Decrease	439	789	10.1	515	801	9.1
Increase	331	654	8.4	367	592	6.7
No change	3,212	6,366	81.3	4,485	7,396	83.9
Missing	9	--	--	13	--	--
Type of drinker 1994/95						
Weekly	2,003	4,055	51.8	1,341	2,347	26.6
Former	494	789	10.1	847	1,288	14.6
Less than weekly/ Abstainer	1,485	2,968	37.9	3,189	5,169	58.7
Missing	9	--	--	3	--	--
New weekly drinker						
Yes	324	672	8.6	314	580	6.6
No	3,646	7,109	90.8	5,047	8,190	92.9
Missing	21	51‡	0.6‡	19	43‡	0.5‡
Physical activity 1994/95						
Regular	2,114	4,148	53.0	2,838	4,498	51.0
Occasional or infrequent	1,860	3,652	46.6	2,528	4,293	48.7
Missing	17	32‡	0.4‡	14	20‡	0.2‡
Change in physical activity						
Increase	896	1,878	24.0	1,259	2,165	24.6
Decrease	801	1,534	19.6	1,028	1,661	18.8
No change	2,271	4,375	55.9	3,072	4,951	56.2
Missing	23	45‡	0.6‡	21	35‡	0.4‡
Weight 1994/95†						
Underweight	97	209	2.7	509	923	10.7
Acceptable	1,369	2,846	36.3	2,320	3,842	44.5
Some excess	1,014	1,926	24.6	799	1,287	14.9
Overweight	1,489	2,795	35.7	1,568	2,424	28.1
Missing	22	56‡	0.7‡	88	164	1.9
Unhealthy weight gain†						
Yes	484	949	12.1	493	805	9.5
No	3,448	6,761	86.3	4,537	7,382	86.9
Missing	59	122§	1.6§	178	310	3.6

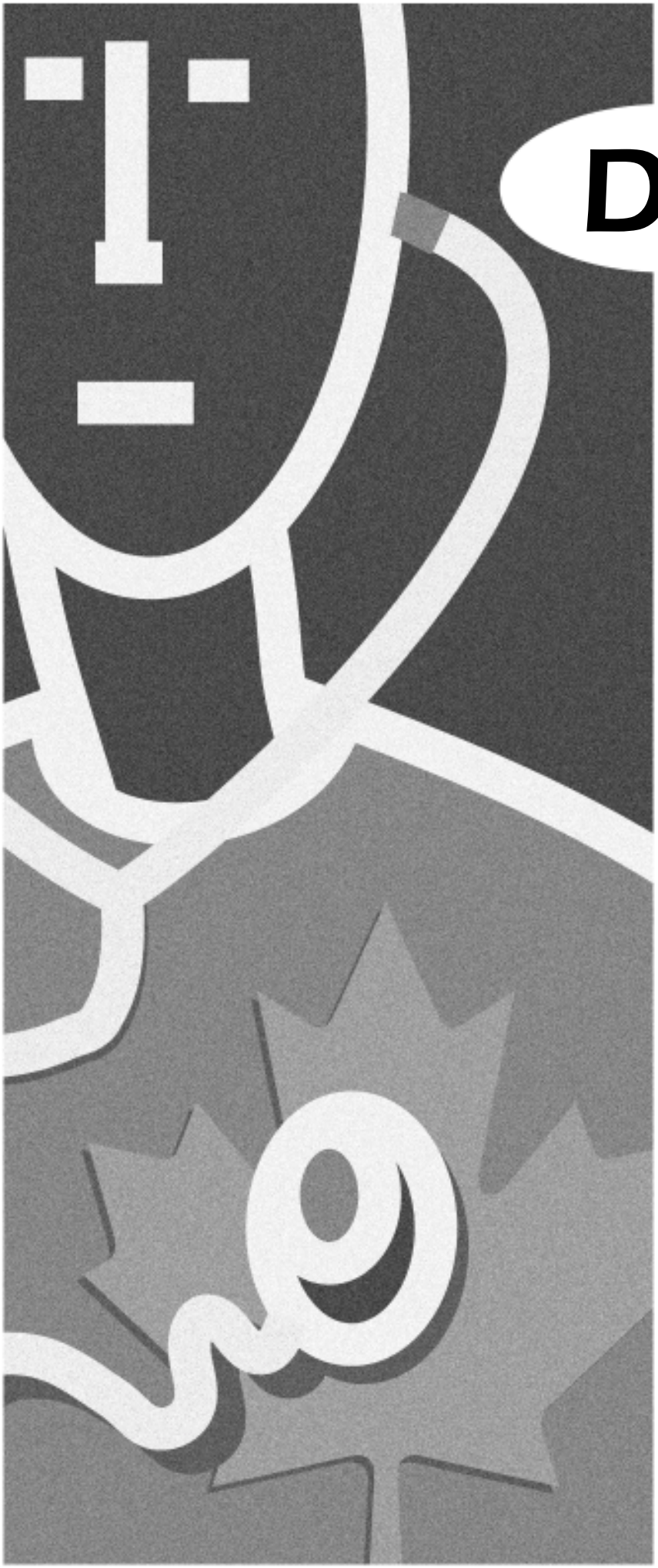
Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, longitudinal sample, Health file*
Notes: *Because of rounding, detail may not add to totals. Variables relating to change refer to changes between 1994/95 and 1996/97.*
† Excluding pregnant women.
‡ Coefficient of variation between 25.1% and 33.3%
§Coefficient of variation between 16.6% and 25%
-- Sample too small to provide reliable estimate

Table E

Distribution of psycho-social factors by sex, household population aged 25 or older in 1994/95, Canada excluding territories

	Men			Women		
	Sample size	Estimated population		Sample size	Estimated population	
		'000	%		'000	%
Total	**3,991**	**7,832**	**100.0**	**5,380**	**8,812**	**100.0**
Low emotional support 1994/95						
Yes	814	1,587	20.3	781	1,326	15.1
No	3,128	6,152	78.5	4,557	7,415	84.2
Missing	49	93†	1.2†	42	70 †	0.8†
Change in emotional support						
Increase	541	1,069	13.6	562	991	11.3
Decrease	462	884	11.3	426	736	8.4
No change	2,910	5,720	73.0	4,319	6,961	79.0
Missing	78	160	2.0	73	124	1.4
Distress 1994/95						
High	402	780	10.0	838	1,420	16.1
Low/Moderate	3,546	6,959	88.9	4,498	7,301	82.9
Missing	43	93†	1.2†	44	91 †	1.0†
Change in distress						
Increase	258	552	7.0	426	699	7.9
Decrease	506	973	12.4	759	1,295	14.7
No change	3,157	6,145	78.5	4,116	6,676	75.8
Missing	70	162	2.1	79	142	1.6
Low self-esteem 1994/95						
Yes	405	740	9.4	722	1,115	12.7
No	3,551	7,020	89.6	4,618	7,609	86.3
Missing	35	72†	0.9†	40	88 †	1.0†

Data source: *1994/95, 1996/97 and 1998/99 National Population Health Survey, longitudinal sample, Health file*
Notes: *Because of rounding, detail may not add to totals. Variables relating to change refer to changes between 1994/95 and 1996/97.*
† Coefficient of variation between 16.6% and 25%



Data Releases

Synopses of recent health information produced by Statistics Canada

Mental health statistics, 1998/99

In 1998/99, the rate at which patients were discharged from general and psychiatric hospitals for mental disorders was 639 discharges per 100,000 population. This represents a decline of 6% from the previous year, and is well below the 25-year high of 894 discharges per 100,000 in 1973. While most provinces and territories followed the national trend, Newfoundland, Prince Edward Island and the Yukon reported slightly higher discharge rates in 1998/99. The continuing decline is largely due to greater emphasis on treating mental disorders in hospital outpatient and community clinics, and the transfer of long-term care patients to residential care facilities.

Patients spent 8.7 million days in hospital for treatment of mental disorders in 1998/99, down from 10.6 million the previous year. Psychiatric hospitals recorded the most notable decline, down 1.6 million days from 1998/99. Most provinces/territories reported decreases; the exceptions were Prince Edward Island, British Columbia and the Northwest Territories.

Hospitals reported 193,869 discharges related to mental disorders in 1998/99. General hospitals accounted for 87% of these; psychiatric hospitals the remainder. Psychiatric hospitals, which tend to treat patients with more serious disorders requiring longer stays, reported an average length of stay of 197 days. This was significantly longer than the average of 22 days for a mental disorder in general hospitals. However, the average length of stay in general hospitals for all causes of hospitalization—cancer, diabetes, and heart disease, for example—was 8.6 days.

These statistics are based on counts of hospital discharges, not patients. Therefore, a patient admitted and discharged more than once during the reporting year would be counted as a discharge each time.

For more information, or to enquire about the concepts, methods or data quality, contact Karen McCarthy (613-241-7860, ext. 4026; fax: 613-241-8120), Canadian Institute for Health Information. For information before 1994/95, contact the Client Custom Services Unit (613-951-1746), Health Statistics Division, Statistics Canada.

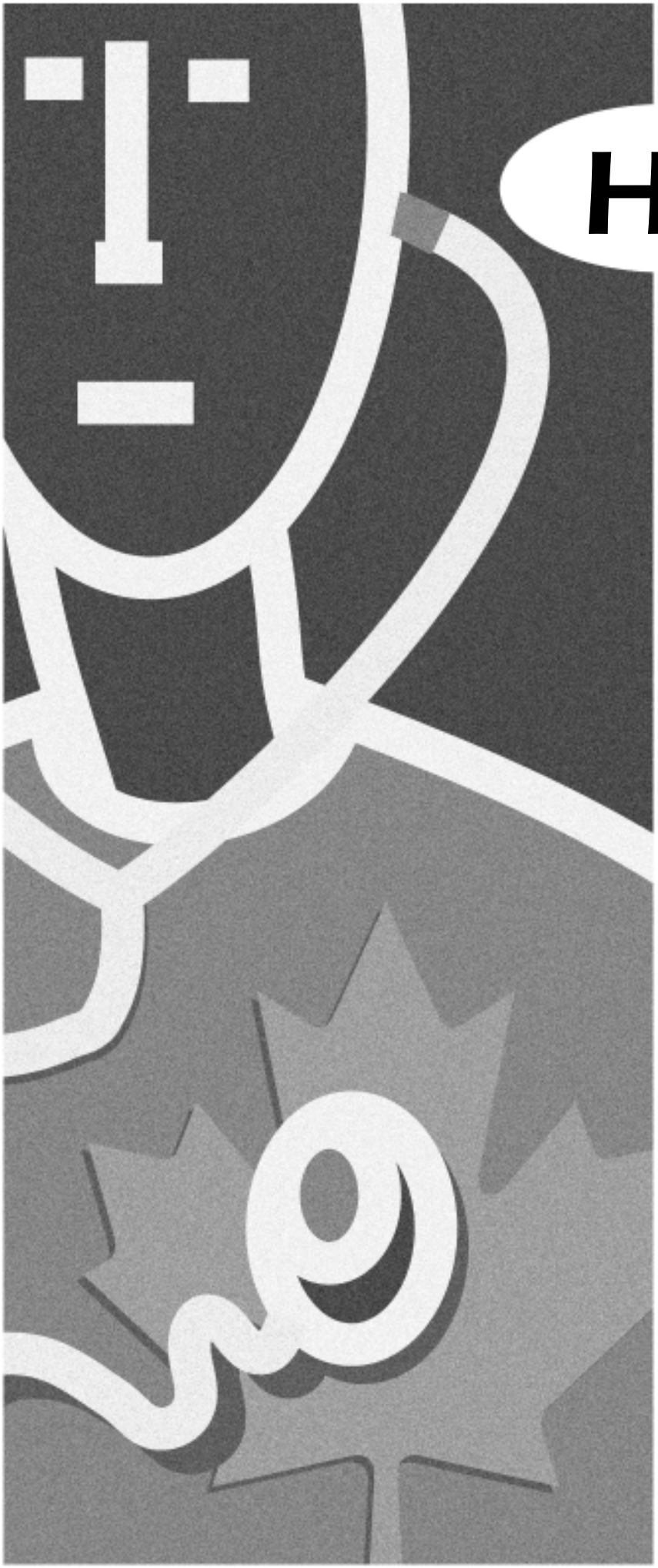
Health Indicators 2, 2001

The second version of *Health Indicators*, a Web-based data publication produced by Statistics Canada and the Canadian Institute for Health Information, is now available. This set of indicators, which is based on standard definitions and methods, was designed to provide comparable information at the national, provincial/territorial and health region levels.

Four types of indicators are presented: health status (including health conditions, mortality rates and measures of well-being); non-medical determinants (socio-economic characteristics and health behaviours); health system performance (measures of accessibility, appropriateness and effectiveness of health care services); and community and health system characteristics (contextual information).

Health Indicators, Volume 2001, Number 2 (82-221-XIE) contains all highlights and data tables from Volume 2001, Number 1, as well as three additional tables on mammography screening, influenza immunization, and breastfeeding. Age-standardized mortality rates by selected causes and sex for Canada, the provinces, and health regions, and age-standardized cancer incidence rates by primary site and sex for Canada, the provinces and selected health regions are also included.

Health Indicators is available free on Statistics Canada's Web site: www.statcan.ca. For more information, contact Jason Gilmore (613-951-7118; jason.gilmore@statcan.ca), Health Statistics Division, Statistics Canada, or Karen McCarthy (613-241-7860), Canadian Institute for Health Information. ●



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	· subscription · single issue	82-003-XIE	Internet	$ 44 $ 15
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Cancer Record, Newsletter for Cancer Registries in Canada		82F0081XIB	Internet	Free
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The Changing Face of Heart Disease and Stroke in Canada		82F0076XIE	Internet	Free
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Registered Nurses Management Data 1998, Shelf Table *(This shelf table can be ordered through the Client Custom Services Unit.)*	83F0005XPB	Paper	$ 25
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National Population Health Survey public-use microdata files		Product number	Format	Price (CAN$)†‡
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Custom tables	Household	82C0013	Price varies with information requirements	
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Canadian Community Health Survey (CCHS)

A new survey, the Canadian Community Health Survey (CCHS), is being conducted by Statistics Canada to provide regular and timely cross-sectional estimates of health determinants, health status and health system utilization for 132 health regions across the country.

For more information about this survey, visit our web site at http://www. statcan.ca, under "Statistical Methods," followed by "New surveys."

National Population Health Survey (NPHS) Questionnaires

- Household
- Institutions
- North

The NPHS questionnaires are downloadable from Statistic Canada's website at http://www.statcan.ca, under "Statistical methods," followed by "Questionnaires" and "National Population Health Survey" (NPHS).

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For more information, visit our web site at http://www.statcan.ca: under "Canadian Statistics," and then click on "Health."

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Statistics Canada, in collaboration with the Social Sciences and Humanities Research Council (SSHRC), has launched an initiative that will help strengthen the country's social research capacity, support policy relevant research, and provide insights on important issues to the Canadian public. The initiative involves the creation of nine research data centres to be hosted at McMaster University in Hamilton, the Université de Montréal, Dalhousie University, and the Universities of Toronto, Waterloo, Calgary, Alberta, New Brunswick (Fredericton), and British Columbia. Prospective researchers who wish to work with data from the surveys must submit project proposals to an adjudicating committee operating under the auspices of SSHRC and Statistics Canada. Approval of proposals will be based on the merit of the research project and on the need to access detailed data. The centres and research projects will be evaluated periodically to assess security standards and the success of analysis resulting from the projects. Researchers will conduct the work under the terms of the *Statistics Act*, as would any other Statistics Canada employee. This means that the centres are protected by a secure access system; that computers containing data will not be linked to external networks; that researchers must swear a legally binding oath to keep all identifiable information confidential; and that the results of their research will be published by Statistics Canada. For more information, contact Garnett Picot (613-951-8214), Business and Labour Market Analysis Division.