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In This Issue

Research Articles

Data Releases

Index

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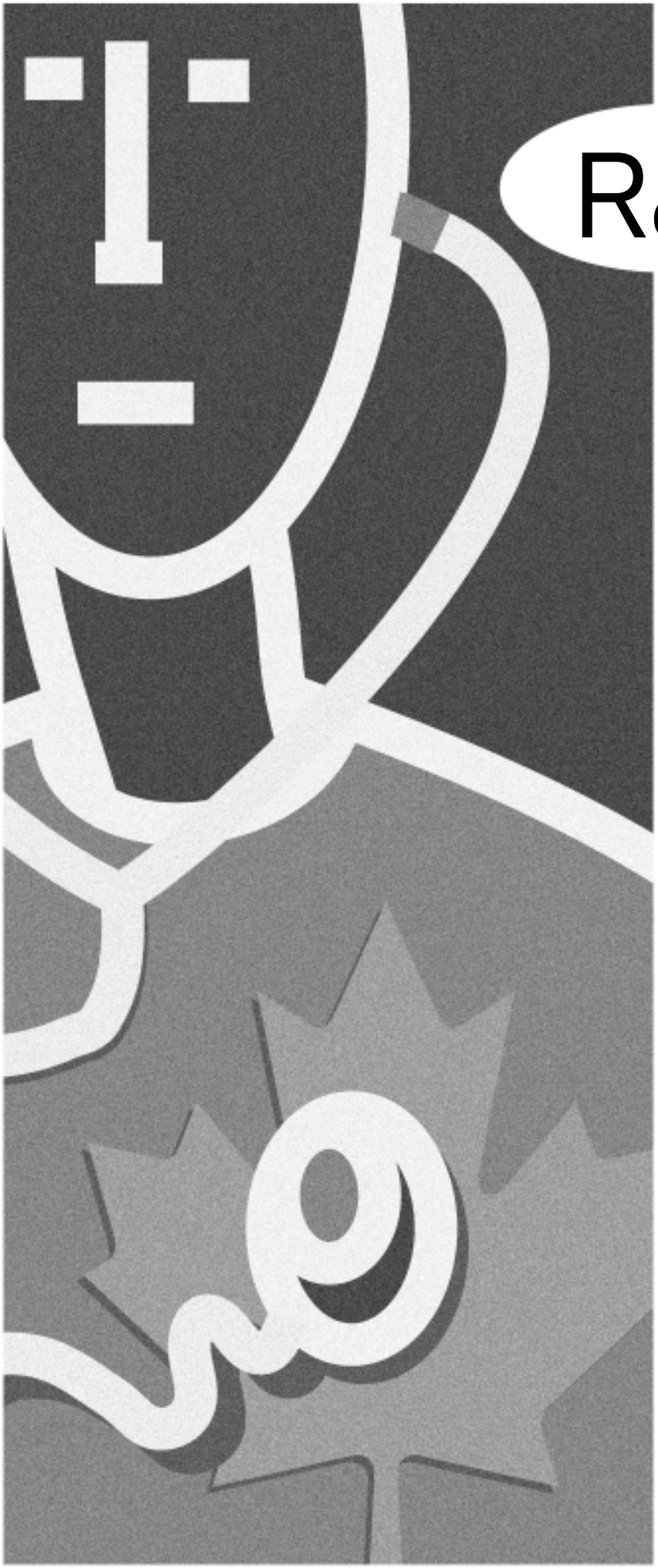

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Are recent cohorts healthier than their predecessors?

Jiajian Chen and Wayne J. Millar

Abstract

Objectives

This article examines changes in the health status of Canadian adults between 1978/79 and 1996/97.

Data sources

Data are from the the Canadian Vital Statistics Data Base, the 1991 General Social Survey, the 1978/79 Canada Health Survey (CHS), and the 1996/97 National Population Health Survey (NPHS).

Analytical techniques

Age-specific mortality rates are presented for 1978 and 1996. The cumulative incidence of heart disease is shown for 1991. Cross-sectional comparisons of prevalence rates for selected chronic conditions, activity limitation, disability days, smoking and overweight are shown for 1978/79 and 1996/97. Multiple logistic regression models were used to test differences in odds ratios for the chronic conditions and for activity limitation between the CHS and the NPHS. SUDAAN, which accounts for the complex survey design, was used to estimate standard errors of the prevalence and of the coefficients in the logistic model.

Main results

Lower mortality rates and lower prevalence of heart disease, high blood pressure, arthritis and activity limitation suggest that recent cohorts are healthier than previous cohorts. When the age effect was controlled along with education and income, the odds of having these conditions were generally lower for each successive cohort, and lower in the mid-1990s than in the late 1970s. However, the odds of having diabetes were higher in 1996/97 than in 1978/79, and higher among more recent cohorts than among earlier cohorts.

Key words

cohort studies, cardiovascular diseases, arthritis, diabetes mellitus, hypertension, limitation of activity

Authors

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In the early decades of the 21st century, baby boomers, the largest birth cohort in Canada's history, will enter their senior years. If they experience the same pattern of disease as previous cohorts, the demand for health care, and consequently, health care expenditures, could rise substantially.[1-3] But if the onset of chronic conditions could be postponed, or even prevented, the prevalence of such conditions and of disability at older ages might be reduced.[4-9] This could be accomplished through healthier lifestyles and environment, combined with regular monitoring of health made possible by accessible health care. Therefore, reductions in health care needs and expenditures are plausible.[9]

This article compares the health status and health behaviours of men and women who were aged 32 to 85 in 1996/97 with that of earlier cohorts who were in the same age range in 1978/79. The purpose is to determine if there is reason to believe that baby boomers will be healthier in old age than previous cohorts.

The term "baby boomer" is applied to the people born from 1947 to 1964, the high-fertility period following World War II. The years since the end of the war have seen

medical and technological advances, public health initiatives in disease prevention, and positive changes in health behaviours that could affect the development of chronic diseases. Recent cohorts may also have had different levels of exposure to environmental risks in early life, compared with the

Data sources

The 1978/79 Canada Health Survey (CHS), conducted by Statistics Canada and Health and Welfare Canada, and the 1996/97 National Population Health Survey (NPHS), conducted by Statistics Canada, are the sources of data on the prevalence of chronic conditions, activity limitation, overweight and smoking, and on the average number of disability days.

The CHS took place from May 1978 through March 1979. The survey covered the non-institutionalized population, excluding residents of the territories, Indian reserves and remote areas. The sample size was 12,218 households. Data were collected with interviewer- and respondent-completed questionnaires (interview component) and with instrumented measures (physical measures component).

The interview component contained three questionnaires: the Household Record Card (HRC), the Interviewer Administered Questionnaire (IAQ) and the Lifestyle and Health Questionnaire (LHQ). The HRC identified the characteristics of the households in the survey and their members. An interviewer collected the IAQ data on self-reported chronic conditions and activity limitation for the entire household from a suitable household member. The LHQ was left for respondent completion and picked up by the interviewer several days later. The LHQ was limited to respondents aged 15 or older.

A subset of households in the interview component was asked to participate in the physical measures component, which was divided into two parts. The first included measurements of blood pressure, cardiorespiratory fitness, height, weight and skinfold of people aged 2 or older. These data were recorded in the Physical Measures Questionnaire (PMQ). The second part involved taking blood samples from people aged 3 or older to determine immune status and biochemical and trace metal levels.

For the interview component, the household response rate for the IAQ was 86% (10,571 households), and 89% (23,791 respondents aged 15 or older) of the IAQ respondents (all ages) responded to the LHQ. For the physical measures component, 72% (6,131 respondents aged 2 or older) of IAQ respondents who were eligible to respond to the PMQ did so. A more detailed description of the survey is available in a published report.[10]

The National Population Health Survey (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 persons living on Indian reserves, on Canadian Force bases, and in some remote areas. The NPHS has both longitudinal and cross-sectional components. Respondents who are part of the longitudinal component will be followed for up to 20 years.

This analysis uses cross-sectional data from cycle 2, conducted in 1996/97. The data pertain to the household population in the 10 provinces.

The 1996/97 cross-sectional sample is made up of longitudinal respondents and respondents who were selected as part of supplemental samples, or buy-ins, in three provinces. The additional respondents for the buy-ins were chosen with the random digit dialing (RDD) technique and were included for cross-sectional purposes only.

Individual data are organized into two files: General and Health. Socio-demographic and some health information (for example, chronic conditions, activity limitation and health care utilization) was obtained for each member of participating households. These data are in the General file. Additional in-depth health information was collected for one randomly selected household member. The in-depth health information, as well as the information on the General file pertaining to that individual, is in the Health file.

In households belonging to the cross-sectional buy-in component, 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 information about his or her own health for the Health file.

In the longitudinal component, persons who were randomly selected to provide in-depth health information about themselves for the Health file in cycle 1 tended to provide information about all other household members for the General file in cycle 2. In addition, the individuals randomly selected for cycle 1 provided follow-up information about their own health in cycle 2.

The 1996/97 cross-sectional household response rate was 83% for the General file, and the selected person response rate was 96% for the Health file. The data used for this analysis were mainly from the General file, except for smoking, height and weight, which were from the Health file. Several published reports contain more detailed descriptions of the NPHS design, sample and interview procedures.[11-13]

The sample sizes for the population analyzed in this article—32- to 85-year-olds—were 14,092 for the CHS and 112, 768 for the NPHS. In the CHS, smoking prevalence was based on a sample of 12,224, and overweight, on a sample of 2,800. The corresponding sample size in the NPHS was 51,163 for both variables.

Data about the age of onset of heart disease were obtained from Statistics Canada's 1991 General Social Survey.[14] This cross-sectional survey covered a sample of 11,924 household residents aged 15 or older. The overall response rate was 80%. The subsample for the survival analysis of the cumulative incidence of heart disease consisted of 9,187 respondents born from 1911 to 1964.

Mortality rates are from the Canadian Vital Statistics Data Base, maintained by Statistics Canada.

cohorts who preceded them. Moreover, a rising share of the Canadian population has attained a postsecondary education, a socioeconomic characteristic that has repeatedly been shown to be associated with better health.[15-18]

This analysis focuses on three age groups: 32 to 49, 50 to 67, and 68 to 85. Corresponding to the 18-year interval between the Canada Health Survey (CHS) and the National Population Health Survey (NPHS), respondents were grouped into four birth cohorts: from 1947 through 1964 (baby boom cohort); from 1929 through 1946 (Depression/World II cohort); from 1911 through 1928 (World War I/Roaring Twenties cohort); and from 1893 through 1910 (Turn-of-the-Century cohort)[2] (Appendix Table A).

The indicators of health status and health behaviours are: age-specific mortality rates; the prevalence of heart disease, high blood pressure, diabetes, arthritis, activity limitation, overweight and smoking; the average number of disability days in the previous year; and the cumulative incidence of heart disease. Mortality rates among people aged 30 to 84 from the Canadian Vital Statistics Data Base are compared for 1978 and 1996. The data on health status are from the 1978/79 CHS and the 1996/97 NPHS (see *Data sources*, *Analytical techniques*, *Definitions*, and *Limitations*). The cumulative incidence of heart disease is calculated from the 1991 General Social Survey.

Mortality down

Between 1978 and 1996, all causes mortality rates for men and women aged 30 to 84 decreased (Chart 1). The decline was more pronounced among men. For instance, at ages 60 to 64, the rate fell from 21 to 14 deaths per 1,000 men in this age range, and at ages 80 to 84, from 110 to 96 deaths per 1,000. Among women, corresponding drops were from 10 to 8 and from 71 to 60 deaths per 1,000.

Much of the decline in age-specific death rates overall was attributable to lower cardiovascular

Analytical techniques

This analysis examines the prevalence of heart disease, high blood pressure, diabetes, arthritis, and activity limitation in each of three age cohorts (32 to 49, 50 to 67, and 68 to 85) in 1978/79 and in 1996/97. The percentages of people in each age cohort who were overweight and who smoked daily, and the average number of disability days they experienced in the previous 12 months are also presented.

Multiple logistic regression models were used to test differences in odds ratios for the health conditions between the Canada Health Survey (CHS) and the National Population Health Survey (NPHS), controlling for age, sex, education and household income simultaneously (see *Definitions*). In the logistic regression, age was a continous variable. The multivariate analysis was based on pooled data from both surveys. The analyses were based on weighted data. The standard errors of prevalence rates and of logistic regression coefficients were estimated with SUDAAN, which uses a Taylor series linearization method to adjust variance estimates to account for the complex survey sample design.[19]

This analysis is a sequential cross-sectional study that tracks different representative samples of a birth cohort over time. (A longitudinal study, by contrast, would follow the same individuals.) For sequential cross-sectional studies, the intervals between the points in time must correspond in years to the intervals used to delineate the birth cohorts. Because the CHS and the NPHS were 18 years apart, the age cohorts each span 18 years (32 to 49, 50 to 67, and 68 to 85).

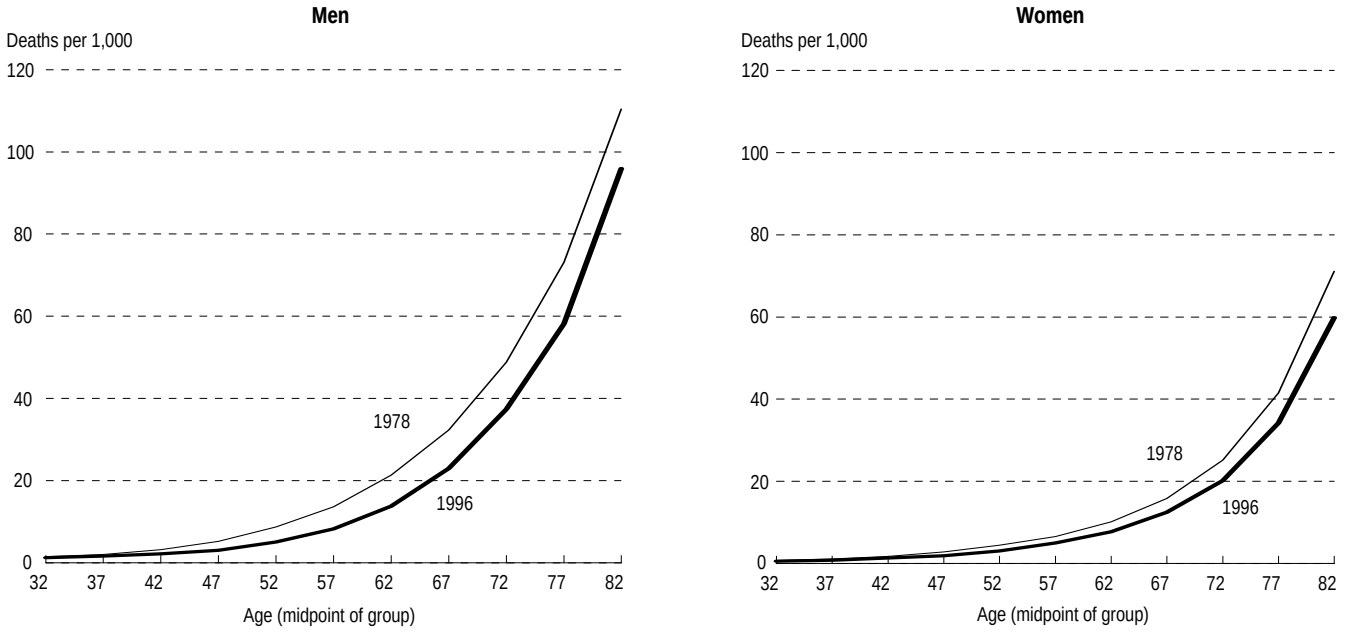
Age effects are produced by influences associated with growing older. *Cohort* effects reflect changes that have occurred and affect successive birth cohorts, such as levels of early life exposure to environmental risk factors and knowledge about health.[20-23] *Period* effects are produced by influences associated with each period of time, regardless of age.[20-24]

The multivariate analysis of the prevalence of health conditions adopted "age-cohort" and "age-period" frameworks to examine changes in cohort health.[25] The data used for this article were limited to comparisons between two points in time 18 years apart to reduce overlapping of cohorts, especially the large baby boom cohort. A shorter time interval and a longer time series would have been preferable. Because of data constraints, the analysis did not attempt to separate period and cohort effects, and interpretations of the results must be viewed as tentative.[25,26]

The cumulative incidence (the proportion of a fixed cohort that experienced the onset of a health-related event during a specified time interval) was estimated by the Kaplan-Meier method. The Lifetest procedure in SAS was used to study the difference in onset of heart disease by cohort.[27] Three cohorts were defined, based on year of birth: 1947 to 1964; 1929 to 1946; and 1911 to 1928.

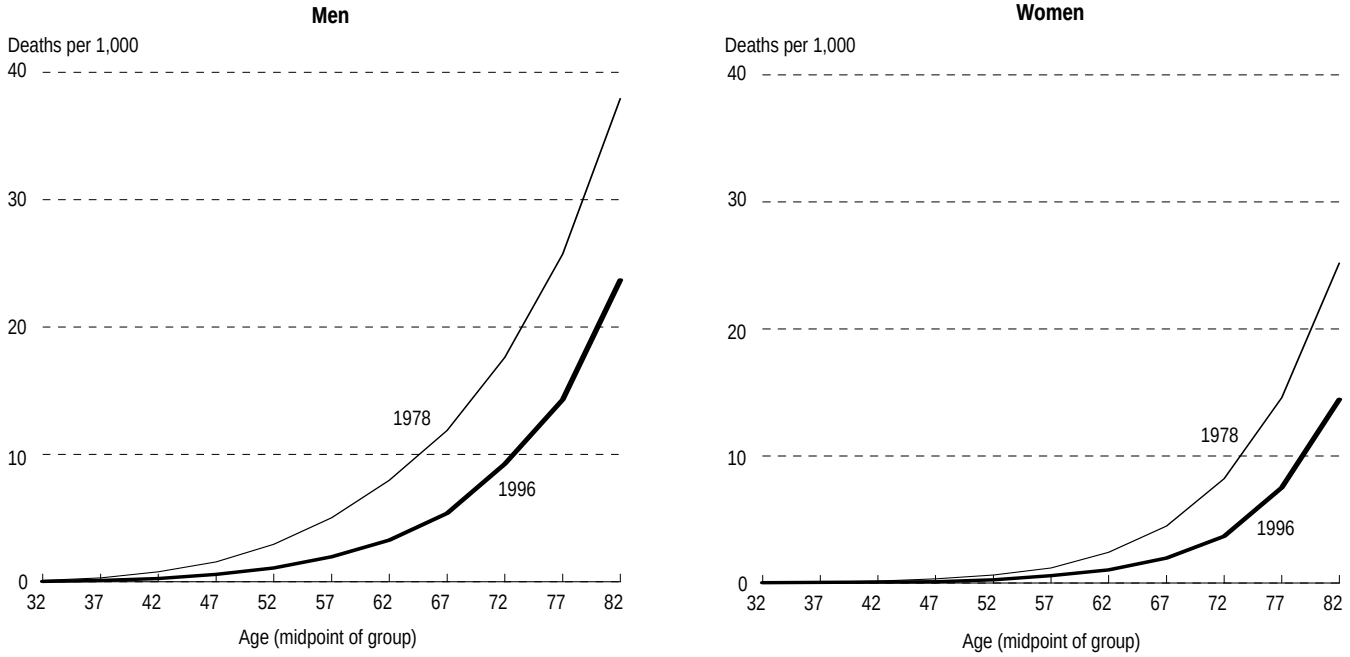
Age-specific mortality rates in 1978 and 1996 were compared for the population aged 30 to 84.

Chart 1
All causes mortality rate, by sex and age, population aged 30 to 84, Canada, 1978 and 1996



Data source: *Canadian Vital Statistics Data Base*

Chart 2
Ischaemic heart disease mortality rate, by sex and age, population aged 30 to 84, Canada, 1978 and 1996



Data source: *Canadian Vital Statistics Data Base*

Table 1
Prevalence of chronic conditions and activity limitation, by sex and age group, household population aged 32 to 85, Canada excluding territories, 1978/79 and 1996/97

	1978/79		1996/97		Difference		
	%	95% CI limits	%	95% CI limits	% point change	95% CI limits	t-value
Men							
Heart disease							
32-49	1.4	±0.6	1.1	±0.2	-0.3	±0.7	-0.85
50-67	10.5	±2.4	8.1	±0.7	-2.5	±2.5	-1.89
68-85	20.4	±3.7	19.8	±1.9	-0.6	±4.1	-0.30
High blood pressure							
32-49	9.7	±2.4	5.0	±0.5	-4.7	±2.4	-3.81*
50-67	21.7	±2.7	18.6	±1.3	-3.2	±3.0	-2.08*
68-85	32.2	±5.9	26.0	±2.1	-6.1	±6.3	-1.92
Diabetes							
32-49	1.1	± 0.5	1.7	±0.3	0.6	±0.5	2.16*
50-67	4.5	±1.2	7.2	±0.8	2.7	±1.4	3.63*
68-85	4.6	±1.7	12.1	±1.6	7.5	±2.4	6.16*
Arthritis							
32-49	6.1	±1.0	5.3	±0.5	-0.8	±1.1	-1.40
50-67	23.6	±2.0	17.3	±1.2	-6.3	±2.3	-5.25*
68-85	32.3	±4.7	30.9	±2.2	-1.3	±5.2	-0.50
Activity limitation							
32-49	8.5	±1.4	8.7	±0.6	0.2	±1.6	0.30
50-67	23.5	±2.6	16.9	±1.0	-6.6	±2.8	-4.64*
68-85	35.6	±3.9	25.2	±1.8	-10.4	±4.3	-4.76*
Women							
Heart disease							
32-49	1.7	±0.5	1.2	±0.2	-0.5	±0.6	-1.84
50-67	8.1	±1.3	5.1	±0.7	-3.0	±1.5	-3.95*
68-85	19.7	±3.7	15.7	±1.4	-4.0	±3.9	-1.98*
High blood pressure							
32-49	8.9	±2.3	4.4	±0.4	-4.4	±2.3	-3.73*
50-67	30.0	±4.2	21.6	±1.4	-8.4	±4.4	-3.73*
68-85	46.3	±4.5	37.2	±2.3	-9.2	±5.0	-3.57*
Diabetes							
32-49	1.1	±0.4	1.9	±0.3	0.8	±0.5	3.07*
50-67	5.0	±1.5	5.4	±0.6	0.4	±1.6	0.48
68-85	8.6	±1.6	9.4	±1.3	0.8	±2.1	0.75
Arthritis							
32-49	13.2	±1.3	9.3	±0.6	-3.9	±1.4	-5.21*
50-67	36.3	±2.2	30.5	±1.4	-5.8	±2.6	-4.42*
68-85	50.9	±4.9	47.2	±2.2	-3.8	±5.3	-1.38
Activity limitation							
32-49	10.5	±1.3	10.6	±0.7	0.0	±1.4	0.03
50-67	22.5	±2.9	17.4	±1.4	-5.1	±3.2	-3.09*
68-85	35.3	±5.1	27.0	±1.9	-8.3	±5.5	-2.97*

Data sources: *1978/79 Canada Health Survey and 1996/97 National Population Health Survey, cross-sectional sample, General file*
Note: *Because of rounding, the percentage-point change may differ slightly from the result that would be obtained using the figures shown in the table.*
** Significantly different from 1978/79, p < 0.05*
CI - confidence interval

disease mortality (data not shown). For one category of cardiovascular disease—ischaemic heart disease—the male mortality rate at ages 60 to 64 fell from 8 to 3 deaths per 1,000, and at ages 80 to 84, from 38 to 24 deaths per 1,000 (Chart 2). Mortality rates were lower among women, but these also declined, from 2 deaths to 1 per 1,000 at ages 60 to 64, and from 25 to 14 deaths per 1,000 at ages 80 to 84.

Decline in heart disease

The drop in cardiovascular disease mortality rates between 1978 and 1996 paralleled a decline in the prevalence of heart disease over the same period (Table 1). At ages 32 to 49, heart disease is relatively uncommon, and the declines in prevalence were not statistically significant. At older ages, declines were more apparent, especially among women. In 1996/97, 5% of women of the Depression/World War II cohort, who were then aged 50 to 67, had heart disease, a substantial and statistically significant drop from 8% for women of the World War I/Roaring Twenties cohort, who had been in the same age range 18 years earlier. And in 1996/97, when

Table 2
Cumulative incidence of heart disease, by sex and birth cohort, household population, Canada excluding territories, 1991

Age of onset	Males born: 1947-1964	Males born: 1929-1946	Males born: 1911-1928	Females born: 1947-1964	Females born: 1929-1946	Females born: 1911-1928
	% diagnosed with heart disease					
0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.1	0.1	0.1	0.1	0.0	0.3
10	0.3	0.1	0.3	0.4	0.1	0.3
15	0.3	0.2	0.3	0.7	0.4	0.4
20	0.7	0.6	1.1	0.9	0.5	0.7
25	0.9	0.6	1.1	1.0	0.6	0.8
30	1.4	0.6	1.2	1.8	0.8	1.0
35	2.6	0.8	1.3	2.7	1.0	1.0
40	4.3	1.5	1.5	4.3	1.7	1.3
45	···	3.0	2.2	···	3.0	2.0
50	···	4.9	4.3	···	4.7	3.4
55	···	6.9	7.1	···	7.7	5.0
60	···	11.8	11.3	···	13.6	8.3
65	···	···	17.4	···	···	13.1
70	···	···	21.1	···	···	19.7
75	···	···	28.1	···	···	26.9

Data source: *1991 General Social Survey*
··· Not applicable

they were aged 68 to 85, 16% of women of the World War I/Roaring Twenties cohort had heart disease, significantly below the prevalence of 20% for women of the Turn-of-the-Century cohort in 1978/79.

However, the cumulative probability of being diagnosed with heart disease was slightly higher in more recent cohorts (Table 2). This seeming contradiction—a lower prevalence of heart disease, but a higher cumulative probability of having been diagnosed—may be partially attributable to a health selection effect (see *Limitations*). That is, the most seriously ill members of earlier cohorts may have been more likely to die or to be institutionalized, and thus would not have been included among respondents to the CHS and the NPHS. As well, improvements in diagnostic techniques may have resulted in earlier detection and better treatment, allowing recent cohorts to continue to live with heart disease.

High blood pressure less prevalent

High blood pressure, a cardiovascular risk factor, was also less prevalent in 1996/97 than in 1978/79 (Table 1). In 1996/97, at ages 32 to 49, 5% of male baby boomers reported having high blood pressure, down from 10% for the Depression/World War II cohort in 1978/79. And by 1996/97, when they were aged 50 to 67, 19% of the latter group had high blood pressure, compared with 22% of the

Limitations

Most of the National Population Health Survey (NPHS) and Canada Health Survey (CHS) data used in this analysis were collected from a randomly selected household member who provided information not only about him- or herself, but also about each member of his or her household. The information about smoking and weight, however, pertains only to the selected individual.

The prevalence of chronic conditions may be affected by the use of proxy responses. Some studies have documented under-reporting of some chronic conditions by proxies, while other have reported no under-reporting.[28-33] Nonetheless, changes in health status over time could be partially attributable to proxy response in the two surveys. But because the exact proxy response rate for the CHS cannot be determined, it is not possible to assess the potential influence of proxy reporting.

The survey data are independent cross-sectional samples of different cohorts, rather than a longitudinal sample of the same cohort over time. Consequently, differences in cohort health may also be partially attributable to changes in population composition resulting from, for example, immigration. However, excluding respondents who immigrated to Canada after 1979 did not substantially alter the results (data not shown).

Although a study of cohort health, especially that of seniors, should ideally include people living in institutions, the estimates of the prevalence and cumulative incidence of chronic conditions exclude residents of long-term health care facilities. Consequently, the prevalence of chronic conditions tends to be underestimated.

The analysis of age of onset of heart disease used data from the General Social Survey, a retrospective rather than prospective survey. As cohorts age, they suffer attrition not only through institutionalization, but also from the death of some members. In both cases, those members of the cohort most likely to have been taken ill are excluded. The cumulative incidence of heart disease is therefore likely to be underestimated among older cohorts because of this "health selection effect." The least healthy members of older cohorts are no longer part of the population under study, and the survivors are often healthier, with a later age of onset of disease. In addition, the results are subject to possible measurement errors due to incorrect reporting of the age at which respondents were first diagnosed with heart disease.

The CHS asked all household members if they had high blood pressure. As well, some members of the household sample participated in the physical measures component. Those who reported having high blood pressure in the Interviewer Administered Questionnaire or whose blood pressure was determined to be high in the Physical Measures Questionnaire were considered to have high blood pressure. Height and weight were based on actual physical measurements in the CHS. By contrast, the NPHS data on blood pressure, height and weight were self-reported. When such information is self-reported, high blood pressure tends to be underreported,[34,35] and the prevalence of overweight tends to be underestimated.[36]

Income distribution by quintile, along with education, was used in this analysis to control for possible confounding effects, although the income variable was defined somewhat differently in the CHS (for economic families) and the NPHS (for households).

World War I/Roaring Twenties cohort when they had been aged 50 to 67 in 1978/79. Similarly, at ages 68 to 85 in 1996/97, 26% of male members of the World War I/Roaring Twenties cohort reported high blood pressure, compared with 32% of the Turn-of-the-Century cohort in 1978/79. Except among 68- to 85-year-old men, these declines in the prevalence of high blood pressure were statistically significant.

Declines in the prevalence of high blood pressure among women over this period were all statistically significant, with particularly large differences at older ages. For instance, in 1996/97, 22% of women aged 50 to 67 had high blood pressure, down from 30% for women in this age range in 1978/79.

Larger proportion report diabetes

By contrast, diabetes, another major risk factor for cardiovascular disease, was more prevalent in 1996/97 than in 1978/79 (Table 1). Among men, the percentage with diabetes increased significantly at all ages. For example, in 1996/97, at ages 50 to 67, 7% of male members of the Depression/World War II cohort reported that they had been diagnosed with diabetes; the corresponding figure for the World War I/Roaring Twenties cohort in 1978/79 had been 5%. And in 1996/97, when they were aged 68 to 85, 12% of men of the World War I/Roaring Twenties cohort had diabetes, up sharply from 5% for men of the Turn-of-the-Century cohort in 1978/79. The proportions of women with diabetes rose slightly between 1978/79 and 1996/97, but the only significant increase was for those aged 32 to 49.

To some extent, the higher prevalence of diabetes among men and younger women may reflect improved sensitivity of biochemical measures for detecting the disease.[37] In addition, a change in diagnostic criteria that was recommended in 1992 (lowering of fasting plasma glucose diagnostic criteria from 7.8 to 7.0 mmol/L) may have contributed to the higher prevalence in 1996/97. This higher prevalence of diabetes is consistent with recent trends in the United States, based on the same diagnostic criteria.[38]

Arthritis less prevalent

Arthritis, while not life-threatening, is a major cause of disability.[32] This disease was less prevalent in 1996/97 than in 1978/79, especially among younger women. In 1996/97, the percentages of women aged 32 to 49 and 50 to 67 who reported having been diagnosed with arthritis were significantly lower than the percentages that had been reported by women in these age groups in 1978/79. The decline among women aged 68 to 85 was not statistically significant.

Among men, the only statistically significant decline in the prevalence of arthritis was at ages 50 to 67.

Drop in activity limitation

Long-term activity limitation is a broad measure of individual health.[39] In 1996/97, when they were aged 32 to 49, the percentage of male and female baby boomers reporting an activity limitation was virtually the same as for the Depression/World War II cohort when they had been in the same age range in 1978/79 (Table 1). On the other hand, by the time they were aged 50 to 67 in 1996/97, men and women of the Depression/World War II cohort had a significantly lower prevalence of activity limitation than had the World War I/Roaring Twenties cohort in 1978/79: approximately 17% versus 23%. And at ages 68 to 85, the latter cohort had a significantly lower prevalence of activity limitation than the Turn-of-the-Century cohort in 1978/79: about 26% versus 35%.

Disability days

At ages 32 to 49, the average number of short-term disability days was higher in 1996/97 than in 1978/79 (Table 3). The increases were almost entirely attributable to less serious "reduced-activity" days, rather than to days of confinement to bed. At ages 50 to 67, the number of bed-days fell among both sexes, while there was no significant change in reduced-activity days. And at ages 68 to 85, bed-days dropped significantly among women.

Definitions

The analysis focuses on three age groups: 32 to 49, 50 to 67, and 68 to 85. Corresponding to the 18-year interval between the Canada Health Survey (CHS) and the National Population Health Survey (NPHS), respondents were grouped into four birth cohorts: from 1947 through 1964 (baby boom cohort); from 1929 through 1946 (Depression/World II cohort); from 1911 through 1928 (World War I/ Roaring Twenties cohort); and from 1893 through 1910 (Turn-of-the-Century cohort)[2] (Appendix Table A).

Because both the CHS and the NPHS were conducted over a two-year period, the corresponding birth years of each 18-year age group were centred around the above-mentioned birth years. As a result, there is a slight overlap. For example, approximately 99% of respondents aged 32 to 49 in 1978/79 were born from 1929 to 1946, but about 1% of them were born in 1928 or 1947.

Both surveys asked respondents about chronic health conditions, which included the four examined in this article: *heart disease, high blood pressure, diabetes* and *arthritis.* In the CHS, respondents were asked if they had any "long-term health problems." In the NPHS, respondents were asked if they had any "long-term health conditions that had been diagnosed by a health professional." For the most part, the data on chronic conditions are self-reported. However, additional information from the CHS on actual blood pressure measurements was used to determine the prevalence of high blood pressure. The following criteria were used: systolic BP $\geq$ 140 mm Hg; diastolic BP $\geq$ 90 mm Hg.[35,40]

In both surveys, respondents were considered to have an *activity limitation* if they or the person answering for them replied "yes" to any of the questions asking if they were limited at home, at school, at work, or in other situations because of health problems. The questions, however, were not identical. In the CHS, long-term activity limitation refers to an individual's limitation in normal activities for most of the past 12 months because of health.[10] In the NPHS, long-term activity limitation refers to limitations in the kind or amount of activity because of a long-term physical or mental condition or a health problem that had lasted or was expected to last six months or more.

Short-term disability refers to the total number of days spent in bed plus days when activities were reduced because of ill health in the past two weeks: bed-days and reduced-activity days, respectively.

Respondents were asked if, at the time of the interview, they smoked cigarettes daily, occasionally, or not at all. *Daily smokers* were those who currently smoked cigarettes daily.

The *Canadian Guidelines for Healthy Weights*[41] use body mass index (BMI) to determine an acceptable range of healthy weights and to identify conditions of excess weight and underweight. BMI is calculated by dividing weight in kilograms by height in metres squared. Four weight categories are identified based on BMI:

- Underweight (BMI less than 20)
- Acceptable weight (BMI 20 to 24.9)
- Some excess weight (BMI 25 to 27)
- Overweight (BMI greater than 27)

In accordance with these guidelines, people aged 32 to 85 whose BMI was greater than 27 were classified as being *overweight* for this analysis. These guidelines, however, are recommended for people aged 20 to 64, excluding pregnant women. The use of such calculations for people older than 65 is not universally recommended because of the tendency for people to overstate their height, especially as they get older. Therefore, the prevalence of overweight may be underestimated.[42]

Education was classified into three groups: low for less than high school graduation; middle for high school graduation or some postsecondary; and high for postsecondary graduation.

Income was based on a derived income quintile variable, and two categories were established: low (quintiles 1 and 2) and middle-to-high (quintiles 3 to 5). A "missing" category was created for cases in which income was not reported. The data are not strictly comparable, as the CHS variable was based on economic families, whereas the NPHS variable was based on households. An economic family is a group of two or more persons who live in the same dwelling and are related by blood, marriage, adoption or common-law.[14,43] A household is a person or group of persons who occupy the same dwelling and do not have a usual place of residence elsewhere in Canada.[14,43]

In the 1991 General Social Survey, the *age of onset* of heart disease was based on respondents' recall of the age at which they were first diagnosed with heart problems, such as a heart attack, angina, heart failure, or rheumatic heart disease.[18]

All causes contributing to a death are entered on the death certificate in accordance with the *International Classification of Diseases*.[44,45] A single underlying cause of death is coded. The following ICD-8 (for 1978) and ICD-9 (for 1996) codes were used for this article: ischaemic heart disease (ICD-8 and ICD-9 codes 410-414) and cardiovascular disease (ICD-8 codes 390-458 and ICD-9 codes 390-459).

For the analysis of mortality rates, the populations were grouped by five-year age intervals. However, there may be a slight overlap between cohorts in 1978 and 1996. For instance, in 1996, baby boomers were in the 30-to-49 age group. In 1978 (the central year), most people aged 30 to 49 were members of the Depression/World War II cohort, although a few of them could have been born in 1947/48.

Table 3
Average number of short-term disability days in previous year, by sex and age group, household population aged 32 to 85, Canada excluding territories, 1978/79 and 1996/97

	1978/79		1996/97		Difference		
	Days	95% CI limits	Days	95% CI limits	% point change	95% CI limits	t-value
	Average number of days						
Men							
Disability days							
32-49	8.6	±1.8	14.6	±1.4	6.0	±2.2	5.23*
50-67	24.7	±5.5	18.3	±1.9	-6.4	±5.9	-2.14*
68-85	29.2	±5.8	32.3	±4.3	3.1	±7.2	0.83
Bed-days							
32-49	2.5	±0.7	3.8	±0.4	1.2	±0.9	2.80*
50-67	8.3	±3.1	5.0	±0.9	-3.2	±3.2	-1.98*
68-85	11.1	±4.2	10.1	±2.0	-1.0	±4.6	-0.43
Reduced-activity days							
32-49	6.0	±1.6	10.8	±1.2	4.8	±2.0	4.67*
50-67	16.4	±4.7	13.2	±1.6	-3.2	±5.0	-1.24
68-85	18.1	±6.4	22.2	±4.0	4.1	±7.5	1.07
Women							
Disability days							
32-49	14.0	±2.1	19.3	±1.2	5.3	±2.4	4.25*
50-67	25.5	±4.5	25.6	±2.9	0.1	±5.3	0.03
68-85	35.1	±7.3	36.6	±5.3	1.5	±9.0	0.34
Bed-days							
32-49	4.7	±1.1	5.3	±0.4	0.6	±1.1	1.05
50-67	10.0	±2.1	7.0	±1.3	-2.9	±2.5	-2.33*
68-85	14.8	±5.2	9.1	±2.1	-5.7	±5.6	-2.00*
Reduced-activity days							
32-49	9.3	±2.2	14.0	±1.1	4.7	±2.4	3.78*
50-67	15.6	±4.2	18.6	±2.1	3.0	±4.7	1.26
68-85	20.2	±5.4	27.5	±5.0	7.3	±7.3	1.94

Data sources: *1978/79 Canada Health Survey and 1996/97 National Population Health Survey, cross-sectional sample, General file*
Note: *Because of rounding, the percentage-point change may differ slightly from the result that would be obtained using the figures shown in the table.*
** Significantly different from 1978/79, p < 0.05*
CI - confidence interval

Healthy habits

Growing awareness of the role lifestyle plays in health has marked the last two decades. Smoking and excess weight, in particular, have been identified as major preventable causes of disease and death, and have been targeted for health promotion efforts.

To a great degree, the dangers of smoking seem to have been recognized, although some of the decline in older age groups may reflect a higher attrition rate (deaths) among smokers. In 1996/97, 32% of male baby boomers were daily smokers, well below the 48% of men of the Depression/World War II cohort who reported daily smoking when they had been aged 32 to 49 in 1978/79 (Table 4). Moreover, by 1996/97, at ages 50 to 67, just 25% of men of the Depression/World War II cohort were daily smokers, compared with 43% of men of the World War I/Roaring Twenties cohort in 1978/79. The figures for 68- to 85-year-olds were 14% in 1996/97 and 30% in 1978/79. The pattern for women was similar, with much lower smoking rates in 1996/97 than in 1978/79.

Table 4
Daily smoking and overweight, by sex and age group, household population aged 32 to 85, Canada excluding territories, 1978/79 and 1996/97

	1978/79		1996/97		Difference		
	%	95% CI limits	%	95% CI limits	% point change	95% CI limits	t-value
Men							
Daily smoking							
32-49	47.6	±3.7	31.8	±1.9	-15.8	±4.2	-7.34*
50-67	42.6	±3.7	24.7	±2.4	-17.9	±4.4	-7.99*
68-85	29.6	±4.7	13.9	±2.1	-15.6	±5.1	-6.00*
Overweight							
32-49	32.8	±5.9	36.0	±1.9	3.2	±6.2	1.01
50-67	43.8	±6.1	42.3	±2.5	-1.5	±6.6	-0.46
68-85	32.0	±8.7	31.6	±2.9	-0.4	±9.1	-0.09
Women							
Daily smoking							
32-49	39.5	±2.8	26.4	±1.7	-13.1	±3.3	-7.86*
50-67	31.2	±2.7	19.2	±2.0	-12.0	±3.3	-7.03*
68-85	14.7	±2.6	9.7	±1.4	-5.0	±2.9	-3.39*
Overweight							
32-49	27.5	±5.9	22.0	±1.6	-5.5	±6.1	-1.76
50-67	47.0	±3.6	34.7	±2.5	-12.4	±4.4	-5.51*
68-85	38.9	±6.6	30.8	±3.1	-8.1	±7.3	-2.17*

Data sources: *1978/79 Canada Health Survey and 1996/97 National Population Health Survey, cross-sectional sample, General file*
Note: *Because of rounding, the percentage-point change may differ slightly from the result that would be obtained using the figures shown in the table.*
** Significantly different from 1978/79, p < 0.05*
CI - confidence interval

During the same period, the proportion of women who were overweight fell significantly at ages 50 to 67 and 68 to 85. Among men, there were no significant changes in the percentages who were overweight.

Period and cohort effects

Differences in the prevalence of chronic conditions in 1978/79 and in 1996/97 suggest that period shifts occurred during these 18 years. Indeed, even when the strong effect of age is controlled, statistically significantly period effects emerge. For both sexes, the odds of having been diagnosed with heart disease, high blood pressure or arthritis and of having an activity limitation were higher in 1978/79 than in 1996/97 (Table 5). However, for men, the odds of diabetes were significantly lower in the earlier period than in 1996/97.

Similarly, in an age-cohort model, the odds of having heart disease, high blood pressure and arthritis were significantly higher for men and women of earlier cohorts than for baby boomers. As well, compared with baby boomers, members of the Turn-of-the-Century and World War I/Roaring Twenties cohorts had significantly high odds of reporting an activity limition. On the other hand, in comparison with male baby boomers, the odds of diabetes were low for men of the Turn-of-the-Century cohort.

Socioeconomic characteristics

Education and income have repeatedly been shown to be positively associated with health.[16,17] Both are also inversely related to smoking[46-51] and obesity,[52]

Table 5
Adjusted odds ratios for chronic conditions and activity limitation, by age and period or cohort, household population aged 32 to 85, Canada excluding territories, 1978/79 and 1996/97

	Heart disease		High blood pressure		Diabetes		Arthritis		Activity limitation	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Men										
Age-period model										
Age	1.08*	1.08, 1.09	1.05*	1.05, 1.06	1.06*	1.05, 1.06	1.06*	1.06, 1.07	1.05*	1.04, 1.05
Period										
1978/79	1.26*	1.02, 1.54	1.49*	1.24, 1.80	0.55*	0.43, 0.71	1.31*	1.19, 1.45	1.34*	1.20, 1.50
1996/97†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Age-cohort model										
Age	1.07*	1.06, 1.08	1.04*	1.03, 1.05	1.07*	1.06, 1.09	1.04*	1.05, 1.06	1.03*	1.03, 1.04
Cohort										
Born 1947-1964†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Born 1929-1946	2.11*	1.63, 2.72	2.20*	1.78, 2.72	1.13	0.87, 1.48	1.44*	1.24, 1.66	1.10	0.96, 1.27
Born 1911-1928	2.68*	1.76, 4.08	2.39*	1.73, 3.31	0.74	0.50, 1.09	1.93*	1.58, 2.35	1.48*	1.21, 1.82
Born 1893-1910	2.45*	1.53, 3.91	2.67*	1.64, 4.33	0.26*	0.15, 0.45	1.64*	1.22, 2.20	1.89*	1.45, 2.47
Women										
Age-period model										
Age	1.08*	1.07, 1.08	1.07*	1.07, 1.08	1.05*	1.05, 1.06	1.06*	106, 1.07	1.04*	1.04, 1.04
Period										
1978/79	1.47*	1.27, 1.70	1.70*	1.43, 2.03	0.86	0.72, 1.02	1.35*	1.24, 1.47	1.26*	1.12, 1.41
1996/97†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Age-cohort model										
Age	1.06*	1.05, 1.06	1.05*	1.04, 1.06	1.06*	1.05, 1.07	1.05*	1.05, 1.06	1.03*	1.02, 1.04
Cohort										
Born 1947-1964†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Born 1929-1946	1.61*	1.25, 2.08	2.42*	1.98, 2.95	0.95	0.75, 1.22	1.65*	1.49, 1.82	1.02	0.90, 1.16
Born 1911-1928	2.54*	1.84, 3.50	3.24*	2.37, 4.43	0.88	0.56, 1.38	1.89*	1.65, 2.16	1.26*	1.01, 1.58
Born 1893-1910	3.18*	2.17, 4.67	3.76*	2.57, 5.52	0.73	0.48, 1.12	1.79*	1.41, 2.28	1.63*	1.19, 2.22

Data sources: *1978/79 Canada Health Survey and 1996/97 National Population Health Survey, cross-sectional sample, General file*
† Reference category for which odds ratio is always 1.00
... Not applicable
** $p < 0.05$*

perhaps in part because health promotion efforts tend to be most successful among people with higher socioeconomic status.[51] As well, socioeconomic status influences population health through differential exposure to physical and social environments.[16,17] Consequently, some of the improvement in health and health behaviours among more recent cohorts may reflect generally higher levels of education and income.

In 1996/97, 43% of baby boom men and 40% of baby boom women had a postsecondary diploma or degree, up from 25% and 19%, respectively, for the Depression/World War II cohort when they were aged 32 to 49 in 1978/79 (Table 6). As well, by the time they were aged 50 to 67 in 1996/97, 33% of men and 28% of women in the latter cohort had obtained postsecondary credentials, which was more than twice the figure for the World War I/Roaring Twenties cohort in 1978/79. Similarly, in 1996/97, 20% of men and 17% of women aged 68 to 85 were postsecondary graduates, compared with 9% for both sexes in 1978/79.

The rise in educational attainment was accompanied by an increase in the proportion of people in each of these age groups whose income was in the middle-to-high range. With the exception of women aged 32 to 49, these increases were statistically significant.

As previously noted, the odds of heart disease, high blood pressure, arthritis and activity limitation were higher in the late 1970s than in the mid-1990s, and higher among earlier than recent cohorts, even when the effect of age was taken into account. These period and cohort effects were attenuated when educational attainment and income were controlled, but for both sexes, the odds of having high blood pressure were still higher in 1978/79 than in 1996/97 (Table 7). And for women, the odds of having arthritis were higher in 1978/79 than in 1996/97.

Similarly, when education and income were taken into account, cohort effects in the prevalence of disease were still apparent. The odds of having heart disease, high blood pressure and arthritis were significantly higher among earlier cohorts than among baby boomers, while the odds of having diabetes were lower.

Table 6
Percentage with postsecondary graduation and in middle-to-high income quintiles, by sex and age group, household population aged 32 to 85, Canada excluding territories, 1978/79 and 1996/97

	1978/79		1996/97		Difference		
	%	95% CI limits	%	95% CI limits	% point change	95% CI limits	t-value
Men							
Postsecondary graduation							
32-49	25.1	±3.6	43.2	±1.0	18.1	±3.8	9.34*
50-67	14.3	±3.1	33.1	±1.4	18.8	±3.4	10.92*
68-85	9.3	±2.8	20.0	±1.6	10.7	±3.3	6.42*
Middle-to-high income quintile							
32-49	63.2	±2.5	75.0	±0.8	11.8	±2.6	8.76*
50-67	65.7	±3.4	72.8	±1.2	7.1	±3.6	3.84*
68-85	38.4	±5.0	67.4	±2.0	28.9	±5.4	10.57*
Women							
Postsecondary graduation							
32-49	19.1	±3.7	40.3	±1.0	21.2	±3.8	10.92*
50-67	11.9	±2.3	28.0	±1.5	16.1	±2.7	11.59*
68-85	9.3	±2.9	16.5	±1.4	7.2	±3.2	4.45*
Middle-to-high income quintile							
32-49	58.6	±3.4	72.0	±1.0	13.4	±3.6	7.38
50-67	59.6	±3.4	68.3	±1.5	8.7	±3.8	4.50*
68-85	33.8	±4.1	55.5	±2.2	21.7	±4.6	9.19*

Data sources: *1978/79 Canada Health Survey and 1996/97 National Population Health Survey, cross-sectional sample, General file*
Note: *Because of rounding, the percentage-point change may differ slightly from the result that would be obtained using the figures shown in the table.*
† Respondents with missing income were included in denominator for each age group. Data for 1978/79 refer to economic families; data for 1996/97 refer to households.
** Significantly different from 1978/79, $p < 0.05$*

Concluding remarks

Lower mortality rates overall, and for cardiovascular disease in particular, as well as lower odds of heart disease, high blood pressure, arthritis and activity limitation suggest that recent cohorts are healthier than the cohorts who preceded them. In the United States, declines in deaths from ischaemic heart disease and stroke have been largely attributed to better diagnosis and control of hypertension.[53]

To some extent, the declines in heart disease, high blood pressure and arthritis are associated with rising levels of education and income. Yet even when education and income were taken into account, the

Table 7
Adjusted odds ratios for chronic conditions and activity limitation, by age, period or cohort, education and income, household population aged 32 to 85, Canada excluding territories, 1978/79 and 1996/97

	Heart disease		High blood pressure		Diabetes		Arthritis		Activity limitation	
	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Men										
Age-period model										
Age	1.08*	1.08,1.09	1.05*	1.05, 1.06	1.05*	1.05, 1.06	1.06*	1.05, 1.06	1.04*	1.04, 1.04
Period										
1978/79	1.15	0.93, 1.42	1.43*	1.18, 1.74	0.51*	0.39, 0.66	1.09	0.98, 1.21	0.94	0.83, 1.07
1996/97†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Education										
Low	1.17	0.96, 1.42	1.16	0.99, 1.37	1.43*	1.19, 1.73	1.64*	1.45, 1.84	1.62*	1.43, 1.82
Middle	1.08	0.87, 1.33	1.13	0.99, 1.29	1.22*	1.03, 1.45	1.17*	1.04, 1.32	1.10	0.97, 1.25
High†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Income‡										
Low	1.13	0.88, 1.45	1.02	0.87, 1.20	0.90	0.73, 1.12	1.18*	1.03, 1.34	2.05*	1.80, 2.34
Middle-to-high†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Missing	0.89	0.76, 1.04	0.94	0.81, 1.08	0.78*	0.65, 0.93	0.89*	0.80, 0.99	0.82*	0.73, 0.93
Age-cohort model										
Age	1.07*	1.06, 1.08	1.04*	1.03, 1.05	1.08*	1.06, 1.09	1.05*	1.05, 1.06	1.04*	1.04, 1.05
Cohort										
Born 1947-1964†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Born 1929-1946	1.99*	1.55, 2.55	2.11*	1.70, 2.60	1.07	0.82, 1.38	1.23*	1.06, 1.44	0.85*	0.73, 0.99
Born 1911-1928	2.39*	1.61, 3.56	2.20*	1.60, 3.03	0.66*	0.45, 0.97	1.45*	1.18, 1.79	0.93	0.75, 1.15
Born 1893-1910	1.93*	1.21, 3.07	2.29*	1.42, 3.70	0.22*	0.13, 0.38	1.00	0.73, 1.38	0.77	0.57, 1.04
Education										
Low	1.13	0.93, 1.37	1.17	0.99, 1.38	1.32*	1.10, 1.60	1.61*	1.43, 1.81	1.62*	1.43, 1.82
Middle	1.06	0.86, 1.31	1.13	0.99, 1.29	1.19*	1.00, 1.42	1.16*	1.03, 1.30	1.10	0.97, 1.25
High†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Income‡										
Low	1.22	0.94, 1.57	1.09	0.92, 1.29	0.93	0.77, 1.13	1.26*	1.11, 1.43	2.08*	1.82, 2.36
Middle-to-high†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Missing	0.88	0.75, 1.03	0.92	0.79, 1.06	0.78*	0.65, 0.93	0.88*	0.78, 0.98	0.82*	0.73, 0.93
Women										
Age-period model										
Age	1.07*	1.07, 1.08	1.07*	1.06, 1.07	1.04*	1.04, 1.05	1.06*	106, 1.07	1.04*	1.03, 1.04
Period										
1978/79	1.13	0.97, 1.33	1.54*	1.28, 1.85	0.65*	0.55, 0.78	1.22*	1.12, 1.34	1.05	0.91, 1.20
1996/97†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Education										
Low	1.89*	1.57, 2.28	1.36*	1.19, 1.56	1.99*	1.61, 2.47	1.25*	1.13, 1.38	1.23*	1.10, 1.37
Middle	1.19	0.96, 1.47	1.16*	1.02, 1.32	1.23	0.99, 1.52	1.08	0.96, 1.20	1.05	0.93, 1.20
High†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Income‡										
Low	1.45*	1.19, 1.77	1.08	0.97, 1.22	1.47*	1.18, 1.81	1.16*	1.08, 1.25	1.52*	1.32, 1.76
Middle-to-high†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Missing	1.00	0.83, 1.19	0.93	0.82, 1.05	1.04	0.84, 1.28	0.98	0.88, 1.08	0.89*	0.80, 1.00
Age-cohort model										
Age	1.06*	1.05, 1.07	1.05*	1.04, 1.06	1.06*	1.05, 1.07	1.05*	1.05, 1.06	1.03*	1.03, 1.04
Cohort										
Born 1947-1964†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Born 1929-1946	1.27	0.98, 1.65	2.18*	1.80, 2.64	0.75*	0.59, 0.96	1.50*	1.35, 1.67	0.89	0.78, 1.00
Born 1911-1928	1.69*	1.23, 2.34	2.69*	1.99, 3.65	0.59*	0.38, 0.91	1.61*	1.39, 1.85	0.97	0.77, 1.22
Born 1893-1910	1.70*	1.14, 2.53	2.81*	1.90, 4.16	0.39*	0.25, 0.61	1.36*	1.07, 1.74	1.02	0.71, 1.46
Education										
Low	1.84*	1.53, 2.22	1.35*	1.18, 1.54	1.93*	1.55, 2.41	1.23*	1.11, 1.37	1.26*	1.13, 1.40
Middle	1.17	0.95, 1.45	1.15*	1.01, 1.31	1.22	0.99, 1.52	1.07	0.95, 1.20	1.06	0.93, 1.20
High†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Income‡										
Low	1.46*	1.21, 1.77	1.16*	1.03, 1.29	1.44*	1.16, 1.78	1.22*	1.14, 1.31	1.53*	1.32, 1.76
Middle-to-high†	1.00	...	1.00	...	1.00	...	1.00	...	1.00	...
Missing	1.00	0.84, 1.20	0.90	0.80, 1.01	1.06	0.86, 1.30	0.95	0.86, 1.06	0.89*	0.79, 0.99

Data sources: *1978/79 Canada Health Survey and 1996/97 National Population Health Survey, cross-sectional sample, General file*
† Reference category for which odds ratio is always 1.00
‡ Data for 1978/79 refer to economic families; data for 1996/97 refer to households.
** $p < 0.05$*

odds of having diabetes, a major risk factor for cardiovascular disease, were higher in 1996/97 than in 1978/79, and tended to be higher for baby boomers than for older cohorts. An increased prevalence of diabetes has also been reported in the United States.[37,38] There, while the increase has been partially attributed to "improved sensitivity of biochemical measures for detecting diabetes and accelerated efforts in screening"[37] that have resulted in earlier detection among more recent cohorts, the rising prevalence of diabetes is viewed as real, and may also reflect increased obesity and a more sedentary lifestyle.[37,38]

The 50-to-67 age group is of particular interest, as this is the age range in which health problems typically begin to increase. It is also the age range that baby boomers will continue to enter over the next two decades. However, a comparison of the results of the 1996/97 National Population Health Survey with those of the 1978/79 Canada Health Survey shows that in 1996/97, people in their fifties and sixties were in better health than had been the case two decades earlier. Such substantial improvements suggest that there may be reason to speculate that the health of baby boomers will be as good, or even better, as they enter this age range. As well, the evidence of considerably improved health among seniors bodes well for baby boomers, who will constitute the senior population in the first half of the 21st century.

Seniors' future need for health care is a function of two factors: the growing population of elderly people multiplied by a possibly modifiable average health.[54] While reductions in the need for health care due to improvements in the average health of seniors through prevention and intervention seem plausible, further improvements in many other dimensions of health are also urgently needed.[9,54-57] And "even if we are optimistic about future events, the sheer growth in the absolute number of elderly people" in the coming decades will present a major challenge for the provisions of health care.[58]

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Appendix

Table A
Ages of birth cohorts in 1978/79 and 1996/97

	Age in:	
Birth year	**1978/79**	**1996/97**
1947-1964 (baby boom cohort)	···	32-49
1929-1946 (Depression/World War II cohort)	32-49 ——>	50-67
1911-1928 (World War I/Roaring Twenties cohort)	50-67 ——>	68-85
1893-1910 (Turn-of-the-Century cohort)	68-85	···

Notes: *Because the surveys were conducted over about two years, the corresponding years of birth for each 18-year age group were centred* ***around*** *the birth years as labelled. For example, 99% of respondents aged 32 to 49 in 1978/79 were born in 1929 through 1946, and fewer than 1% were born in the years slightly outside this range, 1928 or 1947. The arrow (——>) indicates the change in the ages of a birth cohort from 1978/79 to 1996/97.*
··· Not applicable


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Oral contraceptive use

Kathryn Wilkins, Helen Johansen, Marie P. Beaudet and C. Ineke Neutel

Abstract

Objectives

This article profiles Canadian women aged 15 to 49 who use oral contraceptives (OCs), and compares certain of their characteristics with those of non-users. It also examines associations between OC use and selected characteristics, including cardiovascular risk factors.

Data source

The data are from the cross-sectional household component of Statistics Canada's 1996/97 National Population Health Survey. The analysis is based on a sample of 21,996 women aged 15 to 49, weighted to represent an estimated 7.6 million women.

Analytical techniques

Cross-tabulations were used to estimate the percentage of women aged 15 to 49 who use OCs and to compare selected health behaviours of users and non-users. A multiple logistic regression model was used to model relationships between selected characteristics and OC use.

Main results

An estimated 1.3 million women aged 15 to 49, or 18%, reported using OCs in 1996/97. OC use was significantly associated with being young, unmarried, sexually active, and having prescription drug insurance and relatively high education. About one-third of OC users also smoked.

Key words

contraception, smoking, hypertension, cardiovascular disease, stroke, migraine

Authors

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Since oral contraceptives first became available in the 1960s, they have been in wide use throughout the world. Convenient and effective (see *Birth control methods*), birth control pills are also beneficial in treating menstrual disorders.[1,2]

Since their introduction, oral contraceptives have been the subject of numerous epidemiological studies, many of which have focussed on links with cardiovascular disorders and mortality. Decreases in the amount of estrogen in the pill over the past couple of decades appear to have lowered the risks,[3,4] and several fairly recent studies have found no excess risk for heart attack or stroke.[4-6] However, some research suggests that oral contraceptive users remain at a slightly increased risk of stroke and heart attack, as well as death from these causes.[3,7-19] But these studies also state that the increase in risk conferred by the pill is small. Accordingly, researchers consistently conclude that for women without other risk factors of cardiovascular disease, the benefits of today's oral contraceptives certainly outweigh their potential for harm.[10,20,21]

Relative to the minimal risk attributed to oral contraceptive use, the hazards of other factors are far more important. The findings of numerous studies indicate that

Methods

Data source

This article is based on Statistics Canada's National Population Health Survey (NPHS). The NPHS, which began in 1994/95, collects information about the health of the Canadian population every two years. The survey 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 both longitudinal and cross-sectional components. Respondents who are part of the longitudinal component will be followed for up to 20 years.

The 1996/97 cross-sectional household sample is made up of longitudinal respondents and respondents who were selected as part of supplemental samples, or buy-ins, in three provinces. The additional respondents were chosen with random digit dialing (RDD) and were included for cross-sectional purposes only.

Individual data are organized into two files: General and Health. Socio-demographic and some health information was obtained for each member of participating households. These data are found in the General file. Additional in-depth health information was collected for one randomly selected household member. The in-depth health information, as well as the information on the General file pertaining to that individual, is found in the Health file.

In households belonging to the cross-sectional buy-in component, 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, the person providing in-depth health information about himself or herself for the Health file was the randomly selected person for that household in cycle 1 (1994/95) and was usually the person who provided information on all household members for the General file in cycle 2 (1996/97).

The 1996/97 cross-sectional response rates for the Health file were 93.1% for the longitudinal component and 75.8% for the RDD component, yielding an overall response rate of 79.0%. Information in the Health file is available for 81,804 randomly selected respondents.

A more detailed description of the NPHS design, sample and interview procedures can be found in published reports.[22-24]

This analysis is based on cross-sectional data from the Health file for cycle 2. The data were weighted to reflect the sample design, adjustments for non-response, and post-stratification. The findings are based on data provided by 21,996 non-pregnant female respondents aged 15 to 49 living in the 10 provinces, weighted to represent 7.6 million women (Appendix Table A). Of the sampled women, 4,237 (weighted to represent 1.3 million) reported using oral contraceptives within the month prior to their interview. Residents of institutions are not included in this analysis.

Analytical techniques

Frequency distributions and cross-tabulations were used to estimate the percentage of women aged 15 to 49 who use oral contraceptives and to compare the health-related characteristics of users and non-users. Multiple logistic regression was used to model relationships between selected factors and oral contraceptive use. Based on a review of the literature and availability on the NPHS, several variables were included in the regression model. The following socio-demographic characteristics were selected: age, marital status, number of children younger than 12 in household, sexual activity in past year, immigrant status, education, employment/student status, household income, and drug insurance coverage. Cardiovascular risk factors comprised smoking, high blood pressure, migraine, overweight, and physical inactivity.

Coefficients of variation, standard errors and chi-squared tests of significance were estimated using a weighted bootstrap procedure that provides unbiased estimates of variance.[25-27]

Limitations

This is a descriptive study. Since the NPHS data used in this analysis are cross-sectional, relationships between variables can be described, but causality cannot be inferred.

Some important factors related to use (or non-use) of oral contraceptives may not have been taken into account in the analysis. For example, the prevalence of diabetes was too low to allow its inclusion in the multivariate analysis. Also, no information was available on type of migraine (with or without aura or other neurological symptoms). In addition, some women may use the pill to alleviate the symptoms of menstrual disorders, such as heavy periods or painful menstruation, but such information was not available from the NPHS. For women who use the pill for purposes other than contraception, associations between pill use and variables related to child-bearing are weakened. Because the NPHS did not ask specific questions about methods of birth control, the use of birth control pills could not be analyzed in the context of other means of contraception. The extent to which the characteristics of users of other methods resemble those of oral contraceptive users weakens the associations observed in this analysis.

Although the estrogen content of oral contraceptives has decreased considerably since their introduction in the 1960s, no information is available from the NPHS on the dose or formulation of the pills taken. Estimates based on a sample of Canadian pharmacies indicate that, in 1996, just over one-quarter of all prescriptions dispensed for oral contraceptives were for "third-generation" preparations (those containing progestogens such as desogestrel and norethindrone).[28]

The time periods to which various questions pertain do not always coincide. For instance, respondents were asked about medication used in the past month, and "birth control pills" was among the list of items read by interviewers. Questions about sexual activity, however, referred to the past 12 months.

Finally, the NPHS data are self- (or proxy-) reported, and the extent to which they are biased because of reporting error is unknown. Self-reporting can be particularly problematic when dealing with sensitive issues such as sexuality.

the level of risk of heart attack or stroke to women who smoke, have high blood pressure, diabetes, or suffer from migraine far surpasses that associated with oral contraceptive use alone.[8,10,21,29-31] For oral contraceptive users with any of these risk factors, the risks of cardiovascular disease or stroke rise somewhat, and for women who use oral contraceptives and smoke, the risks are multiplied.[8,11,12,18,21,32-36]

Nevertheless, because the absolute risk to younger women remains small, the pill is considered safe for the vast majority.[37] For example, smoking is the factor that, in combination with oral contraceptive use, confers the highest risk of death due to cardiovascular disease. But among women aged 15 to 34 who use today's low-dose estrogen pills and smoke, the number of deaths attributed to the combined effect of oral contraceptive use and smoking is only 3.3 per 100,000 women, compared with 0.59 per 100,000 among non-smoking non-users the same ages, and 0.65 among non-smoking users.[21]

Physicians are advised to closely monitor older oral contraceptive users who have risk factors, as well as those who are particularly susceptible to cardiovascular disease, or to consider an alternative method of contraception.[10-12,19,31,38] Despite the distinct advantages of the pill as a contraceptive, current guidelines explicitly discourage physicians from prescribing it to women aged 35 or older who smoke heavily (15 or more cigarettes daily).[39,41] Among oral contraceptive users aged 35 to 44 who smoke, the number of deaths attributed to the combined risk factors is 29.4 per 100,000. This compares with 3.18 deaths per 100,000 among women who neither smoke nor use the pill, and 6.21 among those who do not smoke and do use the pill.[21] In fact, the risk of death due to cardiovascular causes in older oral contraceptive users who smoke exceeds the risk of death from carrying a pregnancy to term.[21]

In light of the guidelines, it is helpful to look at the use of oral contraceptives according to the presence of cardiovascular risk factors. Reports profiling women who use oral contraceptives have appeared from several countries in recent years,[42-45] and studies carried out in Switzerland and Québec have focussed specifically on smoking in conjunction with oral contraceptive use.[46,47] A Canadian study reported on the characteristics of women who used oral contraceptives (including risk conditions) in the late 1980s and early 1990s; however, data were not available from all provinces.[48]

Data from the National Population Health Survey (NPHS) provide the opportunity to compare selected characteristics, including cardiovascular risk factors, of Canadian women who use oral contraceptives with those of women who do not (see *Methods* and *Definitions*). This analysis uses data from the second cycle of the NPHS (1996/97) to examine associations between oral contraceptive use and smoking, high blood pressure and other risk factors for women aged 15 through 49. Associations with selected socio-demographic characteristics are also presented.

Birth control methods

Oral contraceptives are just one form of birth control. There are many choices, each with its own advantages and disadvantages. Failure rates vary, depending on how correctly and consistently each method or combination of methods is used. The failure rate is the number of pregnancies expected per 100 women during one year of typical use.

Failure rate of selected contraceptive methods

Contraceptive method	Reported pregnancies per 100 women per year
Combination pill (both estrogen and progestin)	Less than 1 to 2
Intrauterine device (IUD)	Less than 1 to 6
Condom with spermicidal foam or gel	1 to 6
Mini-pill (progestin only)	3 to 6
Condom	2 to 12
Diaphragm with spermicidal foam or gel	3 to 18
Spermicide	3 to 21
Sponge with spermicide	3 to 28
Cervical cap with spermicide	5 to 18
Periodic abstinence (rhythm), all types	2 to 20
No birth control	60 to 85

Data source: *Adapted with permission from* the Compendium of Pharmaceuticals and Specialties*, Table 1, p. B156 (see Reference 40).*

Table 1
Socio-demographic characteristics of oral contraceptive (OC) users and non-users, women aged 15 to 49, household population, Canada excluding territories, 1996/97

	OC users		OC non-users		
	'000	%	'000	%	Chi-squared
Total	**1,342**	**100**	**6,203**	**100**	
Age group					455.8***
15-19	277	21	727	12	
20-24	366	27	521	8	
25-29	309	23	626	10	
30-34	227	17	942	15	
35-49	163	12	3,386	55	
Marital status					252.4***
Married	333	25	3,278	53	
Common-law	161	12	462	7	
Single	773	58	1,857	30	
Previously married	74	6	596	10	
Child(ren) under 12 in household					14.7***
None	887	66	3,545	57	
1 or 2	434	32	2,303	37	
3+	20	2	355	6	
Sexually active in past year					135.2***
Yes	1,188	89	4,344	70	
No	92	7	1,184	19	
Missing	62	5	674	11	
Immigrant					156.2***
Yes	94	7	1,207	19	
No	1,247	93	4,974	80	
Missing	–	–	21†	--	
Education					38.5***
Less than high school graduation	214	16	1,305	21	
High school graduation	193	14	1,157	19	
Some postsecondary	451	34	1,571	25	
Postsecondary graduation	483	36	2,150	35	
Missing	–	–	20	–	
Employed/Student					31.8***
Yes	1,118	83	4,698	76	
No	220	16	1,477	24	
Missing	4	–	28	–	
Household income					ns
Lowest	70	5	254	4	
Lower-middle	119	9	564	9	
Middle	318	24	1,558	25	
Upper-middle	467	35	2,059	33	
Highest	179	13	714	12	
Missing	190	14	1,053	17	
Drug insurance coverage					ns
Yes	877	65	3,915	63	
No	450	34	2,199	35	
Missing	14	1‡	89	1	

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
Notes: *Estimates are based on data for women who were not pregnant at the time of their interview. Information on OC use is not available for an estimated 13,480 (n=51) women (0.2%) aged 15 to 49. Detail may not add to totals because of rounding. The chi-squared test used 500 bootstrap weights and included the Rao-Scott second-order correction to account for the complex survey design.*[49]
† Coefficient of variation between 16.6% and 25.0%
‡ Coefficient of variation between 25.1% and 33.3%
**** $p \leq 0.001$*
- - Amount too small to be expressed
– Nil or zero
ns Chi-squared value did not reach statistical significance.

OC users much younger than non-users

In 1996/97, 1.3 million women aged 15 to 49 (18%) were estimated to have used an oral contraceptive in the last month (Appendix Table B). Oral contraceptive users were strikingly younger than non-users: 71% were under age 30, compared with 30% of non-users (Table 1). Just one-quarter of women who were taking the pill were married, versus over half of non-users. Oral contraceptive users were also less likely than non-users to have children younger than 12 at home. The NPHS findings pertaining to age, marital status and number of children are similar to those reported for oral contraceptive users in Québec in 1987[47] and the United States during the 1980s and early 1990s.[45]

Not surprisingly, women who used birth control pills were more likely than non-users to be sexually active: 89% versus 70%. Non-users comprised women who were using other means of contraception, as well as those who were using none—perhaps because some of them were not sexually active.

A higher proportion of oral contraceptive users (93%) than non-users (80%) were Canadian-born. The relatively low use of oral contraceptives by immigrants has also been observed in the United States.[45,50]

Oral contraceptive users differed from non-users when educational attainment was considered: 70% and 60%, respectively, had some education beyond high school. Similarly, profiles of oral contraceptive users in Norway, Italy and the United States have reported higher levels of education among women who use the pill.[42,45,51] By contrast, a study of oral contraceptive users in Québec did not support this association.[47]

Women using oral contraceptives were more likely to be employed or to be students than those who were not taking the pill. Users and non-users showed similar patterns of household income levels and drug insurance coverage.

One-third of OC users smoke

Among oral contraceptive users, an estimated 458,000 (34%) reported smoking either daily or occasionally (Table 2). A lower proportion of non-

users smoked (30%). Despite substantial evidence that smoking combined with oral contraceptive use sharply increases the risk of cardiovascular and cerebrovascular mortality, studies from Switzerland, Italy and the United States have also found smoking to be more common among users of oral contraceptives than non-users.[45,46,50] Data from a representative sample of Québec women in 1987 showed that fully 50% of oral contraceptive users aged 15 to 39 in the province were smokers, compared with 41% of non-users.[47] The high prevalence of smoking among Québec women of child-bearing age reflects the provincial smoking rate, which has generally surpassed that in all other provinces since the mid-1960s.[52] More consistent with the NPHS estimate, Canadian Heart Health Surveys (CHHS) data from a sample of women aged 18 to 34 collected between 1988 and 1992 in all provinces except Nova Scotia showed that the percentage of smokers among both oral contraceptive users and non-users was 29%.[48] Data collected for the Behavioral Risk Factor surveys in the United States indicate that, in 1988, the prevalence of smoking among oral contraceptive users aged 18 to 45 was 24%,[44] substantially lower than either the CHHS or NPHS estimate for Canada.

According to the NPHS, a very small percentage of pill users (1%) reported high blood pressure. This is reassuring, but perhaps falsely so. Data collected from 1986 to 1992 for the CHHS found that a substantial proportion (42%) of people with measured hypertension were previously unaware that they had this condition.[53,54] Even among women in the peak child-bearing ages of 18 to 34, when medical consultations are frequent, 19% of hypertensives were unaware of their high blood pressure.[54] The NPHS data indicate that 17% of pill users reported that their blood pressure had not been measured within the past year, so it is possible that the prevalence of hypertension among pill users is higher than was reported.

The proportion of women with diagnosed migraine did not differ with use of birth control pills: 13% of users as well as non-users reported this condition. This may reflect the somewhat equivocal state of the literature on oral contraceptive use by women with migraine, as well as the fact that physician guidelines for oral contraceptive use differ according to the type of migraine.[29,55] Although it is widely recognized that oral contraceptive use by patients who have migraine with aura sharply increases the risk of stroke, oral contraceptives have also been suggested as a means of treating migraine.[56] Thus prescribing physicians may decide that, for many migraine patients, the therapeutic and contraceptive benefits of the pill outweigh the small increase in the absolute risk of stroke.[8]

The percentage of women using oral contraceptives who were overweight was markedly lower (19%), compared with women who said they were not on the pill (30%). This relationship has been observed previously,[6,43,48,50] and possibly reflects the choice of heavier women not to use the pill, based on the groundless perception that it may cause weight gain.[47] The percentage of oral contraceptive users categorized as "inactive" in leisure time physical activity (52%) was also significantly lower than the corresponding percentage in non-users (58%).

Table 2
Cardiovascular risk factors in users and non-users of oral contraceptives (OCs), women aged 15 to 49, household population, Canada excluding territories, 1996/97

Cardiovascular risk factor	OC users		OC non-users		Chi-squared
	'000	%	'000	%	
Daily or occasional smoker	458	34	1,854	30	6.0*
High blood pressure	16	1†	222	4	38.3**
No blood pressure check in past year	226	17	1,720	28	61.2**
Migraine	181	13	809	13	ns
Overweight	251	19	1,833	30	67.8**
Physical inactivity	697	52	3,593	58	11.0**

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
Notes: *Estimates are based on data for women who were not pregnant at the time of their interview. Information on OC use is not available for an estimated 13,480 (n=51) women (0.2%) aged 15 to 49. The chi-squared test used 500 bootstrap weights and included the Rao-Scott second-order correction to account for the complex survey design.[49]*
† Coefficient of variation between 16.6% and 25.0%
** $p \leq 0.05$*
*** $p \leq 0.01$*
ns Chi-squared value did not reach statistical significance.

Table 3
Smoking, migraine and blood pressure check in users and non-users of oral contraceptives (OCs), by age group, women aged 15 to 49, household population, Canada excluding territories, 1996/97

	15-34					35-49				
	OC users		OC non-users			OC users		OC non-users		
	'000	%	'000	%	Chi-squared	'000	%	'000	%	Chi-squared
Risk factor										
Daily or occasional smoker	430	37	843	30	10.5**	28	17†	1,011	30	12.5***
Migraine	156	13	334	12	ns	25	15	475	14	ns
No blood pressure check in past year	213	18	887	31	64.8***	13	8†	833	25	41.9***

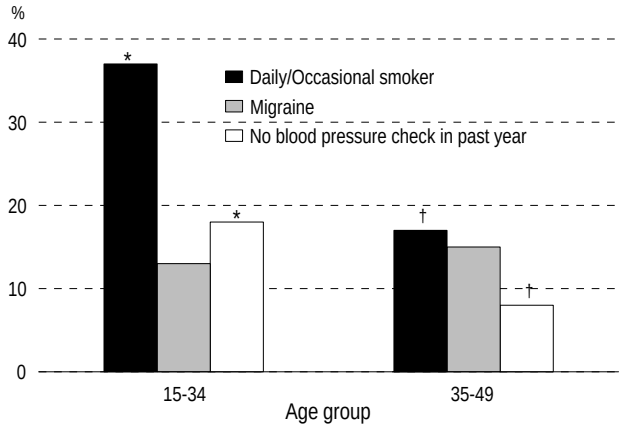
Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
Notes: *Estimates are based on data for women who were not pregnant at the time of their interview. Information on OC use is not available for an estimated 13,480 (n = 51) women (0.2%) aged 15 to 49. The chi-squared test used 500 bootstrap weights and included the Rao-Scott second-order correction to account for the complex survey design.[49]*
† Coefficient of variation between 16.6% and 25.0%
*** p ≤ 0.01*
**** p ≤ 0.001*
ns Chi-squared value did not reach statistical significance.

Because the risk of cardiovascular mortality increases with age, selected risk factors were further examined for oral contraceptive users and non-users by age group. For women aged 15 to 34, smoking was more common among users of oral contraceptives compared with non-users (Table 3). This suggests that, in this younger age group, smoking is not a deterrent to using the pill. The proportion of oral contraceptive users who were heavy smokers (15 or more cigarettes per day) was 14%, similar to the proportion of heavy smokers among non-users these ages (data not shown). Similarly, migraine, which was present to about the same extent in both users and non-users, evidently does not limit pill use among women in this age group.

Among 35- to 49-year-old women, the percentage of oral contraceptive users who smoked (17%) was appreciably lower than that for non-users (30%). Nonetheless, the NPHS data indicate that of the estimated 28,000 women in this age group who used the pill and smoked, 17,000 (data not shown) smoked heavily (at least 15 cigarettes per day). Perhaps doctors decide that, for some older women who smoke, effective contraception takes priority over other health risks.

The proportion of oral contraceptive users aged 35 to 49 who reported being diagnosed with migraine was nearly the same as that for non-users in the same age group—a somewhat unexpected finding. On the basis of a recent literature review, it has been suggested that the use of oral contraceptives may not be appropriate for women aged 35 or older who suffer from migraine, or in whom other major risk factors for stroke such as high blood pressure or smoking are present.[38]

Chart 1
Percentage of oral contraceptive users with selected cardiovascular risk factors, by age group, women aged 15 to 49, household population, Canada excluding territories, 1996/97



Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
Notes: *Estimates are based on data for women who were not pregnant at the time of their interview. Information on oral contraceptive use is not available for an estimated 13,480 (n = 51) women (0.2%) aged 15 to 49.*
† Coefficient of variation between 16.6% and 25.0%
** Significantly higher than corresponding value for 35-to-49 age group (p < 0.05)*

In the context of previous studies showing that substantial proportions of people with high blood pressure remain either untreated or unaware of their condition,[53,54] NPHS data on women whose blood pressure was not checked in the past year were examined. In both age groups, but especially the older one, a lower proportion of oral contraceptive users than non-users reported that their blood pressure had not been measured in the past year. The percentages for smoking and no blood pressure check in the past year were over twice as high in pill users aged 15 to 34 as they were in users aged 35 to 49 (Chart 1). However, the prevalence of migraine in these age groups did not differ significantly.

Being young, single, childless associated with pill use

Multivariate analysis, undertaken to account for the simultaneous effects of all variables, revealed significantly high odds of oral contraceptive use in all five-year age groups under age 35, compared with women aged 35 to 49 (Table 4). The odds of oral contraceptive use for women who were previously married, single or living in a common-law relationship were each significantly high, compared with those for women who were married. Also, even with the effects of age and marital status taken into account, women with three or more children under age 12 had significantly low odds of oral contraceptive use, compared with women with no children. The use of other means of contraception (such as tubal ligation or vasectomy) may have been greater among these women than among women with no young children. As expected, the odds for oral contraceptive use in sexually active women were much higher than those for women who were not sexually active. Finally, the odds of oral contraceptive use for immigrants were significantly lower than those for Canadian-born women.

Higher education, drug insurance related to pill use

The odds of oral contraceptive use were significantly higher for women with postsecondary education than for those for women who did not have this level of schooling.

Table 4
Adjusted odds ratios of oral contraceptive use for selected socio-demographic characteristics and cardiovascular risk factors, women aged 15 to 49, household population, Canada excluding territories, 1996/97

	Adjusted odds ratio	95% confidence interval
Age group		
15-19	9.1*	6.3, 13.3
20-24	10.3*	7.7, 14.0
25-29	8.2*	6.4, 10.6
30-34	4.9*	3.8, 6.5
35-49†	1.0	...
Marital status		
Married†	1.0	...
Common-law	1.6*	1.2, 2.1
Single	2.5*	1.9, 3.2
Previously married	2.0*	1.4, 2.8
Child(ren) under 12 in household		
None†	1.0	...
1-2	0.9	0.8, 1.1
3+	0.3*	0.2, 0.4
Sexually active in past year‡	8.5*	6.1, 12.0
Immigrant‡	0.5*	0.3, 0.6
Postsecondary education‡	1.4*	1.2, 1.7
Employed/Student‡	1.1	0.9, 1.3
High household income‡	1.0	0.7, 1.3
Drug insurance coverage‡	1.3*	1.1, 1.5
Cardiovascular risk factor		
Daily or occasional smoker‡	0.8*	0.7, 1.0
High blood pressure‡	0.9	0.5, 1.5
Migraine‡	1.0	0.8, 1.2
Overweight‡	0.7*	0.6, 0.9
Physically inactive‡	1.0	0.9, 1.2

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
Notes: *The analysis is based on a sample of 20,996 women aged 15 to 49, of whom 4,105 were using oral contraceptives. "Unknown" categories for sexual activity in the past year, income and body mass index were included in the analysis to maximize the sample size; their odds ratios are not shown. 949 women in this age group were missing information on other independent variables and were excluded from the analysis, along with an additional 51 women who were missing information on OC use. Because of rounding, some confidence intervals with 1.0 as the upper limit were significant.*
† Reference category, for which odds ratio is always 1.0
‡ Reference category is absence of the characteristic; for example, the reference categories for immigrant and high blood pressure are Canadian-born and no diagnosis of high blood pressure, respectively.
... Not applicable
**p < 0.05*

Employment or student status and income were not significantly associated with pill use. The odds of pill use were higher, however, among those who reported having drug insurance coverage than for women who had no such benefits.

Definitions

National Population Health Survey (NPHS) respondents were asked: "In the past month, did you take any of the following medications?" Birth control pills were included in the list read by interviewers.

Five *age groups* were established for this analysis: 15 to 19, 20 to 24, 25 to 29, 30 to 34, and 35 to 49, the group least likely to use oral contraceptives.

Respondents were asked for their current *marital status*. Four categories were used for this analysis: married (now married); common-law (including those who said they were "living with a partner"); single (never married); and previously married, which includes women who were widowed, separated or divorced.

A derived variable was created that classified *number of children less than 12 in household* into the following categories: none, one or two, and three or more.

Women who said they had sexual intercourse in the past 12 months were considered to be *sexually active*. Women who reported not having had intercourse in the past 12 months were categorized as not sexually active.

Immigrant status was determined by asking: "In what country were you born?"

Education was classified as less than high school graduation, high school graduation, some postsecondary, and postsecondary graduation. *Postsecondary education* comprises the latter two groups.

Respondents who said that they were currently working were identified as *employed*. An individual currently attending a school, college or university was classified as a *student.*

Household income levels were calculated by considering total household income and the number of people in the household:

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 4	$80,000 or more
	5 or more	$80,000 or more

High household income comprises the three highest groups.

To establish *drug insurance* coverage, respondents were asked: "Do you have insurance that covers all or part of the cost of your prescription medications (including private, government- or employer-paid plans)?"

To establish smoking status, respondents were asked if, at the time of the interview, they smoked cigarettes *daily*, *occasionally*, or not at all. For daily smokers, the number of cigarettes smoked per day was categorized as fewer than 15 and 15 or more (heavy).

Respondents were asked if they had "long-term conditions that have lasted or are expected to last six months or more and that have been diagnosed by a health professional." The interviewer read a list of chronic conditions. *High blood pressure* and *migraine* were among the risk factors relevant to this analysis. Although diabetes was also relevant, the number of respondents who reported this diagnosis was too small for the variable to be included.

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

The *Canadian Guidelines for Healthy Weights*[57] uses body mass index (BMI) to determine an acceptable range of healthy weights and to identify conditions of excess weight and underweight. BMI is calculated by dividing weight in kilograms by height in metres squared. Four weight categories are identified based on BMI:

- Underweight (BMI less than 20)
- Acceptable weight (BMI 20 to 24.9)
- Some excess weight (BMI 25 to 27)
- Overweight (BMI greater than 27)

These guidelines are recommended for everyone aged 20 to 64, excluding pregnant women. In accordance with these guidelines, women whose BMI was 25 or higher were classified as being *overweight* for this analysis. Those with a BMI of less than 25 were defined as not overweight.

To derive physical activity level, respondents' energy expenditure (EE) was estimated for each activity they engaged in during their 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*. Those with a value of 1.5 or higher were considered physically active.

Lower odds for smoking, overweight

Smoking was negatively related to pill use—a somewhat surprising finding, given that a greater percentage of users than non-users were smokers (Table 2). However, when smoking was entered alone into a logistic regression model, the odds ratio in relation to oral contraceptive use was significantly high, indicating that without adjusting for the effects of other variables, the odds of oral contraceptive use were higher among women who smoked than in non-smokers (data not shown). The low odds ratio for smoking in the multivariate analysis indicates that differences between contraceptive users and non-users—other than smoking status—accounted for use of the pill.

The adjusted odds ratio for high blood pressure did not attain statistical significance, partly as a result of the small number of women aged 15 to 49 with this condition. The adjusted odds of oral contraceptive use by overweight women were significantly lower than the odds for women who were not overweight. Neither migraine nor being physically inactive was associated with pill use.

Concluding remarks

The socio-demographic profile of Canadian women who use oral contraceptives that emerges from the 1996/97 National Population Health Survey is fairly consistent with what has been shown in other populations. Oral contraceptive users tend to be young, unmarried, sexually active women who are relatively well-educated.

Two of the cardiovascular risk factors examined in this analysis, overweight and smoking, were negatively associated with oral contraceptive use when the effects of other influences were taken into account. These findings are encouraging, in view of clinical guidelines that advise against prescribing oral contraceptives to women with risk factors for cardiovascular disease or stroke. Although the lowered odds ratio for hypertension in relation to oral contraceptive use was not statistically significant, relatively few women with known high blood pressure reported taking the pill (Appendix Table B), and a large majority of older users reported that their blood pressure had been checked within the past year.

There is still some cause for concern, however. The NPHS data indicate that just over one-third of all oral contraceptive users smoke, and a substantial number smoke heavily. Despite the higher risk of death from stroke and heart attack that the combination of smoking and oral contraceptive use confers, one-sixth of older oral contraceptive users—an estimated 28,000 women aged 35 to 49—also reported that they smoked.

One physician has observed that the continued combination of oral contraceptive use with smoking, despite clear evidence of the risks involved, signals an important shortcoming of medical care.[47] Other Canadian researchers have suggested that the combination of oral contraceptive use and smoking indicates a low level of awareness of the health risks.[48] However, it also serves as a reminder of the difficulties of dealing with a strong addiction, and offers an opportunity for preventive intervention.●

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Appendix

Table A

Distribution of selected characteristics, women aged 15 to 49, household population, Canada excluding territories, 1996/97

	Sample size	Estimated population	
		'000	%
Total	**21,996**	**7,558**	**100**
Age group			
15-19	2,151	1,007	13
20-24	2,628	889	12
25-29	3,167	936	12
30-34	3,894	1,170	16
35-49	10,156	3,557	47
Marital status			
Married	10,787	3,618	48
Common-law	1,351	623	8
Single	7,302	2,633	35
Previously married	2,508	672	9
Missing	48	- -	- -
Child(ren) under 12 in household			
None	12,406	4,440	59
1 or 2	8,198	2,742	36
3+	1,392	375	5
Sexually active in past year			
Yes	15,756	5,533	73
No	3,472	1,276	17
Missing	2,768	748	10
Immigrant			
Yes	2,934	1,304	17
No	18,997	6,231	82
Missing	65	23	- -
Education			
Less than high school graduation	3,952	1,522	20
High school graduation	4,220	1,351	18
Some postsecondary	5,501	2,027	27
Postsecondary graduation	8,223	2,635	35
Missing	100	22	- -
Employed/Student			
Yes	16,890	5,824	77
No	4,972	1,701	23
Missing	134	33	- -

	Sample size	Estimated population	
		'000	%
Total	**21,996**	**7,558**	**100**
Household income			
Lowest	970	326	4
Lower-middle	2,149	683	9
Middle	4,963	1,878	25
Upper-middle	6,859	2,528	34
Highest	2,676	893	12
Missing	4,379	1,248	17
Drug insurance coverage			
Yes	14,292	4,793	63
No	7,309	2,653	35
Missing	395	112	2
Smoker			
Daily or occasional	7,013	2,314	31
Former	5,431	1,872	25
Never	9,490	3,353	44
Missing	62	19†	- -
High blood pressure			
Yes	761	238	3
No	21,217	7,314	97
Missing	18	- -	- -
No blood pressure check in last year			
Yes	16,493	1,947	73
No	5,087	5,488	26
Missing	416	123	2
Migraine			
Yes	3,092	992	13
No	18,898	6,564	87
Missing	6	- -	- -
Overweight			
Yes	6,489	2,089	28
No	14,188	5,140	68
Missing	1,319	329	4
Physically inactive			
Yes	12,050	4,296	57
No	9,639	3,162	42
Missing	307	101	1

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
Note: *Detail may not add to totals because of rounding.*
† Coefficient of variation between 16.6% and 25.0%
‡ Coefficient of variation greater than 33.3%
- - Amount too small to be expressed

Table B
Prevalence of oral contraceptive (OC) use, by selected socio-demographic characteristics and cardiovascular risk factors, women aged 15 to 49, household population, Canada excluding territories, 1996/97

	OC users		
	Sample size	Estimated population	Prevalence of OC use
		'000	%
Total	**4,237**	**1,342**	**18**
Age group			
15-19	555	277	27
20-24	1,180	366	41
25-29	1,141	309	33
30-34	828	227	19
35-49	533	163	5
Marital status			
Married	1,324	333	9
Common-law	433	161	26
Single	2,168	773	29
Previously married	307	74	11
Child(ren) under 12 in household			
None	2,625	887	20
1 or 2	1,473	434	16
3+	139	20	5
Immigrant			
Yes	302	94	7
No	3,932	1,247	20
Postsecondary education			
Yes	2,915	934	20
No	1,315	407	14
Employed/Student			
Yes	3,507	1,118	19
No	716	220	13
High household income			
Yes	2,848	963	18
No	1,389	189	19
Drug insurance coverage			
Yes	2,792	877	18
No	1,392	450	17
Sexually active in past year			
Yes	3,655	1,188	21
No	268	92	7
Cardiovascular risk factors			
Regular or occasional smoker			
Yes	1,383	458	20
No	2,851	883	17
High blood pressure			
Yes	74	16	7
No	4,158	1,324	18
Migraine			
Yes	644	181	18
No	3,592	1,161	18
Overweight			
Yes	968	251	12
No	3,089	1,053	20
Physically inactive			
Yes	2,112	697	16
No	2,080	633	20

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
Notes: *Estimates are based on data for women who were not pregnant at the time of their interview. Information on OC use is not available for an estimated 13,480 (n=51) women (0.2%) aged 15 to 49. Detail may not add to totals because of rounding.*


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Changes in social support in relation to seniors' use of home care

Kathryn Wilkins and Marie P. Beaudet

Abstract

Objectives

This article examines seniors' entry into government-supported home care in relation to changes in levels of social support and in living arrangements.

Data source

The analysis is based on longitudinal data from the household component of the first two cycles of the National Population Health Survey, conducted by Statistics Canada in 1994/95 and 1996/97. Data from a sample of 2,044 people aged 65 or older who were followed prospectively were weighted to represent 2.7 million household-dwelling seniors.

Analytical techniques

Descriptive data were produced using bivariate frequencies. A multiple logistic regression model was used to examine associations between home care entry and changes in levels of social support and in living arrangements, while controlling for demographic and health-related factors.

Main results

Among people aged 65 or older who did not receive government-supported home care in 1994/95, an estimated 7% (192,000) were receiving these services in 1996/97. Changes in social support and in living arrangements between 1994/95 and 1996/97 were significantly associated with home care entry.

Key words

home care services, family characteristics, aged, longitudinal studies, health surveys, activities of daily living

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As a result of continuing constraints on health care budgets, home care has been receiving increased attention as a cost-effective means of caring for people with health problems. For example, research has focussed on the importance of home care in preventing or delaying the need for institutionalization among seniors with chronic or disabling conditions.[1,2]

Currently, government-supported home care comprises a variety of services organized under disparate administrative structures and policies. Although these differences in home care services pose a challenge to researchers, a better understanding of the factors that contribute to home care use is important because growing numbers of people are likely to need such services in coming decades. Recent information from the longitudinal component of Statistics Canada's National Population Health Survey (NPHS) offers an opportunity to study Canadians' use of home care prospectively (see *Methods*, *Limitations* and *Definitions*).

A previous study of home care users, based on cross-sectional data from the first cycle of the NPHS, examined the health and demographic characteristics of users of all

Methods

Data source

This article, which focusses on individuals aged 65 or older, is based on data from the National Population Health Survey (NPHS). The NPHS, which began in 1994/95, collects information about the health of the Canadian population every two years.[3,4] It covers household and institutional residents in all provinces and territories, except persons on Indian reserves, on Canadian Forces bases, and in some remote areas. The NPHS has both longitudinal and cross-sectional components. Respondents who are part of the longitudinal component will be followed for up to 20 years.

Individual data are organized into two files: General and Health. Socio-demographic and some health information was obtained for each member of participating households. These data are found in the General file. Additional, in-depth health information was collected for one randomly selected household member. The in-depth health information, as well as the information in the General file pertaining to that individual, is found in the Health file.

Among individuals in the longitudinal component, 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 and was usually the person who provided information on all household members for the General file in cycle 2.

The 1994/95 provincial, non-institutional sample consisted of 27,263 households, of which 88.7% agreed to participate in the survey. After the application of a screening rule to keep the sample representative, 20,725 households remained in scope.[5] 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. Of these 17,626 randomly selected respondents, 17,276 were eligible for re-interview in 1996/97. A response rate of 93.6% was achieved for the longitudinal panel in 1996/97. Of these 16,168 respondents, 15,670 provided full information; that is, general and in-depth health information for both cycles of the survey.

This analysis of entry into government-supported home care in relation to changes in social support is based on longitudinal data from the household component of the first (1994/95) and second (1996/97) cycles for the 10 provinces. From a total of 2,740 people aged 65 or older randomly assigned to the household-dwelling longitudinal panel at the time of the 1994/95 interview, 194 (7%) had dropped out of the survey and 258 (9%) had died or had been insitutionalized at the time of the 1996/97 follow-up interview.[4] An additional 244 had reported receiving home care in 1994/95. The analysis is based on data from the remaining sample of 2,044. Of these, 154 had newly entered home care by 1996/97. The data, weighted to account for the sample design, non-response and poststratification, represented 2.7 million seniors (Appendix Table A).

Analytical techniques

The analysis was based on the model of determinants of health care use proposed by Andersen and Newman.[6] This model suggests that use of health care services is motivated by factors arising from the environment and from the individual. Three categories of determinants are offered: predisposing, enabling and need (illness- or disability-related).

Individual characteristics that exist before the onset of illness, such as age, sex, living arrangements (including family size) and beliefs or attitudes toward health care predispose a person to use health care, according to Andersen and Newman. An indicator of a change in living arrangements—from living with at least one person to living alone between 1994/95 and 1996/97—was derived from the NPHS data and was included as a predisposing factor. Additional predisposing factors included as control variables were: age group, sex and household income.

Andersen and Newman define enabling factors as those conditions within the family or the community that make health services available to the individual. Two NPHS variables, both of which were indicators of changes in social support, were used in the analysis as enabling factors: change in average frequency of family contacts and change in perceived emotional support. The analysis included variables representing an increase, a decrease, or no change in the level of each of these variables between cycles 1 and 2.

The analysis was also controlled for several indicators of need: having one or more of four selected chronic conditions (cancer, effects of stroke, urinary incontinence, and Alzheimer's disease or other dementia) in 1994/95, becoming dependent on the help of another person in carrying out activities of daily living (ADL) between cycles 1 and 2, and being hospitalized sometime in the 12 months before the cycle 2 interview. The need variables were selected on the basis of their association with receiving home care in previous analyses.[7,8]

With data from the longitudinal file, cross-tabulations were used to estimate the percentage of Canadians aged 65 or older who had entered formal, government-supported home care by 1996/97, by the presence of selected health-related, demographic and social characteristics. Entry into home care was defined as receiving home care in 1996/97, after reporting not receiving such care in 1994/95. Data on sex were pooled for these univariate tabulations.

Multiple logistic regression was used to model associations between entering home care by 1996/97 and indicators of change in levels of social contact, perceived social support and living arrangements, while controlling for demographic and health-related factors. To account for survey design effects, standard errors and coefficients of variation were estimated with the bootstrap technique.[9] Results at the 0.05 level were considered statistically significant.

ages.[7] This analysis, based on longitudinal data from cycles 1 (1994/95) and 2 (1996/97), extends that work by examining associations between government-supported home care entry and changes in social support, while controlling for factors already shown to be related to the use of home care. This article pertains to people aged 65 or older, the group that most commonly uses home care.

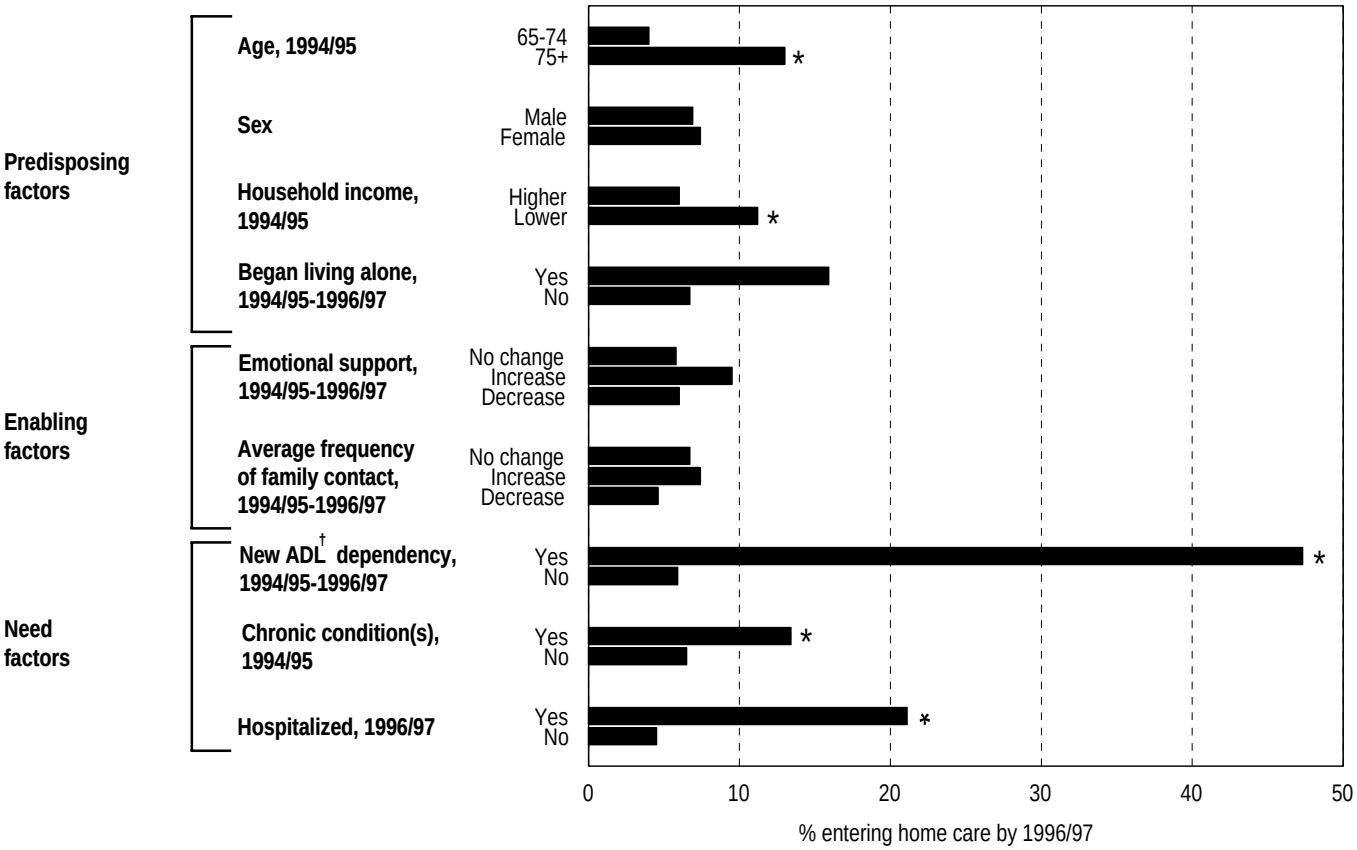
Age, need linked to home care entry

Of household residents aged 65 or older who did not receive formal, government-supported home care in 1994/95, an estimated 7%, or 192,000, were receiving such services two years later (Appendix Table A).

Certain factors distinguished individuals who entered home care at some point before their 1996/97 interview (Chart 1, Appendix Table B). Predictably, the likelihood of home care entry was higher for older seniors than for those aged 65 to 74. As well, people who were newly dependent on others for help with activities of daily living, had at least one chronic condition, or had been hospitalized in the previous year were more likely than others to enter home care.

Income also played an important role. A significantly higher percentage of lower-income individuals entered home care than did their higher-income counterparts. This may reflect the poorer health—and therefore greater need for care—of individuals with limited means. But it may also be partly because individuals with higher incomes are able to pay for private services, rather than depending on government-subsidized home care.

Chart 1
Percentage of household population aged 65 or older in 1994/95 entering home care by 1996/97, by selected characteristics, Canada excluding territories



Data source: *1994/95 and 1996/97 National Population Health Survey, Longitudinal file, 1994/95 to 1996/97*
† Activities of daily living
** Significantly higher than other value in category (p = 0.05). Critical value was adjusted to take multiple comparisons into account, where applicable.*

Emotional support related to home care

Many of the factors associated with entry into home care are, of course, related. However, even when the effects of variables such as age, sex, income, and physical need were taken into account, significant associations with home care entry emerged for factors that reflected changes in social support. Notably, individuals who reported an increase in perceived emotional support had just over twice the odds of entering home care as those who reported no change (Table 1). Although the association between decreased family contact and lower odds of home care entry was significant only

Limitations

Information on informal home care is not available from the National Population Health Survey (NPHS). However, other research has shown that, in many cases, seniors who are receiving formal, government-supported home care are also receiving informal care such as help from family and friends.[10,11] The characteristics and needs of individuals receiving government-supported home care may not actually differ much from those of people receiving informal care only. The similarities between these groups can be expected to dilute the strength of the associations examined in this study. As well, the NPHS provides no information on private home care, so individuals receiving such services may be misclassified as not receiving home care. Finally, because respondents were asked only about home care received in the 12 months before their interviews, there is no information on the years before the first survey period, or on the year immediately following the first interview (1995/96). Therefore, it is not known to what extent the characteristics of people who may have received home care during these periods would resemble those of people who entered home care in the 12-months before the cycle 1 and 2 interviews. Again, similarities between the groups could weaken any true associations.

Currently across Canada, and from one region to another, government-supported home care differs in its structure and access, and in the nature of services available. Such factors related to the delivery of health care are likely to affect the use of home care (and are postulated to do so by the Andersen and Newman model); however, because such information is not available from the NPHS, this analysis does not take it into account.

Because the reference period for some of the variables was the 12 months before each interview, it was not possible to determine the timing of some factors. For example, an increase in perceived emotional support might occur before entry into home care, perhaps arising from increased contact with children after the loss of a spouse. It might also occur after home care has begun, perhaps through contact with the formal caregiver.

The relatively small sample size of people aged 65 or older who are being followed longitudinally restricts the scope of this analysis. It would have been preferable to analyze the data for men and women separately, but the resulting sample sizes for the two groups were too small. It is also possible that the small sample size may have prevented some true associations from reaching the designated level of significance.

The data are self- (or proxy-) reported, and the degree to which they are biased because of reporting error is unknown. To minimize reporting error in data related to chronic conditions (including cancer, effects of stroke, urinary incontinence, and Alzheimer's disease or other dementia), respondents were instructed to report only those conditions that had been "diagnosed by a health professional."

Table 1
Adjusted odds ratios for home care entry, household population aged 65 or older in 1994/95, by selected characteristics, Canada excluding territories

	Odds ratio	95% confidence interval
Predisposing factors		
Age group, 1994/95		
65-74†	1.0	...
75+	3.0*	1.8, 4.8
Sex		
Men†	1.0	...
Women	1.1	0.6, 2.0
Household income, 1994/95		
Higher†	1.0	...
Lower	2.0*	1.0, 3.9
Began living alone, 1994/95-1996/97		
No†	1.0	...
Yes	3.1*	1.4, 6.9
Enabling factors		
Perceived emotional support, 1994/95-1996/97		
No change†	1.0	...
Increase	2.1*	1.1, 4.0
Decrease	1.1	0.6, 2.1
Average frequency of family contact, 1994/95-1996/97		
No change†	1.0	...
Increase	0.9	0.5, 1.7
Decrease	0.6[a]	0.3, 1.1
Need factors‡		
New need for help with activities of daily living, 1994/95-1996/97	7.0*	2.8, 17.3
Chronic condition(s), 1994/95	1.7	0.8, 3.7
Hospitalized in previous 12 months, 1996/97	4.7*	2.7, 8.1

Data source: *National Population Health Survey, Longitudinal file, 1994/95 to 1996/97*

Notes: *"Unknown" categories for household income level, perceived emotional support and average frequency of family contact were included in the model, but their odds ratios are not shown. Analysis is based on a sample of 2,040; 4 individuals were excluded because of missing values for one or more other variables. Because of rounding, some confidence intervals with 1.0 as the lower limit were significant.*

† Reference category, for which odds ratio is always 1.0

‡ Reference category is absence of condition.

··· Not applicable

** $p < 0.05$*

[a] $p = 0.07$

Definitions

The National Population Health Survey (NPHS) question about home care was: "Home care services are health care or homemaker services received at home, with the cost being entirely or partially covered by government. Examples are nursing care, help with bathing or housework, respite care, and meal delivery. Have/Has . . . received any home care services in the past 12 months?" *Entry into home care* was defined as receiving home care in the 12 months before the cycle 2 interview in 1996/97, but not in the corresponding period before the cycle 1 interview in 1994/95.

Several ***predisposing factors*** were used for this analysis.

Two *age groups* (age in 1994/95) were defined: 65 to 74 and 75 or older.

Household income was defined as "lower" and "higher," based on total household income and the number of household members.

	Total household income	
People in household	**Lower**	**Higher**
1 or 2	Less than $15,000	$15,000 or more
3 or 4	Less than $20,000	$20,000 or more
5 or more	Less than $30,000	$30,000 or more

Income data were not available for 6% of the longitudinal respondents aged 65 or older. So that other information on these respondents could be included in the regression analysis, a variable for unknown income was included in the model.

Change in *household size* was defined as living in a household with at least one other person in 1994/95, then living alone in 1996/97.

Two measures of change in *social support* between 1994/95 and 1996/97 were included as ***enabling factors*****:** an increase, decrease or no change in perceived emotional support, and an increase, decrease or no change in average frequency of family contact.

Perceived emotional support was measured by four questions:

"Do you have someone you can confide in or talk to about your private feelings or concerns?"

"Do you have someone you can really count on to help you out 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?"

Each "yes" answer was scored 1, for a maximum score of 4. Total scores that were higher or lower in 1996/97 compared with 1994/95 were considered to show an increase or decrease, respectively, in perceived emotional support. Scores that remained the same in both cycles were considered to show no change.

Information on *average frequency of family contact* was ascertained from questions measuring contacts with daughters or sons (or daughters- or sons-in-law), in view of recent research on informal eldercare in Canada showing that the majority of caregivers are adult children looking after their elderly parents.[12] The NPHS asked, "In the past 12 months, how often did you have contact [either in person, by phone, or by mail with persons who do not live with you] with your daughters or daughters-in-law?" A similar question was asked about contacts with sons and sons-in-law. Responses were: "Don't have any, or all live with you," "Never," "Once a year," "A few times a year," "Once a month," "Two or three times a month," "At least once a week," "Every day." The responses were recoded so that scores ranging from 1 to 7 were assigned to successive response levels, from "never" through "every day." To calculate a respondent's average score, his or her total score was divided by the number of family relationships for which responses were provided. No contacts with daughters or sons or daughters- or sons-in-law scored 0; contact only with daughters or sons or respective in-laws, 1; and contact with both daughters and sons or respective in-laws, 2. An increase or a decrease in the average frequency was defined as a higher or lower score, respectively, in cycle 2 than in cycle 1. No change in the score was considered to reflect no change in frequency of contacts.

Because the NPHS question was asked only in reference to adult children living outside the home, people whose children lived in their homes or who had no children also had to be included. Individuals with children living in their home in cycle 1 but not in cycle 2 were defined as having a decrease in average frequency of contact; conversely, those with children in their home in cycle 2 but not in cycle 1 were defined as having an increase. People whose children lived with them in both cycles were defined as having no change in average frequency of contact. Those with no children, either inside or outside the home, in both cycles were scored as having no change in average frequency of contact. Data for individuals who responded that they had children in cycle 2 but not in cycle 1 were excluded from the analysis.

Several ***need factors*** were examined. A new need for help with activities of daily living (ADL) was determined by asking: "Because of any condition or health problem, does . . . need the help of another person in personal care such as washing, dressing or eating?" A "no" response in cycle 1 and a "yes" in cycle 2 indicated a new need for help with ADL.

Respondents were asked if a health professional had diagnosed them as having selected *chronic conditions* "that have lasted or are expected to last six months or more." A "yes" response to at least one of four specific conditions—cancer, effects of stroke, urinary incontinence, and Alzheimer's disease or other dementia—was used to determine the presence of a chronic condition in cycle 1.

Hospitalization at some time during the 12-month period before the cycle 2 interview was defined as a "yes" response to the question, "In the past 12 months, have you been a patient overnight in a hospital, nursing home or convalescent home?"

at the level of $p = 0.07$, it adds to the plausibility of the converse positive relationship between increased emotional support and entry into home care.

In addition, a reduction in household size resulting in living alone, which indicates a potential change in level of social support, was independently associated with entry into home care. Seniors who had begun living alone sometime between their cycle 1 and cycle 2 interviews had just over three times the odds of entering home care by 1996/97, compared with their counterparts whose household size either remained the same or increased. This finding supports other research showing that people living alone are more likely to receive formal care than those living with family members.[10,13]

As expected, age was independently predictive of entry into home care. The odds of entering government-supported home care were three times as high for people aged 75 or older as those for 65- to 74-year-olds. Income remained a factor: members of lower-income households had twice the odds of entering home care, compared with those in the higher-income group.

Consistent with other research,[8,10,14,15] physical need was associated with entering home care. For example, seniors who indicated a new need for help with the activities of daily living had seven times the odds of entering home care, compared with individuals who reported no new need. In addition, people who had been hospitalized sometime during the 12 months before the cycle 1 interview also had much higher odds (4.7) of entry into home care, compared with those who had not been hospitalized in that period. This finding also supports previous research and was not unexpected.[8] Older patients released from hospital often need continuing care or assistance, and arrangements for home care may be made as part of their discharge plan.

Social support linked to formal care

Because the NPHS does not provide information about exact dates, the timing of events related to entry into home care cannot be established. The vulnerability of the elderly can increase gradually, as in the case of a chronic, debilitating disease, or abruptly, perhaps as the result of a fracture or an acute illness. When functional decline is gradual, family members might initially provide care themselves, and thereby become more involved with the elderly person's emerging needs.[11] As the burden of care becomes too physically or emotionally demanding or too technically complex, this informal network may assume the role of advocate and mobilize the formal support system, including government-supported home care services. The role of the family and other informal networks as advocates in the use of health care has been documented by previous research,[11,16,17] and may explain the association between perceived emotional support and entry into home care. It is also possible that, in some cases, increases in perceived emotional support result from contact with the formal caregiver. In the case of a precipitating event, access to home care services may be facilitated by a health care provider who is a formal caregiver; for example, as part of a discharge plan from an acute care hospital.

The few studies that focus on social support in relation to home care utilization are contradictory and inconclusive. However, similar to the NPHS results, a study of patients in the Boston area who had been discharged to their homes from rehabilitation hospitals showed that those patients whose family and friends provided informal care were also more likely to use community-based home care services.[18] As well, a study of elderly people in Cleveland showed lower rates of use of social and health services among socially isolated seniors than others.[19] By contrast, other research has shown no associations between social resources and the use of home care,[20-22] or associations between *low* levels of social support and receiving formal home care.[10,23,24]

With the important exception of a longitudinal study of formal care use by frail elderly in the United States, most previous research of health services utilization has used variables measured at one point in time.[8] By contrast, this analysis has examined changes over time in social support and living arrangements. Associations between such changes and use of home care services may be more pronounced than associations with variables

measured only once. For example, the transition to living alone, which may often occur as a result of the death or institutionalization of an ailing spouse, reflects a loss of close companionship, and frequently, help with tasks such as housework, grocery shopping, or preparing meals. The need for home care may be greater during the period of adjustment to living alone, especially for someone who is already disabled, than it would be later on, after new ways of coping have been established. (See also *Living at home or in an institution: What makes the difference for seniors?* in this issue.)

However, the association between home care entry and the change in living arrangements may also reflect the response of the health care system. As noted in a study of Manitoba seniors, availability of informal care reduces one's assigned priority of need for formal home care service.[22] People who have recently experienced the loss of a partner may be deemed in greater need of home care than those with the same physical condition who are living with others.[25]

Concluding remarks

This analysis uses longitudinal data from the first two cycles of the National Population Health Survey to provide evidence of the importance of changes in social support in the entry of seniors into formal, government-supported home care. The analysis also adds to existing evidence of the strong associations between socio-demographic conditions and physical needs and entry into home care. Yet even when controlling for the effects of these factors, the data indicate that entry into home care is related to an increase in perceived emotional support and a change in living arrangements to a one-person household. The lack of information on the timing of events surrounding entry into home care does limit the analysis somewhat. Nonetheless, whether home care is initiated as a result of action by family members or by the health care system, this analysis suggests that the informal network operates in concert with the formal delivery system to care for older people in the community. ●

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Appendix

Table A
Distribution of selected characteristics, household population aged 65 or older in 1994/95, Canada excluding territories

	Sample size	Estimated population	
		'000	%
Total	**2,044**	**2,686**	**100**
Entered home care by 1996/97	154	192	7
Predisposing factors			
Age group, 1994/95			
65-74	1,294	1,797	67
75+	750	889	33
Sex			
Male	814	1,169	44
Female	1,230	1,517	56
Household income, 1994/95			
Higher	1,330	1,944	72
Lower	612	593	22
Unknown	102	149	6
Began living alone, 1994/95-1996/97	82	138	5
Enabling factors			
Perceived emotional support, 1994/95-1996/97			
No change	1,365	1,708	64
Increase	286	391	15
Decrease	226	313	12
Unknown	167	273	10
Average frequency of family contact, 1994/95-1996/97			
No change	888	1,111	41
Increase	508	686	26
Decrease	496	625	23
Unknown	152	264	10
Need factors			
New need for help with activities of daily living, 1994/95-1996/97	71	82	3
Chronic condition(s), 1994/95	185	253	9
Hospitalized in previous 12 months, 1996/97	333	427	16

Data source: *National Population Health Survey, Longitudinal file, 1994/95 to 1996/97*
Note: *Detail may not add to total, as data were missing for some variables.*

Table B
Distribution of selected characteristics, by home care entry status in 1996/97, household population aged 65 or older in 1994/95, Canada excluding territories

	Entered home care	Did not enter home care
	%	%
Predisposing factors		
Age group, 1994/95		
65-74	38	69
75+	62	31
Sex		
Male	42	44
Female	58	56
Household income, 1994/95		
Higher	61	73
Lower	35	21
Unknown	5	6
Began living alone, 1994/95-1996/97		
Yes	11	5
No	89	95
Enabling factors		
Perceived emotional support, 1994/95-1996/97		
No change	52	65
Increase	19	14
Decrease	10	12
Unknown	19	9
Average frequency of family contact, 1994/95-1996/97		
No change	39	42
Increase	27	25
Decrease	15	24
Unknown	20	9
Need factors		
New need for help with activities of daily living, 1994/95-1996/97		
Yes	20	2
No	80	98
Chronic condition(s), 1994/95		
Yes	18	9
No	82	91
Hospitalized in previous 12 months, 1996/97		
Yes	47	14
No	53	86

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


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Living at home or in an institution: What makes the difference for seniors?

Helen Trottier, Laurent Martel, Christian Houle, Jean-Marie Berthelot and Jacques Légaré

Abstract

Objectives

This article examines some of the health and socio-demographic factors associated with living in long-term health care facilities rather than in private households, for elderly people with various levels of disability.

Data source

The data are from the 1996/97 National Population Health Survey conducted by Statistics Canada. Data from a sample of 1,711 people aged 65 or older living in long-term health care facilities and 13,363 in private households were weighted to represent about 185,100 and 3.4 million seniors, respectively.

Analytical techniques

Descriptive data were produced using bivariate frequencies. Multiple logistic regression models were used to examine associations between living in long-term health care facilities and selected health and socio-demographic characteristics for seniors with self-reported severe, moderate or no disability.

Main results

While health status was strongly associated with residence in a long-term health care facility, the absence of a spouse, low income, low education, and advanced age were also significant.

Key words

homes for the aged, nursing homes, disability, health utilities index, socioeconomic factors

Authors

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The link between advanced age and activity limitations, and between such limitations and institutionalization, has been repeatedly demonstrated.[1,2] Consequently, as the population ages, the need for institutionalization is likely to grow and exert increasing financial pressure on the health care system.

In 1995, just 1% of the total Canadian population lived in long-term health care facilities.[3] The proportion was higher at older ages: 5% for people aged 65 or older, and 18% at age 80 or older. If these rates persist, Statistics Canada's latest population projections[4] suggest that the number of beds required in long-term health care facilities could rise from 184,300 in 1996/97 to over 565,000 in 2031. Other researchers have estimated that an even higher number of elderly people will be in institutions by 2031—746,000.[5] Earlier studies, however, have shown that the number of beds required depends not only on the absolute number of elderly persons and their health status, but also on their socio-demographic characteristics.[6-10]

Methods

Data source

This article is based on data from Statistics Canada's National Population Health Survey (NPHS). The NPHS, which began in 1994/95, collects information about the health of the Canadian population every two years.[11,12] 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.

This analysis uses cross-sectional data from cycle 2 of the NPHS, conducted in 1996/97. The data pertain to the population in households and in long-term health care facilities in the 10 provinces.

The 1996/97 cross-sectional household sample is made up of a longitudinal component and one-time respondents who were selected as part of supplemental samples, or buy-ins, in three provinces. The additional respondents for the buy-ins were chosen with the random digit dialing (RDD) technique and were included for cross-sectional purposes only.

Individual data are organized into two files: General and Health. Socio-demographic and some health information was obtained for each member of participating households. These data are found in the General file. Additional in-depth health information was collected for one randomly selected household member. The in-depth health information, as well as the information on the General file pertaining to that individual, is found in the Health file.

Among individuals belonging to the cross-sectional buy-in component, 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 belonging to the longitudinal component, the person providing in-depth health information about himself or herself for the Health file was the randomly selected person for that household in cycle 1 (1994/95) and was usually the person who provided information on all household members for the General file in cycle 2.

The 1996/97 cross-sectional response rates for the Health file were 93.6% for the longitudinal component and 75.8% for the RDD component, yielding an overall response rate of 79.0%.

Data for the institutional component of the 1996/97 NPHS came from 212 institutions in the 10 provinces. To obtain the institutional sample, lists of health care facilities with long-term residents were drawn up and stratified according to geographic region and type and size of facility. Provincial ministries of health verified and updated these lists to ensure accuracy. The institutions were classified by the dominant type of care provided, and only those providing long-term care (a period of at least six months) were retained. A random sample was selected from the final list. The sample was restricted to facilities with at least four beds that provided long-term care to residents with health problems. With help from administrators in each institution, a subsample of residents was randomly selected. The administrator determined if these individuals were capable of answering the questionnaire or if a proxy respondent was required. The proxy respondent could be a relative, or a staff member or volunteer working in the institution.

Questions for the institutional component were designed to be asked through personal, on-site interviews. Telephone interviews were allowed when it was not possible to interview the respondent on site.

The sample size was 2,393 for long-term health care facilities and 81,804 for private households. This analysis of people aged 65 or older is based on 1,711 respondents in institutions and 13,363 in private households, representing about 185,100 and 3.4 million seniors, respectively.

Analytical techniques

With cross-sectional data, frequencies were used to demonstrate that the various disability levels were associated with health status, as measured by the Health Utilities Index (see *Health Utilities Index*), thereby providing evidence of construct validity. Cross-tabulations were also used to describe people aged 65 or older, according to their disability level and their place of residence.

Multiple logistic regression was used to model associations between health and socio-demographic variables and place of residence. Five separate logistic regressions were modeled. The first compares the characteristics of individuals living in long-term health care facilities with those of residents of private households. Separate regressions compare individuals according to their place of residence for each level of disability: severe, moderate and no disability. A final regression compares the characteristics of individuals with severe or moderate disability in private households with those of disability-free individuals in institutions, to reveal factors other than health status that are related to institutionalization.

The data were weighted so that the sample represents the population of Canada. Nonetheless, the complex sampling design of the NPHS presents a problem for the derivation of unbiased estimates of the variance. To partially reduce the bias, the weights were normalized (by dividing each weight by the global average weight) to average 1. In addition, tests with p-values less than 0.01 (instead of 0.05) were considered significant to partially account for the larger variance estimates that would have been obtained if full account had been taken of the survey design. Nonetheless, the odds ratios reported in this article should be viewed with caution. Their standard errors, and hence, confidence intervals, may be underestimated.

Most of these studies have not examined the factors associated with institutionalization of elderly people, while controlling for level of disability. This analysis, by contrast, uses cross-sectional data from the household and institutional components of the 1996/97 National Population Health Survey (NPHS) to identify characteristics associated with residing in long-term health care facilities among elderly people with severe, moderate or no disability (see *Methods*, *Definitions* and *Limitations*).[13]

The Health Utilities Index and disability

The Health Utilities Index (HUI) is a summary measure of health (see *Health Utilities Index*). It combines the functional aspects of health, such as mobility and cognition, with a valuation component to produce an overall score, or index, for each individual.

Given the functional components of the Health Utilities Index, HUI scores should reflect levels of disability. That is, people with severe disability

Definitions

In the National Population Health Survey (NPHS), long-term health care facilities were defined as public or private residential care facilities or hospitals with at least four beds, that provide care for periods of at least six months. Hospitals, nursing homes and residential facilities for people with disabilities are examples. Those on military bases, in correctional institutions, in religious centres, or on Indian reserves were excluded.

Questions on activity limitation and dependence were used to define *disability* levels. The questions for respondents in long-term health care facilities differed slightly from those asked of private household residents.

To determine an activity limitation, residents of institutions were asked: "Because of a long-term physical or mental condition or a health problem, are you limited in the kind or amount of activity you can do: within the residence or institution? outside the residence or institution in activities such as travel, recreation or leisure?" They were also asked: "Do you have any long-term disabilities or handicaps?" Residents of private households were asked: "Because of a long-term physical or mental condition or a health problem, are you limited in the kind or amount of activity you can do: at home? in other activities (such as leisure)?" and "Do you have any long-term disabilities or handicaps?" In each instance, respondents who replied affirmatively to at least one of these questions were categorized as persons whose activities were restricted.

To evaluate dependence, residents of institutions were asked: "Because of any condition or health problem, do you need the help of another person with: personal care such as bathing, dressing or eating? moving about inside the residence or institution?" A similar question was asked of private household residents: "Because of any condition or health problem, do you need the help of another person: in personal care such as washing, dressing or eating? in moving about inside the house?" Respondents who reported needing assistance with at least one of these activities were classified as dependent.

The responses to the activity limitation and dependence items were combined to define three levels of *disability*: severe, moderate and no disability (Appendix Table A). People classified as having severe disability had activity limitation and dependence. Those with moderate disability had activity limitation but no dependence, or dependence but no activity limitation. Those with no disability had neither activity limitation nor dependence.

For this analysis, five *age groups* were established: 65 to 69, 70 to 74, 75 to 79, 80 to 84, and 85 or older.

Marital status was defined as: married/common-law, single, widowed, or separated/divorced.

Education was categorized as: none, primary, some high school, high school graduation, some postsecondary, or postsecondary graduation.

Four sources of *income* were identified: retirement income (Canada/Québec Pension Plan, other private pensions), transfers (Old Age Security, Guaranteed Income Supplement), investment income (Registered Retirement Savings Plan, dividends and interest), and employment (salary, wages, income from self-employment). These sources were used to construct the variable number of sources of income.

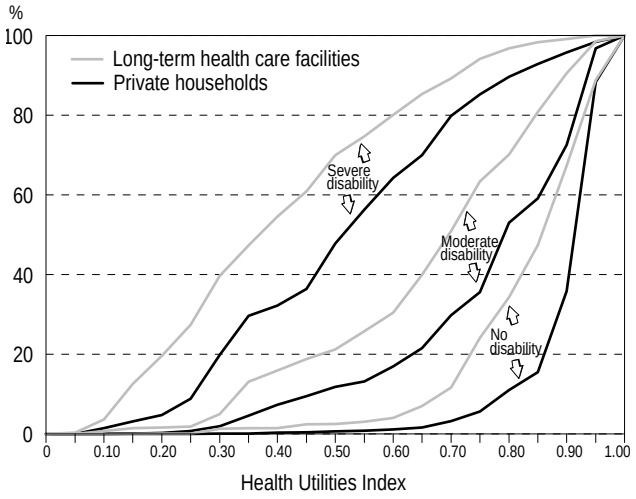
Respondents were asked if a health professional had diagnosed them as having a *chronic condition*. Based on a review of the literature and preliminary multivariate analyses, the following conditions were selected for this analysis: Alzheimer's disease or other dementia, urinary incontinence, ulcers, arthritis, effects of stroke, bowel disorders, high blood pressure, bronchitis or emphysema, epilepsy, and heart disease.

should have low scores, whereas scores among those free of disability should be relatively high. This pattern prevailed among the elderly in 1996/97 (Chart 1). The cumulative percentage curves indicate that the proportion of elderly people with low HUI scores (poor functional health) was greater among those with severe disability than among those with moderate or no disability.

In addition, at each level of disability, the proportion of elderly people with low scores tended to be higher among those in long-term health care facilities than in private households. For instance, among people with severe disability, HUI scores of 0.2 or less accounted for 20% of institutional residents, but only 5% of private household residents.

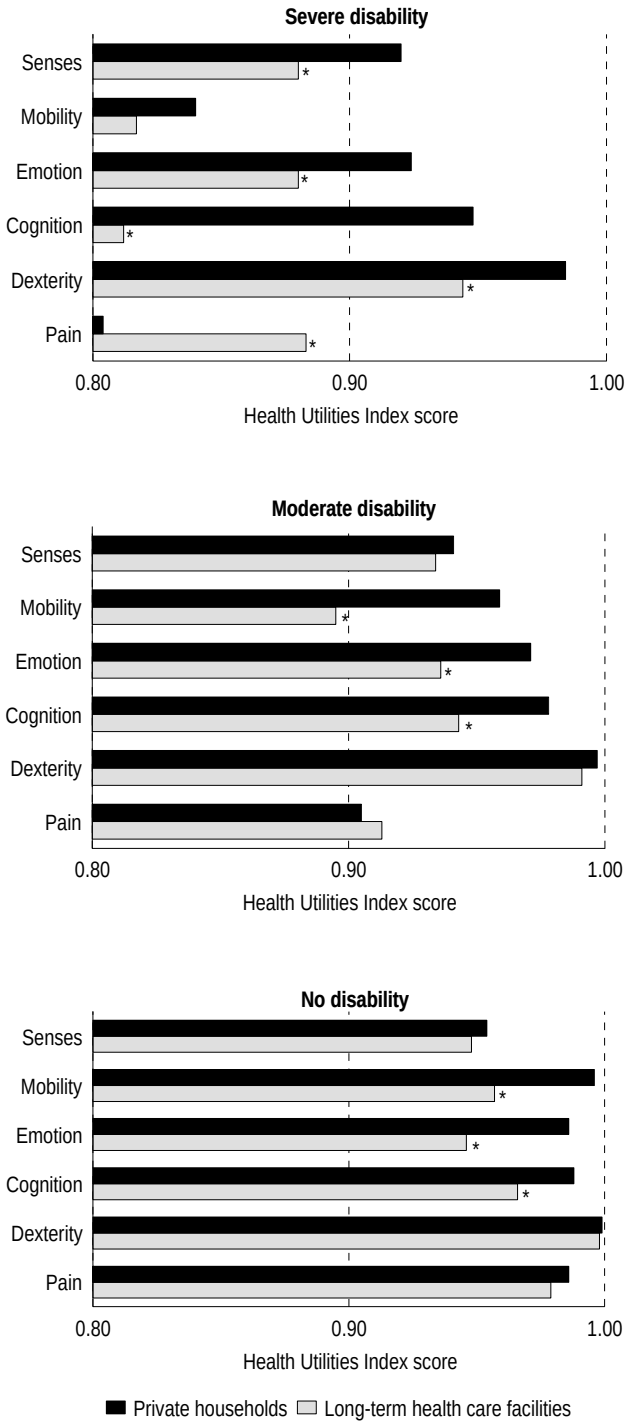
Comparisons of the various components of HUI scores (senses, dexterity, etc.) for people at the same level of disability in long-term health care facilities with those for individuals in private households reveal the components associated with being in an institution (Chart 2). Among people classified as having severe disability, the mean of the cognition

Chart 1
Cumulative percentage of Health Utilities Index, by disability level and place of residence, population aged 65 or older, Canada excluding territories, 1996/97



Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health and Institutional files*
Note: *Adjusted for age and sex; standardization of curves of residents of long-term health care facilities, compared with age and sex structure of residents of private households*

Chart 2
Mean scores of components of Health Utilities Index, by disability level and place of residence, population aged 65 or older, Canada excluding territories, 1996/97



Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health and Institutional files*
Note: *Adjusted for age and sex; standardization for various attributes for residents of long-term health care facilities, compared with age and sex structure of residents of private households*
** Significantly different from residents of private households, $p \leq 0.01$*

component of the HUI was much lower (designating worse health for that component) for those in institutions than for those in private households, while the pain component was lower for those in private households. Painful illnesses such as arthritis do not necessarily lead to institutionalization, but the daily dependence brought on by cognitive illnesses such as Alzheimer's disease almost always mandates it.

The presence of elderly people with no disability in long-term health care facilities cannot be primarily attributed to their health status. The average scores of this group on the various components of the HUI were relatively high, compared with people with moderate or severe disability. This suggests that, for some elderly people, factors other than health status (as measured by the HUI) are associated with institutionalization.

Health Utilities Index

The Health Utilities Index (HUI), which was developed by the Centre for Health Economics and Policy Analysis (CHEPA) at McMaster University, summarizes the quantitative and qualitative aspects of health. It is based on the Comprehensive Health Status Measurement System (CHSMS),[14] a descriptive measure of an individual's overall functional health. The functional component is determined by asking respondents about eight areas of their personal health: vision, hearing, speech, mobility (ability to get around), dexterity (use of hands and fingers), cognition (memory and thinking), emotion (feelings), and pain and discomfort. Each rating by an individual on these eight health attributes is used to create an overall index, the value of which ranges between 0 and 1. For instance, vision ranges from blindness to perfect vision; a person with myopia but no other health problems would have a HUI of 0.95.

The valuation component is derived from another survey[15] that asked respondents to rank their preferences for various health conditions. Evaluation of individual preferences is complex: an individual classifies, by order of preference, all states of health corresponding to each area of health. Cardinal utilities are given through the standard gamble method,[16] based on the theory of utility assembled by Von Newmann and Morgenstern.[17]

The standard gamble method asks subjects to choose between two options. Option 1 offers a particular possibility with certainty, while Option 2 represents a gamble with explicit probabilities that can lead to two outcomes. For instance, the choice may be between having a chronic condition for life (Option 1), and an intervention that would allow the patient to regain his or her health and live t more years (probability p), but which could also cause his or her immediate death (probability 1-p) (Option 2).

Each individual rating on each of the functional dimensions is weighted by the valuation component to yield an overall HUI for each individual. The HUI ranges from 0.00 to 1.00, with 1.00 representing perfect health.

The HUI is one of the variables available from the National Population Health Survey (NPHS). The NPHS index consists of six, rather than eight, areas of health: vision, hearing and speech are grouped into "senses." Based on the questions on vision, hearing, speech, mobility, emotion, cognition, dexterity and pain, a value was assigned to each HUI component on a scale of 0.51 to 1.00, ranging from severe disability (0.51) to perfect health (1.00).

Health Utilities Index (HUI) components and values attributed to each component based on responses to questionnaire

SENSES U1	MOBILITY U2	EMOTION U3	COGNITION U4	DEXTERITY U5	PAIN U6
1.00	1.00	1.00	1.00	1.00	1.00
0.95	0.97	0.93	0.95	0.97	0.97
0.90	0.84	0.81	0.88	0.91	0.85
0.86	0.78	0.53	0.65	0.80	0.51
0.74	0.73				
0.67					
0.61					

HUI = 1.06 ((U1*U2*U3*U4*U5*U6)-0.06)

The resulting HUI transposes a vector resulting from the multiplication of the values attributed to each of the components, then a correction factor that takes social preferences into account is added. With the minimum value of each attribute, the resulting HUI is 0; that is, 1.06*((0.61*0.73*0.53*0.65*0.80*0.51)-0.06) = 0. On the other hand, the maximum value for each attribute yields a HUI of 1; that is, 1.06*((1*1*1*1*1*1)-0.06) = 1.

Analysts at Statistics Canada have subjected the HUI to coherence tests and consider that it provides a realistic evaluation of the functional health status of the population. A detailed explanation of the calculation of the HUI is available in another report.[18]

Characteristics differ

Predictably, the characteristics of residents of long-term health care facilities differed from those of seniors in private households.

At each level of disability, residents of long-term health care facilities had a lower average Health Utilities Index score than did their counterparts in private households (Table 1). As well, the average age of institutional residents was higher than that of people in private households. The gap, however, was widest—about 10 years—among those reporting no disability.

At older ages, women account for a progressively larger share of the population. Even so, the female majority was much more pronounced in institutions than in private households. To a large extent, this

Table 1
Socio-demographic and health characteristics of population aged 65 or older, by disability level and place of residence, Canada excluding territories, 1996/97

	Residents of long-term health care facilities			Residents of private households		
	Total	Men	Women	Total	Men	Women
Severe disability						
Average Health Utilities Index	0.40*	0.41*	0.40*	0.52	0.55	0.50
Average age (years)	84.0*	81.1*	85.1*	79.1	77.7	80.2
Sex distribution (%)						
Men	26.3*	...	...	42.2	...	...
Women	73.7*	...	...	57.8	...	...
Marital status distribution (%)						
Married/Common-law	18.4*	38.9*	11.1*	50.2	73.5	33.3
Widowed	64.3*	36.4*	74.2*	39.3	16.4	55.9
Separated/Divorced	2.6	4.9	1.8	4.1	3.0	5.0
Single	14.1*	18.6*	12.5*	6.2	7.1	5.5
Missing	0.6	1.2	0.4	0.2	–	0.3
Moderate disability						
Average Health Utilities Index	0.64*	0.66*	0.64*	0.77	0.77	0.76
Average age (years)	82.8*	78.4*	84.5*	74.6	74.4	74.8
Sex distribution (%)						
Men	28.2*	...	...	43.9	...	...
Women	71.8*	...	...	56.1	...	...
Marital status distribution (%)						
Married/Common-law	10.3*	24.1*	4.9*	56.7	77.7	40.3
Widowed	67.4*	43.1*	76.9*	33.1	13.7	48.2
Separated/Divorced	7.9	16.2	4.6	5.1	4.4	5.7
Single	13.5*	14.9	13.0	5.0	4.2	5.7
Missing	0.9	1.7	0.6	0.1	–	0.1
No disability						
Average Health Utilities Index	0.80*	0.84*	0.78*	0.91	0.91	0.91
Average age (years)	82.2*	79.3*	83.5*	72.6	72.5	72.6
Sex distribution (%)						
Men	31.1*	...	...	43.0	...	...
Women	68.9*	...	...	57.0	...	...
Marital status distribution (%)						
Married/Common-law	10.2*	15.6*	7.8*	60.1	74.8	48.9
Widowed	65.7*	41.1*	76.8*	27.7	13.6	38.3
Separated/Divorced	6.4	13.0	3.4	6.5	5.9	7.0
Single	17.7*	30.3*	12.0	5.5	5.5	5.6
Missing	–	–	–	0.2	0.2	0.2

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health and Institutional files*
... Not applicable
– Nil
** Significantly different from residents of private households, $p \leq 0.01$*

imbalance reflects higher male mortality, especially at older ages.

As a result, among the elderly, women are more likely than men to be widowed. And while the proportion of both widows and widowers was much higher in institutions than in private households, this was particularly the case for women. Since elderly women frequently have no spouse, the likelihood that they will receive personal assistance at home is reduced, and institutionalization may be necessary. Men, on the other hand, are more likely to live with a spouse, and hence, to receive help at home.

Multivariate analysis

The differences in the characteristics of seniors in long-term health care facilities and private households suggest that, along with health status, personal characteristics such as age, sex and marital status may be associated with living in institutions. As well, previous research has shown that education and income may play a role.[19,20] Of course, many of these variables tend to be related. For instance, people with high educational attainment often have higher incomes, and the incomes of women who are widowed may be limited. The association of each of these factors with the presence of seniors in institutions can best be determined through multivariate analysis.

Andersen's conceptual framework,[21] which defines the use of health care services as being a function of predisposing factors, enabling factors and individual need factors, is helpful in analyzing the variables associated with the institutionalization of elderly people. Predisposing factors are socio-demographic characteristics such as age, sex, marital status, and education. Enabling factors represent individual or community resources; income, for example, can influence access to health care services. Need factors refer to health problems that generate a demand for care, such as chronic conditions or activity restrictions.

An overall comparison of seniors in long-term health care facilities with those in private households reveals the predisposing, enabling and need factors that were significantly associated with institutionalization.

Age stood out among the predisposing factors. The odds were significantly high that people aged 80 or older would be institutionalized, compared with those who were in their sixties (Table 2). As well, seniors who were single, widowed or divorced/separated had significantly higher odds of residing in such a facility than did those who were married. Education, too, was significant, with high odds of institutionalization among people with primary school or less, compared with postsecondary graduates. However, when these predisposing factors, along with enabling and need factors were taken into account, women's odds of living in a long-term care facility were statistically no greater than those of men.

Income, the only enabling factor considered in this analysis, was significant, with higher odds of institutionalization among seniors with two or fewer sources of income than among those with three or more sources. This suggests that elderly people who are better off financially are at less risk of being in

Limitations

Ideally, the transition to institutional living should be studied longitudinally. However, after age 65 very few people (about 6 individuals in the sample) move out of long-term health care facilities to live elsewhere, and the number in the sample who moved from private households to institutions (fewer than 50) was not large enough to analyze. Thus, this analysis, like most research on the population living in institutions in Canada, is based on cross-sectional data.

The questions asked of residents of long-term health care facilities differed slightly from those asked of private household residents. As well, the information for over half of respondents in institutions (and for almost three-quarters with a severe disability) was provided by proxy (Appendix Table B).

Respondents were asked if a health professional had diagnosed them as having selected chronic conditions. However, no information is available about the severity of those conditions.

Some important variables that might discriminate between moderately/severely disabled seniors who remain at home and those who are institutionalized are not available for the institutional population: for example, availability of informal support.

Table 2
Adjusted odds ratios for residence in long-term health care facility, by disability level, population aged 65 or older, Canada excluding territories, 1996/97

	Total		Severe disability		Moderate disability		No disability	
	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval	Odds ratio	99% confidence interval
Predisposing factors								
Age								
65-69†	1.00	...	1.00	...	1.00	...	1.00	...
70-74	1.21	0.68, 2.13	1.16	0.47, 2.82	0.90	0.32, 2.53	1.24	0.31, 4.96
75-79	1.45	0.83, 2.53	1.21	0.51, 2.84	1.14	0.40, 3.20	1.59	0.41, 6.17
80-84	2.52*	1.45, 4.36	1.79	0.76, 4.20	1.60	0.59, 4.36	5.04*	1.44, 17.62
85 or older	4.96*	2.94, 8.38	2.55*	1.14, 5.74	6.43*	2.65, 15.64	17.89*	5.44, 58.87
Marital status								
Married/Common-law†	1.00	...	1.00	...	1.00	...	1.00	...
Widowed	3.81*	2.57, 5.63	2.51*	1.51, 4.16	6.31*	2.62, 15.22	8.14*	2.52, 26.27
Separated/Divorced	4.18*	2.11, 8.28	2.06	0.72, 5.92	11.90*	3.53, 40.09	8.07*	1.56, 41.82
Single	7.59*	4.63, 12.45	6.40*	3.21, 12.77	13.07*	4.53, 37.70	17.31*	4.68, 64.08
Sex								
Women†	1.00	...	1.00	...	1.00	...	1.00	...
Men	0.85	0.61, 1.18	0.57*	0.36, 0.90	0.89	0.48, 1.67	0.91	0.42, 1.98
Education								
None	4.31*	1.95, 9.52	1.87	0.73, 4.76	5.89*	1.34, 25.81	15.33*	2.13, 110.16
Primary	2.06*	1.35, 3.14	1.51	0.86, 2.64	3.45*	1.45, 8.19	2.52	0.83, 7.69
Some high school	0.89	0.56, 1.42	0.77	0.41, 1.44	1.34	0.52, 3.46	1.23	0.37, 4.03
High school graduation	1.18	0.70, 2.00	0.96	0.47, 1.95	1.44	0.48, 4.35	2.55	0.78, 8.28
Some postsecondary	0.74	0.40, 1.36	0.96	0.42, 2.18	0.88	0.27, 2.83	0.31	0.04, 2.10
Postsecondary graduation†	1.00	...	1.00	...	1.00	...	1.00	...
Enabling factor								
Income								
Single source‡	1.68*	1.14, 2.49	2.40*	1.42, 4.05	0.87	0.39, 1.95	1.57	0.63, 3.91
Two sources	1.56*	1.11, 2.18	1.75*	1.11, 2.73	1.11	0.58, 2.11	1.11	0.48, 2.54
Three or more sources†	1.00	...	1.00	...	1.00	...	1.00	...
Need factors								
Dependency								
Not dependent†	1.00	...	...	...	...	...	...	...
Dependent: personal care and transportation	9.55*	6.35, 14.37	...	...	...	...	...	...
Dependent: personal care only	12.57*	8.35, 18.94	...	...	...	...	...	...
Dependent: transportation only	0.51	0.17, 1.57	...	...	...	...	...	...
Activity restrictions§	1.35	0.92, 1.97	...	...	...	...	...	...
Chronic conditions††								
Alzheimer's disease or other dementia	9.33*	6.08, 14.30	7.00*	4.44, 11.04	12.23*	4.24, 35.32	44.92*	9.59, 210.27
Urinary incontinence	4.94*	3.58, 6.82	6.40*	4.30, 9.52	3.03*	1.56, 5.88	4.12*	1.46, 11.63
Ulcers	0.09*	0.02, 0.32	0.23	0.04, 1.29	0.17	0.01, 2.09	0.10	0.00, 11.06
Arthritis	0.62*	0.46, 0.84	0.45*	0.30, 0.66	0.70	0.40, 1.23	0.92	0.45, 1.86
Effects of stroke	1.86*	1.24, 2.77	1.92*	1.23, 2.97	1.56	0.59, 4.08	2.09	0.42, 10.30
Bowel disorders	0.34*	0.16, 0.73	0.30*	0.13, 0.67	0.35	0.06, 2.03	0.65	0.06, 7.29
High blood pressure	0.51*	0.37, 0.71	0.52*	0.34, 0.80	0.53	0.28, 1.00	0.52	0.23, 1.20
Bronchitis or emphysema	1.29	0.80, 2.09	1.14	0.63, 2.09	1.22	0.51, 2.93	1.75	0.48, 6.44
Epilepsy	2.13	0.81, 5.59	1.82	0.52, 6.41	2.21	0.42, 11.60	1.08	0.01, 190.83
Heart disease	0.74	0.52, 1.05	0.63*	0.41, 0.95	0.85	0.43, 1.65	1.69	0.72, 3.95

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health and Institutional files*
Notes: *Dependency cannot be tested by disability level, since activity restrictions and dependency are used to establish disability levels. Everyone with severe disability is restricted and dependent whether in private households or in long-term health care facilities. Odds ratios would, therefore, always be 1.00.*
† Reference category, for which odds ratio is always 1.00
‡ Includes no source of income.
§ Reference category is absence of condition.
†† Diagnosed by a health professional; reference category is absence of condition.
** $p \leq 0.01$*
... Not applicable

a long-term health care facility, possibly because they have the means to pay for the help they need.[2]

Not surprisingly, several need factors increased the odds of institutionalization for elderly people. Dependency for personal care and chronic conditions, notably Alzheimer's disease or other dementia, urinary incontinence and the effects of stroke, were significantly associated with living in an institution.

While an overall comparison of seniors in long-term health care facilities with those in private households is helpful in explaining institutionalization, an analysis of elderly people with the same level of disability is more useful in revealing the factors associated with their place of residence.

Severe disability

In 1996/97, an estimated 135,100 elderly people with severe disability lived in long-term health care facilities. But far more with severe disability were living in private households—230,700 (Appendix Table A) .

Predictably, for elderly people with severe disability, need factors and enabling factors (that is, chronic conditions associated with a high level of dependency and few sources of income) were strongly associated with institutionalization, even when other potentially confounding variables were taken into account. This is not unexpected, since a severe disability dominates all other factors in accounting for residence in a long-term health care facility.[13] The odds of institutionalization among severely disabled elderly people were very high for those with Alzheimer's disease or other dementia or with urinary incontinence, and were also significantly elevated for those suffering the effects of stroke, compared with seniors who were not affected by these conditions (Table 2).

Age was significantly associated with institutionalization among seniors with severe disability. At age 85 or older, the odds that severely disabled seniors would live in an institution were about two and a half times the odds for those aged 65 to 69.

Being single or widowed, as opposed to married, was significantly associated with residence in a long-term health care facility for seniors with severe disability. As well, men had significantly low odds of living in an institution, compared with women. This may reflect the fact that men are less likely to be widowed or to reach very advanced ages.

High odds of institutionalization among elderly people with few sources of income indicate that those with the financial means to do so will remain at home, even when extremely debilitating conditions such as Alzheimer's disease or urinary incontinence are taken into account.

The significantly low odds of institutionalization associated with ulcers, arthritis, bowel disorders, and high blood pressure are unexpected, as it is unlikely that these conditions actually reduce the risk of being in a long-term care facility. These findings may be an effect of proxy reporting. Fully 73% of severely disabled seniors in long-term health care facilities answered the NPHS by proxy (Appendix Table B). Under-reporting of conditions such as arthritis and ulcers may explain the low odds ratios. This appears to be corroborated by the fact that a higher proportion of residents of institutions who had severe disability and who answered the questions themselves reported such health problems than did those who responded by proxy (for example, 7.9% versus 5.7% for ulcers). It is likely, then, that ulcers, arthritis, high blood pressure, and bowel diseases may tend to go unnoticed among people suffering more severe conditions such as Alzheimer's disease.

Moderate disability

Only about 28,700 seniors with moderate disability lived in long-term health care facilities in 1996/97, whereas 934,100 with this level of disability were in private households (Appendix Table A).

The presence of seniors with moderate disability in long-term health care facilities was associated with many of the same factors as for those with severe disability. For instance, the odds of institutionalization were high for people aged 85 or older, compared with 65- to 69-year-olds, and among those with Alzheimer's disease or other dementia or with urinary incontinence (Table 2).

In addition to being single or widowed, being separated or divorced was associated with higher odds of institutionalization for seniors with moderate disability, compared with their counterparts who were married. As well, those with primary school or no formal education had higher odds of living in a long-term care facility than did those with postsecondary credentials.

For seniors with moderate disability, the number of income sources was not significantly associated with institutionalization.

No disability

As might be expected, few seniors who reported that they were free of disability lived in long-term health care facilities in 1996/97—just 17,400 (Appendix Table A). For this small group, residence in such a facility was associated with two chronic conditions: Alzheimer's disease or other dementia and urinary incontinence (Table 2). The characterization of people with dementia as having "no disability" seems illogical. However, because dementia is degenerative and begins with short-term memory loss, in the early stages individuals are not necessarily at a severe level of disability, as defined in this analysis.

Predisposing factors were also significantly associated with the institutionalization of elderly people with no disability. Both the 80-to-84 and 85-and-older age groups had significantly high odds of living in a long-term care facility, compared with 65- to 69-year-olds. As well, compared with those who were married, seniors with no disability who were single, widowed, or separated/divorced had significantly high odds of living in an institution. Also, seniors with no formal education had higher odds of institutionalization than did postsecondary graduates. However, the number of income sources was not significantly associated with institutionalization for seniors with no disability.

Perhaps most paradoxical was that over a million seniors with severe or moderate disability lived in private households, while at the same time, 17,400 individuals with no disability lived in long-term care facilities (Appendix Table A). The presence in institutions of seniors with no reported disability was not associated with chronic conditions or the number of income sources (Table 3). Predisposing factors seemed to make the difference, notably, advanced age and lack of a spouse.

Table 3
Adjusted odds ratios, population aged 65 or older with no disability in long-term health care facility compared with severe/moderate disability in private households, Canada excluding territories, 1996/97

	Odds ratio	99% confidence interval
Predisposing factors		
Age		
65-69†	1.00	...
70-74	1.17	0.29, 4.67
75-79	1.50	0.38, 5.89
80-84	3.25	0.95, 11.17
85 or older	5.00*	1.53, 16.37
Marital status		
Married/Common-law†	1.00	...
Single	14.04*	3.96, 49.74
Widowed	6.70*	2.21, 20.27
Separated/Divorced	12.08*	2.44, 59.89
Sex		
Women†	1.00	...
Men	0.89	0.43, 1.86
Education		
None	2.68	0.43, 16.71
Primary	2.85	0.98, 8.23
Some high school	1.63	0.51, 5.17
High school graduation	3.75*	1.19, 11.85
Some postsecondary	0.55	0.08, 3.62
Postsecondary graduation†	1.00	...
Enabling factor		
Income		
Single source‡	2.01	0.83, 4.87
Two sources	1.29	0.58, 2.85
Three or more sources†	1.00	...
Need factors		
Chronic conditions††		
Alzheimer's disease or other dementia	2.13	0.65, 7.02
Urinary incontinence	1.41	0.56, 3.58
Ulcers	0.26	0.01, 13.04
Arthritis	0.31*	0.16, 0.62
Effects of stroke	0.48	0.11, 2.04
Bowel disorders	0.28	0.03, 2.81
High blood pressure	0.46	0.20, 1.04
Bronchitis or emphysema	0.81	0.24, 2.70
Epilepsy	0.10	0.00, 15.33
Heart disease	0.73	0.32, 1.65

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health and Institutional files*
† Reference category, for which odds ratio is always 1.00
‡ Includes no source of income.
§ Reference category is absence of condition.
†† Diagnosed by a health professional; reference category is absence of condition.
** $p \leq 0.01$*
... Not applicable

Concluding remarks

According to the 1996/97 National Population Health Survey, health-related factors, notably, debilitating chronic conditions such as Alzheimer's disease, urinary incontinence and the effects of stroke, were strongly associated with whether or not a senior lives in a long-term health care facility. In fact, the majority (75%) of people aged 65 or older in long-term health care facilities had a severe disability, whereas most elderly people in private households had no disability (66%). Since Alzheimer's disease or other forms of dementia seem to be one of the most important determinants of institutionalization, it follows that medical advances in this field and progress in the treatment and management of this condition might contribute to reducing the numbers in long-term health care facilities in the future. A greater supply of and more appropriate home care for those afflicted with dementia might also reduce the demand for long-term care now as well as in the future.

However, a substantial number of seniors with no disability were residents of long-term health care institutions, while close to a quarter million with severe disability lived in private households. Therefore, considerations beyond health status can influence whether an individual senior will continue to live in a private household. This analysis of NPHS data shows that age, marital status and income are among the factors associated with institutionalization of the elderly. Again, the availability of provincial home care programs that provide services to seniors may play a role.[22]

Except among those with severe disability, being female was not, per se, a risk factor for institutionalization. It was the other characteristics of elderly women—advanced age, lack of a spouse, and few sources of income—that contributed to the preponderance of women among residents of long-term health care facilities.

The absence of a spouse was clearly related to institutionalization among elderly people, especially those with no disability. Eventually, the death of a spouse is inevitable for one partner of a married couple. The narrowing gap in life expectancy between men and women[23] could substantially reduce the time elderly people, particularly women, spend without a partner. Nonetheless, the high divorce rate in recent years might mean an increase in the number of people living without a spouse.

Even when other variables were taken into account, advanced age was independently associated with the institutionalization of elderly people. Rising life expectancy and the projected increase in the number of Canadians in their eighties and older[4] suggest that the need for long-term care beds could grow in the future.

A related demographic trend, declining family size, could also have some effect on the need for long-term health care facilities. A number of studies[9,24,25] have shown that the presence of children (especially daughters) as a source of help at home may prevent, or at least postpone, institutionalization. (See *Changes in social support in relation to seniors' use of home care* in this issue.) With fewer children available to provide such support in the future, the need for institutionalization might increase.

The rising incomes of seniors[26] may permit more and more elderly people to avoid, or at least delay, institutionalization in coming years. And as a result of the growing labour force participation of women,[27] in the future a larger share of senior women will have income from savings, investments and pensions from employment than is the case today.

Thus, while major demographic changes in the short- and medium-term have implications for health care policies directed toward the elderly, social and economic factors will also influence the need for various levels of care. ●

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Appendix

Table A
Sample size, weighted counts and distribution of population aged 65 or older, by place of residence, National Population Health Survey, 1996/97

	Residents of long-term health care facilities			Residents of private households		
	Sample size	Weighted count		Sample size	Weighted count	
		'000	%		'000	%
Total	**1,674**	**181.2**	**100.0**	**13,337**	**3,403.8**	**100.0**
Severe disability (activity limitation *and* dependence)	1,238	135.1	74.5	889	230.7	6.8
Moderate disability (activity limitation but *no* dependence or dependence but *no* limitation)	267	28.7	15.9	3,702	934.1	27.4
No disability (no limitation *and* no dependence)	169	17.4	9.6	8,746	2,239.1	65.8

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health and Institutional files*
Note: *Total excludes missing values.*

Table B
Percentage of proxy responses, by disability level and place of residence, National Population Health Survey, 1996/97

Disability level	Long-term health care facilities	Private households
	%	%
Total	**59.2**	**18.3**
Severe	73.3	31.7
Moderate	28.8	17.3
No disability	6.5	17.3

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health and Institutional files*
Note: *Unweighted counts based on sample of 1,674 residents of institutions and 13,337 residents of private households.*


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Errata

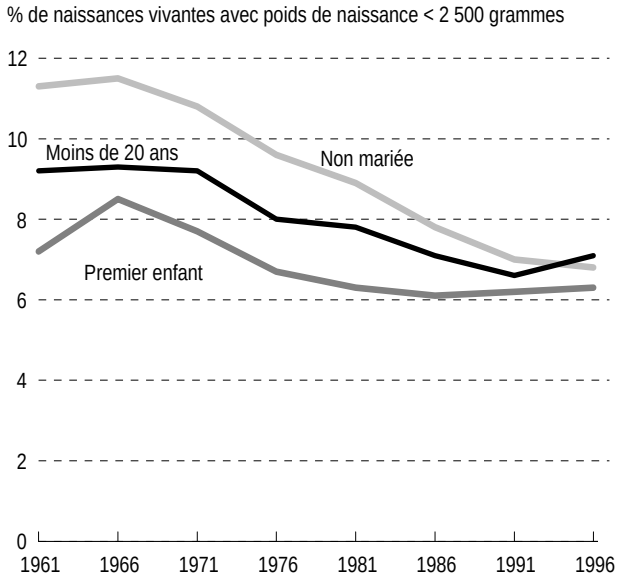
Health Reports, Winter 1999, Volume 11, Number 3

L'état de santé des enfants

On page 29 of the French version of this article, the dates in the title of Tableau 1 should be "1970 à 1996," rather than "1970 à 1975."

On page 32, Graphique 3 was mislabelled. Non mariée and Moins de 20 ans were reversed. The correct chart is shown below.

Graphique 3
Taux de bébés ayant un faible poids à la naissance, selon les caractéristiques de la mère, Canada, de 1961 à 1997



Sources des données : *Références nos 2, 13 et 14 et Base canadienne de données sur la natalité*

Health among older adults

The third highlight on page 47 refers to the percentage of people aged 75 or older, not 65 or older, who were institutionalized.

Habitudes personnelles liées à la santé : tabac, alcool, activité physique et poids

On page 99 of the French version of this article, the column headed "Obésité (IMC ≥ 27)" should be "Poids excessif (IMC ≥ 27)."

Health care services—recent trends

On page 92, the ICD codes in the third paragraph of the "Data sources" section should be: "pregnancy-related diagnoses (ICD 630.0-679.9), congenital abnormalities (ICD 740.0-759.9)," not "pregnancy-related diagnoses (ICD 630.0-678.9), congenital abnormalities (ICD 740.0-759.4)."

In Table 6, on page 102, the sex-age-adjusted odds ratios and confidence intervals (both sexes) for "One or more disability days" should be 1.64* (1.33, 2.02), not 1.68* (1.36, 2.06), and for "Pain and discomfort," 1.39* (1.09, 1.77), not 1.44* (1.12, 1.85).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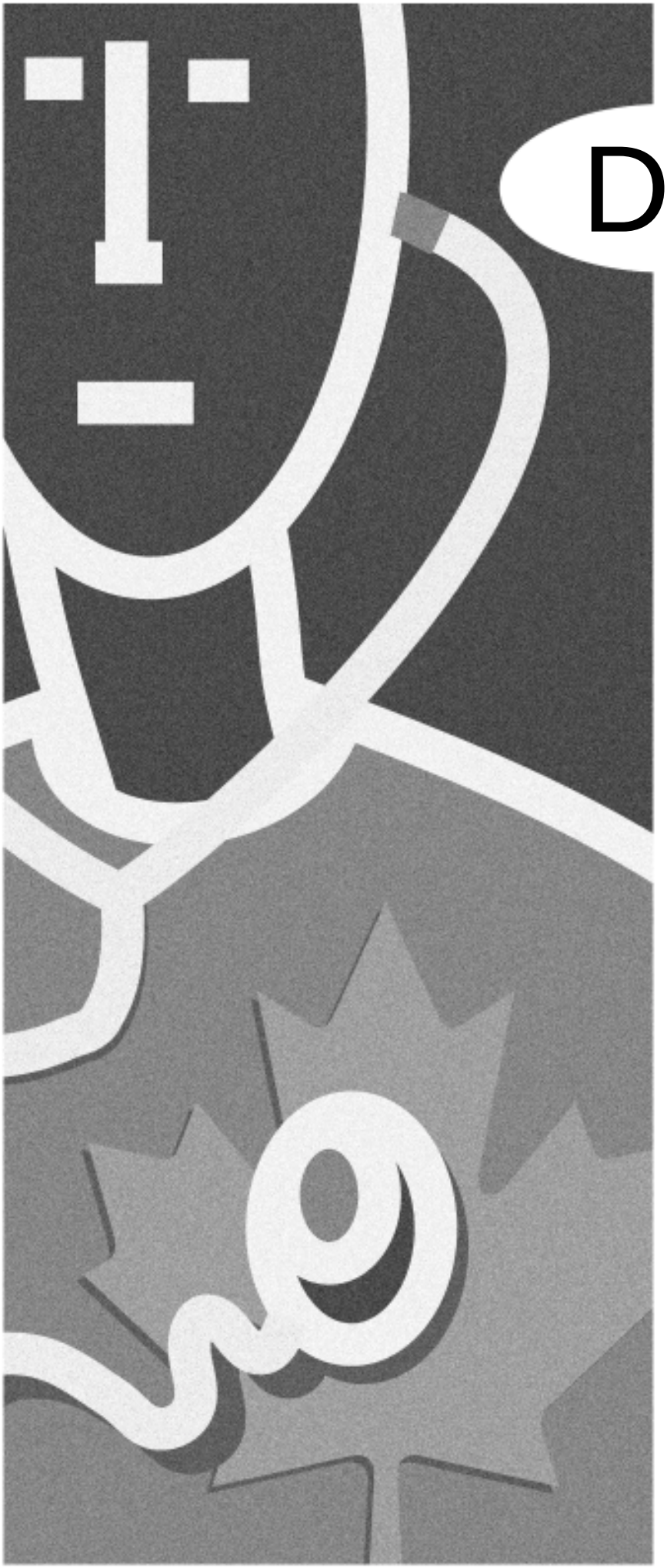

Data Releases

Synopses of recent health information produced by Statistics Canada


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National Population Health Survey, 1998/99

National Population Health Survey (NPHS) data are now available for 1998/99 (the third cycle), household component.

1996/97 NPHS data are also available for the Northwest Territories (1996/97 boundaries) and the Yukon. Estimates can be produced separately for the Northwest Territories (current boundaries) and Nunavut.

To order custom tabulations, contact Client Services (telephone: 613-951-1746; fax: 613-951-0792; e-mail: hd-ds@statcan.ca), Health Statistics Division.

For more information on the 1998/99 NPHS household component, or to enquire about the concepts, methods, and data quality of this release, contact Mario Bédard (613-951-8933; mario.bedard@statcan.ca). To enquire about the NPHS data for the territories, contact Brent Diverty (613-951-4269; brent.diverty@statcan.ca), Health Statistics Division.

Report on smoking prevalence, 1985 to 1999

The *Report on smoking prevalence in Canada, 1985 to 1999* analyzes the comparability of Statistics Canada surveys about smoking prevalence and examines the statistical significance of trends in smoking rates from 1985 to 1999.

Between 1985 and 1999, Statistics Canada conducted 11 surveys that asked questions about smoking. Most of these had comparable questions, although caution should be used when comparing results from four of the surveys (the National Alcohol and Drugs Survey of 1989, the Health Promotion Survey of 1990, the Canadian Alcohol and Drug Survey of 1994, and the General Social Survey of 1995) with results from the others.

Overall, the surveys reveal a significant decline of 10.3 percentage points (error range of plus or minus 2.3 percentage points) in the prevalence of smoking among Canadians aged 15 or older between 1985 and 1999. Most of this decline occurred after 1994.

There was a significant and large increase of 6.5 percentage points (error range of plus or minus 4.4 percentage points) in the current smoking rate for 15- to 19-year-olds between 1991 and January 1, 1994. Since 1994, there has been no significant change in the current smoking rate for youth.

Over one-quarter (28%) of adults who smoked occasionally in 1994/95—about 1 million Canadians—had become daily smokers by 1996/97. Another 32% remained occasional smokers, while 38% had quit smoking.

The *Report on smoking prevalence in Canada, 1985 to 1999* (82F0077XIE), commissioned by the Canadian Tobacco Manufacturers' Council, is now available free on Statistics Canada's Web site (www.statcan.ca). Select "Products and services," then "Downloadable research papers (free)." For more information, or to enquire about the concepts, methods or data quality of this release, contact Jason Gilmore (613-951-7118; jason.gilmore@statcan.ca), Health Statistics Division.

Vital statistics compendium, 1996

The *Vital statistics compendium* provides a comprehensive summary of recent trends in births, deaths, stillbirths, marriages and divorces up to 1996. For example, on an average day in 1996, 1,001 babies were born, 582 persons died, 428 couples married, and 195 divorces were finalized.

Women in their thirties or older accounted for 44% of live births in 1996, up from 29% in 1986. In 1996, the infant mortality rate fell below 6 infant deaths per 1,000 live births for the first time in 10 years.

Between 1986 and 1996, life expectancy at birth rose for both sexes. For males, it increased 2.4 years to 75.7; for females, 1.4 years, to 81.4. As a result, the gap in life expectancy between the sexes narrowed from 6.7 to 5.7 years.

In 1996, the number of new marriages fell to 156,700, its lowest level in 30 years. This was an 18% decline over 1989, and occurred despite substantial population growth during the period.

The mean age at first marriage has been rising steadily since 1986. In 1996, the average age of first-time brides was 27.3, compared with 24.8 a

decade earlier. The average age of first-time grooms was 29.3, up from 27.0 in 1986.

The proportion of married couples expected to divorce before their 30th wedding anniversary (the total divorce rate) ranged from 24% in Prince Edward Island to 56% in the Yukon. Rates were also high in Québec (46%) and British Columbia (45%).

The *Vital statistics compendium, 1996* is now available (paper: 84-214-XPE, $45; electronic: 84-214-XIE, $33). For more information, or to enquire about the concepts, methods and data quality of this release, contact Doreen Duchesne (613-951-6379), Health Statistics Division. To order custom tabulations, contact Client Custom Services (613-951-1746; fax: 613-951-0792), Health Statistics Division.

Marriages, 1997

In 1997, the number of marriages fell to 153,306, down 2% from the previous year and 24% below the 1972 peak. Between 1996 and 1997, there were slight increases in the number of marriages in Newfoundland, Saskatchewan and the Northwest Territories, but all other provinces and territories reported declines.

The average age of brides in 1997 was 30.9, up from 28.4 a decade earlier. But over half (56%) of ceremonies conducted in 1997 involved brides aged 20 to 29. The average age of first-time brides was 27.4. Previously divorced brides averaged 39.8, and previously widowed brides, 55.5.

The average age of grooms was 33.5 in 1997, compared with 31.1 ten years earlier. In over half (52%) of 1997 weddings the groom was aged 25 to 34. The average age of first-time grooms was 29.5. Previously divorced or widowed grooms averaged 43.4 and 62.1, respectively.

In 1997, three out of four brides and grooms were marrying for the first time. In two out of three marriages, both spouses were marrying for the first time. A first-time partner married a divorced partner in 18% of marriages, and both partners had been divorced in 12% of marriages. Fewer than 5% of marriages involved a widowed partner.

Marriages, 1997 (paper shelf table 84F0212XPB, $20) is now available. To request custom data extractions or to order the shelf table, contact Client Custom Services (613-951-1746; fax: 613-951-0792). For more information, or to enquire about the concepts, methods and data quality, contact Patricia Tully (613-951-1759) or Doreen Duchesne (613-951-6379), Health Statistics Division.

The changing face of heart disease and stroke, 2000

The changing face of heart disease and stroke in Canada provides a snapshot of cardiovascular disease in Canada—data on death, risk factors, treatment and the cost of health care collected from varying sources. A new section focuses on Canadian youth. The report draws primarily on results from the National Population Health Survey, the Mortality Database and the Hospital Morbidity Database.

The changing face of heart disease and stroke in Canada (82F0076XIE) is available free on Statistics Canada's Web site (www.statcan.ca). Select "Products and services," then "Downloadable publications (free)," followed by "Health." For more information, or to enquire about the concepts, methods or data quality, contact Cyril Nair (613-951-8387), Health Statistics Division or Barbara Steele (613-569-4361, ext. 318; bsteele@hsf.ca), Heart and Stroke Foundation of Canada. Print copies of this report are available by calling 1-888-473-4636.

Index


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Subject Index Volumes 7 to 11

Abdominal aortic aneurysm

Gender differences in abdominal aortic aneurysm surgery. Parsons GF, Gentleman JF, Johnston KW. 1997; 9(1): 9-18.

Trends in mortality and hospital morbidity due to abdominal aortic aneurysms. Millar WJ, Cole CW, Hill GB. 1995; 7(1): 19-27.

Aboriginal Peoples

Disability among Canada's Aboriginal Peoples in 1991. Ng E. 1996; 8(1): 25-32.

The health of Northern residents. Diverty B, Pérez C. 1998; 9(4): 49-58.

Life expectancy. Gilmore J, Wannell B. 2000; 11(3): 9-24.

Trends in breast cancer incidence and mortality. Gaudette LA, Silberberger C, Altmayer CA, et al. 1996; 8(2): 29-37.

Tuberculosis, 1994. Wilkins K. 1996; 8(1): 33-9.

Abortion

See also Miscarriage

Marital status and abortion. Wadhera S, Millar WJ. 1998; 9(3): 19-26.

Pregnancy outcomes. Wadhera S, Millar WJ. 1996; 8(1): 7-15.

Teenage pregnancies, 1974 to 1994. Wadhera S, Millar WJ. 1998; 9(3): 9-17.

Accidents

Accidents in Canada, 1988 and 1993. Millar WJ. 1995; 7(2): 7-16.

Health care consequences of falls for seniors. Wilkins K. 1999; 10(4): 47-55.

Adolescents

See Youths

Aging

See also Seniors

Changes in social support in relation to seniors' use of home care. Wilkins K, Beaudet MP. 2000; 11(4): 39-47.

Dementia among seniors. Hill G, Forbes W, Bethelot J-M, et al. 1996; 8(2): 7-10.

The elimination of disease: A mixed blessing. Millar WJ, Hill GB. 1995; 7(3): 7-13.

Health-adjusted life expectancy. Wolfson MC. 1996; 8(1): 41-6.

Health among older adults. Shields M, Chen J. 2000; 11(3); 47-61.

Health care consequences of falls for seniors. Wilkins K. 1999; 10(4): 47-55.

Home care in Canada. Wilkins K, Park E. 1998; 10(1): 29-37.

Hormone replacement therapy and incident arthritis. Wilkins K. 1999; 11(2): 49-57.

Living at home or in an institution: What makes the difference for seniors? Trottier H, Martel L, Houle C, et al. 2000; 11(4): 49-61.

Medications and fall-related fractures in the elderly. Wilkins K. 1999; 11(1): 45-53.

Older drivers—a complex public health issue. Millar WJ. 1999; 11(2): 59-71.

Senior's needs for health-related personal assistance. Chen J, Wilkins R. 1998; 10(1): 39-50.

Alcohol

Health care services—recent trends. Millar WJ, Johansen H. 2000; 11(3): 91-109.

Long working hours and health. Shields M. 1999; 11(2): 33-48.

Multiple-risk behaviour in adolescents and young adults. Galambos NL, Tilton-Weaver LC. 1998; 10(2): 9-20.

Personal health practices: Smoking, drinking, physical activity and weight. Pérez C. 2000; 11(3): 83-90.

Arthritis

Are recent cohorts healthier than their predecessors? Chen J, Millar WJ. 2000; 11(4): 9-23.

Asthma

Athletic injuries

Automobile driving

B

Births

See also Low birth weight
Pregnancy

C

Cancer

Cardiovascular disease

Care-giving

See Social support

Cause of death

See also Deaths

Cesarean section

Children

See also Youths

Chronic conditions

See also Arthritis
Asthma
Cancer
Cardiovascular disease
Depression
Diabetes
Hypertension
Stroke

Contraception

D

Data collection

See also Health surveys

Deaths

See also Cause of death

Dementia

Demography

Dental care

Dependency

See also Social support

Depression

See also Mental health

Diabetes

Disability

Divorce

Domestic violence

E

Exercise

F

Fractures

H

Health care

See also Hospitalization

Health insurance

Health promotion

Health services accessibility

Health status indicators

See also Life expectancy
Life tables

Are recent cohorts healthier than their predecessors? Chen J, Millar WJ. 2000; 11(4): 9-23.

Health-adjusted life expectancy. Wolfson MC. 1996; 8(1): 41-6.

Health among older adults. Shields M, Chen J. 2000; 11(3): 47-61.

Health expectancy by immigrant status, 1986 and 1991. Chen J, Wilkins R, Ng E. 1996; 8(3): 17-38.

Health in mid-life. Chen J, Shields M. 2000; 11(3): 35-46.

Health status of children. Wilkins R, Houle C. 2000; 11(3): 25-34.

The health utility index: Measuring health differences in Ontario by socioeconomic status. Roberge R, Berthelot J-M, Wolfson M. 1995; 7(2): 25-32.

A healthy outlook. Hood S, Beaudet MP, Catlin G. 1996; 7(4): 25-32.

Impact of new population estimates on health and vital statistics. Bender R. 1995; 7(1): 7-18.

Life expectancy. Gilmore J, Wannell B. 2000; 11(3): 9-24.

Health surveys

See also Data collection

The National Population Health Survey—its longitudinal nature. Swain L, Catlin G, Beaudet MP. 1999; 10(4): 69-82.

Sample design of the National Population Health Survey. Tambay J-L, Catlin G. 1995; 7(1): 29-38.

Health Utilities Index

The health utility index: Measuring health differences in Ontario by socioeconomic status. Roberge R, Berthelot J-M, Wolfson M. 1995; 7(2): 25-32.

Living at home or in an institution: What makes the difference for seniors? Trottier H, Martel L, Houle C, et al. 2000; 11(4): 49-61.

Home care

Changes in social support in relation to senior's use of home care. Wilkins K, Beaudet MP. 2000; 11(4): 39-47.
Home care in Canada. Wilkins K, Park E. 1998; 10(1): 29-37.
Seniors' needs for health-related personal assistance. Chen J, Wilkins R. 1998; 10(1): 39-50.

Hormone replacement therapy

Characteristics of women on hormone replacement therapy. Beaudet MP, Walop W, Le Petit C. 1997; 9(2): 9-18.

Hormone replacement therapy and incident arthritis. Wilkins K. 1999; 11(2): 49-57.

Hospitalization

Changes in children's hospital use. Connors C, Millar WJ. 1999; 11(2): 9-19.

Characteristics of hospital users. Wilkins K, Park E. 1998; 9(3): 27-36.

Current and future hospitalization after heart attack. Johansen H, Nair C, Taylor G. 1998; 10(2): 21-8.

Health care services—recent trends. Millar WJ, Johansen H. 2000; 11(3): 91-109.

The health of Canada's immigrants in 1994/95. Chen J, Ng E, Wilkins R. 1996; 7(4): 33-45.

Mental health statistics, 1982/83 to 1993/94. Randhawa J, Riley R. 1996; 7(4): 55-61.

Pregnancy-related hospital use. Werschler T. 1998; 10(1): 21-7.

Trends in hospital utilization, 1982/83 to 1992/93. Randhawa J, Riley R. 1995; 7(1): 41-9.

Trends in mortality and hospital morbidity due to abdominal aortic aneurysms. Millar WJ, Cole CW, Hill GB. 1995; 7(1): 19-27.

Hospitals

See also Residental facilities

Downsizing Canada's hospitals, 1986/87 to 1994/95. Tully P, Saint-Pierre E. 1997; 8(4): 33-9.

Hypertension

Body mass index and health. Gilmore J. 1999; 11(1): 31-43.

Chronic conditions, physical limitations and dependency among seniors living in the community. Wilkins K, Park E. 1996; 8(3): 7-15.

I

Immigrants

Income

Injuries

See Accidents

L

Life expectancy

See also Health status indicators
Life tables

Life tables

See also Health status indicators
Life expectancy

Lone parents

Low birth weight

M

Mammography

Trends in mammography utilization, 1981 to 1994. Gaudette LA, Altmayer CA, Nobrega KMP, et al. 1996; 8(3): 17-27.

Who doesn't get a mammogram? Gentleman JF, Lee J. 1997; 9(1): 19-28.

Marriage

Twenty years of marriages. Nault F. 1996; 8(2): 39-47.

Mass screening

Falling short of Pap test guidelines. Lee J, Parsons GF, Gentleman JF. 1998; 10(1): 9-19.

Medical records

See Data collection
Health surveys

Medication use

Characteristics of women on hormone replacement therapy. Beaudet MP, Walop W, Le Petit C. 1997; 9(2): 9-18.

Chronic pain. Millar WJ. 1996; 7(4): 47-53.

Depression. Beaudet MP. 1996; 7(4): 11-24.

Disparities in prescription drug insurance coverage. Millar WJ. 1999; 10(4): 11-31.

Health care services—recent trends. Millar WJ, Johansen H. 2000; 11(3): 91-109.

Hormone replacement therapy and incident arthritis. Wilkins K. 1999; 11(2): 49-57.

Medications and fall-related fractures in the elderly. Wilkins K. 1999; 11(1): 45-53.

Multiple medication use among seniors. Millar WJ. 1998; 9(4): 11-7.

Older drivers—a complex public health issue. Millar WJ. 1999; 11(2): 59-71.

Oral contraceptive use. Wilkins K, Johansen H, Beaudet MP, et al. 2000; 11(4): 25-37.

Menopause

Characteristics of women on hormone replacement therapy. Beaudet MP, Walop W, Le Petit C. 1997; 9(2): 9-18.

Hormone replacement therapy and incident arthritis. Wilkins K. 1999; 11(2): 49-57.

Mental health

See also Depression
Stress, psychological

The health of lone mothers. Pérez C, Beaudet MP. 1991; 11(2): 21-32.

Living at home or in an institution: What makes the difference for seniors? Trottier H, Martel L, Houle C, et al. 2000; 11(4): 49-61.

Mental health statistics, 1982/83 to 1993/94. Randhawa J, Riley R. 1996; 7(4): 55-61.

Psychological health—depression. Beaudet MP. 2000; 11(3): 63-75.

Work stress and health. Wilkins K, Beaudet MP. 1999; 10(3): 47-62.

Miscarriage

See also Abortion

Pregnancy outcomes. Wadhera S, Millar WJ. 1996; 8(1): 7-15.

Teenage pregnancies, 1974 to 1994. Wadhera S, Millar WJ. 1998; 9(3): 9-17.

Morbidity

See Hospitalization

Mortality

See Deaths

N

Neoplasms

See Cancer

Northern residents

Life expectancy. Gilmore J, Wannell B. 2000; 11(3): 9-24.

S

Safety equipment

Factors associated with bicycle helmet use. Millar WJ, Pless IB. 1997; 9(2): 31-9.

Seasonality

Monthly and daily patterns of death. Trudeau R. 1997; 9(1): 43-50.

Seniors

See also Aging

Changes in social support in relation to seniors' use of home care. Wilkins K, Beaudet MP. 2000; 11(4): 39-47.

Health among older adults. Shields M, Chen J. 2000; 11(3): 47-61.

Health care consequences of falls for seniors. Wilkins K, 1999; 10(4): 47-55.

Home care in Canada. Wilkins K, Park E. 1998; 10(1): 29-37.

Hormone replacement therapy and incident arthritis. Wilkins K. 1999; 11(2): 49-57.

L:iving at home or in an institution: What makes the difference for seniors? Trottier H, Martel L, Houle C, et al. 2000; 11(4): 49-61.

Medications and fall-related fractures in the elderly. Wilkins K. 1999; 11(1): 45-54.

Multiple medication use among seniors. Millar WJ. 1998; 9(4): 11-7.

Older drivers—a complex public health issue. Millar WJ. 1999; 11(2): 59-71.

Older residents of health care institutions. Tully P, Mohl C. 1995; 7(3): 27-30.

Seniors' needs for health-related personal assistance. Chen J, Wilkins R. 1998; 10(1): 39-50.

Smoking

The age of smoking initiation: Implications for quitting. Chen J, Millar WJ. 1998; 9(4): 39-46.

Are recent cohorts healthier than their predecessors? Chen J, Millar WJ. 2000; 11(4): 9-23.

Attitudes toward smoking. Ross N, Pérez C. 1999; 10(3): 23-33.

Body mass index and health. Gilmore J. 1999; 11(1): 31-43.

Health care services—recent trends. Millar WJ, Johansen H. 2000; 11(3): 91-109.

Long working hours and health. Shields M. 1999; 11(2): 33-48.

Maternal education and risk factors for small-for-gestational age births. Millar WJ, Chen J. 1998; 10(2): 43-51.

Multiple-risk behaviour in adolescents and young adults. Galambos NL, Tilton-Weaver LC. 1998; 10(2): 9-20.

Oral contraceptive use. Wilkins K, Johansen H, Beaudet MP, et al. 2000; 11(4): 25-37.

Personal health practices: Smoking, drinking, physical activity and weight. Pérez C. 2000; 11(3): 83-90.

Reaching smokers with lower educational attainment. Millar WJ. 1996; 8(2): 11-9.

Smoking prevalence, quit attempts and successes. Stephens M, Siroonian J. 1998; 9(4): 31-7.

Which workers smoke? Gaudette LA, Richardson A, Huang S. 1999; 10(3): 35-45.

Social support

See also Dependency

Changes in social support in relation to seniors' use of home care. Wilkins K, Beaudet MP. 2000; 11(4): 39-47.

Home care in Canada. Wilkins K, Park E. 1998; 10(1): 29-37.

L:iving at home or in an institution: What makes the difference for seniors? Trottier H, Martel L, Houle C, et al. 2000; 11(4): 49-61.

Seniors' needs for health-related personal assistance. Chen J, Wilkins R. 1998; 10(1): 39-50.

Spontaneous abortion

See Miscarriage

Spouse abuse

See Domestic violence

Stress, psychological
See also Mental health

A healthy outlook. Hood S, Beaudet MP, Catlin G. 1996; 7(4): 25-32.

Long working hours and health. Shields M. 1999; 11(2): 33-48.

Psychological health—depression. Beaudet MP. 2000; 11(3): 63-75.

Work stress and health. Wilkins K, Beaudet MP. 1999; 10(3): 47-62.

Stroke

Oral contraceptive use. Wilkins K, Johansen H, Beaudet MP, et al. 2000; 11(4): 25-37.

Surgery

Changes in children's hospital use. Connors C, Millar WJ. 1999; 11(2): 9-19.

Gender differences in abdominal aortic aneurysm surgery. Parsons GF, Gentleman JF, Johnston KW. 1997; 9(1): 9-18.

Trends in hospital utilization, 1982/83 to 1992/93. Randhawa J, Riley R. 1995; 7(1): 41-9.

T

Therapeutic abortion
See Abortion

Tuberculosis

Tuberculosis, 1994. Wilkins K. 1996; 8(1): 33-9.

U

United States

Income inequality and mortality among working-age people in Canada and the US. Wolfson M. 2000; 11(3): 77-82.

V

Vital statistics
See also Births
Deaths
Demography
Divorce
Marriage

Health status of children. Wilkins R, Houle C. 2000; 11(3): 25-34.

Life expectancy. Gilmore J, Wannell B. 2000; 11(3): 9-24.

W

Weight

Are recent cohorts healthier than their predecessors? Chen J, Millar WJ. 2000; 11(4): 9-23.

Body mass index and health. Gilmore J. 1999; 11(1): 31-43.

Health care services—recent trends. Millar WJ, Johansen H. 2000; 11(3): 91-109.

Long working hours and health. Shields M. 1999; 11(2): 33-48.

Personal health practices: Smoking, drinking, physical activity and weight. Pérez C. 2000; 11(3): 83-90.

Y

Youths
See also Children

Multiple-risk behaviour in adolescents and young adults. Galambos NL, Tilton-Weaver LC. 1998; 10(2): 9-20

Personal health practices: Smoking, drinking, physical activity and weight. Pérez C. 2000; 11(3): 83-90.

Teenage pregnancies, 1974 to 1994. Wadhera S, Millar WJ. 1998; 9(3): 9-17.


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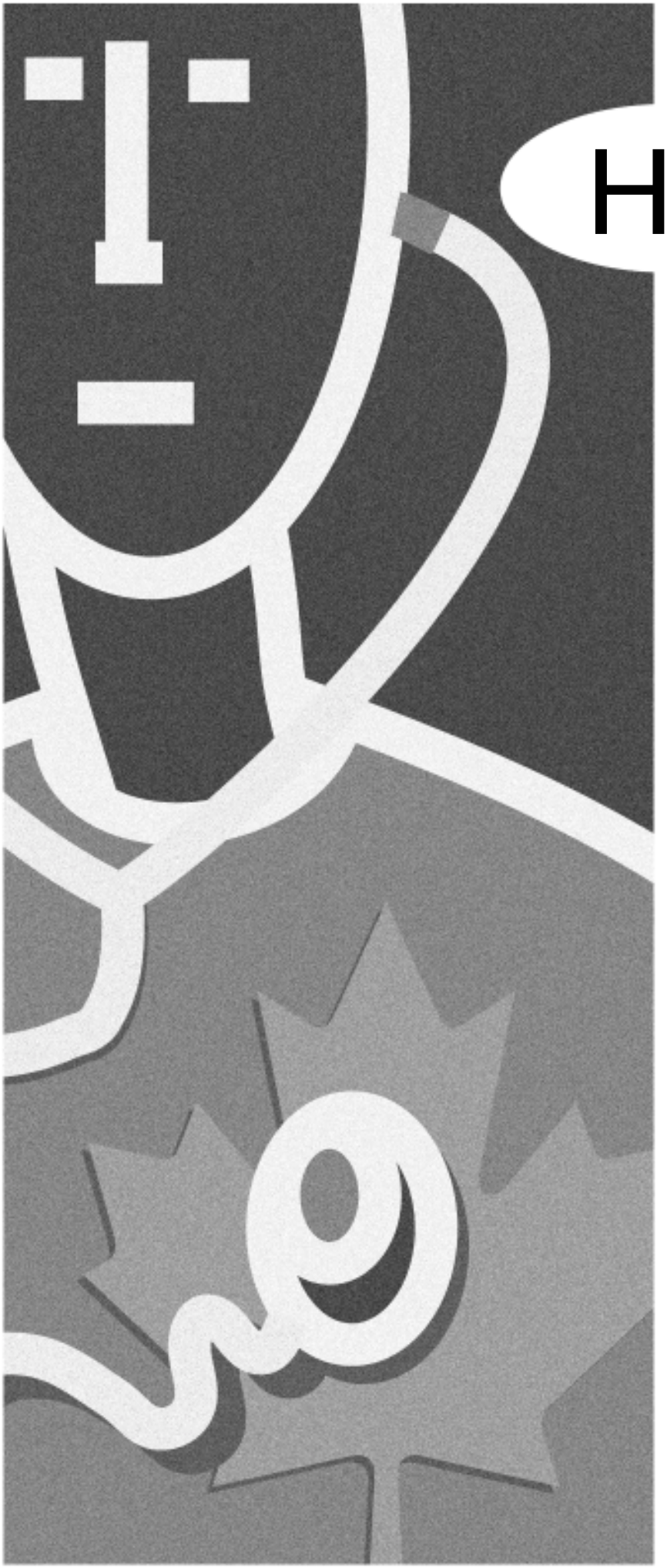

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Validation study for a record linkage of births and deaths in Canada	84F0013XIE	Internet	Free	Free	Free
Historical Information					
Vital Statistics Compendium, 1996	84-214-XPE 84-214-XIE	Paper Internet	$45 $33	$45 $33	$45 $33
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National Population Health Survey public-use microdata files		Product number	Format	Price† Canada	Price† Other countries (US$)
Cycle 3, 1998-99					
Household (Available Summer 2000)	Cross-sectional data in Flat ASCII files, User's Guide, data dictionary, indexes, layout, Beyond 20/20 Browser for the Health File	82M0009XCB	CD-ROM	$2,000	$2,000
Custom tables	Household	82C0013	Price varies with information requirements		
Cycle 2, 1996-97					
Household	Cross-sectional Flat ASCII Files, Beyond 20/20 Browser for HealthFile	82M0009XCB	CD-ROM	$2,000	$2,000
Health care institutions‡	Cross-sectional Flat ASCII File	82M0010XCB	CD-ROM Clients who purchase the 1996/97 Household file will receive Institutions file free of charge	$295	$295
Custom tables	Household Institutions	82C0013 82C0015	Price varies with information requirements		
Special package NPHS 1994/95 and 1996/97		***2 CD-ROMs 82F0001XCB 82M0009XCB***	***$2,500***	***$2,500***	***$2,500***
Cycle 1, 1994-95					
Household	Data, Beyond 20/20 Browser Flat ASCII Files, User's Guide	82F0001XCB 82F0001XDB	CD-ROM Diskette	$800 $650	$800 $650
Health care institutions	Flat ASCII Files	82M0010XDB	Diskette	$250	$250
Custom tables	Household Institutions	82C0013 82C0015	Price varies with information requirements		

† All prices exclude sales tax.
‡ Forthcoming May 2000

Canadian Community Health Survey (CCHS)

A proposed new survey, the Canadian Community Health Survey (CCHS), is being developed by Statistics Canada for the purpose of providing 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 Concepts, definitions and methods, followed by Discussion papers or 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 Concepts, definitions and methods, followed by Questionnaires and data dictionaries and National Population Health Survey.