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by Pamela L. Ramage-Morin

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*Pamela L. Ramage-Morin*

## **Abstract**

### **Objectives**

This study describes the prevalence of chronic pain among seniors living in private households and in long-term health care institutions. Associations between an increase in chronic pain and unhappiness and negative self-perceived health are examined.

### **Data sources**

Data are from the Health Institutions and Household components of Statistics Canada's 1994/1995 through 2002/2003 National Population Health Survey (NPHS) and 2005 Canadian Community Health Survey (CCHS).

### **Analytical techniques**

Prevalence rates of chronic pain were estimated using cross-sectional data from the 1996/1997 NPHS and the 2005 CCHS. Multiple logistic regression was used to model an increase in chronic pain in relation to quality of life outcomes, controlling for chronic conditions, medication use, age, sex, proxy response, and socioeconomic status.

### **Main results**

Thirty-eight percent of institutionalized seniors experienced pain on a regular basis, compared with 27% of seniors living in households. In both populations, rates were higher for women than men. An increase in pain over a two-year period was associated with higher odds of being unhappy or having negative self-perceived health at the end of the period.

### **Conclusions**

Chronic pain is a major health issue for seniors, particularly those in health care institutions. The reduction of pain symptoms, independent of the presence of chronic conditions, would have a positive impact on the well-being of seniors.

### **Keywords**

Aging, cross-sectional studies, epidemiology, health surveys, logistic models, longitudinal studies, pain, prevalence, self-perceived health, unhappiness

### **Author**

Pamela L. Ramage-Morin (1-613-951-1760; Pamela.Ramage-Morin@statcan.ca) is with the Health Information and Research Division at Statistics Canada, Ottawa, Ontario, K1A 0T6.

Throughout our lives we experience pain. It could be a temporary discomfort such as infant colic or a more chronic level of pain resulting from injury or disease. Although not pleasant, pain may be protective,<sup>1</sup> helping us survive.<sup>2</sup> As a symptom of injury, illness or disease, pain motivates us to seek treatment and teaches us to change our behaviour—the child who touches a hot surface, for example, learns to avoid further injury and heed parents' warnings. However, pain may be chronic and destructive, serving no useful purpose for survival.<sup>2</sup> Pain is usually considered chronic if it lasts anywhere from 3 to 6 months or more<sup>3</sup> or, alternatively, if it persists after an injury has healed.<sup>2</sup>

The importance of pain as a public health issue lies in the high prevalence and impact of this problem.<sup>4-6</sup> Professor Harald Breivik stated:

“Chronic pain is one of the most underestimated health care problems in the world today, causing major consequences for the quality of life of the sufferer and a major burden on the health care system in the Western world. We believe chronic pain is a disease in its own right.”<sup>7</sup>

Studies consistently show that the likelihood of experiencing pain increases with age.<sup>6,8-10</sup> Chronic pain threatens the quality of life for many seniors who are often

copied with other physical conditions, activity limitations, and cognitive changes.<sup>8,11-14</sup> Studies have shown that chronic pain is related to fatigue, malnutrition, addiction, loneliness, and loss of independence.<sup>1,11,14-15</sup> Pain control is identified by seniors as an important health care priority;<sup>16,17</sup> some fear a life in pain more than death.<sup>2</sup>

Anywhere from a quarter to as many as three-quarters of older adults suffer from chronic pain and are consequently limited in their mobility and dexterity.<sup>11,14,18,19</sup> For those residing in health care institutions, the range of chronic pain prevalence is estimated to be even higher.<sup>4,5,20-22</sup>

This is a concern in Canada where the number and proportion of seniors (aged 65 or older) are projected to grow. In 2005, seniors comprised 13% of the population.<sup>23</sup> By 2031, when the last of the baby boom generation has reached age 65, it is estimated that there will be between 8.9 and 9.4 million seniors in Canada, representing almost a quarter of the population.<sup>24</sup>

With an aging population, there is a need for chronic pain studies that focus specifically on seniors, including those residing in private households as well as in long-term health care institutions. Many studies have been based on samples from specific nursing homes or community groups,<sup>3,10,12,13,25,26</sup> but larger, population-based studies are required. Such needs are addressed in this study, which is based on cross-sectional and longitudinal data from the National Population Health Survey and the Canadian Community Health

Survey. National estimates of the prevalence of pain are provided for seniors in private households and in long-term health care institutions. A unique feature of this study is the use of longitudinal data to assess how the onset of chronic pain is associated with the happiness and self-perceived health of senior Canadians.

## Methods

### Data sources

This article is based on data from the National Population Health Survey (NPHS) and the Canadian Community Health Survey (CCHS). Detailed documentation on both surveys can be found at Statistics Canada's Web site (<http://www.statcan.ca>). Descriptions of the NPHS design, sample, and interview procedures are available in published reports.<sup>27,28</sup> Sample sizes and response rates for the NPHS and CCHS are presented in Table 1.

### National Population Health Survey

The NPHS, which began in 1994/1995, collects information about the health of the Canadian population every two years. It includes cross-sectional samples and longitudinal panels. The NPHS has three components: health care institutions, private households, and the North. This study is based on the first two components.

The NPHS *Health Institutions component* collected data from people living in hospitals, nursing homes, and facilities for people with disabilities. The institutions were sampled from a list of residential

**Table 1**  
Response rates, National Population Health Survey and Canadian Community Health Survey

Survey	Cycle	Year	Panel	Institutions			Households	
				Sample	Institution response rate (%)	Individual response rate (%)	Sample	Cycle response rate (%)
National Population Health Survey	1	1994/1995	Longitudinal	2,287	95.5	93.6	20,095	83.6
	2	1996/1997	Longitudinal	2,287	100.0	95.9	17,276	92.8
	2	1996/1997	Cross-sectional	2,118	100.0	89.9	...	...
	3	1998/1999	Longitudinal	2,287	100.0	98.4	17,276	88.2
	4	2000/2001	Longitudinal	2,287	99.3	96.9	17,276	84.8
	5	2002/2003	Longitudinal	...	...	...	17,276	80.6
Canadian Community Health Survey	3.1	2005	Cross-sectional	...	...	...	132,947	78.9

... not applicable

care facilities collected by the Canadian Institute for Health Information and a list of hospitals maintained by the Health Statistics Division of Statistics Canada. The sample was restricted to facilities with at least four beds. In-scope institutions were stratified in three stages: first by geography (five regions excluding the Territories); then by type of institution (institutions for the elderly, institutions for those who are cognitively impaired, and other rehabilitative institutions); and finally, by size (number of beds). The first two cycles (1994/1995 and 1996/1997) were both cross-sectional and longitudinal (collecting health information from the same individuals each cycle). Beginning in cycle 3 (1998/1997), the institutional component became strictly longitudinal.

Interviewers initially met with institution administrators to establish which residents would require proxy interviews because of illness or incapacity. Next-of-kin were contacted and given the option of completing the interview on their relative's behalf or having a knowledgeable staff member or volunteer respond for their relative. Most interviews were done in person, although telephone interviews were accepted for proxy respondents who could not be met in person.

The *household component* of the NPHS covers household residents in all provinces, except persons living on Indian reserves, on Canadian forces bases, and in some remote areas. The first three cycles (1994/1995, 1996/1997, and 1998/1999) were both cross-sectional and longitudinal. Beginning in cycle 4 (2000/2001), the household component became strictly longitudinal. People in the longitudinal sample are interviewed every two years. This analysis uses the cycle 5 (2002/03) longitudinal "square" file, which contains records for all responding members of the original panel whether or not information about them was obtained in all subsequent cycles.

#### Canadian Community Health Survey

The CCHS targets persons aged 12 or older who are living in private dwellings in the ten provinces and the three territories. People living on Indian Reserves or Crown lands, residents of institutions, full-time members of the Canadian Forces, civilian and military residents of Canadian Forces bases, and

residents of certain remote regions are excluded. The CCHS covers approximately 98% of the Canadian population aged 12 or older. Cycle 3.1 began in January 2005 and was conducted over the following 12 months.

The CCHS is a sample survey with a cross-sectional design. Cycle 3.1 used three sampling frames to select the sample of households: 49% of the sample of households came from an area frame, 50% from a list frame of telephone numbers, and the remaining 1%, from a Random Digit Dialing sampling frame. The area frame designed for the Canadian Labour Force Survey was used to select sample for the CCHS. A multi-stage stratified cluster design was used to sample dwellings within this area frame. One person aged 12 or older was randomly selected from the sampled households.

The CCHS is composed of modules categorized as common, subsample and optional content. Common content comprises the major part of the questionnaire and is asked of all respondents. The subsample content is designed to reduce respondent burden by including only enough respondents to yield reliable estimates at the national and provincial levels. The optional content allows health regions to focus on issues of local importance.

This research is based on 25,672 respondents who were selected as part of the subsample that included the Health Utility Index module, which has questions about chronic pain. There are an additional 14,020 respondents from British Columbia, the only province that selected this module as optional content.

#### Definitions

Unless otherwise stated, definitions apply to both the CCHS and NPHS variables.

*Chronic pain*, the primary independent variable, is based on a response of "no" to the question: "Are you usually free of pain or discomfort?" People who experience chronic pain were asked about the severity: "How would you describe the usual intensity of your pain or discomfort?" They categorized their pain as mild, moderate or severe.

*Activity interference* was derived from the question: "How many activities does your pain or discomfort prevent?" A dichotomous variable was created

whereby responses of “none,” “a few,” or “some” were coded “0” (minor interference). Responses of “most,” coded as “1,” indicated a more major perception of interference.

*Self-perceived health* is one of two outcome variables. It is based on the question: “In general, would you say your health is: ...” The five response categories were combined into two: good/very good/excellent health comprises “positive” self-perceived health, while fair/poor health constitutes “negative” self-perceived health.

The second outcome variable, *self-perceived happiness*, is derived from the question: “How would you describe yourself as being usually?” People were considered “happy” if they indicated either of two categories: happy and interested in life/somewhat happy. The other three response categories were combined to indicate “unhappiness”: somewhat unhappy/unhappy with little interest in life/so unhappy that life is not worthwhile.

An *increase in pain* is the primary independent variable in the longitudinal analysis. The analysis was limited to those with either no pain or mild pain at the start of each two-year period; those who reported “moderate” or “severe” pain at the end of the period were classified as having an increase in pain. The sample size for the household population was sufficient to further compare those who had experienced increases to moderate pain with those whose pain had increased to severe levels.

The presence of *chronic conditions* was established by asking respondents if they had been diagnosed by a health professional with a long-term chronic condition, one that had lasted, or was expected to last, at least six months. Respondents were read a list of conditions that included arthritis or rheumatism, high blood pressure, asthma, chronic bronchitis or emphysema, diabetes, epilepsy, heart disease, cancer, effects of a stroke, partial or complete paralysis, incontinence, Alzheimer’s disease or other dementia, osteoporosis, cataracts, glaucoma, kidney disease, and other chronic condition. Only conditions that were listed at every cycle were included in the analyses. The list of conditions differs slightly between the household and institutional files. Conditions in the institutional file

were used as a starting point and, where possible, matched to conditions from the household file. For institutions in 1994/1995, respondents were asked if they had difficulty controlling their bladder or bowels. In subsequent years, they were asked separate questions about urinary incontinence and bowel control. To be consistent with 1994/1995, these were combined into one chronic condition for all years. For household respondents, the incontinence question refers only to urinary incontinence. Appendix Table A contains a list of the chronic condition variables used in the longitudinal analysis.

The number of chronic conditions at baseline was included in the longitudinal analysis, categorized as none, one, or two or more conditions. New *chronic conditions* were those reported at follow-up that were not reported at baseline. They were counted and categorized in the same manner as the baseline chronic conditions.

All respondents were asked how many different medications they had taken in the past two days. People who had taken one or more were asked the names of their medications. These were subsequently coded using the Canadian edition of the *Anatomical Therapeutic Chemical (ATC) Classification System for Human Medications*. Pain medications were those that commenced with codes: MO1 (anti-inflammatory and anti-rheumatic agents), MO2 (topical products for joint and muscular pain), or N02 (analgesics). Medication use over the past two days was categorized as “no medication use,” “medication use, but not pain medication,” or “pain medication.”

In addition to *sex*, a number of socio-demographic and administrative variables were used in this study. *Age* is included as a continuous variable in the multivariate models. The *working-age* population covers people aged 18 to 64. *Seniors* are aged 65 or older.

*Education*, a dichotomous variable, distinguishes those who had graduated from secondary school from those who had not.

*Income* was used for the cross-sectional analysis only. Total *personal income* over the past 12 months was used for the institutional population. This



includes income from all sources, before taxes and deductions. Based on the distribution, people were categorized into the following income groups:

Lower	No income to less than \$10,000
Middle	\$10,000 to less than \$15,000
Higher	\$15,000 or more

For the household population, total *household income* from all sources in the previous 12 months was adjusted for the 2004 low-income cutoff (LICO) specific to the household and community size. (The low-income cutoff is the threshold at which a family would typically spend a larger portion of its income than the average family on the necessities of food, clothing and shelter.) Adjusted household incomes were then grouped into deciles (10 groups each containing approximately equal numbers of respondents). Deciles were generated using weighted data. These deciles were grouped into three income categories: lower (deciles 1 to 3), middle (deciles 4 to 6), and higher (deciles 7 to 10) income.

Interviewers recorded whether the questionnaire was completed by the respondent or by *proxy*. This is a dichotomous variable where “1” indicates a questionnaire completed by proxy and “0” refers to interviews completed by respondents.

### Statistical analyses

#### Cross-sectional analyses

Cycle 2 (1996/1997) of the NPHS institutional component and Cycle 3.1 (2005) of the CCHS were used for these analyses. Weighted frequencies and cross-tabulations were used to estimate the proportion of people with chronic pain by selected characteristics. In addition, cross-sectional data were used to calculate the excess number of cases of chronic pain in order to demonstrate how the burden of this condition is unequally distributed among Canadians.

#### Longitudinal analyses

Associations between an increase in pain over a two-year period and unhappiness and negative self-perceived health were based on data from the NPHS. Data were used from four cycles of the health institutions component (1994/1995 through 2000/

2001) and five cycles of the private households component (1994/1995 through 2002/2003). Pooling of repeated observations was combined with logistic regression analysis. Three cohorts of observations were pooled for the institutional population with baseline years of 1994/1995, 1996/1997 and 1998/1999. Four cohorts of observations were used for the household population with baseline years of 1994/1995, 1996/1997, 1998/1999 and 2000/2001.

The study sample was limited to those who, at each baseline year:

- reported no pain or mild pain;
- were 65 or older; and
- provided a full response at baseline and follow-up (two years later).

Respondents were excluded if they moved between a health care institution and private household over the study period.

**Text table A**  
Sample sizes for longitudinal analysis

Cohort	Baseline (Time 1)	Follow-up (Time 2)	Institutions	Households
1	1994/1995	1996/1997	798	1,826
2	1996/1997	1998/1999	414	1,863
3	1998/1999	2000/2001	253	1,747
4	2000/2001	2002/2003	..	1,694
<b>Total</b>			<b>1,465</b>	<b>7,130</b>

.. not available

It is possible that seniors contributed more than one record to the analysis. For example, a senior with no or mild pain in 1994/1995 is followed up two years later, contributing one record to the analysis. If that person reported no or mild pain in 1996/1997, or in any subsequent baseline year, they were followed up again two years later, contributing another record to the analysis. The bootstrap method accounts for the increase in variance that may result from having repeated observations, because the same individual is always in the same bootstrap sample.<sup>29</sup>

Logistic models were used on the pooled set of observations to estimate associations between an increase in pain over a two-year period and each quality of life outcome (unhappiness and negative self-perceived health). The restricted models contain

baseline characteristics (age, sex, education, existing chronic conditions, proxy status, and unhappiness or negative self-perceived health). A variable, “cycle,” was included to control for differences between each two-year cohort. In addition, follow-up characteristics were entered into the restricted models (medication use, new chronic conditions, and proxy status). The full models contain the main exposure of interest (an increase in pain) in addition to the variables entered in the restricted models.

The longitudinal analyses were conducted on both sexes combined. Tests for interaction were carried out to establish whether the impact of an increase of pain on quality of life varied by sex. There were no significant interaction terms for either negative self-perceived health or unhappiness.

To account for survey design effects of the NPHS and CCHS, coefficients of variation and p-values were estimated, and significance tests were performed using the bootstrap technique.<sup>30-32</sup> The significance level was set at  $p < 0.05$ .

## Results

The cross-sectional analysis for health care institutions is based on a sample of 1,711 seniors aged 65 or older, with a mean age of 84. Almost three-quarters (73%) of the sample were women. For the household population, the cross-sectional analysis includes 39,692 respondents, most of whom (30,713) were working age (18 to 64). Information from these respondents provides some context against which to compare seniors (8,979 respondents), the main focus of the study. The mean age of the senior sample was 75. Fifty-nine percent of the senior sample were women.

### Prevalence and associated factors

Chronic pain is common among seniors, who are more likely to experience it than are younger, working-age people: 27% of seniors living in private households reported chronic pain, compared with 16% of people aged 18 to 64 (Table 2, Chart 1). Seniors living in long-term health care institutions were even more likely to experience chronic pain (38%).

Although seniors were more likely to report chronic pain than were working-age people, there was little difference between seniors of different ages. In institutions, those aged 85 or older were no more or less likely to report chronic pain than were younger residents. In the household population, there was no difference between the oldest and youngest seniors, although those aged 75 to 84 were more likely to report pain (30%) than were 65- to 74-year-olds (24%).

Among seniors, chronic pain was more common than a number of other major chronic conditions

**Table 2**  
Prevalence of chronic pain, by selected characteristics, household and institutional populations aged 18 to 64 and 65 or older, Canada excluding territories, 2005 (households) and 1996/1997 (institutions)

	Households	Institutions
	%	%
<b>18 to 64</b>		
<b>Total</b>	15.5 <sup>†</sup>	...
<b>Sex</b>		
Men	14.0 <sup>†*</sup>	...
Women <sup>†</sup>	16.9 <sup>†</sup>	...
<b>65 or older</b>		
<b>Total</b>	26.7 <sup>§</sup>	37.9
<b>Sex</b>		
Men	21.0 <sup>§*</sup>	33.9 <sup>*</sup>
Women <sup>†</sup>	31.2 <sup>§</sup>	39.4
<b>Age group</b>		
65 to 74 <sup>†</sup>	24.4 <sup>§</sup>	37.3
75 to 84	29.9 <sup>§*</sup>	40.7
85 or older	29.5 <sup>§</sup>	36.2
<b>Education</b>		
Less than secondary graduation	29.5 <sup>§*</sup>	40.7 <sup>*</sup>
Secondary graduation or more <sup>†</sup>	23.3 <sup>§</sup>	32.6
<b>Income</b>		
Lower	28.1 <sup>§*</sup>	40.2
Middle	25.4 <sup>§</sup>	37.2
Higher <sup>†</sup>	22.8 <sup>§</sup>	34.7
<b>Proxy response</b>		
Yes	39.7 <sup>*</sup>	34.7 <sup>*</sup>
No <sup>†</sup>	26.0 <sup>§</sup>	42.4

<sup>†</sup> reference category

<sup>‡</sup> significantly different from estimate for household population aged 65 or older ( $p < 0.05$ )

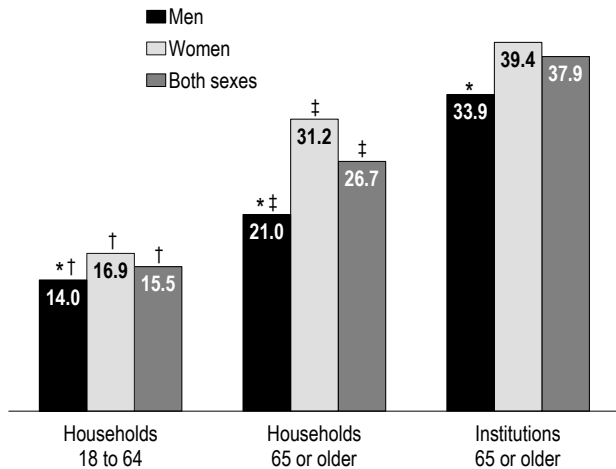
<sup>§</sup> significantly different from estimate for institutional population ( $p < 0.05$ )

<sup>\*</sup> significantly different from estimate for reference category ( $p < 0.05$ )

... not applicable

**Sources:** 2005 Canadian Community Health Survey; 1996/1997 National Population Health Survey, cross-sectional sample, Health Institutions component.

**Chart 1**  
Prevalence of chronic pain, by sex, household and institutional populations aged 18 to 64 and 65 or older, Canada excluding territories, 2005 (households) and 1996/1997 (institutions)



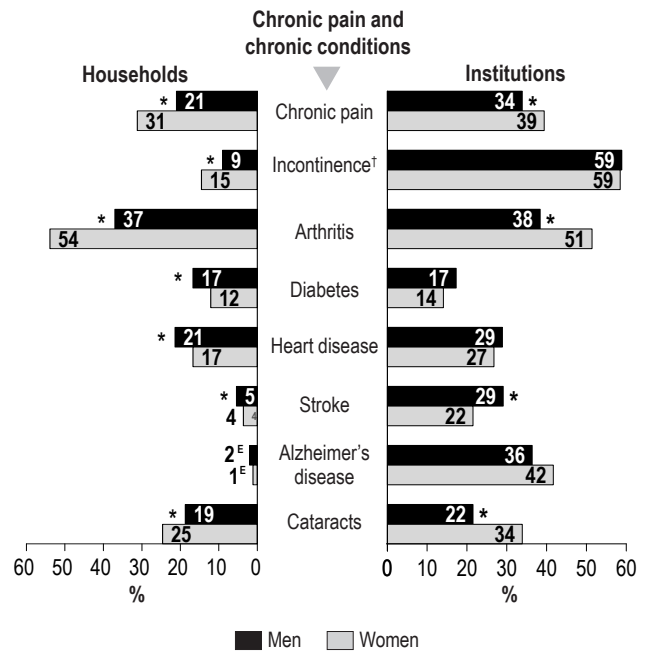
\* significantly different from estimate for women ( $p < 0.05$ )  
 † significantly different from estimate for household population aged 65 or older ( $p < 0.05$ )  
 ‡ significantly different from estimate for institutional population ( $p < 0.05$ )  
**Sources:** 2005 Canadian Community Health Survey; 1996/1997 National Population Health Survey, cross-sectional sample, Health Institutions component.

(Chart 2). For those residing in private households, it was more common than diabetes, heart disease, Alzheimer’s disease, incontinence, cataracts or suffering from the effects of stroke. In institutions, only incontinence, arthritis and Alzheimer’s disease were more common than chronic pain.

However, pain and chronic conditions were closely related. Over half of seniors living in households (56%) reported two or more chronic conditions, as did 83% of institutionalized seniors. And those with at least two chronic conditions were more likely to experience chronic pain than were those with fewer conditions (Chart 3).

Seniors with some common chronic conditions, such as arthritis, heart disease and diabetes, were generally more likely to report chronic pain than were those without the condition (Chart 4). A notable exception was institutionalized seniors with Alzheimer’s disease, 28% of whom were reported to have chronic pain, compared with 43% of institutional residents who did not have Alzheimer’s disease.

**Chart 2**  
Prevalence of chronic pain and selected chronic conditions, household and institutional populations aged 65 or older, Canada excluding territories, 2005 (households) and 1996/1997 (institutions)



\* significantly different from estimate for women ( $p < 0.05$ )  
 † limited to urinary incontinence for the household population, but also includes bowel incontinence for the institutional population.  
 ‡ use with caution (coefficient of variation 16.6% to 33.3%)  
**Sources:** 2005 Canadian Community Health Survey; 1996/1997 National Population Health Survey, cross-sectional sample, Health Institutions component.

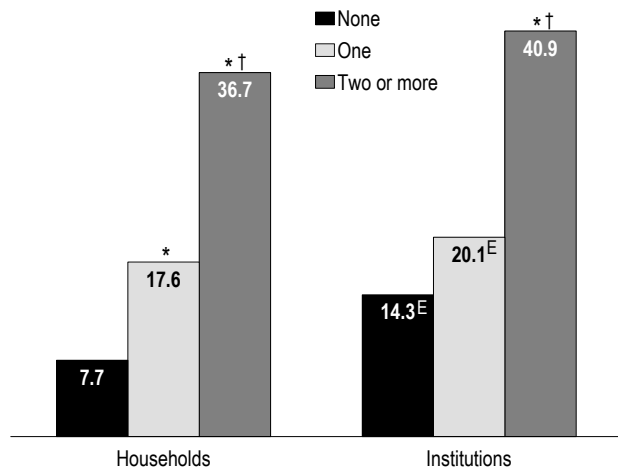
Women were consistently more likely than men to report chronic pain, regardless of whether they were working-age or older, living in an institution or not (Table 2). However, for the most part, among seniors with chronic pain, women were no more or less likely than men to report their pain as moderate or severe (Table 3). The exception was household residents: men reporting pain were more likely than women to rate their pain as mild.

Education and income were used as markers of socio-economic status (Table 2). For education, 33% of institutional residents who had graduated from secondary school experienced chronic pain, compared with 41% of residents with less than secondary graduation. Prevalences were lower among the household population, but a similar pattern existed; 23% of secondary graduates had



Chart 3

Prevalence of chronic pain, by number of chronic conditions, household and institutional populations aged 65 or older, Canada excluding territories, 2005 (households) and 1996/1997 (institutions)



\* significantly different from estimate for "None" ( $p < 0.05$ )

† significantly different from estimate for previous category ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation between 16.6% and 33.3%)

**Notes:** The count of chronic conditions is based on arthritis, high blood pressure, asthma, bronchitis / emphysema, diabetes, epilepsy, heart disease, incontinence, cataracts, Alzheimer's disease, glaucoma, and the effects of stroke. Cancer is included for the household population; partial or complete paralysis, osteoporosis, kidney disease and other chronic conditions are included for the institutional population.

**Sources:** 2005 Canadian Community Health Survey; 1996/1997 National Population Health Survey, cross-sectional sample, Health Institutions component.

Table 3

Percentage distribution of people reporting chronic pain, by intensity of pain and sex, household and institutional populations aged 65 or older, Canada excluding territories, 2005 (households) and 1996/1997 (institutions)

Intensity of pain	Households	Institutions
	%	%
<b>Mild</b>	<b>27.4</b>	<b>22.4</b>
Men	34.1 <sup>*†</sup>	18.7 <sup>E</sup>
Women	23.7	23.6
<b>Moderate</b>	<b>54.7</b>	<b>50.0</b>
Men	50.5	57.0
Women	56.9 <sup>†</sup>	47.8
<b>Severe</b>	<b>18.0<sup>†</sup></b>	<b>27.6</b>
Men	15.4	24.4 <sup>E</sup>
Women	19.4 <sup>†</sup>	28.6

† significantly different from estimate for institutional population ( $p < 0.05$ )

\* significantly different from estimate for women ( $p < 0.05$ )

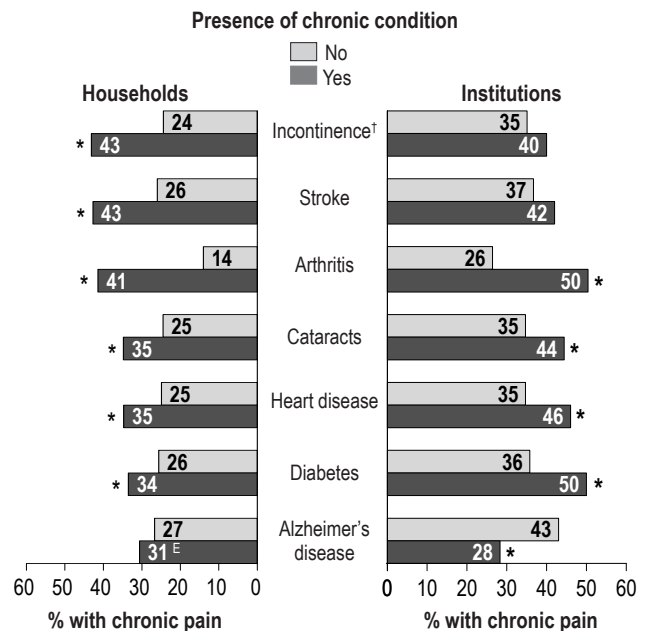
<sup>E</sup> use with caution (coefficient of variation between 16.6% and 33.3%)

**Note:** Percentages based on people reporting chronic pain

**Sources:** 2005 Canadian Community Health Survey; 1996/1997 National Population Health Survey, cross-sectional sample, Health Institutions component.

Chart 4

Prevalence of chronic pain, by presence or absence of selected chronic conditions, household and institutional populations aged 65 or older, Canada excluding territories, 2005 (households) and 1996/1997 (institutions)



\* significantly different from estimate for those without condition ( $p < 0.05$ )

† limited to urinary incontinence for the household population, but also includes bowel incontinence for the institutional population.

<sup>E</sup> use with caution (coefficient of variation 16.6% to 33.3%)

**Sources:** 2005 Canadian Community Health Survey; 1996/1997 National Population Health Survey, cross-sectional sample, Health Institutions component.

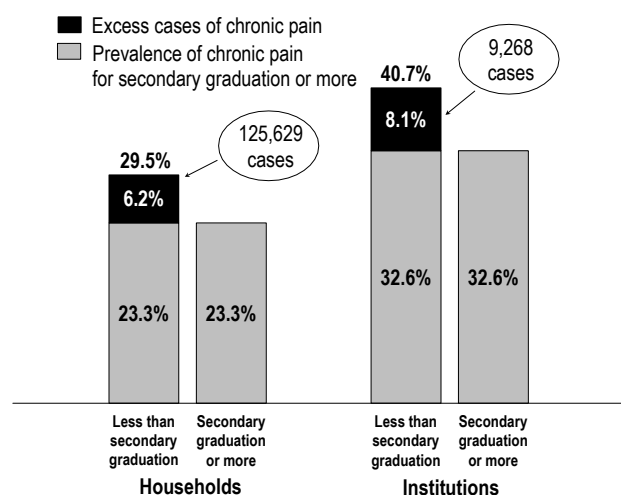
chronic pain, compared with 30% of those with less education.

Seniors whose household income was in the lower range were more likely to have chronic pain than were those with higher household incomes: 28% versus 23%. For institutional residents, despite a gradient in the prevalences of chronic pain, no significant differences existed between income groups.

### The burden of chronic pain

The socio-economic gradient in chronic pain indicates a potential for improvement. Currently, the burden of this condition is not shared equally among Canadians. If seniors with less than secondary graduation experienced chronic pain to the same extent as those with more education, the prevalence of chronic pain in the former group

**Chart 5**  
**Prevalence of chronic pain, by educational attainment, household and institutional populations aged 65 or older, Canada excluding territories, 2005 (households) and 1996/1997 (institutions)**



**Sources:** 2005 Canadian Community Health Survey; 1996/1997 National Population Health Survey, cross-sectional sample, Health Institutions component.

would be 6.2 percentage points lower in the household population and 8.1 percentage points lower among those in institutions (Chart 5). These percentages represent around 125,600 residents of private households and almost 9,300 residents of institutions.

**Table 4**  
**Percentage whose pain interferes with most activities, by intensity of pain, household and institutional populations aged 65 or older, Canada excluding territories, 2005 (households) and 1996/1997 (institutions)**

	Households	Institutions
	%	%
<b>Total with pain</b>	<b>21.8<sup>†</sup></b>	<b>42.3</b>
<b>Intensity of pain</b>		
Mild	6.7 <sup>†E</sup>	15.1 <sup>E</sup>
Moderate	19.1 <sup>*†</sup>	42.7 <sup>*</sup>
Severe	52.7 <sup>*†</sup>	63.8 <sup>*</sup>

<sup>†</sup> significantly different from estimate for institutional population ( $p < 0.05$ )

<sup>\*</sup> significantly different from estimate for "Mild" ( $p < 0.05$ )

<sup>E</sup> use with caution (coefficient of variation between 16.6% and 33.3%)

**Note:** Percentages based on people reporting chronic pain.

**Sources:** 2005 Canadian Community Health Survey; 1996/1997 National Population Health Survey, cross-sectional sample, Health Institutions component.

Many people reported that chronic pain interfered with their activities, and the more intense the pain, the more likely it was to interfere with most activities (Table 4). For the household population with severe pain, 53% stated that it interfered with most activities. Among institutional residents in severe pain, 64% reported major activity interference.

### Pain and unhappiness

While the cross-sectional analysis provides a portrait of seniors who experienced pain, it is limited when discussing the temporal order between pain and quality of life. The following longitudinal analyses of NPHS data address this issue. The analyses are based on 1,465 responses for institutions and 7,130 responses for the household population (see *Statistical analyses*).

Apart from interfering with regular activities, it is evident from the NPHS that pain can contribute to feelings of unhappiness. The odds of being unhappy at the end of a two-year period were estimated, comparing seniors who had experienced an increase of pain over the two years with those who had not (Table 5). Having two or more chronic conditions to begin with, or two or more new chronic conditions diagnosed over the two-year period, contributed to people's unhappiness. However, even when these chronic conditions and other factors (socio-demographic factors and medication use) were taken into account, seniors who experienced an increase in pain had greater odds of being unhappy. In other words, it was not just illness that contributed to unhappiness; pain in and of itself had a profound impact. In institutions, after experiencing an increase in pain, seniors had over twice the odds (2.2) of being unhappy. Seniors living in private households had higher odds of being unhappy when they experienced an increase to moderate (2.0) or severe (6.4) pain, compared with those who did not report an increase in pain.

### Pain and self-perceived health

As with unhappiness, many factors can account for negative self-perceived health, including existing and emerging chronic conditions, medication use, and socio-demographic factors (Table 6). However, it is clear from the NPHS that an increase in pain has

Table 5

Odds ratios relating unhappiness to selected characteristics with and without controlling for an increase in chronic pain, household and institutional populations aged 65 or older, Canada excluding territories, 1994/1995 to 2002/2003 (households) and 1994/1995 to 2000/2001 (institutions)

	Households				Institutions			
	Not controlling for pain		Controlling for pain		Not controlling for pain		Controlling for pain	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
<b>Two-year follow-up characteristics</b>								
<b>Increase in pain over 2 years</b>								
No/Mild pain to moderate/severe pain	...	...	...	...	...	...	2.2*	1.5 to 3.3
No/Mild pain to moderate pain	...	...	2.0*	1.3 to 3.1	...	...	...	...
No/Mild pain to severe pain	...	...	6.4*	3.0 to 13.8	...	...	...	...
No change in pain <sup>†</sup>	...	...	1.0	...	...	...	1.0	...
<b>Medication</b>								
No medication <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Medication, but not pain medication	0.6*	0.4 to 1.0	0.6*	0.4 to 0.9	1.2	0.5 to 3.0	1.2	0.5 to 3.1
Pain medication	0.9	0.6 to 1.4	0.8	0.5 to 1.3	1.4	0.6 to 3.3	1.3	0.6 to 3.1
<b>Chronic conditions</b>								
No new chronic conditions <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
1 new chronic condition	1.4	0.9 to 2.2	1.4	0.9 to 2.2	2.0*	1.2 to 3.3	2.0*	1.2 to 3.4
2 or more new chronic conditions	2.0*	1.2 to 3.4	1.8*	1.0 to 3.1	2.4*	1.6 to 3.5	2.3*	1.6 to 3.5
<b>Proxy status</b>								
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Yes	2.6*	1.3 to 5.5	2.6*	1.2 to 5.7	3.0*	2.0 to 4.5	3.0*	2.0 to 4.6
<b>Baseline characteristics</b>								
<b>Unhappiness</b>								
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Yes	11.6*	6.3 to 21.3	10.3*	5.3 to 19.8	2.7*	1.9 to 3.8	2.7*	1.9 to 3.8
<b>Sex</b>								
Men	1.1	0.8 to 1.6	1.1	0.7 to 1.6	0.9	0.6 to 1.2	0.9	0.6 to 1.3
Women <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
<b>Age (continuous)</b>								
	1.02	0.99 to 1.05	1.01	0.99 to 1.05	1.00	0.98 to 1.02	1.00	0.98 to 1.02
<b>Education</b>								
Less than secondary graduation	1.0	0.7 to 1.5	1.0	0.7 to 1.4	0.9	0.6 to 1.1	0.8	0.6 to 1.1
Secondary graduation or more <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
<b>Chronic conditions</b>								
No chronic conditions <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
1 chronic condition	1.1	0.6 to 2.0	0.9	0.5 to 1.7	1.7	0.9 to 3.3	1.6	0.8 to 3.1
2 or more chronic conditions	2.5*	1.5 to 4.1	2.1*	1.2 to 3.5	2.1*	1.1 to 3.9	1.9	1.0 to 3.5
<b>Proxy status</b>								
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Yes	1.5	0.6 to 3.6	1.4	0.5 to 3.6	1.0	0.7 to 1.5	1.1	0.7 to 1.6
	Not controlling for pain		Controlling for pain		Not controlling for pain		Controlling for pain	
<b>Model information</b>								
Sample size	6,735		6,729		1,202		1,178	
Sample with unhappiness (at follow-up)	218		216		357		344	
Records dropped because of missing values	395		401		263		287	

<sup>†</sup> reference category

\* significantly different from estimate for reference category ( $p < 0.05$ )

... not applicable

**Notes:** A variable, "cycle", was included to control for differences between each two-year cohort; the odds ratios are not shown. All models are based on weighted data. Missing values for chronic conditions at baseline and new chronic conditions at two-year follow-up were included in models to maximize sample size; the odds ratios are not shown. Because of rounding, some odds ratios with lower or upper confidence limits of 1.0 were statistically significant.

**Sources:** 1994/1995 through 2002/2003 National Population Health Survey, longitudinal file, Household component and 1994/1995 through 2000/2001 National Population Health Survey, longitudinal file, Health Institutions component.

Table 6

Odds ratios relating negative self-perceived health to selected characteristics with and without controlling for an increase in chronic pain, household and institutional populations aged 65 or older, Canada excluding territories, 1994/1995 to 2002/2003 (households) and 1994/1995 to 2000/2001 (institutions)

	Households				Institutions			
	Not controlling for pain		Controlling for pain		Not controlling for pain		Controlling for pain	
	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval	Adjusted odds ratio	95% confidence interval
<b>Two-year follow-up characteristics</b>								
<b>Increase in pain over 2 years</b>								
No/Mild pain to moderate/severe pain	...	...	...	...	...	...	2.3*	1.7 to 3.1
No/Mild pain to moderate pain	...	...	3.5*	2.7 to 4.7	...	...	...	...
No/Mild pain to severe pain	...	...	6.9*	4.2 to 11.3	...	...	...	...
No change in pain <sup>†</sup>	...	...	1.0	...	...	...	1.0	...
<b>Medication</b>								
No medication <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Medication, but not pain medication	1.5*	1.2 to 2.0	1.5*	1.2 to 2.0	1.3	0.7 to 2.5	1.3	0.7 to 2.6
Pain medication	1.5*	1.1 to 2.0	1.4*	1.0 to 1.8	1.2	0.7 to 2.2	1.2	0.7 to 2.1
<b>Chronic conditions</b>								
No new chronic conditions <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
1 new chronic condition	1.7*	1.4 to 2.1	1.6*	1.3 to 1.9	1.1	0.7 to 1.6	1.1	0.7 to 1.6
2 or more new chronic conditions	2.6*	2.0 to 3.4	2.4*	1.8 to 3.1	1.9*	1.3 to 2.8	1.8*	1.2 to 2.6
<b>Proxy status</b>								
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Yes	2.1*	1.3 to 3.3	2.0*	1.3 to 3.3	2.8*	2.0 to 3.9	2.6*	1.8 to 3.7
<b>Baseline characteristics</b>								
<b>Negative self-perceived health</b>								
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Yes	5.6*	4.5 to 7.1	5.4*	4.3 to 6.8	2.4*	1.8 to 3.0	2.3*	1.8 to 2.9
<b>Sex</b>								
Men	1.4*	1.2 to 1.7	1.4*	1.2 to 1.8	0.9	0.7 to 1.2	0.9	0.7 to 1.2
Women <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
<b>Age (continuous)</b>								
	1.02*	1.00 to 1.03	1.01	1.00 to 1.03	0.99	0.97 to 1.00	0.99*	0.97 to 1.00
<b>Education</b>								
Less than secondary graduation	1.5*	1.3 to 1.9	1.5*	1.3 to 1.8	0.8	0.6 to 1.0	0.7	0.5 to 1.0
Secondary graduation or more <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
<b>Chronic conditions</b>								
No chronic conditions <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
1 chronic condition	1.4*	1.1 to 1.9	1.3*	1.0 to 1.8	1.3	0.7 to 2.3	1.2	0.7 to 2.2
2 or more chronic conditions	2.4*	1.9 to 3.2	2.1*	1.6 to 2.8	2.5*	1.5 to 4.1	2.2*	1.3 to 3.7
<b>Proxy status</b>								
No <sup>†</sup>	1.0	...	1.0	...	1.0	...	1.0	...
Yes	1.1	0.7 to 1.8	1.0	0.6 to 1.7	0.7*	0.6 to 1.0	0.8	0.6 to 1.0
	Not controlling for pain		Controlling for pain		Not controlling for pain		Controlling for pain	
<b>Model information</b>								
Sample size	6,760		6,748		1,311		1,267	
Sample with unhappiness (at follow-up)	1,295		1,288		716		678	
Records dropped because of missing values	370		382		154		198	

<sup>†</sup> reference category

\* significantly different from estimate for reference category ( $p < 0.05$ )

... not applicable

**Notes:** A variable, "cycle", was included to control for differences between each two-year cohort; the odds ratios are not shown. All models are based on weighted data. Missing values for chronic conditions at baseline and new chronic conditions at two-year follow-up were included in models to maximize sample size; the odds ratios are not shown. Because of rounding, some odds ratios with lower or upper confidence limits of 1.0 were statistically significant.

**Sources:** 1994/1995 through 2002/2003 National Population Health Survey, longitudinal file, Household component and 1994/1995 through 2000/2001 National Population Health Survey, longitudinal file, Health Institutions component.

an independent effect on self-perceived health. Seniors living in private households had higher odds (3.5) of reporting negatively on their general health after their pain increased to moderate levels, compared with those who remained pain-free or with low levels of pain. The odds were even higher (6.9) for those who suffered an increase to severe levels of pain. A similar relationship between an increase in pain and negative self-perceived health existed among institutionalized seniors, with an odds ratio of 2.3 for any increase in pain to moderate or severe levels.

## Discussion

The present study provides benchmarks for the prevalence of chronic pain in Canada. In the household population, seniors were more likely to report chronic pain (27%) than were people of working age (16%). The prevalence of chronic pain, however, was highest among seniors in long-term care institutions (38%). It is possible that these prevalences are underestimates, as seniors have been known to underreport their pain.<sup>3</sup> This may result from the belief that pain is a natural part of aging, which must be endured with the passage of time.<sup>1,11,33</sup> Alternatively, some seniors who fail to report their pain may do so because they fear that their complaints could negatively influence their care.<sup>18</sup>

A comparison with other population-based studies revealed a wide range in the reported prevalence of chronic pain. A third of of US seniors (70 or older) living in private households had pain often.<sup>19</sup> A Finnish study revealed that 35% of the general population aged 15 to 74 reported chronic pain.<sup>10</sup> An earlier Canadian study found that 29% of adults reported chronic, non-cancer pain,<sup>34</sup> while an Australian study reported chronic pain among 17% of men and 20% of women.<sup>6</sup> Finally, a UK study<sup>8,9</sup> estimated that almost half (47%) the general population aged 25 or older had “any chronic pain,” while estimates for “significant” and “severe” chronic pain were 12% and 6%, respectively.

Studies based on specific communities and nursing homes report sample prevalences that are generally higher than the population-based studies.

From a community sample of seniors admitted to home care programs in Italy, Landi et al.<sup>35</sup> reported that 40% experienced pain daily. Three-quarters of subjects studied by Ross et al.<sup>11</sup> were frequently troubled with pain or experienced pain of a noteworthy nature within the two-week period before their interview. This was based on a small sample (66) of seniors aged 64 to 99 years who received care from the Ottawa-Carleton branch of the Victorian Order of Nurses. From non-representative samples of studies of nursing home residents, the prevalences of pain ranged between 50% and 83%,<sup>5,20-22,36</sup> far higher than the prevalence from the NPHS (38%) for health care institutions.

The variety of prevalences may reflect real geographic and cultural differences in chronic pain or differences in research methods. With regard to research methods, the nature of the different samples is a factor, as well as different survey questions and time-frames. NPHS and CCHS respondents were asked about the absence of pain (“Are you usually free of pain or discomfort?”). In contrast, other studies ask directly about pain. For example “How much bodily pain have you had during the past four weeks?”<sup>37</sup> and “Have you been troubled by pain for the last three months?”<sup>38</sup> In addition, it is clear that many different time-frames are used, such as the experience of pain in the past four weeks,<sup>37</sup> two weeks,<sup>11</sup> preceding week,<sup>10,35</sup> and current pain.<sup>20</sup> Alternatively, the time-frame may not be specified, asking respondents if they are *usually* free of pain (present study) or *often* bothered by pain.<sup>19</sup> The different time-frames, or absence of a specific time-frame, likely contribute to different prevalences.

Other differences between studies include definitions of pain, the use of direct (self-reported or chart review) or indirect (analgesic use) measures of pain, the type of pain being assessed (chronic or acute), and whether non-communicative respondents were included.<sup>5</sup> Ross et al.<sup>11</sup> recognize these issues when they recommend that researchers adopt standard ways of defining pain sufferers and measuring pain.

The inclusion or exclusion of seniors with cognitive or communication impairments is an



important consideration that likely has an impact on the reported prevalence of pain.<sup>13</sup> Pain, by definition, is subjective;<sup>3</sup> in Levy's words: "Pain is what the patient says it is and occurs when he or she says it does."<sup>39</sup> How then to work with seniors who are unable to communicate the presence or extent of their pain because of cognitive problems, speech, hearing, or other difficulties? Studies consistently show that the prevalence of pain is lower among seniors with higher levels of cognitive impairment.<sup>13,36</sup> These studies highlight the need for better assessment and management of pain for those who cannot advocate on their own behalf.<sup>20</sup> Seniors with cognitive or communication impairments rely on a family member, staff person or friend to speak on their behalf.<sup>26</sup> People regularly make objective assessments about the pain of others through signs such as limping, flinching from physical contact, groaning, facial expressions, guarding parts of the body, and so on. Although these objective assessments are useful, they are subject to interpretation (or misinterpretation).<sup>13</sup> People may also gauge pain by the amount of damage that has been done to a person's body—certain conditions look very painful. However, while chronic pain may be related to a particular disease or injury, for many, the cause remains unexplained, persisting in the absence of injury or after the healing process appears complete.<sup>2,20,40</sup>

It is evident from this study that in institutions there is a lower prevalence of pain among those with Alzheimer's disease, compared with those without this condition. Most people (93%) in the institutional sample with Alzheimer's disease relied on a family member, friend or staff member to respond on their behalf. This suggests that proxy respondents are less likely to report the presence of pain, at least in institutions. In fact, the estimate of chronic pain among institutional residents was significantly lower for proxy reports (35%), compared with self-reports (42%). Consequently, the overall estimate for chronic pain within institutions (38%) is more conservative than it would be if the proxy respondents (and therefore, most people suffering from Alzheimer's disease) had been excluded. In contrast, proxy respondents for the

household population were more likely to report chronic pain (40%) than those with self-reports (26%). However, because only 4% of sampled seniors in private households relied on proxy respondents (compared with 59% of seniors in institutions), this "overestimation" of chronic pain in households did not have a great impact on the overall prevalence of pain (27%). These results emphasize the need to control for proxy respondents in the multivariate analyses.

As with many conditions, chronic pain is not evenly distributed among the population. Women are more likely to report chronic pain,<sup>8,9,13,19</sup> as are people with lower socioeconomic status.<sup>8,9,19</sup> The present study supports these findings. When measuring socioeconomic status for people residing in institutions, only education was significant. It is possible that for seniors, level of education is more sensitive than current income as a measure of socioeconomic status, reflecting past lifestyle and environmental factors that may affect health.

Pain has been implicated as interfering with physical activity, recreation, family responsibilities and self-care.<sup>4,11,14,37</sup> Findings from the CCHS and NPHS support the association between pain and activity interference. The survey question does not specify the type or number of activities and so leaves respondents free to rate the interference of pain relative to normal activities and expectations. What is interesting is that although seniors living in health care institutions may be perceived as having fewer activities in their daily lives (with the institutions being responsible for grocery shopping, laundry, cooking, and other daily activities), their reported interference was greater regardless of the level of pain they experienced.

In addition to interfering with activities and responsibilities, chronic pain has been shown to have an impact on happiness and self-perceived health. Institutionalized seniors who were usually pain-free had higher odds of reporting positive self-perceived health than did those with chronic pain.<sup>41</sup> Among non-institutionalized adults, those who suffered chronic pain had higher odds of reporting poor self-rated health.<sup>10,19</sup> The longitudinal nature of the present study provides even stronger evidence for

the relationship between pain and self-perceived health or unhappiness. When people who were initially free of pain or reported only mild pain experienced an increase in pain to moderate or severe levels over a two-year period, they had higher odds of being unhappy or reporting negatively about their health.

### Limitations

The current study has a number of limitations. Chronic conditions are self-reported. Respondents were asked if they had chronic conditions diagnosed by a health professional, but their responses were not verified by any other source. The list of chronic conditions in the institutional questionnaire differed from those presented to the household population. Consequently, the count of chronic conditions may vary between household and institutional residents, in part because the lists of conditions were not identical. In addition, some chronic conditions were omitted because they were not included in every cycle of the longitudinal file.

While recent data (2005) are available for the cross-sectional analysis of the household population, the latest cross-sectional data for people living in institutions are for 1996/1997. Thus, the prevalence of pain reported for residents of health care institutions is at least 10 years old. The absence of current data from representative samples of

institutionalized seniors limits the ability to conduct relevant analysis on this sector of the population.

Finally, as already discussed, 59% of the seniors' interviews were completed by proxy respondents in the 1996/1997 NPHS Health Institutions component, compared with 4% of interviews for seniors residing in households in the 2005 CCHS. As demonstrated, this appears to introduce a bias into the prevalences.

### Conclusion

Chronic pain is a debilitating condition that affects many aspects of people's lives.

It is a major health concern for seniors, many of whom are already coping with the changes wrought by aging—chronic diseases, cognitive problems, and the need for medications, for example. Chronic pain is common, affecting 27% of seniors living in households and 38% of those in health care institutions. The impact of this public health problem will likely grow as Canada's population ages. What is evident from this analysis is that efforts focused on reducing pain would have a positive impact on the happiness and self-perceived health of seniors. Seniors likely accept that many diseases cannot be cured, but would experience a better quality of life if their pain could be adequately assessed and controlled. ●

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## Appendix

**Table A**

**Chronic diseases included in health institutions and household components of National Population Health Survey, by cycle, 1994/1995 to 2002/2003**

	Health institutions component				Household component				
	1994/1995	1996/1997	1998/1998	2000/2001	1994/1995	1996/1997	1998/1998	2000/2001	2002/2003
Arthritis or rheumatism	1	1	1	1	1	1	1	3	3
Arthritis or rheumatism excluding fibromyalgia	3	3	3	3	3	3	3	1	1
Fibromyalgia	3	3	3	3	3	3	3	2	2
High blood pressure	1	1	1	1	1	1	1	1	1
Asthma	1	1	1	1	1	1	1	1	1
Chronic bronchitis/emphysema	1	1	1	1	1	1	1	1	1
Diabetes	1	1	1	1	1	1	1	1	1
Epilepsy	1	1	1	1	1	1	1	1	1
Heart disease	1	1	1	1	1	1	1	1	1
Cancer	2	3	2	2	1	1	1	1	1
Effects of stroke	1	1	1	1	1	1	1	1	1
Partial or complete paralysis	1	1	1	1	3	3	3	3	3
Urinary incontinence	1	1	1	1	1	1	1	1	1
Bowel incontinence	1	1	1	1	3	3	3	3	3
Bowel disorder (Crohn's Disease or colitis)	3	2	2	2	3	2	2	2	2
Alzheimers or other dementia	1	1	1	1	1	1	1	1	1
Osteoporosis or brittle bones	1	1	1	1	3	3	3	3	3
Cataracts	1	1	1	1	1	1	1	1	1
Glaucoma	1	1	1	1	1	1	1	1	1
Stomach or intestinal ulcers	3	2	2	2	2	2	2	2	2
Kidney failure or disease	1	1	1	1	3	3	3	3	3
Thyroid conditions	3	2	2	2	3	2	2	2	2
Other chronic condition	1	1	1	1	1	1	1	1	1

**Notes:**

1 = included in survey cycle, used in analysis

2 = included in survey cycle, not used in analysis

3 = not included in survey cycle

For health institutions, incontinence refers to urinary or bowel incontinence; for households, incontinence refers to urinary incontinence only.

**Sources:** 1994/1995 to 2002/2003 National Population Health Survey, Health Institutions and Household components.