Impact of chronic conditions

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Abstract

Objectives

This article compares the impact of various self-reported chronic conditions on health-related quality of life, as measured by the Health Utilities Index 3 (HUI3), for the population aged 12 or older.

Data source

The data are from the cross-sectional household component of the Health file of the 1996/97 National Population Health Survey.

Analytical techniques

The effect of 21 chronic conditions was assessed for the full sample (73,402) and in subgroups by age and sex. All analyses were weighted to represent the Canadian population at the time of the survey. The effect of each chronic condition on the HUI3 was estimated using multivariate linear regression, adjusting for age, sex and co-morbidity.

Main results

The average impact of different chronic conditions on health status varies substantially. At younger ages, urinary incontinence and arthritis/rheumatism have the greatest effect on health-related quality of life, while at older ages, Alzheimer's disease and the effects of stroke have a major impact. Assessments of the impact of any specific condition should account for the presence of other conditions.

Key words

health status index, health status indicators, sickness impact profile, health surveys, Alzheimer's disease

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As Canada and other industrialized countries moved through the "epidemiologic transition," the focus of policy and planning related to health interventions shifted from the control of infectious diseases to reducing mortality from chronic conditions. In recent years, with mortality rates at very low levels and life expectancy increasing steadily,[1] another shift has been occurring—this time from a focus on reducing mortality from chronic conditions to preventing or reducing disability.

This change in emphasis brings a number of new challenges. One is the need for methods of measuring a condition's effect on health status, which is more complicated than simply measuring how often the condition causes death. Developing valid and reliable methods for assessing the relative impact and distinguishing between chronic conditions is important when establishing program priorities and for estimating the cost burden that various conditions present.[2]

Different methodologies have been proposed for comparing the burden of chronic conditions, both in economic terms and in loss of quality of life. In the Global Burden of Disease Study, disability weights for various

Methods

Data source

The data in this analysis are from cycle 2 of the National Population Health Survey (NPHS), which was conducted in 1996/97. The NPHS 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 Forces bases, and in some remote areas. The NPHS has both longitudinal and cross-sectional components.

This analysis uses cross-sectional data from the Health file of the NPHS. 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 dialling (RDD) technique and were included for cross-sectional purposes only.

Individual data are organized into two files: General and Health. The General file contains socio-demographic and some health information that was obtained for each member of participating households. 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.

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.

In households 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 about 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%. A more detailed description of the NPHS design, sample, and interview procedures can be found in published reports.[3,4]

Analytical techniques

The analyses were done using multivariate linear regression. One of the challenges of measuring the effect of a specific chronic condition on health-related quality of life is that individuals often have more than one condition, which makes it difficult to assess the impact of each one separately. In addition, interactions may occur; that is, the effect of a particular condition may be heightened or lessened by the presence of others.

To examine the relative impact of each condition in different circumstances, three analyses were conducted. Analysis I examined the effect of each condition in the absence of co-morbidity, comparing the mean HUI3 (Health Utilities Index Mark III) scores of those who reported only that condition with the scores of those who reported no chronic conditions, adjusting for age and sex. Analysis II, which concerned only respondents who reported at least one chronic condition, compared those with and without each condition, adjusting for age, sex and the number of conditions. Analysis III covered the entire population, comparing the mean HUI3 of those with and without each condition, adjusting for age, sex and all other chronic conditions. This last analysis was also carried out separately for males and females and for four age groups: 12 to 24, 25 to 44, 45 to 64, and 65 or older.

The results provide a measure of the relative impact of each condition on health-related quality of life, as measured by the HUI3, which can be used to group conditions into larger categories.[5] While no "gold standard" exists for grouping conditions based on their impact on the HUI3, Drummond[6] has suggested that a difference in HUI2 global utility scores of 0.03 represents a minimal clinically important difference. Although Drummond's recommendation pertained to the HUI2, a study[7] that compared HUI2 and HUI3 scores for Alzheimer's disease with scores for people with little or no functional impairment (such as the caregivers of Alzheimer patients) found the results for the two measures to be nearly identical. Based on this finding, 0.03 for the minimal clinically important difference is appropriate for the HUI3. Using multiples of the minimal clinically important difference as the cut-points between mild, moderate and severe conditions, the classifications are:

- No discernible impact: difference < 0.03
- Mild impact: difference 0.03 to < 0.06
- Moderate impact: difference 0.06 to < 0.09
- Severe impact: difference ≥ 0.09

The NPHS is a two-stage probability sample; a final survey weight represents both the selection probabilities and post-stratification adjustments to match the sample to population characteristics.[4] All analyses were weighted to represent the Canadian population in the 10 provinces in 1996/97. To account for survey design effects, standard errors and coefficients of variation were estimated with the bootstrap technique.[8-10] All analyses were carried out with SAS[11] using multivariate linear regression. Analyses I and II were done using contrasts, correcting for multiple comparisons.

diagnoses were obtained from a panel of experts using a person-trade-off protocol.[12] These were then used to estimate potential years of life lost or disability-adjusted life years. Studies of health expectancy have used the Health Utilities Index (HUI) to weight years lived in less than perfect health, estimating health-adjusted life expectancy.[13] Other research used data from the US National Health Interview Survey to calculate utilities for 130 specific conditions based on respondents' self-rated health and reported role functioning/activity limitation, using a modified version of the Health Utilities Index Mark I (HUI) to derive the weights.[14,15] Various chronic conditions have been ranked based on mean HUI scores for people reporting each condition in the National Population Health Survey (NPHS), stratifying by sex, age group, and co-morbidity.[2] The impact of chronic illnesses on children in terms of activity limitation, and measures of the effect of chronic condition-related activity limitation on the education system, on the health care system and on the health status of the children in general, have also been presented.[21] Other measures used to quantify the impact of chronic illness include self-reported need for assistance with activities of daily living and the Physical Performance Test.[22]

With data from the 1996/97 National Population Health Survey (NPHS), this article estimates the impact of self-reported chronic conditions on overall health status as measured by the HUI (see *Methods, Definitions* and *Limitations*). Rather than using an absolute score, as did Mittmann et al.,[2] the analysis focuses on the difference in mean HUI scores between those who reported a diagnosed chronic condition and those who did not. This difference is interpreted as the effect of the condition on health status.

One advantage of measuring health in terms of preferences or utilities, as opposed to arbitrary scales, is that the numbers have a rational interpretation (see *Health Utilities Index*). For example, a utility of 0.80 for a particular health state implies that people would, on average, accept an intervention with at least an 80% chance of gaining perfect health and a 20% risk of death, if they were in that state. The regression coefficient for a given disease, adjusted for confounding factors, can be interpreted as the average change in health utility due to the presence of the disease.

Most people report chronic conditions

In 1996/97, more than half of Canadians aged 12 or older, an estimated 58%, reported that they had at least one chronic condition. And among the people with such conditions, a slightly greater proportion reported having two or more conditions rather than only one (Appendix Table A).

The most common condition was non-food allergies (22%) (Table 1). Back problems and arthritis/rheumatism followed (both about 14%).

Health Utilities Index

The Health Utilities Index (HUI) is "a generic approach to the measurement of health status and the assessment of health-related quality of life."[16] It is a summary measure that incorporates functional health and societal preferences of health states and therefore comprises two components: a health status classification system and a multiattribute utility function used to value health states. The HUI was originally developed for use in assessing outcomes in low birth weight infants (HUI Mark I), and then extended for use with survivors of childhood cancer (HUI Mark II). The HUI Mark II was subsequently adapted for use with population health surveys. The resulting HUI Mark III was used in this study. Detailed information about the HUI is available elsewhere.[16-19]

The HUI Mark III (HUI3) comprises eight attributes: vision, hearing, speech, ambulation, dexterity, emotion, cognition, and pain. Based on a series of questions about usual functional ability, a respondent is assigned to one of the five or six levels for each attribute.[20] Utility-based preference scores assigned to each attribute level are then combined using the multiplicative utility function:

$$u = 1.371\,(u1 * u2 * u3 * u4 * u5 * u6 * u7 * u8) - 0.371$$

to arrive at an overall score, or index, for each individual. Perfect health is rated at 1.000, and death, 0.000; negative scores reflect health states considered worse than death. The global utility score provides a quantitative measure of the health-related quality of life associated with an individual's health state.[20]

The lowest prevalences were for Alzheimer's disease, epilepsy and the effects of stroke, each of which was reported by less than 1% of the population.

HUI scores vary with condition

Among people who reported chronic conditions, those with allergies or asthma had the highest mean Health Utility Index (HUI3) scores, while the lowest scores were among people with Alzheimer's disease or the effects of stroke (Table 1). Because these estimates were not adjusted for age, this difference partly reflects the age groups affected: Alzheimer's disease and stroke tend to affect seniors.

The relative impact of the various chronic conditions on health-related quality of life is evident when the HUI3 scores of people with each condition are compared with the scores of people without the condition. When people with each condition, but without co-morbidity, were compared with those with no conditions at all, Alzheimer's disease showed the most dramatic effect, with a difference in HUI3 scores of -0.31, followed by stroke, urinary incontinence and arthritis (Table 2). When age and sex were taken into account, people with no chronic conditions had an average HUI3 score of 0.93 (data not shown). By contrast, individuals with Alzheimer's disease but no other chronic condition had an average score of 0.62, a difference of -0.31 (data not shown). When only those with chronic conditions are considered, the effect was similar (-0.33). And when all the other chronic conditions, as well as age and sex were

Table 1
Prevalence of chronic conditions and unadjusted Health Utilities Index (HUI3) score, household population aged 12 or older, Canada excluding territories, 1996/97

			Unadjusted HUI3 score					
			Condition alone		With other condition(s)		Overall	
	Total with condition†	With condition, reporting no other condition	HUI3	95% confidence interval	HUI3	95% confidence interval	HUI3	95% confidence interval
	%	%						
Non-food allergies	22.3	34.6	0.95	0.95, 0.96	0.86	0.85, 0.87	0.89	0.89, 0.90
Food allergies	6.8	19.4	0.95	0.93, 0.96	0.86	0.85, 0.87	0.88	0.87, 0.89
Asthma	7.2	17.9	0.95	0.94, 0.96	0.85	0.84, 0.86	0.87	0.86, 0.88
Sinusitis	4.6	13.4	0.95	0.94, 0.96	0.83	0.81, 0.84	0.84	0.83, 0.86
Chronic bronchitis/Emphysema	2.8	12.4	0.95	0.93, 0.96	0.73	0.70, 0.75	0.76	0.73, 0.78
Thyroid condition	3.5	19.7	0.94	0.93, 0.95	0.81	0.78, 0.83	0.83	0.81, 0.85
Migraine	7.8	27.6	0.93	0.92, 0.94	0.81	0.79, 0.82	0.84	0.83, 0.85
High blood pressure	10.1	21.2	0.93	0.92, 0.94	0.79	0.77, 0.80	0.82	0.81, 0.83
Stomach/Intestinal ulcers	2.7	21.9	0.92	0.90, 0.94	0.73	0.71, 0.76	0.77	0.75, 0.80
Diabetes	3.2	18.6	0.92	0.90, 0.94	0.73	0.70, 0.75	0.76	0.74, 0.79
Glaucoma‡	1.1	12.3	0.92	0.90, 0.95	0.73	0.70, 0.77	0.76	0.72, 0.79
Epilepsy	0.6	28.9	0.91	0.88, 0.93	0.75	0.69, 0.82	0.80	0.75, 0.84
Heart disease	3.9	13.4	0.90	0.88, 0.93	0.71	0.68, 0.73	0.73	0.71, 0.75
Bowel disorders	1.5	13.5	0.90	0.84, 0.95	0.71	0.67, 0.74	0.73	0.70, 0.76
Back problems	14.1	26.7	0.89	0.88, 0.91	0.78	0.77, 0.79	0.81	0.80, 0.82
Cancer	1.5	12.6	0.88	0.85, 0.92	0.77	0.74, 0.80	0.78	0.75, 0.81
Arthritis/Rheumatism	13.8	18.0	0.86	0.85, 0.88	0.74	0.73, 0.76	0.77	0.75, 0.78
Cataracts‡	2.7	10.9	0.84	0.78, 0.91	0.67	0.64, 0.71	0.69	0.66, 0.72
Urinary incontinence	1.5	12.2	0.82	0.76, 0.89	0.61	0.58, 0.64	0.64	0.61, 0.67
Effects of stroke	0.9	7.7	0.80	0.70, 0.89	0.57	0.52, 0.62	0.58	0.54, 0.63
Alzheimer's disease‡	0.3	23.6	0.59	0.40, 0.79	0.41	0.29, 0.52	0.45	0.35, 0.55
At least one chronic condition	57.5	27.0	0.92	0.92, 0.93	0.82	0.82, 0.83	0.87	0.87, 0.87
No chronic conditions	42.5	...	...	...	...	...	0.95	0.95, 0.95

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
† Denominator does not include missing values.
‡ Respondents aged 12 to 19 with "not applicable" code were assigned to "no" group.
··· Not applicable

controlled, Alzheimer's disease still showed the greatest impact on health, with a difference in HUI3 scores of -0.34 between those with and without the disease. Stroke and urinary incontinence also showed differences of 0.10 or more. By contrast, no impact on health-related quality of life was apparent for a number of common conditions, notably allergies and high blood pressure.

The estimates of the impact of chronic conditions on people who reported only one condition, compared with those who reported none, are important in that they simulate the effect of developing each condition. However, the small number of statistically significant results may be related to the fact that most people who had each condition had others as well, and this may have resulted in sample sizes too small to detect differences for some conditions. Chronic conditions, in fact, rarely exist alone. The proportion of people with each condition who reported at least one other condition ranged from a low of 65% for those with non-food allergies to a high 92% for those with stroke.

Differences by sex and age

The impact of each condition on health-related quality of life was not the same for males and females. In addition to Alzheimer's disease, urinary incontinence and the effects of stroke, females' health status was severely affected by bowel disorders, and males', by arthritis/rheumatism, cataracts, chronic bronchitis/emphysema and epilepsy (Chart 1, Appendix Tables B and C).

Table 2
Impact† of chronic conditions on health-related quality of life, by presence of other conditions, household population aged 12 or older, Canada excluding territories, 1996/97

	Analysis I		Analysis II		Analysis III	
	Impact of condition with no other condition‡	95% confidence interval	Impact of condition with at least one other condition§	95% confidence interval	Overall impact of condition on total study population††	95% confidence interval
Alzheimer's disease‡‡	-0.31*	-0.57, -0.06	-0.33*	-0.43, -0.23	-0.34*	-0.42, -0.26
Effects of stroke	-0.13*	-0.25, 0.00	-0.16*	-0.22, -0.10	-0.17*	-0.22, -0.13
Urinary incontinence	-0.10*	-0.18, -0.01	-0.11*	-0.15, -0.08	-0.13*	-0.16, -0.10
Arthritis/Rheumatism	-0.05*	-0.08, -0.03	-0.05*	-0.07, -0.04	-0.09*	-0.10, -0.07
Bowel disorders	-0.05	-0.12, 0.02	-0.05*	-0.08, -0.01	-0.08*	-0.11, -0.06
Back problems	-0.05*	-0.06, -0.03	-0.03*	-0.04, -0.02	-0.06*	-0.07, -0.06
Epilepsy	-0.05*	-0.08, -0.01	-0.04	-0.10, 0.01	-0.08*	-0.12, -0.03
Cataracts‡‡	-0.04	-0.13, 0.04	-0.06*	-0.09, -0.02	-0.08*	-0.11, -0.06
Cancer	-0.03	-0.07, 0.01	0.01	-0.02, 0.04	-0.02	-0.04, 0.00
Migraine	-0.02*	-0.04, -0.02	0.00	-0.02, 0.01	-0.04*	-0.06, -0.03
Asthma	-0.01	-0.03, 0.00	0.04*	0.03, 0.05	-0.02*	-0.03, -0.01
Stomach/Intestinal ulcers	-0.01	-0.04, 0.02	-0.02	-0.04, 0.00	-0.05*	-0.07, -0.03
Food allergies	-0.01	-0.03, 0.01	0.06*	0.05, 0.07	0.00	-0.01, 0.01
Non-food allergies	0.00	-0.01, 0.00	0.06*	0.05, 0.07	0.00	0.00, 0.01
Heart disease	0.00	-0.03, 0.03	-0.03*	-0.05, -0.01	-0.06*	-0.08, -0.05
Diabetes	0.00	-0.03, 0.03	-0.03*	-0.05, 0.00	-0.06*	-0.07, -0.04
Chronic bronchitis/Emphysema	0.00	-0.02, 0.02	-0.02	-0.05, 0.00	-0.08*	-0.10, -0.06
Sinusitis	0.01	-0.01, 0.03	0.05*	0.04, 0.07	0.00	-0.01, 0.01
Thyroid condition	0.01	0.00, 0.03	0.03	0.01, 0.05	-0.01	-0.02, 0.01
Glaucoma‡‡	0.03	-0.01, 0.06	0.00	-0.04, 0.03	-0.03*	-0.05, 0.00
High blood pressure	0.03	0.01, 0.04	0.03*	0.01, 0.04	-0.01	-0.02, 0.00
Other	-0.06*	-0.10, -0.02	-0.05*	-0.07, -0.03	-0.09*	-0.10, -0.07

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
† Estimated as difference in mean Health Utilities Index (HUI3) scores between those with and without condition, adjusted for confounding factors.
‡ Adjusted for age and sex
§ Adjusted for age, sex and number of chronic conditions
†† Adjusted for age, sex and all other chronic conditions
‡‡ Respondents aged 12 to 19 with "not applicable" code were assigned to "no" group.
** Significantly different from those reporting no chronic conditions ($p \leq 0.05$)*

Nor was the impact of various chronic conditions the same at all ages. For example, at ages 25 to 44, only urinary incontinence and arthristis/rheumatism had a severe effect on health-related quality of life (Chart 2, Appendix Tables C and D). Among 45-to 64-year-olds, the list of conditions having a severe impact was longer: Alzheimer's disease, stroke, urinary incontinence, bowel disorders, cataracts and chronic bronchitis/emphysema. However, at these ages, the overall effect of arthritis/rheumatism was less severe than at ages 25 to 44.

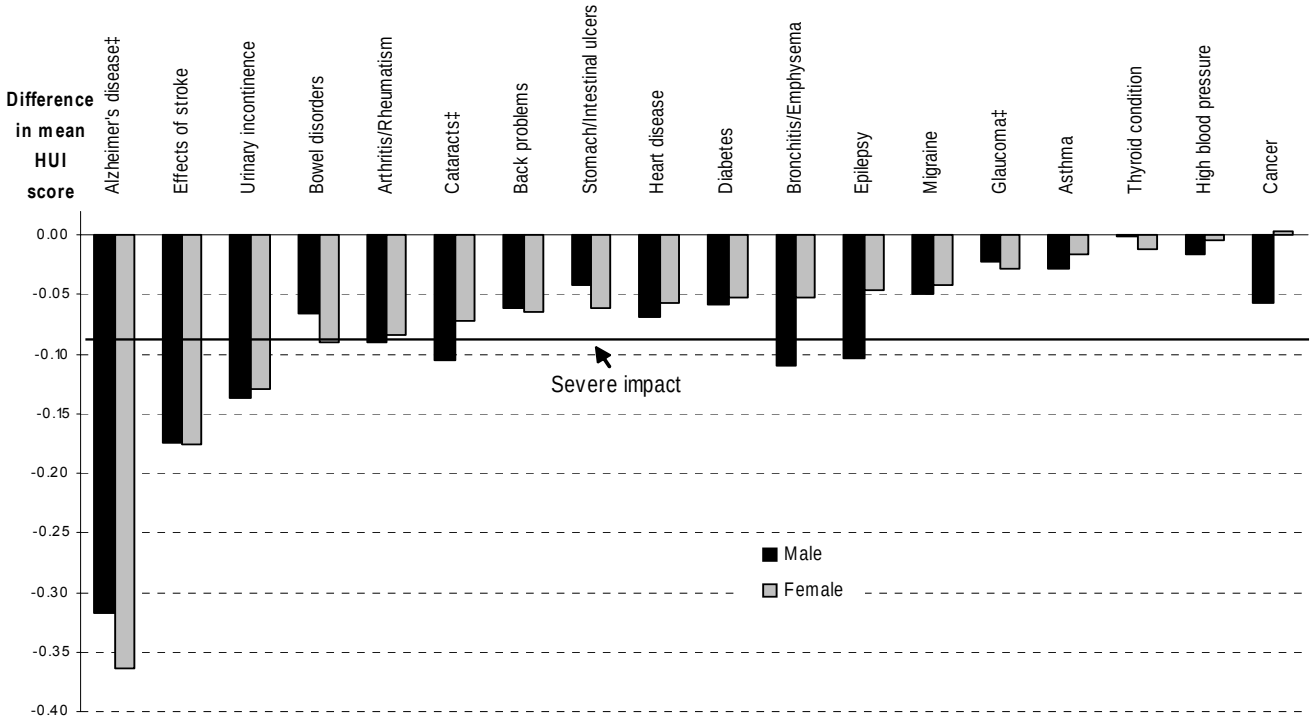
Variations in the impact of particular conditions across population groups are not always easy to explain. Some conditions, such as bowel problems or chronic bronchitis/emphysema, seem to have a great effect on older individuals' health-related quality of life. The reasons for the differential impact of the same condition across age and sex groups may be related to interaction effects that heighten or lessen the effect of specific conditions.

Assessing effects

Based on the analysis of the population as a whole and using the criteria outlined in the Methods,[6] Alzheimer's disease, urinary incontinence and the effects of stroke were classified as having a severe impact on health-related quality of life. Arthritis/rheumatism, bowel disorders, chronic bronchitis/emphysema, back problems, epilepsy, heart disease and cataracts had a moderate impact. The effect of asthma, migraine, diabetes, stomach/intestinal ulcers and glaucoma was relatively mild, while the remaining conditions were considered to have no impact.

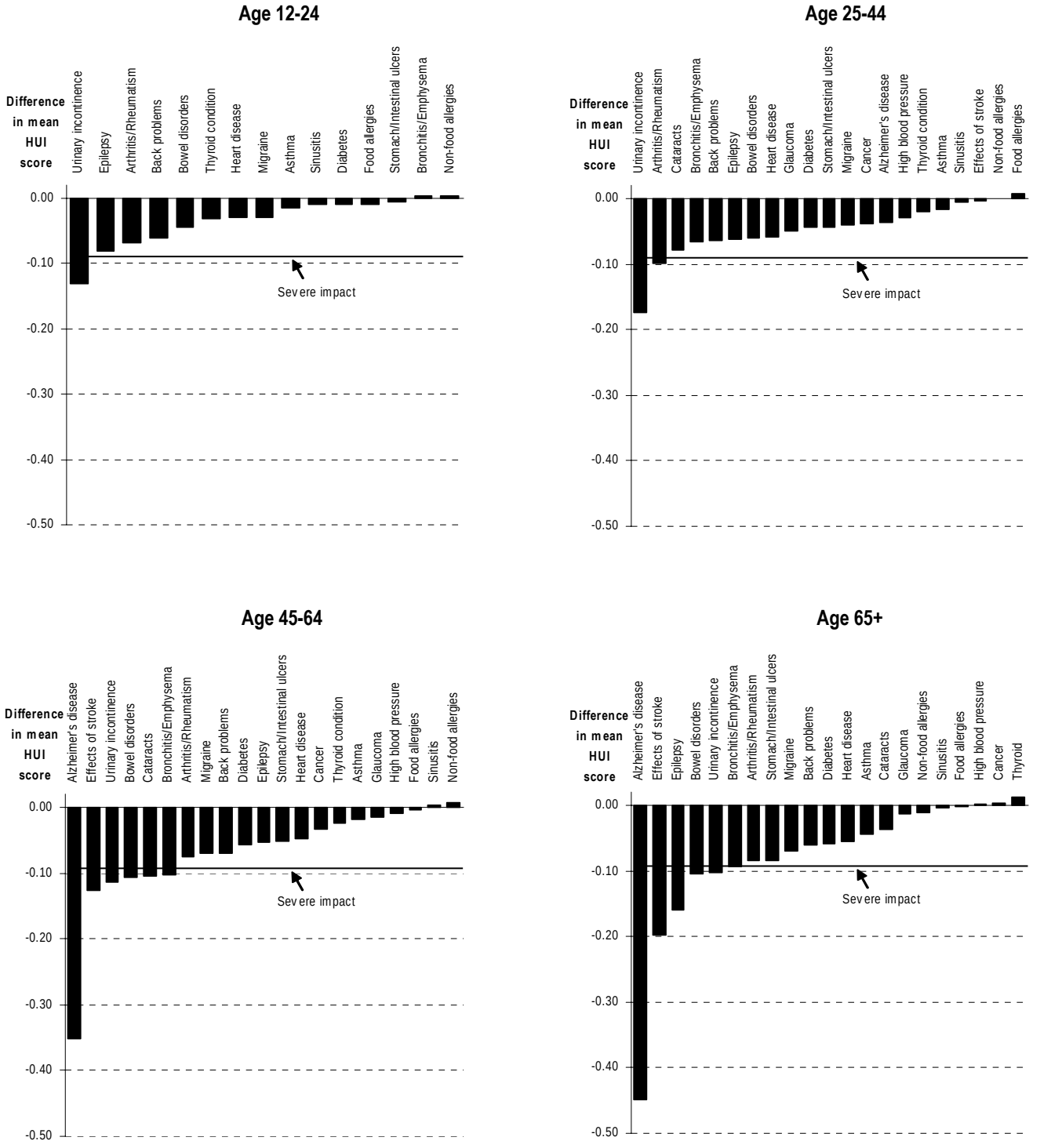
This classification of conditions makes clinical sense, even though a few results may seem surprising. For example, asthma and cancer showed relatively little impact on health-related quality of life. However, a cross-sectional study found that most people diagnosed with cancer did not have pain or limited physical or mental function. In fact, many

Chart 1
Impact† of selected chronic conditions on health-related quality of life, by sex, household population aged 12 or older, Canada excluding territories, 1996/97



Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
† Estimated as difference in mean Health Utilities Index (HUI3) score between those with and without condition, adjusted for age and all other conditions ($p \leq 0.05$).
‡ Respondents aged 12 to 19 with "not applicable" code were assigned to "no" group.

Chart 2
Impact† of selected chronic conditions on health-related quality of life, by age group, household population aged 12 or older, Canada excluding territories, 1996/97



Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
† Estimated as difference in mean Health Utilities Index (HUI3) score between those with and without condition, adjusted for age and all other conditions ($p \leq 0.05$).

may have been successfully treated. Similarly, asthma is not, in the majority of cases, associated with the attributes that comprise the HUI, such as pain, mobility problems, or decline in emotional health. The results of this analysis of NPHS data are similar to those reported in other research based on US data and adjusted for co-morbidity.[14]

A 2000 study used data from the 1990 Ontario Health Survey to look at the mean HUI3 of people with arthritis and stroke, comparing each group with a reference group that had neither condition.[23] The estimates of the impact of stroke were somewhat larger than the estimates in this analysis of NPHS data, but the estimate for arthritis was remarkably similar. To a great extent, the larger coefficient for stroke in the earlier study is due to the exclusion of people with arthritis from the reference group.

Other studies have reported absolute mean utilities for people with various conditions.[2,14] However, absolute utilities alone do not provide accurate information about the impact a condition has on health-related quality of life. For example, in this analysis, the average HUI3 score of people reporting arthritis was 0.77. It would be inappropriate to infer that the impact of arthritis is to reduce health utility by -0.23, or relative to perfect health, because most people without arthritis are not in perfect health. The adjusted coefficient for arthritis was -0.09.

In the Global Burden of Disease Study,[12] the disability weights for comparable conditions were much higher than the effects estimated in this analysis. However, the weights for that study were derived from an expert panel, using the person-trade-off technique, rather than population data. It is possible that the study participants considered

Definitions

The National Population Health Survey collected information on the following *chronic conditions*, defined as "long-term conditions that have lasted or are expected to last six months or more and that have been diagnosed by a health professional": food allergies, non-food allergies, asthma, arthritis/rheumatism, back problems excluding arthritis, high blood pressure, migraine, chronic bronchitis or emphysema, sinusitis, diabetes, epilepsy, heart disease, cancer, stomach or intestinal ulcers, effects of a stroke, urinary incontinence, bowel disorders such as Crohn's disease or colitis, Alzheimer's disease or other dementia, cataracts, glaucoma, and thyroid condition.

Although the analysis includes all respondents aged 12 or older, the questions about Alzheimer's disease, cataracts and glaucoma were not asked for those younger than 18. To ensure that all analyses included the same respondents, the responses for these three conditions for people in the 12 to14 and 15 to 19 age groups were changed from "not applicable" to "no."

Four *age groups* were established: 12 to 24, 25 to 44, 45 to 64, and 65 or older. In all analyses, age was treated as a continuous variable.

Limitations

National Population Health Survey (NPHS) data are self- or proxy-reported, and the degree to which they are inaccurate because of reporting error is unknown. Because responses were not verified by an independent source, it is not possible to know if respondents who reported a chronic condition had actually received a professional diagnosis. Some studies have suggested decreased accuracy of reporting for less severe conditions.[24] If the proportion of false positives among those reporting a given condition was large, the effect may have been diluted.

No information about the severity of chronic conditions is available from the NPHS. And, of course, the effect of chronic conditions that were not included in the NPHS could not be measured or taken into account.

The HUI3 may not be sensitive enough to capture the impact of relatively minor health problems, such as allergies.[5] The results of this analysis should not be regarded as evidence that these conditions have no effect on health-related quality of life.

The household component of the NPHS used in this analysis excludes the institutionalized population, many of whom have a much poorer health-related quality of life than do people living in the community. As well, the random-digit dialling technique, which was used for the large buy-in component, would not likely reach the sickest segment of the household population.

The reported confidence intervals should be interpreted with caution. The point estimates from linear regression may be slightly biased because of a skewed distribution of the outcome variable.[25] An alternative would have been to dichotomize the HUI3 and use logistic regression.[5,25] However, the possibility of a small bias should be outweighed by the advantage of being able to interpret the results in terms of utilities.

more severe cases or more advanced stages of disease.

Utilities have also been measured directly in patients with various clinical diagnoses. Such data are difficult to compare with the results of this analysis because the spectrum of disease in a selected group of patients probably differs from that observed in a random population sample. Furthermore, studies that measure patient utilities relative to perfect health may not accurately reflect the effect of disease in the average patient who may have other health problems.

Concluding remarks

In the past, attempts to assess the relative severity of chronic conditions focused primarily on mortality. More recently, the move has been toward summary measures of population health, such as health expectancy, which combine mortality and morbidity.[13] A limitation of this approach is that estimates of health expectancy and cause-deleted health expectancy are also heavily weighted by mortality. By focusing on health-related quality of life, this analysis of data from the National Population Health Survey provides an additional piece of the burden of disease picture.

The results may have implications for health policy, as they give some indication of the benefits that can be achieved through disease prevention and other health interventions. In this analysis, the impact of individual conditions was generally smaller than that suggested by some previous studies. Economic models for cost-benefit analyses that use utilities derived from expert panels or selected patient groups, as well as models based on unadjusted population data, may overestimate potential gains in quality of life from disease prevention programs. Furthermore, this analysis suggests that future models should take into account differences in disease impact according to age and sex. ●

Acknowledgements

The authors thank Dr. J. Ivan Williams and Dr. Vivek Goel for helpful comments during the preparation of this manuscript.

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Appendix

Table A
Distribution of selected characteristics, household population aged 12 or older, Canada excluding territories, 1996/97

	Sample size	Estimated population	
		'000	%
Total	**73,402**	**24,595**	**100.0**
Sex			
Men	34,265	12,099	49.2
Women	39,137	12,495	50.8
Age group			
12-24	12,120	5,134	20.9
25-44	28,900	9,709	39.5
45-64	19,019	6,335	25.8
65+	13,363	3,416	13.9
Number of chronic conditions			
None	28,766	10,392	42.3
One	19,110	6,598	26.8
Two+	24,997	7,479	30.4
Missing	529	125	0.5
Alzheimer's disease†			
Yes	245	67	0.3
No	73,134	24,518	99.7
Missing	23	F	F
Arthritis/Rheumatism			
Yes	13,063	3,400	13.8
No	60,274	21,175	86.1
Missing	65	F	F
Asthma			
Yes	5,467	1,778	7.2
No	67,896	22,807	92.7
Missing	39	10[E2]	0.0[E2]
Back problems			
Yes	12,097	3,483	14.2
No	61,259	21,096	85.8
Missing	46	16[E2]	0.1[E2]
Bowel disorders			
Yes	1,520	375	1.5
No	71,844	24,211	98.4
Missing	38	9[E1]	0.0[E1]
Chronic bronchitis/Emphysema			
Yes	2,429	690	2.8
No	70,933	23,895	97.2
Missing	40	10[E2]	0.0[E2]
Cancer			
Yes	1,359	368	1.5
No	72,003	24,216	98.5
Missing	40	11[E2]	0.0[E2]
Cataracts†			
Yes	2,679	659	2.7
No	70,682	23,928	97.3
Missing	41	7[E1]	0.0[E1]
Diabetes			
Yes	2,706	788	3.2
No	70,661	23,798	96.8
Missing	35	9[E1]	0.0[E1]
Effects of stroke			
Yes	868	217	0.9
No	72,505	24,371	99.1
Missing	29	6[E1]	0.0[E1]
Epilepsy			
Yes	446	158	0.6
No	72,935	24,431	99.3
Missing	21	6[E2]	0.0[E2]
Food allergies			
Yes	5,335	1,667	6.8
No	67,987	22,908	93.1
Missing	80	20	0.1
Glaucoma†			
Yes	1,013	272	1.1
No	72,343	24,312	98.9
Missing	46	10[E1]	0.0[E1]
Heart disease			
Yes	3,695	946	3.8
No	69,661	23,632	96.1
Missing	46	16[E2]	0.1[E2]
High blood pressure			
Yes	8,676	2,471	10.0
No	64,623	22,099	89.9
Missing	103	25	0.1
Migraine			
Yes	5,804	1,915	7.8
No	67,566	22,670	92.2
Missing	32	9[E2]	0.0[E2]
Non-food allergies			
Yes	16,221	5,499	22.4
No	57,104	19,078	77.6
Missing	77	17[E1]	0.1[E1]
Sinusitis			
Yes	38	1,126	4.6
No	69,576	23,460	95.4
Missing	38	9[E2]	0.0[E2]
Stomach/Intestinal ulcers			
Yes	2,245	666	2.7
No	71,093	23,911	97.2
Missing	64	17[E1]	0.1[E1]
Thyroid condition			
Yes	2,852	865	3.5
No	70,502	23,717	96.4
Missing	48	13[E2]	0.1[E2]
Urinary incontinence			
Yes	1,596	370	1.5
No	71,773	24,216	98.5
Missing	33	8[E1]	0.0[E1]

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
Note: *Because of rounding, detail may not add to totals.*
† Respondents aged 12 to 19 with "not applicable" code were assigned to "no" group.
E1 Coefficient of variation between 16.6% and 25.0%
E2 Coefficient of variation between 25.1% and 33.3%
F Coefficient of variation greater than 33.3%

Table B
Impact† of chronic conditions on health-related quality of life, by sex, household population aged 12 or older, Canada excluding territories, 1996/97

	Male		Female	
	Overall impact of condition on total study population	95% confidence interval	Overall impact of condition on total study population	95% confidence interval
Alzheimer's disease‡	-0.32*	-0.42, -0.21	-0.36*	-0.48, -0.24
Effects of stroke	-0.17*	-0.23, -0.12	-0.18*	-0.25, -0.10
Urinary incontinence	-0.14*	-0.18, -0.09	-0.13*	-0.16, -0.09
Chronic bronchitis/ Emphysema	-0.11*	-0.14, -0.07	-0.05*	-0.08, -0.03
Epilepsy	-0.10*	-0.17, -0.04	-0.05	-0.11, 0.02
Cataracts‡	-0.10*	-0.15, -0.06	-0.07*	-0.10, -0.04
Arthritis/Rheumatism	-0.09*	-0.10, -0.07	-0.08*	-0.10, -0.07
Heart disease	-0.07*	-0.09, -0.05	-0.06*	-0.08, -0.03
Bowel disorders	-0.07*	-0.11, -0.03	-0.09*	-0.12, -0.06
Back problems	-0.06*	-0.07, -0.05	-0.06*	-0.07, -0.05
Diabetes	-0.06*	-0.08, -0.03	-0.05*	-0.08, -0.03
Cancer	-0.06*	-0.10, -0.01	0.00	-0.02, 0.03
Migraine	-0.05*	-0.07, -0.03	-0.04*	-0.06, -0.03
Stomach/Intestinal ulcers	-0.04*	-0.06, -0.02	-0.06*	-0.09, -0.04
Asthma	-0.03*	-0.04, -0.01	-0.02	-0.03, 0.00
High blood pressure	-0.02	-0.03, 0.00	0.00	-0.02, 0.01
Glaucoma‡	-0.02	-0.05, 0.01	-0.03	-0.06, 0.01
Sinusitis	0.00	-0.02, 0.02	0.00	-0.02, 0.02
Thyroid condition	0.00	-0.03, 0.03	-0.01	-0.03, 0.01
Food allergies	0.01	-0.01, 0.02	0.00	-0.02, 0.01
Non-food allergies	0.01	0.00, 0.01	0.00	-0.01, 0.01
Other	-0.08*	-0.10, -0.06	-0.10*	-0.12, -0.08

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
† Estimated as difference in mean Health Utilities Index (HUI3) score between those with and without condition, adjusted for age and all other conditions.
‡ Respondents aged 12 to 19 with "not applicable" code were assigned to "no" group.
** Significantly different from those reporting no chronic condition ($p \leq 0.05$)*

Table C

Classification of chronic conditions according to impact on health-related quality of life,† by sex and age group, household population aged 12 or older, Canada excluding territories, 1996/97

				Age group			
	Total	Male	Female	12-24	25-44	45-64	65+
Alzheimer's disease‡	severe	severe	severe	...	none	severe	severe
Effects of stroke	severe	severe	severe	...	none	severe	severe
Urinary incontinence	severe	severe	severe	severe	severe	severe	severe
Arthritis/Rheumatism	severe	severe	moderate	moderate	severe	moderate	moderate
Bowel disorders	moderate	moderate	severe	none	moderate	severe	severe
Bronchitis/Emphysema	moderate	severe	mild	none	moderate	severe	severe
Back problems	moderate	moderate	moderate	moderate	moderate	moderate	moderate
Epilepsy	moderate	severe	mild	none	moderate	none	none
Cataracts‡	moderate	severe	moderate	...	none	severe	mild
Heart disease	moderate	moderate	moderate	none	none	mild	moderate
Diabetes	moderate	moderate	mild	none	none	moderate	moderate
Stomach/Intestinal ulcers	mild	mild	moderate	none	mild	mild	moderate
Migraine	mild	mild	mild	mild	mild	moderate	moderate
Glaucoma‡	mild	none	none	...	none	none	none
Cancer	none	moderate	none	none	none	none	none
Asthma	none	mild	none	none	none	none	mild
Thyroid condition	none	none	none	...	none	none	none
High blood pressure	none	none	none	...	mild	none	none
Sinusitis	none	none	none	none	none	none	none
Food allergies	none	none	none	none	none	none	none
Non-food allergies	none	none	none	none	none	none	none

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
† Health Utilities Index (HUI3) score
‡ Respondents aged 12 to 19 with "not applicable" code were assigned to "no" group.
··· Not applicable

Table D

Impact† of each chronic condition on health-related quality of life, by age group, household population aged 12 or older, Canada excluding territories, 1996/97

	Age 12-24		Age 25-44		Age 45-64		Age 65+	
	Overall impact of condition on total study population	95% confidence interval	Overall impact of condition on total study population	95% confidence interval	Overall impact of condition on total study population	95% confidence interval	Overall impact of condition on total study population	95% confidence interval
Alzheimer's disease	...	...	-0.04	-0.09, 0.02	-0.35*	-0.59, -0.11	-0.45*	-0.53, -0.37
Effects of stroke	0.00	-0.06, 0.05	-0.13*	-0.19, -0.06	-0.20*	-0.25, -0.15		
Urinary incontinence	-0.13*	-0.22, -0.04	-0.17*	-0.25, -0.10	-0.11*	-0.17, -0.06	-0.10*	-0.14, -0.07
Arthritis/Rheumatism	-0.07*	-0.11, -0.02	-0.10*	-0.12, -0.08	-0.08*	-0.09, -0.06	-0.08*	-0.10, -0.06
Bowel disorders	-0.04	-0.10, 0.01	-0.06*	-0.09, -0.03	-0.11*	-0.16, -0.05	-0.10*	-0.16, -0.05
Back problems	-0.06*	-0.08, -0.04	-0.06*	-0.08, -0.05	-0.07*	-0.08, -0.06	-0.06*	-0.08, -0.04
Epilepsy	-0.08	-0.17, 0.00	-0.06*	-0.10, -0.03	-0.05	-0.13, 0.03	-0.16	-0.32, 0.00
Cataracts	...	...	-0.08	-0.23, 0.07	-0.10*	-0.18, -0.03	-0.04*	-0.06, -0.01
Cancer	-0.01	-0.11, 0.08	-0.04	-0.09, 0.01	-0.03	-0.07, 0.01	0.00	-0.03, 0.04
Migraine	-0.03*	-0.06, -0.01	-0.04*	-0.05, -0.03	-0.07*	-0.09, -0.05	-0.07*	-0.11, -0.03
Asthma	-0.01	-0.03, 0.00	-0.02	-0.03, 0.00	-0.02	-0.04, 0.00	-0.04*	-0.08, -0.01
Stomach/Intestinal ulcers	0.00	-0.06, 0.05	-0.04*	-0.06, -0.02	-0.05*	-0.08, -0.02	-0.08*	-0.13, -0.04
Food allergies	-0.01	-0.03, 0.01	0.01	-0.01, 0.02	0.00	-0.02, 0.01	0.00	-0.04, 0.03
Non-food allergies	0.00	0.00, 0.01	0.00	-0.01, 0.01	0.01	-0.01, 0.02	-0.01	-0.04, 0.01
Heart disease	-0.03	-0.10, 0.03	-0.06	-0.12, 0.00	-0.05*	-0.07, -0.02	-0.06*	-0.08, -0.03
Diabetes	-0.01	-0.06, 0.05	-0.04	-0.10, 0.01	-0.06*	-0.08, -0.03	-0.06*	-0.09, -0.03
Chronic bronchitis/Emphysema	0.00	-0.03, 0.04	-0.07*	-0.10, -0.03	-0.10*	-0.14, -0.06	-0.09*	-0.13, -0.05
Sinusitis	-0.02	-0.05, 0.02	-0.01	-0.02, 0.01	0.00	-0.02, 0.02	0.00	-0.04, 0.03
Thyroid condition	...	...	-0.02	-0.05, 0.01	-0.02	-0.05, 0.00	0.01	-0.01, 0.04
Glaucoma	...	...	-0.05	-0.13, 0.03	-0.01	-0.05, 0.02	-0.01	-0.04, 0.02
High blood pressure	...	...	-0.03*	-0.05, -0.01	-0.01	-0.02, 0.00	0.00	-0.02, 0.02
Other	-0.10*	-0.15, -0.06	-0.08*	-0.10, -0.06	-0.11*	-0.14, -0.08	-0.08*	-0.11, -0.05

Data source: *1996/97 National Population Health Survey, cross-sectional sample, Health file*
† Estimated as difference in mean Health Utilities Index (HUI3) score between those with and without condition, adjusted for sex and all other conditions.
** Significantly different from those reporting no chronic condition ($p \leq 0.05$)*
··· Not applicable