

FUNCTIONAL LIMITATIONS AND ACTIVITY RESTRICTIONS AMONG NON-INSTITUTIONALIZED CANADIAN SENIORS

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ABSTRACT

Population-based surveys conducted in the mid-1980's show that, of several socio-economic variables examined, low income is the best predictor of functional impairment among non-institutionalized Canadians aged 55 and over. Using comparable data from the National Population Health Survey of 1994-95, we have updated estimates of the prevalence of chronic diseases, functional limitations and activity restrictions in Canadian seniors. Among persons aged 55 and over, who now account for about one-fifth of the Canadian population, 83% of men and 87% of women reported having at least one chronic disease. Of functional limitations studied, limitations in mobility were most common, followed by limitations in vision and hearing. In addition to socio-economic variables found to be associated with functional limitations, including age, marital status and income adequacy, we have also studied the effects of health-related behaviours, including physical activity, alcohol use and smoking, as well as the presence of various chronic diseases. Although most chronic diseases have little discernible effect on functional ability, the presence of late effects of stroke, epilepsy and arthritis is strongly related to limitations in mobility. Restrictions in performing activities of daily living are related to numerous health-related factors and chronic diseases, including epilepsy, effects of stroke, urinary incontinence, back problems, heart disease, arthritis, being underweight and chronic respiratory disease.

KEY WORDS: Activity restrictions; Functional limitations; National Population Health Survey; Seniors.

RÉSUMÉ

Des enquêtes sur la population faites au milieu des années 80 montrent que parmi plusieurs variables socio-économiques considérées, le faible revenu est le meilleur prédicteur de l'infirmité chez les Canadiens âgés de 55 ans et plus, et vivant hors institution. En utilisant des données comparables obtenues de l'Enquête nationale sur la santé de la population de 1994-95, nous avons mis à jour les estimations de la prévalence de maladies chroniques, de limitations physiques et de limitations d'activités chez les Canadiens aînés. Parmi les personnes âgées de 55 ans et plus, qui forment maintenant un cinquième de la population canadienne, 83% des hommes et 87% des femmes ont indiqué qu'ils ont été victimes d'au moins une maladie chronique. Des limitations physiques étudiées, les limitations de la mobilité étaient les plus fréquentes, suivies des limitations de la vision et de l'ouïe. En plus des variables socio-économiques reliées aux limitations physiques, incluant l'âge, la situation de famille et l'insuffisance du revenu, nous avons aussi étudié les effets de comportements reliés à la santé, incluant l'activité physique, la consommation d'alcool et l'usage du tabac, ainsi que la présence de diverses maladies chroniques. Bien que la plupart des maladies chroniques ont un effet peu discernable sur les capacités fonctionnelles, la présence des séquelles des maladies cérébro-vasculaires, d'épilepsie et d'arthrite est fortement reliée aux limitations de mobilité. Une capacité restreinte face aux activités de la vie quotidienne est cependant reliée à plusieurs facteurs de santé et de maladies chroniques, incluant: l'épilepsie, les séquelles des maladies cérébro-vasculaires, l'incontinence urinaire, les maux de dos, les maladies cardiaques, l'arthrite, un poids inférieur à la normale et la maladie respiratoire chronique.

MOTS CLÉS: Limitations d'activités; limitations physiques; Enquête nationale sur la santé de la population; aînés.

1. INTRODUCTION

As the number of people aged 65 and over in the Canadian population increases (in 1995, there were an estimated 3.6 million persons aged 65 and over; by 2016, they will number between 5.6 and 6.3 million

(Statistics Canada, 1995)), so does the prevalence of chronic diseases such as heart disease, arthritis and diabetes. From 1978 to 1994-95, the percentage of the population reporting the presence of chronic disease rose substantially, reflecting, in part, the growth of the elderly population (Statistics Canada, 1994).

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However, information about the prevalence of chronic disease alone is of limited use in assessing the health of the population. Some diseases have little associated morbidity, while others entail a great deal of illness and debility. Taking into account the functional limitations and activity restrictions associated with chronic diseases provides a truer picture of the burden that these long-term conditions impose on the population's health.

This paper describes the relationship between chronic diseases, and functional limitations and activity restrictions in the non-institutionalized Canadian population aged 55 and over, using data from the National Population Health Survey (NPHS). The effects of health-related factors, including sex, age, and other demographic and socio-economic characteristics, as well as selected health-related behaviour are also examined.

2. DATA AND METHODS

The data are from the household component of the first cycle of the NPHS, conducted from June 1994 through June 1995. A detailed description of the NPHS methodology was provided in a previous article (Tambay and Catlin, 1995). Briefly, from a sample of 27,000 households, interviewers collected information about health status, health care utilization, and socio-economic and demographic characteristics. Weighted estimates generalizable to the household population of Canada were produced. Generally in each household, a knowledgeable household member reported information on activity restrictions and presence of chronic conditions for every household member. Information on height and weight, smoking and drinking habits, and functional limitations was collected from a randomly selected household member by non-proxy interview.

The survey response rate (the proportion of selected households in which agreement to participate was obtained, including households later rejected for sampling reasons (Tambay and Catlin, 1995)) was 88%. Within participating households, the response rate for individuals aged 55 and over (the proportion of sampled persons this age who agreed to participate in the survey) was 97%.

A total of 2,117 men and 2,976 women aged 55 and over were surveyed in the NPHS, representing the

non-institutionalized Canadian population² of 2.6 million men and 3.2 million women in this age group. The data were weighted to reflect the age and sex distribution of the population; 41% of women and 45% of men were aged 55-64, 36% of both sexes were aged 65-74, and 23% of women compared to 19% of men were aged 75 and over. Just under 80% of men aged 55 and over were married or lived with a partner, compared with 57% of women.

Independent variables in the multiple logistic regressions included age, chronic diseases, general health, body mass index (BMI) (weight in kilograms divided by height in metres), tobacco and alcohol use, education, household income adequacy and level of recreational physical activity participation. The dependent variables were functional limitations in vision, hearing, speech, mobility and dexterity and restrictions in performing activities of daily living (ADL). Restrictions in ADLs were measured in terms of the respondent's reported need for assistance with personal care and with instrumental ADL (preparing meals, shopping, housework).

People were categorized as having a *chronic disease* when they answered "yes" to the question, "Do(es) . . . have any of the following long-term conditions that have been diagnosed by a health professional?" A list of 20 conditions (see Appendix) was read to the respondent, who was instructed to identify as many as were applicable. "Long-term conditions" are those that have lasted, or are expected to last, six months or more.

Information on *functional limitations* was collected through a series of questions about the respondent's "usual abilities" related to vision, hearing, speech, mobility, and dexterity. For this analysis, the following criteria were used to categorize respondents as having functional limitations:

1. Visually-impaired: Unable (even with corrective lenses) to read newsprint or to recognize someone at a distance, or unable to see at all.
2. Hearing-impaired: Difficulty (even with a hearing aid) hearing what is said in conversation with one other person, or with a group of at least three other people, or unable to hear at all.
3. Speech-impaired: Unable to be fully understood in mother tongue.
4. Mobility-impaired: Needs mechanical aids (such as braces, a cane, crutches or a wheelchair) to get

² Data from the Northwest Territories and Yukon were not available.

around the neighbourhood (either with or without the help of another person), or unable to walk at all.

5. Dexterity-impaired (hands and fingers): Needs the help of another person or assistive devices because of limitations in the use of hands or fingers. People who did not require such help were categorized as not dexterity-impaired, even if they reported problems in grasping and holding small objects such as a pencil and scissors.

NPHS data on *activity restrictions* in performing activities of daily living (ADL) were obtained through questions asking whether, as the result of "any condition or health problem," the respondent needs help in meal preparation, shopping for necessities, everyday housework, heavy household chores, personal care (washing, dressing, eating), and moving about inside the house. Respondents who reported needing assistance with any of these tasks were categorized as having an activity restriction.

Data pertaining to demographic and socio-economic characteristics and other health-related information were collected through questions about living arrangements (lives with a spouse or partner, or not), height and weight, use of tobacco and alcohol, recreational physical activity participation, household income and educational attainment. A global self-rating of general health was ascertained by the question, "In general, would you say your health is: Excellent? Very good? Good? Fair? Poor?"

Income was dichotomized as adequate or inadequate according to the number of people in the household. According to the NPHS data, 21% of the household population aged 55 and over had less than adequate income; income data were missing for 6%. A higher percentage of women (27%) than men (17%) were living in households with inadequate income.

For recreational physical activity level and for income, data were missing for 228 (4%) and 271 (5%), respectively, of the 5,093 respondents aged 55 and over. So that the rest of the data from these respondents would be included in the full multivariate models, a "not available" category for the physical activity and income variables was created.

Because of the relatively low prevalence of limitations in dexterity and in speaking, regression analyses were restricted to limitations in vision, hearing, and mobility. To adjust for the design effects of the NPHS, as well as for analytic purposes, variables describing geographic region of residence, age and sex were included in the regressions.

3. RESULTS

Of non-institutionalized persons aged 55 and over, 83% of men and 87% of women reported having at least one chronic disease condition. Arthritis was the most frequently reported condition, affecting 28% of men and 40% of women. The prevalence of arthritis increased directly with age, as did most other conditions. By contrast, among men, non-arthritic back problems showed an inverse association with age. This decline with age of back problems, which often arise from occupational strain or injury, probably reflects men's exit from the labour force. Among both men and women, non-food allergies were less prevalent at older ages. Epilepsy, with a prevalence of less than 1% in all age groups studied, showed no particular relationship with age.

Relatively few non-institutionalized people aged 55 and over (15% of men and 18% of women) were affected by at least one functional limitation in 1994-95. For both sexes, however, the prevalence of limitations increased with age. At ages 55 to 64, 10% of men and 9% of women reported at least one limitation. By age 75 and over, 29% of men and 38% of women had at least one limitation. The higher prevalence of limitations among older women partially reflects the age profiles of the male and female populations in this age range.

The most prevalent limitations concerned mobility: 6% of men and 9% of women aged 55 and over reported such an impairment. Again, there was generally a strong association between age and the prevalence of specific functional limitations. For example, 24% of women aged 75 and over reported mobility limitations, compared with 3% of those aged 55 to 64.

Pronounced differences between the sexes emerged for limitations in mobility, vision and hearing. Higher proportions of women than men reported limited mobility and vision. However, more men than women reported limitations in hearing, perhaps another reflection of occupationally related exposure.

In 1994-95, 15% of men and 26% of women aged 55 and over needed assistance with activities of daily living. For tasks that may more directly affect the likelihood of a person being able to remain living at home, *i.e.*, personal care and moving about inside the house, the differences between the sexes were quite small. However, pronounced differences between the sexes occurred for tasks related to household management. In particular, 10% of women, compared with 5% of men, reported needing help with shopping

for necessities; 12% of women but only 6% of men needed help with everyday housework; and 24% of women versus 14% of men, needed help with heavy housework. In these areas, women's greater reported need for help was consistent over the age groups.

For both sexes, activity restrictions increase markedly with age: at age 75 and over, 51% of women and 30% of men were affected by at least one restriction. Among men, the percentage reporting activity restrictions corresponded closely to the percentage affected by at least one functional limitation. But among women, the percentage with a restriction considerably exceeded the percentage with at least one functional limitation: 26% versus 18%. Moreover, this discrepancy increased with age.

The prevalence of restrictions was higher among both men and women with inadequate incomes than among those whose incomes were adequate (26% versus 13% for men; 35% versus 23% for women). Activity restrictions were also more common among people with less than high school education than among those with more education.

Logistic regression was used to estimate odds ratios for variables associated with each functional limitation individually (*i.e.*, vision, hearing and mobility), with the presence of at least one functional limitation, and with the presence of activity restrictions. Variables that were significantly ($p \leq .05$) associated with limitations in vision included: advanced age (75 years and over, compared to ages 55 to 64), being underweight, diabetes and cataract (Table 1). Variables associated with limitations in hearing included old age (both ages 65 to 74 and 75+, compared to ages 55 to 64), poor perceived health, being physically inactive, non-arthritic back problems, chronic bronchitis or emphysema, and effects of stroke. Note that female sex was protective for this outcome. For mobility limitations, significantly associated variables included older age (age groups 65 to 74 and 75+, compared with age 55 to 64), poor perceived health, being physically inactive, arthritis or rheumatism, epilepsy, effects of stroke, and urinary incontinence. Abstinence from drinking alcohol was significantly associated with limitations in mobility, in comparison with regular use (at least one drink per week). However, it is reasonable to expect that the likelihood of abstinence may be greater among people who have health problems. This may partially account for the apparently protective effect of regular drinking.

Having at least one functional limitation (including dexterity or speech) was associated with advanced age (both ages 65 to 74 and 75+, relative to ages 55 to 64),

poor perceived health, being physically inactive, being underweight, smoking, arthritis or rheumatism, back problems, effects of stroke, and urinary incontinence.

The variable, 'physical activity level unavailable', was significantly related to all four functional outcomes (vision, hearing, mobility and at least one functional limitation). This suggests that persons for whom information regarding physical activity level was withheld were more frequently affected by functional limitations and other health problems than were other persons, even those whose reported activity level was low.

Numerous variables were associated with activity restrictions. Advanced age (65 to 74, and 75 and over, compared with 55 to 64) was highly predictive, as were female sex, poor perceived health, low level of physical activity, inadequate income, and low BMI. Chronic diseases that were associated with activity restrictions included allergies, asthma, arthritis or rheumatism, back problems, chronic bronchitis or emphysema, epilepsy, heart disease, effects of stroke, and urinary incontinence.

4. DISCUSSION

The most prevalent chronic diseases in the non-institutionalized population aged 55 and over are arthritis and rheumatism, followed by hypertension and back problems. The findings regarding musculoskeletal conditions, *i.e.*, back problems, and arthritis and rheumatism, are consistent with previous studies (Minister of Supply and Services Canada, 1981).

As expected, age, self-reported general health and physical inactivity contribute substantially to functional limitation and activity restriction. Low BMI is also related to functional limitation, to a smaller extent. As has been observed in the U.S. (Jette and Branch, 1985; Guccione *et al.*, 1994; Hubert *et al.*, 1993), musculoskeletal conditions are significantly associated with limitations in mobility and with activity restrictions. However, the odds ratios for other conditions, including epilepsy, effects of stroke and urinary incontinence, are generally even higher than those for musculoskeletal conditions. These results indicate that persons with these conditions are more severely affected by activity restrictions and problems with mobility than persons who have only arthritis and rheumatism. Because musculoskeletal problems are far more common, however, they account for more of the physical dysfunction and disability experienced by the non-institutionalized populations of Canada and the

U.S. (Guccione *et al.*, 1994).

The relatively higher prevalence of limitations in mobility, compared to other areas of function, corroborates the results of earlier Canadian studies (Statistics Canada, 1994; Reynolds *et al.*, 1992). As well, the inverse relationship between socioeconomic status and mobility limitations and activity restrictions has been noted in earlier Canadian (Statistics Canada, 1994; Reynolds *et al.*, 1992) and US studies of seniors (Guralnik *et al.*, 1993; Hubert *et al.*, 1993; Guralnik and Kaplan, 1989; Ettinger *et al.*, 1994; Lafata *et al.*, 1994; Berkman *et al.*, 1993).

The large sample size of the NPHS and the sampling methods employed are features that enhance the external validity of the estimates produced. The study is limited by the nature of the data collected to date, which are cross-sectional and thus do not establish cause and effect. For example, it is not possible to distinguish cause and effect in the strong relationship that emerges between physical inactivity and limitations in mobility (although data collected longitudinally in the U.S. show that low levels of recreational activity are predictive of later disability (Hubert, 1993)).

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Table 1. Odds ratios relating socio-demographic and behavioural characteristics and chronic diseases to functional limitations and activity restrictions

		Vision	Hearing	Mobility	≥ limitation	Activity restrictions
Age	55-64	1.00	1.00	1.00	1.00	1.00
	65-74	1.22	1.67**	2.06**	1.58*	1.62**
	75 +	2.60**	3.60	5.42**	3.62*	4.24**
Sex	Men	1.00	1.00	1.00	1.00	1.00
	Women	1.27	0.62**	0.91	0.88	1.85**
Living Arrangements	With partner	1.00	1.00	1.00	1.00	1.00
	Alone	1.17	0.77	1.26	1.03	1.18
General health	Excellent, very good, or good	1.00	1.00	1.00	1.00	1.00
	Fair or Poor	1.29	1.34*	2.89**	2.05**	3.02**
Physical activity	Active	1.00	1.00	1.00	1.00	1.00
	Moderate	1.18	1.57	1.22	1.35	1.21
	Inactive	1.19	1.55*	3.00**	1.72**	1.84**
	Missing	2.00*	3.14**	5.26**	3.89**	1.52
Income	Adequate	1.00	1.00	1.00	1.00	1.00
	Inadequate	1.05	1.15	1.23	1.18	1.26*
	Not available	1.55	0.60	1.43	1.14	0.94
Body mass index	Appropriate ¹	1.00	1.00	1.00	1.00	1.00
	Underweight	1.64*	1.07	1.42	1.40*	1.53**
	Overweight ¹	0.95	0.96	1.26	1.13	0.90
Alcohol use	At least 1 drink per week	1.00	1.00	1.00	1.00	1.00
	Less than 1 drink per week	1.05	0.85	1.18		0.94
	None	1.39	0.91	1.53**		1.08
Smoking	Non-smoker	1.00	1.00	1.00	1.00	1.00
	Former/ occasional smoker	0.95	0.77	0.89	0.94	1.11
	Current smoker	1.29	1.06	1.23	1.29*	1.25
Chronic disease	Allergies (except food allergy)	1.12	1.23	0.85	1.11	1.32*
	Asthma	1.20	0.75	0.75	0.94	1.55**
	Arthritis or rheumatism	1.14	1.17	2.33**	1.54**	1.99**
	Back problems excl. arthritis	1.08	1.39*	1.19	1.24*	2.13**
	High blood pressure	0.85	1.06	0.83	0.89	1.18
	Migraine headaches	1.34	0.72	1.45	1.16	0.86
	Chronic	0.77	1.68*	0.93	1.17	1.62**
	Diabetes	1.47*	1.21	1.20	1.08	1.12
	Epilepsy	1.16	0.62	3.26*	1.72	3.56**
	Heart disease	1.16	1.13	1.25	1.07	2.22**
	Cancer	1.19	0.75	0.94	0.93	1.39
	Stomach or intestinal ulcers	1.22	1.21	0.80	1.05	1.12
	Effects of stroke	1.21	2.22**	3.59**	3.62**	4.02**
	Urinary incontinence	1.11	1.15	2.20**	1.59*	2.56**
	Alz. disease or other dementia	1.42	0.59	0.98	1.23	1.85
	Cataracts	2.08**	1.25	1.18	1.49**	1.17
Glaucoma	1.51	0.68	0.97	1.08	1.18	

* : $p \leq 0.05$ ** : $p \leq 0.01$ ¹Range definitions: appropriate = 20-27; underweight = less than 20; overweight = 27 and over

APPENDIX

Chronic conditions

Do(es) . . . have any of the following long-term conditions (long-term conditions refer to conditions that have lasted or are expected to last 6 months or more) that have been diagnosed by a health professional:

1. food allergies
2. other allergies
3. asthma
4. arthritis or rheumatism
5. back problems excluding arthritis
6. high blood pressure
7. migraine headaches
8. chronic bronchitis or emphysema
9. sinusitis
10. diabetes
11. epilepsy
12. heart disease
13. cancer
14. stomach or intestinal ulcers
15. effects of stroke
16. urinary incontinence
17. acne requiring prescription medication
18. Alzheimer's disease
19. cataracts
20. glaucoma