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Describing Disability among High and Low Income Status

Older Adults in Canada

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ABSTRACT

The purpose of this study was to determine the prevalence, types, and severity of disabilities, as well as the medical conditions that may have caused disabilities among non-institutionalized older adults by high and low income. Disabled individuals aged 55 years and older were identified from the 1986 and 1991 Health and Activity Limitation Surveys. The overall unweighted sample sizes for each survey were 132,337 in 1986 and 91,355 in 1991. Approximately 40% of senior men and women reported having at least one disability, with women just slightly more likely than men to report being disabled. Almost twice as many senior women had low income compared with senior men. Mobility and agility disabilities were the most common types of disabilities reported by older adults. Arthritis/rheumatism was the medical condition most often reported as the primary cause of a disability among women.

Men

most often reported diseases of the ear and mastoid processes, with differences reported by

low

and high income respondents. Among 55-64 year olds, low income respondents were generally less likely to be categorized as mildly disabled and more likely to be categorized as severely disabled compared with high income respondents. In an effort to postpone or prevent disabilities in an ever-growing older population, public health initiatives are required to educate older adults about medical conditions and impairments that often lead to disability, particularly among low income seniors.

INTRODUCTION

By the year 2031, the population of seniors is projected to increase from the current 3.8 million to 8.3 million (Statistics Canada, 1994a; Norland, 1994). This represents an increase from 12% to 22% of Canada's senior population in the next three decades. The changing age structure of the population brings with it a host of challenges and opportunities to individuals and to the health care system. One of the most important of these challenges facing seniors is maintaining their independence and quality of life when many of them may be experiencing a decline in health and a reduction in their financial resources.

There is no question that increasing age is associated with worsening health among the older adult population. In one of many cross-sectional and longitudinal studies in the literature, Strawbridge and colleagues (1992) found that, over a six year period, seniors aged 65 years and older from Alameda County, California experienced increased mobility impairment and increased dependence on others to carry out activities required for daily living. These changes were most dramatic for those aged 80 and older. Studies performed in Canada have also shown decreases in health and functional abilities among seniors. For example, results from two nation wide health surveys of the 1986 and 1991 Health and Activity Limitation Surveys revealed that a greater prevalence of mobility, agility, hearing, seeing, and speaking disabilities in seniors 65 years and older compared with 55-64 year olds (Raina, Dukeshire, Lindsay et al., 1997).

Studies have also closely examined the relationship that economic status has on the health of older individuals. This area of research is important among the seniors population particularly since financial resources tend to decrease when they retire and leave the

workforce, or lose a spouse (Clark, 1998). The effects of fewer financial resources may negatively impact seniors' health while at the same time, lessen their ability to acquire the health care that they need. This has been demonstrated in large population-based. House, Lepkowski, Kinney, et al. (1994) examined social stratification of aging and health using the Americans' Changing Lives (ACL) survey, a two and a half year longitudinal survey of 2,867 respondents conducted in 1986 and 1989. In general, they found that socioeconomic status, measured by education and income, impacted health across all age levels, with individuals at a lower socioeconomic status more likely to experience chronic disease and functional impairment. Further, over the two and a half year period, among respondents who were in good health at the beginning of the survey, those with lower levels of income were more likely to experience subsequent declines in health and functional status. The survey also revealed that lower socioeconomic status respondents were the most likely to experience psychosocial health risk factors such as drinking and less social support, and the authors demonstrated that the effects of socioeconomic status may be mediated by these psychosocial risk factors.

Among Canadian studies, Forbes, Hayward, and Agwani (1991), using the 1986 Health and Activity Limitation Survey and 1985 General Social Survey, demonstrated that low income Canadians 55 years and older were more likely than high income individuals to report being disabled after adjusting for marital status, tenure of housing, and household size. Cairney and Arnold (1996), also found that of three social class variables examined (income adequacy, education, and occupation) income adequacy (based on household income and household size) was the strongest predictor of seniors' (65 years and older) health status, and was a significant predictor of three (heart disease, respiratory disease, and

sleeping problems) of five health status indicators examined. There was no relationship between income and two other two health status indicators (high blood pressure and arthritis).

These studies, therefore, consistently indicate that lower economic status is generally associated with poorer health among seniors. Further, longitudinal studies suggest that a temporal link exist between economic status and health such that low economic status results in worsening health. If true, these findings are of some concern when considering the health of seniors, given that most seniors have retired from the workforce, and therefore, likely experience a decrease in income from their salary to a pension or some form of government assistance. In Canada, however, relatively little research has been conducted on the relationship between economic status and health in the elderly population (Cairney & Arnold, 1996). Clearly, a reasonable response to prevent or delay the onset of disability is to devise and implement appropriate strategies that target older adults. The first step is to delineate the factors associated with the development of disabilities. Therefore, the purpose of this study was to determine the types and prevalence of disabilities among non-institutionalized older adults by high and low income. As well, the study describes the severity of disabilities and the medical conditions that may have caused disabilities reported by older adults in Canada.

METHODS

SURVEY DESIGN

Both the 1986 and 1991 Health and Activity Limitation Surveys were cross-sectional surveys designed to gather information on disabilities experienced by Canadians and the impact these disabilities had on their daily living. HALS defined a disability as “any restriction or lack

(resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being” and that the restriction or lack of ability to perform an activity had lasted or was expected to last six months or more (Statistics Canada, 1989, 1995). However, people who used a technical aid to completely remove the restriction were not considered disabled (e.g., using corrective lenses to eliminate vision restrictions). For both surveys, a nationally representative sample of disabled Canadians 15 years and older was selected based on the 1986 or 1991 Canadian Census. In 1986, both institutionalized and noninstitutionalized Canadians were included in the survey, whereas, in 1991, only non-institutionalized Canadians were included. To facilitate comparability between the two surveys, for the purposes of this report, only data from the non-institutionalized samples were considered.

The survey was conducted in two stages. The first stage consisted of determining whether individuals from the 1986 and 1991 Canadian Census Long Form (completed by every fifth household) indicated that they were limited in the kind and amount of activity they did at home, work or school because of a long-term physical condition. A list of all people (with the exception of those in penal institutions and correctional facilities) 15 years old and older who indicated on the Census Long Form that they had a physical or mental disability was identified. From this list, the second stage involved using a stratified sampling procedure to select the disabled sample with two major strata formed, Indian reserves and all other areas. All Indian reserves were included in the survey and a sample of the remaining areas were selected.

The results of a small field test showed that many people with a mild disability and some individuals aged 65 years and older (herein, seniors) did not indicate that they were disabled on the Census Long Form. As a result, a sample of individuals 15 years and of age and older who reported that they were not disabled on the Census Long Form was also selected. Among those

originally selected for the nondisabled sample, approximately 5% were subsequently classified as disabled by HALS, and became part of the disabled sample (Statistics Canada, 1989, 1995).

SURVEY SAMPLE

The disabled sample for the Health and Activity Limitation Surveys consisted of individuals who identified themselves on the Census Long Form as having either a physical or mental disability or who originally indicated on the Census Long Form that they were nondisabled, but were subsequently classified as disabled when they completed the HALS. The nondisabled sample included Canadians who indicated on the Census Long Form that they did not have a physical or mental disability and were also classified as nondisabled based on their responses to the HALS. The total response rates for the two surveys were 90% in 1986 and 92% in 1991. The overall unweighted sample sizes for each survey were 132,337 and 91,355 in 1986 and 1991, respectively. Sample sizes for the age groups used in this report (55-64 years and 65 years and older) are presented in Table 1.

SURVEY INSTRUMENT

Canadians who indicated on the Census Long Form that they had a disability completed the HALS through a face-to-face interview. For people unable to complete the interview themselves, usually due to their having a high level of disability, the interview was completed by proxy (approximately 12% of all cases). Canadians who indicated on the Census Long Form that they did not have disability completed the HALS through a shorter telephone interview.

Both the 1986 and 1991 HALS had similar formats and asked similar questions. All respondents completed Section A of the surveys. The first part of Section A included an Activities of Daily Living Scale designed to assess whether respondents had any of 17 physical restrictions (Table 2). Other items (not shown in Table 2) assessed respondents' level of cognitive functioning. Respondents who indicated that they had at least one ADL restriction or a cognitive limitation were classified as disabled. For each ADL restriction respondents indicated they had, they were also asked to indicate what medical condition was the primary cause of the restriction, the cause of the medical condition, the duration of the restriction, and assistance devices used to overcome their restrictions. Only respondents who were classified by HALS as disabled completed the second part of the survey which assessed the impact of their disability(ies) in areas of daily living such as assistance required for instrumental activities of daily living (e.g., help with housework), disability-related sources of income and expenses, and emotional well-being. Further, through a computer link with the Canadian census, additional demographic and household information, such as level of income, marital status, and household size, was available for all respondents in both the 1986 and 1991 HALS.

VARIABLES USED IN THE ANALYSES

Demographic Variables

Demographic variables used in the analyses that were available through a computer link with the 1986 and 1991 Canadian Census included age (55-64 years and 65 years and older), sex, marital status, degree of urbanization, type of dwelling (single versus other), tenure of dwelling (owned versus rented), household size, region of Canada, and total

household income. Throughout the report, only two age groupings were used, 55-64 years and 65 years and older. Because of the relatively small unweighted sample size for the 1991 HALS, finer age groupings were not provided for this survey.

Income status in this study was based on Statistics Canada's (1994b) "low income cut-offs", an indicator which identifies families who have a low household income status predicated upon their ability to buy basic necessities. The low income cut-off is the most commonly accepted measure of poverty in Canada (Ross, Shillington, and Lochead, 1996). Using a nationally accepted definition of low income makes comparisons to other studies using the same definition easier and also provides a definition of low income familiar to policy makers, something which may facilitate policy decisions made on the basis of these analyses.

Disability Status

HALS classified respondents who indicated on Section A of HALS that they had at least one restriction in activities of daily living or a cognitive limitation as disabled. Those who reported no restrictions in activities of daily living and no cognitive limitations were classified as nondisabled. HALS then further categorized disabled respondents according to the type of physical disability(ies) they had. Based on their responses to the 17 ADL items in Section A, respondents were classified by whether or not they had seeing, hearing, speaking, mobility, and agility disabilities (see Table 2 for a breakdown of the ADLs used to categorize respondents according to type of disability).

Severity of Disability

The degree of severity of a respondent's disability(ies) was measured by HALS using a severity index developed by McDowell (1988). The severity index was based on both the number of and degree to which disabled respondents experienced restrictions in their activities of daily living. The severity index ranged from 1 to 43, with higher scores indicating greater severity. Based on the severity index, HALS classified respondents as mildly (scores 1-4), moderately (scores 5-10), or severely (scores 11-43) disabled.

Medical Conditions Reported as Causing Disabilities

For each ADL restriction a respondent reported, s/he was asked in an open-ended format what medical condition was the primary cause of the restriction. For both the 1986 and 1991 HALS, the medical conditions reported were subsequently coded according to the classifications provided by the International Coding of Diseases (ICD), Ninth Revision (WHO, 1977, 1978) and the Musculo-Skeletal Codes list developed by Statistics Canada (1989, 1995). Each medical condition reported by respondents as the cause of an ADL restriction was assigned an ICD-9 or Musculo-Skeletal code that corresponded to the medical condition.

The ICD-9 and Musculo-Skeletal codes reported in the 1986 and 1991 HALS differed in two ways. First, the 1986 HALS used a finer level of coding than the 1991 HALS. For example, all disabled respondents who reported disorders of the eye and adnexa were assigned the ICD-9 code of 036 in the 1991 HALS. However, for the 1986 HALS, the code for disorders of the eye and adnexa was further subdivided into seven categories, each one indicating a more specific disorder of the eye and adnexa.

To facilitate comparisons between the two surveys, the disease codes in the 1986 HALS were collapsed to reflect the same level of categorization used in the 1991 HALS (for example, the seven subcategories for diseases of the eye and adnexa in the 1986 HALS were collapsed into a single category). The second difference between the coding of medical conditions used in the two surveys was that the 1991 HALS provided all the disease codes reported for each ADL restriction, whereas the 1986 HALS only provided the most commonly reported codes. To facilitate comparison between the two surveys, only codes provided in both surveys were reported (see Table 5 for a list of medical conditions and corresponding disease codes used in the analyses of this report).

For the number of medical conditions reported as causing disabilities, a comorbidity status was determined by deriving a variable based on the fifteen ICD-9 and Musculo-Skeletal codes provided in both surveys (see Table 4). Respondents were categorized according to whether they reported having none of the fifteen medical conditions, one medical condition, two medical conditions, or more than two medical conditions.

STATISTICAL ANALYSES

Population Characteristics

Descriptive statistics were generated breaking down the sample's characteristics by income status (high versus low income) for both the 1986 and 1991 HALS. Logistic regression analyses were also conducted for each population characteristic to indicate the odds and 95% confidence intervals for being classified as low income.

Types of Physical Disabilities

The prevalence of overall disability and each of the five types of physical disabilities assessed by HALS was generated by sex, age, and income status. Logistic regression analyses were conducted comparing the odds of low income respondents being disabled to high income respondents. Both unadjusted odds ratios and odds ratios adjusted for marital status, tenure of dwelling, and region of Canada were generated.

Severity of Disability

The severity of disability for disabled respondents was reported by sex, age, and income status for both the 1986 and 1991 HALS. Chi-square analyses were conducted by age and sex to determine any differences in the severity of disability between high and low income disabled respondents.

Medical Conditions Reported as the Primary Causes of Disabilities

The percentage of disabled respondents who indicated each medical condition as a cause of a disability was reported by age, sex, and income status. For each medical condition reported, separate chi-square analyses at each level of age and sex were conducted comparing differences in the percentage of low income to high income disabled respondents who reported a particular medical condition. For example, a chi-square analysis was conducted for 55-64 year old disabled women comparing the percentage of low income respondents reporting arthritis/rheumatism as a cause of a disability to high income respondents. A significant chi-square would indicate that there were differences by income status in the percentage of 55-64 year old disabled women who reported having arthritis/rheumatism.

The number of different medical conditions disabled respondents reported as a primary cause of a disability was broken down by sex, age, and income status for both the 1986 and 1991 HALS. Chi-square analyses were conducted by age and sex to determine any differences in the number of conditions reported between high and low income disabled respondents. For all inferential statistics, an alpha level of 0.05 was required for statistical significance.

WEIGHTING

Due to the multi-staged, stratified sampling used in HALS, it was necessary to use a weighting process for all analyses. In both surveys, every respondent was assigned a weight corresponding to the number of people the respondent represented based on the Canadian Census. These weights were used to generate all population estimates. Although this weighting procedure generates accurate estimates, significance tests and confidence intervals are inflated and the risk of Type I error is increased. Therefore, for all inferential analysis using weighted data, such as logistic regression, weights were rescaled by dividing the weight for each respondent by the average weight of all respondents. This strategy generates more accurate significant tests and confidence intervals (Statistics Canada, 1986, 1991)

RESULTS

INCOME STATUS

Table 5 presents the income status by age and sex of Canadians 55 years and older for the 1986 and 1991 cross-sectional HALS. Among respondents aged 55-64 years old, between 11.8% of men in 1991 and 20.1% of women in 1986 were classified as low income. Among seniors, between 10.3% of men in 1986 and 23.2% of women in 1991 were classified as low income. In

both age groups and both years, a greater proportion of women was classified as low income than men.

POPULATION CHARACTERISTICS

Tables 6a and b present the population characteristics by income status of Canadians 55 years and older for the 1986 and 1991 HALS. Unadjusted odds ratios indicating the odds of being classified as low income for each population characteristic are also presented. With the exception of age, there was little difference in population characteristics between 1986 and 1991. There was a small increase in the percentage of seniors from 1986 to 1991 (51.7% versus 55.3%). In 1986, there was no difference between 55-64 year olds and seniors in terms of income status (OR=0.99; 95% CI: 0.95-1.04), whereas, in 1991 seniors were more likely to be classified as low income (OR=1.52; 95% CI: 1.40-1.66).

All other population characteristics were consistent between 1986 and 1991. Approximately 54% were female, 67% were married, 80% lived in urban areas, 65% lived in a single house, and 50% lived in households of two people. Men were significantly less than half as likely to be classified as low income (1986: OR=0.52; 95% CI: 0.60-0.71 and 1991: OR=0.65; 95% CI: 0.22-0.30) as were married respondents (1986: OR=0.23; 95% CI: 0.21-0.25 and 1991: OR=0.26; 95% CI: 0.22-0.30) compared with single respondents. Furthermore, respondents who lived in dwellings other than single houses were about three times more likely to be classified as low income (1986: OR=2.78; 95% CI: 2.66-2.90 and 1991: OR=3.28; 95% CI: 3.02-3.56). Respondents who rented their dwelling were also more than three times more likely to be classified as low income than respondents who owned (1986: OR=3.28; 95% CI: 3.13-3.42 and 1991: OR=4.81; 95%: 4.41-5.24).

DISABILITY STATUS

Tables 7a-d present the percentage of Canadians 55 years and older who reported having any disability, as well as the percentage who reported having each of the five types of physical disabilities assessed by HALS. Further, the percentage reporting disabilities is broken down by income status, and the odds of low income respondents being disabled compared with high income respondents are presented both unadjusted and adjusted for marital status, tenure of dwelling, and region of Canada. Among 55-64 year old men and women in 1986 and 1991, just over a quarter reported having at least one disability, with little difference between men and women. Mobility type disabilities were the most common type of physical disability reported by both sexes followed by agility, hearing, seeing, and speaking disabilities. Women tended to be more likely than men to report having a mobility disability (20.5% and 19.8% of women versus 16.5% and 16.4% of men in 1986 and 1991, respectively). Men tended to be more likely to report hearing disabilities (4.9% and 5.5% of women versus 9.7% and 11.4% of men in 1986 and 1991, respectively). For both sexes in both years, respondents with a low income were significantly more likely to report having any disability as well as more likely to report having each of the five types of physical disabilities. These results were consistent unadjusted and after being adjusted for marital status, tenure of dwelling, and region of Canada.

Among senior men and women, just over 40% reported having at least one disability, with women just slightly more likely than men to report being disabled. Approximately one third of women (34.1% and 32.9% in 1986 and 1991, respectively) and just over one quarter of men (25.4% and 25.9%) reported having a mobility disability. Women also tended to report agility (27.1% and 28.3% in 1986 and 1991, respectively) and seeing disabilities (11.5% and 11.2% in

1986 and 1991, respectively) more often than men (22.3% and 21.7% for agility disabilities and 7.3% and 8.6% for seeing disabilities in 1986 and 1991, respectively). Men tended to more often report hearing (21.8% and 19.7% in 1986 and 1991, respectively) and speaking disabilities (2.8% and 2.6% in 1986 and 1991, respectively) than women (14.9% and 15.2% for hearing disabilities and 1.7% and 1.8% for speaking disabilities in 1986 and 1991, respectively). In 1986, after adjusting for marital status, tenure of dwelling, and region of Canada, both men and women who were classified as low income were significantly more likely to report having all types of disabilities with the exception of speaking disabilities (adj ORs = 0.94 and 1.11 for women and men, respectively) and seeing disabilities for men (adj OR = 1.12). In 1991, there was no significant difference by income status in the odds of reporting being disabled (adj ORs = 1.16 and 0.80 for men and women, respectively). Women classified as low income were significantly more likely than high income women to report having a mobility disability (adj OR = 1.25), hearing disability (adj OR = 1.34), and seeing disability (adj OR = 1.70) and significantly less likely to report having a speaking disability (adj OR = 0.34). Men classified as low income were significantly less likely to report having a mobility disability (adj OR = 0.45), agility disability (adj OR = 0.61), and hearing disability (adj OR = 0.69).

SEVERITY OF DISABILITY

Tables 8a and b present the severity of disability by sex and age. In both 1986 and 1991, significant differences were found in the level of severity of disability by income status, sex and age group. Among 55-64 year olds, compared with those classified as high income, low income respondents were generally less likely to be categorized as mildly disabled and more likely to be categorized as severely disabled (p 's < 0.003). A similar pattern was found among senior women

in 1991 ($\chi^2 = 45.53$, $p < 0.001$) and senior men in 1986 ($\chi^2 = 23.18$, $p < 0.001$). However, fewer low income senior women reported being severely disabled in 1986 compared with high income senior women (27.5% versus 30.9%). Low income senior women were more likely to report being moderately disabled compared with high income senior women (42.8% versus 37.8%, $\chi^2 = 35.86$, $p < .001$). In 1991, a greater percentage of low income men reported being mildly disabled compared with high income men (53.5% versus 42.1%). In addition, a smaller percentage of low income men reported being severely disabled compared with their high income counterpart (20.0% versus 21.9%, $\chi^2 = 10.20$, $p = .006$).

MEDICAL CONDITIONS REPORTED AS CAUSING DISABILITY

Tables 9a and b present the most commonly reported causes of disability by income status, age, and sex. In both 1986 and 1991, women most often reported arthritis/rheumatism as the primary cause of a disability (reported by approximately 30% of women and 15% of men). Men most often reported diseases of the ear and mastoid processes, with differences reported by low and high income respondents. Men classified as high income were significantly more likely to report diseases of the ear and mastoid processes (all p 's < 0.01), but for women, those classified as low income, with the exception of seniors in 1986, were significantly more likely to report diseases of the ear and mastoid processes (p 's < 0.01). Other commonly reported disabling medical conditions included disorders of the eye and adnexa, cerebrovascular disease, other forms of heart disease, and fractures.

NUMBER OF MEDICAL CONDITIONS REPORTED AS CAUSING DISABILITIES

Tables 10a and b present the number (out of fifteen) of different medical conditions disabled respondents reported as the primary cause of a disability. The majority of respondents reported experiencing either none of the fifteen medical conditions or only one condition. Among women of both ages and in both survey years, there was a significant difference in the number of medical conditions reported as the primary cause of disabilities between high and low income respondents (χ^2 greater than or equal to 20.11, $p < .001$). In general, low income women reported experiencing more medical conditions than high income women. However, among men, with the exception of 55-64 year olds in 1986 ($\chi^2 = 25.45$, $p < .001$), no differences by income status in the number of medical conditions were reported as the primary cause of disability.

DISCUSSION

The 1986 and 1991 HALS showed that a greater proportion of women were classified as low income compared with men in both age groups. In particular, close to twice as many senior women had low income compared with senior men. The greater percentage of women reporting disabilities may be due in part by the fact that women tend to live longer than men, and since they constitute a larger proportion of the older age group they may be more likely to experience disabling health conditions. As well, older adults who were divorced, separated, or widowed were more likely to report having low income than those who were single. Similarly, respondents who rented instead of owned a dwelling and who lived in a dwelling other than a single dwelling were also more likely to be classified as low income. These results suggest that a number of factors are related to individual's level of economic status. Dutton and Levine (1989) note that, in

reality, income may affect health through its interaction with many other social, physical, and environmental factors. It is not so much any single aspect of being poor that undermines health as the entire experience of being on the bottom of the socio-economic ladder with all of the attendant material, social and psychological disadvantages.

Overall, mobility and agility disabilities were the most common types of disabilities reported among Canadians 55 years and older, with women more likely than men to report having these types of disabilities. Women were also more likely than men to report experiencing disabling arthritis/rheumatism, a condition that is the most common cause of agility and mobility disabilities (Raina, Dukeshire, & Lindsay, 1997; Verbrugge, Lepkowski, & Konkol, 1991; Badley, Rasooly, & Webster, 1994). Men were more likely than women to report having hearing disabilities, a finding consistent with other research (Raina et al., 2000; Ives, Bonino, Traven, et al., 1995; Forbes, Hayward, & Agwani, 1991). In particular, disabled men in high income groups were more likely to report disabling diseases of the ear and mastoid processes than men in low income groups. This finding was unlikely an anomaly of the data set, given that the same result was found for both the 1986 and 1991 HALS. Therefore, for older, disabled men, low income appears to be an indicator of some underlying factor that protects against the development of disabling diseases of the ear and mastoid processes. It is possible that men in this cohort who had high income might have been exposed to environmental or lifestyle factors that increased the probability of developing disabling hearing disease. Wallhagen and colleagues (1997), for example, suggested that the greater percentage of men reporting hearing disabilities may be attributed to past involvement in occupations with high noise exposure (e.g., craftsman or foreman) occurring over an extended period of time. However, it was not possible to elucidate these underlying factors from HALS nor was it possible to determine from HALS whether

nondisabling diseases of the ear and mastoid processes were also more prevalent among high income men.

Although the well documented pattern of lower income being associated with greater disability was evident among 55-64 year olds, this relationship was attenuated among seniors to the point where in 1991, after adjusting for marital status, tenure of dwelling, and geographic location, income was not predictive of disability status. This finding is consistent with other research which found that the effect of income is also less predictive of mortality among seniors compared with 45-64 year olds (McDonough, Duncan, Williams, et al., 1997), indicating that other factors attenuate the influence of income on mortality among seniors.

At least two factors may have been acting to reduce the influence of income on disability among older Canadians. First, the aging process itself may have a relatively large influence on the development of disabilities, effectively overriding the effects of income. Second, many seniors, as they retire, experience a reduction in overall income as they become more dependent on sources other than employment income, such as government assistance, retirement plans, and investments (Norland, 1994). Although these seniors still may not be classified as poor according to the low-income cut-off criteria, their decreased income could have led to a reduction in protective factors against disability. Results from a couple studies support the idea that income loss can have an adverse affect on health. Findings from the 20 year Ontario Longitudinal Study on Aging revealed that a reduction in income was associated with a perceived worsening of health among middle-aged men. Further, findings from an American study revealed that for 45-64 year olds loss of income was associated with increased mortality, particularly among those who were middle class (McDonough, Duncan, Williams, et al.,1997). Although for both studies

analyses were not provided for individuals 65 years and older, one may also expect a similar effect of loss of income on morbidity and mortality among this older age group.

Our findings indicated that one group in particular, senior women, were consistently disadvantaged in terms of income, disability status (with the exception of hearing and speaking disabilities), and functional independence. Senior women's disadvantaged state may be the result of a number of factors. Women tend to live longer than men do (Norland, 1994), and this results in the mean age of senior women to be greater than that of men. Increased disability due to the aging process alone could account for the differences in disability status between senior men and women. However, senior women were also disadvantaged in terms of income, and their lower income may also be a factor in their greater likelihood of both experiencing a disability and also in not having the resources to reduce the impact of their disabilities.

Our study could not analyze the data into finer age categories due to the release guidelines of the 1986 and 1991 HALS. Adults aged 65 years and over are well recognized in the literature to be a heterogeneous group. For example, the "young old" population aged 65 to 84 years have been found to differ substantially from the "oldest-old" population aged 85 years and older with respect to factors such as demography, level of physical and social functioning, impairment and disability (Mor et al., 1994; Laforge et al., 1992; Suzman et al., 1992). The differences within the elderly population are so marked that greater insights are derived when we examine data on elderly adults on the basis of multiple age categories.

In an effort to postpone or prevent disabilities in an ever-growing older population, public health initiatives are required to educate older adults about medical conditions and impairments that often lead to disability in this age group. Primary care physicians and other health care professionals should be encouraged to identify physical, cognitive and sensory impairments,

particularly among low income older adults. Furthermore, another important task is a need to eliminate barriers to accessibility and affordability of interventions and adaptive devices, such as walking aids and good quality hearing aids, to prevent or delay the onset of disabilities among our low income seniors.

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Table 1. Sample Sizes for Respondents 55 Years and Older, Health and Activity Limitation Surveys

	1986	1991
55-64 Years		
Unweighted N	22,386	11,507
Weighted N	2,313,100	2,365,000
65 Years and Older		
Unweighted N	38,518	5,106
Weighted N	2,484,800	2,906,900

Table 2. Activities of Daily Living Items Used to Assess Disability Status, Health and Activity Limitation Surveys

<p>ADLs Used to Assess a Seeing Disability</p> <p>Do you have any difficulty seeing ordinary newsprint, with glasses or contact lenses if usually worn? Do you have any difficulty clearly seeing the face of someone across a room (that is from 4 meters/12 feet), with glasses or contact lenses if usually worn?</p>
<p>ADLs Used to Assess a Hearing Disability</p> <p>Do you have any difficulty hearing what is said in a conversation with one other person? Do you have any difficulty hearing what is said in a group conversation with at least three other people?</p>
<p>ADL Used to Assess a Speaking Disability</p> <p>Do you have any difficulty speaking and being understood?</p>
<p>ADLs Used to Assess a Mobility Disability</p> <p>Do you have any difficulty walking 350 meters or 400 yards without resting (about three city blocks, about half a kilometre or a quarter of a mile)? Do you have any difficulty walking up and down a flight of stairs (about 12 steps)? Do you have any difficulty carrying Do you have any difficulty moving from one room to another?an object of 4.5 kg for 10 metres or 10 pounds for 30 feet (for example, carrying a bag of groceries)? Do you have any difficulty standing for more than 20 minutes?</p>
<p>ADLs Used to Assess an Agility Disability</p> <p>When standing, do you have any difficulty bending down and picking up an object from the floor (for example, a shoe)? Do you have any difficulty dressing and undressing yourself? Do you have any difficulty getting in and out of bed? Do you have any difficulty cutting your own toenails (That is, is it physically difficult for you to cut your own toenails)? Do you have any difficulty using your fingers to grasp or handle (such as using pliers or scissors)? Do you have any difficulty reaching in any direction (for example, above your head)? Do you have any difficulty cutting your own food?</p>

Table 3. Percent of Canadians 55 Years and Older Classified as Either High Income or Low Income by Total Household Income, Health and Activity Limitation Surveys

Total Household Income	1986 Income Status			1991 Income Status		
	High Income	Low Income	Total	High Income	Low Income	Total
55-64 Years						
Less than \$10,000	35.2	94.2	45.5	26.5	82.1	34.5
\$10,000-\$24,999	33.8	5.8	28.9	27.7	17.8	26.3
\$25,000-\$34,999	16.6	0.0	13.7	17.4	0.0	14.9
\$35,000 and More	14.4	0.0	11.9	28.4	0.0	24.3
65 Years and Older						
Less than \$10,000	46.2	96.7	54.9	25.3	46.4	29.6
\$10,000-\$24,999	41.7	3.3	35.1	49.8	53.6	50.6
\$25,000-\$34,999	6.3	0.0	5.2	10.4	0.0	8.3
\$35,000 and More	5.9	0.0	4.8	14.5	0.0	11.5

Table 4. Disease Codes and Associated Medical Conditions Reported, Health and Activity Limitation Surveys

Disease Code	Medical Condition Classification
(ICD-025)	Diseases of other endocrine glands
(ICD-030)	Neurotic, personality, and mental disorders
(ICD-033)	Hereditary and degenerative disorders of the central nervous system
(ICD-034)	Other disorders of the central nervous system
(ICD-036)	Disorders of the eye and adnexa
(ICD-038)	Diseases of the ear and mastoid processes
(ICD-042)	Other forms of heart disease
(ICD-043)	Cerebrovascular disease
(ICD-074)	Congenital anomalies
(ICD-095)	Injury to nerves and spinal cord
(VA-106)	Arthritis or rheumatism of any type
(VB-107)	Damaged or removed discs
(VG-112)	Absent, missing, amputated limbs
(VH-113)	Fractures
(VP-119)	Paralysis

Note: Codes beginning with "ICD" are from the International Coding of Diseases, Ninth Revision; codes beginning with "V" are from the Musculo-Skeletal Impairments List.

Table 5. Percent of Canadians 55 Years and Older Classified as Either High Income or Low Income, Health and Activity Limitation Surveys

	1986 Income Status		1991 Income Status	
	High Income	Low Income	High Income	Low Income
55-64 Years				
Women	79.9	20.1	83.1	16.9
Men	85.5	14.5	88.2	11.8
65 Years and Older				
Women	77.4	22.6	76.8	23.2
Men	89.7	10.3	83.2	16.8

Table 6a. Population Characteristics of Canadians 55 Years and Older, 1986 Health and Activity Limitation Survey (n = 4,721,000)

Characteristic	Percent Total	Percent High Income	Percent Low Income	Odds Ratio* (95% CI)
Age				
55-64	48.3	82.6	17.4	Referent
65+	51.7	82.7	17.3	0.99 (0.95-1.04)
Sex				
Women	54.3	78.5	21.5	Referent
Men	45.7	87.5	12.5	0.52 (0.50-0.55)
Marital Status				
Single	6.5	69.0	31.0	Referent
Married	66.6	90.6	9.4	0.23 (0.21-0.25)
Div/Sep/Wid	26.9	66.2	33.8	1.13 (1.05-1.22)
Geographic Location				
Urban	78.1	81.4	18.6	Referent
Rural	21.9	87.3	12.7	0.64 (0.60-0.67)
Type of Dwelling				
Single House	65.0	88.1	11.9	Referent
Other	35.0	72.6	27.4	2.78 (2.66-2.90)
Tenure of Dwelling				
Owned	73.5	87.7	12.3	Referent
Rented	26.5	68.6	31.4	3.28 (3.13-3.42)
Number of Persons in Household				
One Person	20.6	58.0	42.0	Referent
Two Persons	48.3	89.3	10.7	0.17 (0.16-0.17)
Three or More Persons	31.1	88.7	11.3	0.18 (0.17-0.19)
Region of Canada				
Atlantic	8.8	83.2	16.8	Referent
Quebec	25.2	77.1	22.9	1.47 (1.35-1.59)
Ontario	37.9	85.8	14.2	0.82 (0.75-0.89)
Prairies	16.2	84.3	15.7	0.92 (0.84-1.01)
British Columbia	11.9	81.6	18.4	1.12 (1.02-1.23)

*Odds ratio represents odds of having low income.

Table 6b. Population Characteristics of Canadians 55 Years and Older, 1991 Health and Activity Limitation Survey
(n = 5,130,900)

Characteristic	Percent Total	Percent With High Income	Percent With Low Income	Odds Ratio* (95% CI)
Age				
55-64	44.7	85.6	14.4	Referent
65+	55.3	79.6	20.4	1.52 (1.40-1.66)
Sex				
Women	53.9	79.5	20.5	Referent
Men	46.1	85.6	14.4	0.65 (0.60-0.71)
Marital Status				
Single	6.1	69.4	30.6	Referent
Married	66.6	89.7	10.3	0.26 (0.22-0.30)
Div/Sep/Wid	27.2	67.0	33.0	1.12 (0.96-1.30)
Geographic Location				
Urban	80.3	80.8	19.2	Referent
Rural	19.7	88.5	11.5	0.55 (0.49-0.62)
Type of Dwelling				
Single House	65.9	88.5	11.5	Referent
Other	34.1	70.2	29.8	3.28 (3.02-3.56)
Tenure of Dwelling				
Owned	77.1	88.5	11.5	Referent
Rented	22.9	61.4	38.6	4.81 (4.41-5.24)
Number of Persons in Household				
One Person	20.2	57.6	42.4	Referent
Two Persons	51.3	87.6	12.4	0.19 (0.18-0.21)
Three or More Persons	28.5	90.2	9.8	0.15 (0.13-0.17)
Region of Canada				
Atlantic	8.4	82.8	17.2	Referent
Quebec	24.6	76.6	23.4	1.47 (1.26-1.73)
Ontario	38.6	83.2	16.8	0.97 (0.83-1.14)
Prairies	15.4	85.2	14.8	0.84 (0.70-1.00)
British Columbia	13.1	86.5	13.5	0.75 (0.62-0.91)

*Odds ratio represents odds of having low income.

Table 7a. Percent of Canadians 55-64 Years Who Reported Being Disabled by Income Status, 1986 Health and Activity Limitation Survey (n = 2,279,000)

Type of Disability	Total	High Income	Low Income	Odds Ratio	Adjusted Odds Ratio*
Any Disability					
Women	25.4	21.1	42.6	2.77	2.45
Men	25.6	22.5	44.1	2.72	2.68
Mobility					
Women	20.5	16.5	36.3	2.89	2.52
Men	16.5	14.0	30.8	2.72	2.67
Agility					
Women	16.8	13.6	29.3	2.63	2.36
Men	14.3	11.8	28.8	3.02	2.96
Hearing					
Women	4.9	3.8	9.0	2.50	2.21
Men	9.7	8.5	16.4	2.11	2.15
Seeing					
Women	3.1	2.4	6.1	2.64	1.89
Men	3.0	2.3	7.1	3.29	3.10
Speaking					
Women	0.8	0.6	1.3	2.03	1.69
Men	1.2	1.0	2.7	2.80	2.48

Note: Odds ratios represent odds of low income individuals being disabled compared with high income. All odds ratios are significant, $p < 0.05$.

*Adjusted for marital status, tenure of dwelling, and region of Canada.

Table 7b. Percent of Canadians 55-64 Years Who Reported Being Disabled by Income Status, 1991 Health and Activity Limitation Survey (n = 2,291,000)

Type of Disability	Total	High Income	Low Income	Odds Ratio	Adjusted Odds Ratio*
Any Disability					
Women	26.2	23.7	38.5	2.01	1.93
Men	27.3	24.5	48.3	2.87	2.81
Mobility					
Women	19.8	17.5	30.9	2.11	2.02
Men	16.4	14.2	32.8	2.96	2.97
Agility					
Women	16.9	14.8	26.7	2.09	2.05
Men	16.0	14.2	28.9	2.45	2.51
Hearing					
Women	5.5	4.5	10.0	2.35	2.49
Men	11.4	10.6	17.3	1.76	1.97
Seeing					
Women	3.9	3.6	5.3	1.51	1.58
Men	2.1	1.8	4.5	2.60	2.28
Speaking					
Women	1.0	0.7	2.4	3.63	3.60
Men	1.5	1.2	4.2	3.73	2.80

Note: Odds ratios represent odds of low income individuals being disabled compared with high income. All odds ratios are significant, $p < 0.05$.

*Adjusted for marital status, tenure of dwelling, and region of Canada.

Table 7c. Percent of Canadians 65 Years and Older Who Reported Being Disabled, 1986 Health and Activity Limitation Survey (n=2,442,000)

Type of Disability	Total	High Income	Low Income	Odds Ratio	Adjusted Odds Ratio*
Any Disability					
Women	41.7	38.6	52.3	1.75	1.47
Men	40.6	39.4	51.2	1.62	1.60
Mobility					
Women	34.1	31.3	43.5	1.69	1.46
Men	25.4	24.5	34.1	1.60	1.59
Agility					
Women	27.1	25.5	32.6	1.41	1.23
Men	22.3	21.5	29.6	1.54	1.51
Hearing					
Women	14.9	14.3	17.1	1.24	0.90
Men	21.8	21.4	25.6	1.26	1.26
Seeing					
Women	11.5	10.2	16.1	1.70	1.40
Men	7.3	7.1	8.8	1.26	1.12 ^{ns}
Speaking					
Women	1.7	1.7	1.6	0.95 ^{ns}	0.94 ^{ns}
Men	2.8	2.8	3.1	1.13 ^{ns}	1.11 ^{ns}

Note: Odds ratios represent odds of low income individuals being disabled compared with high income. Except for those denoted as “ns”, all odds ratios are significant, $p < 0.05$.

*Adjusted for marital status, tenure of dwelling, and region of Canada.

Table 7d. Percent of Canadians 65 Years and Older Who Reported Being Disabled, Health and Activity Limitation Survey, 1991 (n = 2,839,500)

Type of Disability	Total	High Income	Low Income	Odds Ratio	Adjusted Odds Ratio*
Any Disability					
Women	42.9	41.0	49.2	1.40	1.16 ^{ns}
Men	40.7	41.2	38.4	0.89 ^{ns}	0.80 ^{ns}
Mobility					
Women	32.9	30.6	40.3	1.53	1.25
Men	25.9	27.6	17.7	0.57	0.45
Agility					
Women	28.3	27.8	30.2	1.13 ^{ns}	0.94 ^{ns}
Men	21.7	22.6	17.3	0.71	0.61
Hearing					
Women	15.2	14.3	18.2	1.33	1.34
Men	19.7	20.5	15.9	0.73	0.69
Seeing					
Women	11.2	9.1	18.4	2.26	1.70
Men	8.6	8.5	9.1	1.08 ^{ns}	0.92 ^{ns}
Speaking					
Women	1.8	2.1	0.9	0.43 ^{ns}	0.34
Men	2.6	2.6	2.7	1.07 ^{ns}	0.95 ^{ns}

Note: Odds ratios represent odds of low income individuals being disabled compared with high income. Except for those denoted as “ns”, all odds ratios are significant, $p < 0.05$.

*Adjusted for marital status, tenure of dwelling, and region of Canada.

Table 8a. Severity of Disability Among Disabled Canadians 55-64 Years by Income Status, Health and Activity Limitation Surveys

	1986 Income Status		1991 Income Status	
Severity of Disability	High Income (n = 410,200)	Low Income (n = 171,300)	High Income (n = 473,200)	Low Income (n = 140,000)
Women				
Mild	41.1	38.5	43.8	33.8
Moderate	38.6	37.6	38.4	36.9
Severe	20.2	23.9	17.8	29.3
	$\chi^2 = 12.98, p = 0.002$		$\chi^2 = 43.01, p < 0.001$	
Men				
Mild	45.4	35.0	48.8	39.1
Moderate	38.5	37.2	34.0	39.3
Severe	16.1	27.8	17.2	21.7
	$\chi^2 = 148.30, p < 0.001$		$\chi^2 = 17.99, p < 0.001$	

Table 8b. Severity of Disability Among Disabled Canadians 65 Years and Older by Income Status, Health and Activity Limitation Surveys

	1986 Income Status		1991 Income Status	
Severity of Disability	High Income (n = 786,900)	Low Income (n = 219,800)	High Income (n = 928,200)	Low Income (n = 262,600)
Women				
Mild	31.3	29.8	40.4	28.9
Moderate	37.8	42.8	36.4	31.9
Severe	30.9	27.5	23.2	39.2
	$\chi^2 = 35.86, p < 0.001$		$\chi^2 = 45.53, p < 0.001$	
Men				
Mild	43.6	41.0	42.1	53.5
Moderate	34.9	32.3	35.9	26.5
Severe	21.5	26.7	21.9	20.0
	$\chi^2 = 23.18, p < 0.001$		$\chi^2 = 10.20, p = 0.006$	

Table 9a. Percent of Disabled Canadians 55-64 Years Who Reported the Following Medical Conditions as the Primary Cause of Their Disability by Income Status, Health and Activity Limitation Surveys

Medical Condition	1986 Income Status		1991 Income Status	
	High Income (n = 410,200)	Low Income (n = 171,300)	High Income (n = 473,200)	Low Income (n = 140,000)
Arthritis/Rheumatism				
Women	27.4	34.5***	34.8	33.1
Men	12.1	16.5***	18.1	15.8
Diseases of the Ear and Mastoid Processes				
Women	9.4	13.1***	9.8	14.2**
Men	27.1	23.8**	27.5	22.2**
Disorders of the Eye and Adnexa				
Women	5.0	6.0	8.1	6.1
Men	5.2	6.2	3.9	3.9
Cerebrovascular Disease				
Women	2.6	1.0***	1.7	—
Men	2.0	2.1	2.0	2.6
Other Forms of Heart Disease				
Women	2.7	4.3***	3.9	4.3
Men	4.4	6.6***	4.8	5.3
Fractures				
Women	0.9	1.3	2.0	1.4
Men	1.4	1.1	2.7	7.1***

Cells denoted by "—" are based on unweighted sample sizes of less than 15 and have been suppressed as suggested by HALS release guidelines.

Results for all other medical conditions were based on unweighted cell sizes of less than 15, and therefore are not reported.

Chi-square analyses were conducted separately for women and men to compare differences in reported percentages between high and low income respondents.

*p<0.05, **p<0.01, ***p<0.001.

Table 9b. Percent of Disabled Canadians 65 Years and Older Who Reported the Following Medical Conditions as the Primary Cause of Their Disability, Health and Activity Limitation Surveys

Medical Condition	1986 Income Status		1991 Income Status	
	High Income (n = 786,900)	Low Income (n = 219,800)	High Income (n = 928,200)	Low Income (n = 262,600)
Arthritis				
Women	30.7	30.6	33.8	34.2
Men	16.1	16.3	14.0	17.3
Diseases of the Ear and Mastoid Processes				
Women	19.1	19.7	11.6	17.5**
Men	35.1	30.3***	29.1	13.2***
Disorders of the Eye and Adnexa				
Women	15.2	16.2	14.6	26.7***
Men	10.0	8.9	12.0	18.3*
Cerebrovascular Disease				
Women	3.7	1.7***	2.2	—
Men	4.6	6.2**	4.6	—
Other Forms of Heart Disease				
Women	5.6	3.9***	7.1	9.2
Men	3.6	4.3	9.3	—
Fractures				
Women	3.0	2.2**	5.5	8.2*
Men	1.3	0.9	2.1	—

Cells denoted by "—" are based on unweighted sample sizes of less than 15 and have been suppressed as suggested by HALS release guidelines.

Results for all other medical conditions were based on unweighted cell sizes of less than 15, and therefore are not reported.

Chi-square analyses were conducted separately for women and men to compare differences in reported percentages between high and low income respondents.

*p<0.05, **p<0.01, ***p<0.001.

Table 10a. Percent of Disabled Canadians 55-64 Years Who Reported Experiencing Medical Conditions Which Caused Disabilities by Income Status, Health and Activity Limitation Surveys

Number of Medical Conditions*	1986 Income Status		1991 Income Status	
	High Income (n = 410,200)	Low Income (n = 171,300)	High Income (n = 473,200)	Low Income (n = 140,000)
Women				
Zero	52.6	46.8	39.3	39.2
One	40.0	41.5	50.6	44.4
Two	6.7	10.7	9.1	14.4
Three or More	0.7	0.9	1.0	1.9
	$\chi^2 = 44.25, p < 0.001$		$\chi^2 = 20.11, p < 0.001$	
Men				
Zero	49.6	47.0	41.5	42.0
One	41.3	41.7	47.3	47.0
Two	8.5	9.8	10.1	10.0
Three or More	0.5	1.6	1.1	—
	$\chi^2 = 25.45, p < 0.001$		$\chi^2 = 0.12, ns$	

*Out of fifteen medical conditions commonly reported by disabled respondents.

Cells denoted by "—" are based on unweighted sample sizes of less than 15 and have been suppressed as suggested by HALS release guidelines.

Table 10b. Percent of Disabled Canadians 65 Years and Older Who Reported Experiencing Medical Conditions Which Caused Disabilities by Income Status, Health and Activity Limitation Surveys

Number of Medical Conditions*	1986 Income Status		1991 Income Status	
	High Income (n = 786,900)	Low Income (n = 219,800)	High Income (n = 928,200)	Low Income (n = 262,600)
Women				
Zero	37.5	34.9	34.9	22.6
One	45.3	49.7	49.0	57.1
Two	14.1	11.9	13.4	14.2
Three or More	3.1	3.5	2.7	6.1
	$\chi^2 = 33.45, p < 0.001$		$\chi^2 = 31.58, p < 0.001$	
Men				
Zero	38.4	39.3	36.5	43.8
One	47.2	47.5	47.4	39.4
Two	12.0	10.9	12.1	13.0
Three or More	2.4	2.2	3.9	---
	$\chi^2 = 1.95, ns$		$\chi^2 = 5.10, ns$	

*Out of fifteen medical conditions commonly reported by disabled respondents.

Cells denoted by "—" are based on unweighted sample sizes of less than 15 and have been suppressed as suggested by HALS release guidelines.

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