

**THE RELATIVE IMPACTS OF ARTHRITIS AND OTHER LONG TERM
HEALTH PROBLEMS IN THE POPULATION: A CANADIAN EXAMPLE**

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SUMMARY

Introduction

Arthritis is a highly prevalent condition and a leading cause of disability. Most studies comparing the impacts of different conditions examine only one outcome, usually physical disability. This study describes the relative impacts of arthritis and a range of other chronic conditions across various health outcomes and on health care utilization in the population.

The impact of chronic conditions can be described both at the individual level and at the population level. At the individual level, the impact of a condition is characterized by its severity, or the risk of the condition being associated with negative outcomes. The population level impact of a chronic condition is a function not only of the severity of the condition, but also of the prevalence of the condition. This type of impact is captured by 'attributable risk', which quantifies the proportion of the occurrences of a particular outcome in the population that can be attributed to a particular chronic condition. Conditions which are rare but have high risks for negative outcomes in individuals will have smaller attributable risks than conditions with moderate risks for negative outcomes but high prevalence.

Methods

This study uses data on respondents aged 15 or older from the 1994 Canadian National Population Health Survey (NPHS). The survey employed a multi-stage stratified cluster sample design. The target population included all household residents in each Canadian province, excluding populations on Indian reserves, Canadian Forces Bases, and some remote areas of Ontario and Quebec. Additionally, for respondents in the province of Ontario, information on health care utilization from administrative databases for the two years following the survey was studied.

The 11 most prevalent chronic conditions in the survey were examined. In order of decreasing prevalence these were: arthritis, non-food allergies, back problems, high blood pressure, migraine, asthma, heart disease, sinusitis, diabetes, stomach/intestinal ulcers, and bronchitis or emphysema.

The outcomes studied were long-term disability, pain which prevents activity, score on the Health Utility Index, two-week disability, self-reported health, labour force participation, and health care utilization. The health care utilization variables examined were number of general practitioner visits, visits to another type of physician, and occurrence of a hospital admission in the previous year among all respondents of the NPHS. Health care utilization variables for respondents in the province of Ontario whose survey responses were linked to the administrative databases included number of general practitioner visits, number of specialist visits, the occurrence of a hospital admission, number of lab and x-ray procedures, and for people aged 65 or older, the number of prescription medication claims.

The proportions of people with each condition who reported each outcome were determined, as well as the odds ratios for reporting each outcome (larger odds ratios indicating greater likelihood of reporting the outcome), and the attributable risk for each outcome and each condition.

Findings

Individual Impacts: The odds ratios for reporting pain which prevents activity and long-term disability were high for arthritis and back problems. The highest odds ratios for long-term disability were for heart disease and bronchitis or emphysema. The odds ratios for these four conditions, as well as for migraine and stomach/intestinal ulcers were highest for two-week disability. Back problems, heart disease, and diabetes were the conditions with the highest odds ratios for not being in the labour force due to illness or disability. The highest odds ratios for health care utilization outcomes were found for people with heart disease, diabetes, bronchitis or emphysema, and high blood pressure. Unlike the odds ratios for pain and disability, the odds ratios for health care utilization outcomes were relatively small for people with arthritis.

Population Impacts: Different results were seen when considering attributable risks. Arthritis and back problems ranked highest for nearly all outcomes, even when odds ratios for some outcomes were only moderate compared to the odds ratios for heart disease and bronchitis or emphysema. When taking into account prevalence by using attributable risk, the population impacts of arthritis and back problems were larger than for any other conditions across nearly all outcomes.

Conclusions

The two main findings of this study were that:

- ◆ different chronic conditions have their impacts on different outcomes
- ◆ conditions which have severe impacts for individuals are not always the same conditions which have large impacts in the population

The results of the present study shed light on the relative impacts of different chronic conditions and their importance in setting priorities for maintaining and improving the health of the population.

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 - 25 or more prescription medication claims in the two years following the survey among those aged 65 or older

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1.0 INTRODUCTION

Arthritis and other chronic conditions are becoming increasingly important in the spectrum of health conditions in the population. Arthritis is one of the most common chronic conditions, with a prevalence of 14% in Canada (1) and 15% in the U.S. (2) in 1990.

Among the chronic conditions, arthritis is a leading cause of long-term disability, pain, short-term activity restriction, (3-7), and increased health care utilization (5,6,8,-13). Arthritis is also a major contributor to poor self-rated health (14).

The economic burden of arthritis is substantial. In 1994 in Canada, direct and indirect costs for arthritis were \$2.12 billion and \$3.75 billion respectively (15), accounting for 0.8% of the Gross Domestic Product. The cost of lost productivity due to disability (indirect costs) accounted for 63.4% of arthritis costs. In Canada in 1993, 6.8% of medication costs, 6.5% of physician costs, and 4.9% of hospital costs were due to musculoskeletal disorders (including but not exclusively arthritis), amounting to a total of 2.5 billion dollars for direct costs due to musculoskeletal disorders (16). These direct costs were not as high as those for cardiovascular and respiratory diseases; however, the economic burden of musculoskeletal conditions far exceeded any other group of conditions for indirect costs due to long and short-term disability and lost work time. For total costs, musculoskeletal conditions were exceeded only by cardiovascular conditions.

There are several other common chronic conditions in the population. In Canada, allergies were slightly more prevalent (17.7%) than arthritis in 1990 (1). Other common chronic conditions include high blood pressure (9.8%), back problems (9.2%), other bone or joint problems (4.8%), heart

problems (4.3%), digestive problems (3.9%), asthma (3.8%), and diabetes (2.7%) (1). These conditions have a similar prevalence in the U.S. In 1991, arthritis was the second most prevalent condition after sinusitis (17). High blood pressure was reported by 11%, heart disease by 8%, bronchitis by 5%, asthma by 5%, migraine by 4%, diabetes by 3%, and cerebrovascular disease by 1% (17).

Conditions such as arthritis and high blood pressure affect a large proportion of elderly people in Canada; however, the greatest number of people affected in the population are middle aged. This is a reflection of the age structure of the Canadian population where people in the middle ages comprise a larger proportion of people in the population than older people. The number of people affected by a condition in the population is determined by the prevalence of the condition in the different age groups, and the number of people in the population in those age groups.

Most studies of the relative impacts of chronic conditions examine only outcomes relating to disability. However, two U.S. studies which have examined the impacts of chronic and acute conditions on a wider range of outcomes, have shown that conditions strongly associated with disability and other poor health outcomes are not always the same conditions which are strongly associated with health service utilization. Pope (1988) reported that functional and role limitation variables (disability) measured primarily the most severe and chronic conditions, while restricted activity days measured more acute illnesses (18). Furthermore, the conditions which determined ambulatory health care utilization were not the most severe and chronic conditions. Similar results were found by Verbrugge & Patrick (1995) for conditions associated with disability and health care utilization

(19).

The relative impacts of different chronic conditions vary depending on whether the impacts are assessed at the individual level or the population level. At the individual level, the impact is related to the severity of the conditions and the need for health care. Conditions which are strongly associated with adverse health outcomes such as disability, mortality, and health care utilization, are often thought of as severe. At the population level, the impact of a condition is governed by the relative number of individuals experiencing adverse outcomes and using health care in relation to the different conditions. This relationship is mediated by both the prevalence of the condition and the proportion of people with the condition who experience the adverse outcomes (i.e. the severity of the condition). Clinicians need to be concerned with the risks of negative outcomes or severity for individuals with particular conditions; however, health planning must be informed by the numbers of people in the population who experience negative outcomes such as disability and increased health care utilization, factors largely dependent upon prevalence.

Comparative studies of various conditions suggest arthritis has a moderate to high health impact in the population (6,18,19), depending on the other conditions in the study and the outcomes examined. A limited number of studies have shown that some less common conditions, although severe and life threatening, have a smaller impact on the health of a population than more common but less severe conditions. A study of The Dutch National Survey of General Practice reported that compared to other chronic conditions, the elimination of arthritis and back complaints would result in the largest increase in disability-free life expectancy for women and the second largest increase (after heart disease) in men (20). In a U.S. study, the individual impact of arthritis, expressed by the odds of becoming functionally limited (disabled) in two years were lower for arthritis than for stroke, diabetes, or cognitive impairment. However, a reduction in the

prevalence of arthritis by 1% every two years over five decades, resulted in a greater reduction in the number of older persons with disability than would have resulted for the same reduction in the prevalence of coronary disease, stroke, diabetes, cancer, or cognitive impairment. In fact, the 1% reduction every two years in cancer and coronary disease resulted in a slight increase in the number of disabled older persons after five decades (21).

1.1 Objectives of the Study

There is considerable information on the prevalence and impacts of arthritis and other chronic conditions in the literature. However, few studies have examined the relative impacts of different conditions across different outcomes in the population. It is often difficult to make comparisons of the impacts of different conditions across studies, because most studies examine only one outcome, and a variety of populations and methodologies are used across different studies.

The Canadian National Population Health Survey (NPHS, 1994/95) (22) contains information on the prevalence of chronic conditions and various outcomes such as disability and pain, other illness-related factors, labour force participation, and self-reported health care utilization. Documented health care utilization exists in a research database in Ontario which linked people's responses to the NPHS to their actual health care utilization information from administrative databases in Canada.

This study aims to describe the relative impacts of arthritis and other chronic conditions in the population of Canada on a range of outcomes including long and short-term disability, pain which prevents activity, self-rated health, labour force participation, self-reported health care utilization during the year before the survey, and documented health care utilization for the two years following the survey. This study will examine both individual level impacts of conditions and the population level impacts.

2.0 METHODS

2.1 Data Source

The data for the study were obtained from the Canadian National Population Health Survey (NPHS) conducted in 1994/95. The target population includes all household residents in each Canadian province, excluding populations on Indian reserves, Canadian Forces Bases, and some remote areas of Ontario and Quebec. Health care utilization data were also obtained for NPHS respondents in Ontario who agreed to give their health card numbers and have their responses to the NPHS linked to their health care utilization for the two years following the survey. The sampling and data collection methods are described in the following section.

2.2 Sampling and Data Collection Methods for the NPHS

The survey employed a stratified two-stage cluster design. In stage one, separate geographic and/or socioeconomic strata were formed in each province and then six independent clusters were drawn from each stratum. In stage two, dwelling lists were prepared for each cluster and dwellings were selected from those lists. The data were collected from respondents in two ways. In the first part of the survey, information about all household members was obtained from one knowledgeable member (household component), usually at the time of the home recruitment visit, or over the telephone if the person was unable to complete the interview at that time. The questions in this phase pertained to demographic factors, health status, chronic health problems, disability, and health care utilization for all members of the household. In the second part of data collection, one member of the household aged 12 or older (selected respondent) was randomly selected for a more in-depth interview. This interview was completed by someone other than the selected respondent only if the selected respondent was unable to answer due to special circumstances.

Questions in the selected respondent interview pertained to health status, health behaviours, risk factors, life events, stress, and psychological variables.

The data for the household component and the selected person component were linked to form a data file containing 17,626 respondents. The response rate for the household component was 88.7% and the response rate for the selected person component was 96.1%. The analysis in this study was based on the 16,989 respondents who were aged 15 or older.

2.3 Linkage of the NPHS and Health Care Utilization Data for Ontario Respondents (Ontario File)

There were 5,187 respondents in Ontario who completed the selected respondent part of the survey, all of whom were asked to provide their health card number, share the responses to the questionnaire with the provincial Ministry of Health, and permit the Ministry to link the responses with health care administrative databases for research purposes. Of these respondents, 4,813 (93%) provided their health numbers and consented to the linkage of records. The Ontario Ministry of Health considered 4,621 of the numbers to be valid for linkage. The Institute for Clinical Evaluative Sciences (ICES) obtained a copy of the NPHS sharing file for Ontario through a Special Research Agreement with the Ministry of Health. Analyses were based on the 4,470 respondents with valid health numbers who were 15 years of age and older and who answered all questions about chronic conditions. This group reflected 8,588,516 people in Ontario. The health numbers were encrypted and replaced with unique identifiers created by ICES for purposes of data linkage.

The NPHS was linked to health care data for the 24 months following the survey interview dates. The health care data included the Discharge Abstract Data for inpatients and same-day surgery patients from the Canadian Institute for Health Information

(CIHI), and claims data from the Ontario Drug Benefit program (ODB) for respondents 65 years of age and older. Inpatients and same-day surgery files of the Discharge Abstract Data from CIHI were searched to identify NPHS respondents who had one or more separations from a hospital during the two-year follow-up period. Overall, 623 respondents had 1,109 discharges from inpatient services and 653 respondents had 932 same-day surgery services. Hospital services related to pregnancy, abortion and childbirth (ICD-9 630-676; complications of pregnancy childbirth and puerperium) were flagged. There were 199 women who had 277 hospital separations for these services. Similarly, 230 women were identified who had 2,996 related Ontario Health Insurance Plan (OHIP) claims. Health services related to pregnancy were excluded from the utilization data.

The OHIP claims files included billings for professional services and laboratory services. A claim for professional services indicates who provided the services. By using specialist codes, professional services were grouped into general practitioner visits, specialist visits, and laboratory and x-ray visits.

2.4 Variables Used in the Analyses

In order to study the relative impacts of the different chronic conditions, several conditions and various types of impacts or outcomes were examined. Some variables were collapsed or recoded for analyses as described below. Demographic variables were examined for their associations with chronic conditions and were used as covariates in multiple logistic regression analyses to control for confounding. For chronic conditions, respondents were instructed that a long-term condition was one that had lasted or was expected to last six months or more. Respondents were then asked if they had any of the 20 long-term conditions in the survey diagnosed by a health professional. The 11 most prevalent chronic conditions were studied. Other conditions were omitted due to the fact that they

were reported very infrequently, and data on some conditions was only obtained from people in certain age groups. Conditions which were excluded were food allergies, cancer, epilepsy, effects of stroke, Alzheimer's disease, urinary incontinence, cataracts, glaucoma, and acne requiring prescription medicine. Conditions examined in this study are: allergies (non-food), arthritis or rheumatism, back problems (excluding arthritis), high blood pressure, migraine headaches, sinusitis, heart disease, stomach or intestinal ulcers, chronic bronchitis or emphysema, and diabetes.

2.4.1 Demographic variables:

Age: derived variable in the survey in five year age groups recoded into decades; 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75 or older.

Gender: male, female

Education: recoded into four categories; some or completed primary school, some or completed secondary school, some or completed college/trade or some university, and university degree.

Income: Five-level variable derived by Statistics Canada: lowest, lower middle, middle, upper middle, and highest.

2.4.2 Outcome Variables Used in the NPHS and the Ontario File:

Pain which prevents any activity: five-level variable derived by Statistics Canada: no pain or discomfort, pain does not prevent any activity, pain prevents a few activities, pain prevents some activities, and pain prevents most activities was dichotomized as follows: 1) no pain or pain does not prevent activity, versus 2) pain prevents a few, some, or most activities.

Score of disabled on the Health Utility Index (HUI): generic health status index describing overall functional health; includes vision, hearing, speech, mobility, dexterity, cognition, emotion, pain, and discomfort. Derived score ranges from 0 (worst health) to 1 (best health). Score of less than 0.83 recommended by Statistics Canada (based on

research) as cut off to indicate disability.

Long-term disability: derived variable—respondent answers ‘yes’ to any of: restriction of activity at work, at home, or in leisure activity that has lasted or is expected to last six months or more and is due to a long-term physical or mental condition or health problem **OR** person answered ‘yes’ to having any long-term disabilities or handicaps.

Two week disability: if response was “yes” to questions asking if respondent had spent a day in bed in the previous 14 days due to illness or injury, or if the respondent had cut down on their normal activities for any day during the previous 14 days.

Labour force participation: analysed for those between ages 20 and 64: those reporting not currently working but had a job, or did not work in past 12 months **AND** reason for not working is due to illness/disability versus those reporting currently working, or not currently working for reasons other than illness or disability.

Poor self-reported health: five responses to the question “In general, how would you say your health is?”—excellent, very good, good, fair, poor dichotomized as follows: 1) fair or poor versus 2) good, very good, or excellent.

Health care utilization (self-reported): hospitalization in previous year (yes/no), number of visits to a general practitioner (GP) in previous year recoded into ‘4 or more’ and ‘less than 4’, number of visits to other another type of physician in previous year recoded into ‘4 or more’ and ‘less than 4’. Consultation with nurse, chiropractor, physiotherapist, and alternative health care provider were originally included in the analyses but there was little variation between the conditions and utilization was small for all conditions, hence these results will not be presented in this report.

Health care utilization in the Ontario file: for the two years following the survey date for respondents aged 15 or older: any inpatient hospital admission (yes/no), any same day surgery (yes/no), number of visits to a general practitioner recoded into ‘8 or more’ and ‘less than 8’, number of visits to

specialists recoded into ‘8 or more’ and ‘less than 8’, number of laboratory and x-ray procedures recoded to ‘8 or more’ and ‘less than 8’, and for those aged 65 or older, number of Ontario Drug Benefit (ODB) claims recoded into ‘25 or more’ and ‘less than 25’.

2.5 Statistical Analyses

Data were analysed using the statistical package SAS, version 3.10, release 6.08. Each respondent was assigned a weight by Statistics Canada which reflects the fact that each person in the survey represents more than one person in the population and takes into account the two-stage cluster sample design used in the survey. All estimates from the NPHS respondents can be interpreted as representative at the national level. Estimates from the Ontario file can be interpreted as representative at the provincial (Ontario) level. Statistical significance was tested using rescaled weights to provide a more accurate estimate of variance. Rescaled weights were calculated as each respondent’s weight divided by the mean of all respondents’ weights. The probability of a type I error (alpha) was set at 0.01 rather than 0.05 for tests of statistical significance to be more conservative, since the sample size is large. The coefficients of variation for all estimates were checked using the tables provided by Statistics Canada in the NPHS user’s manual. Estimates with coefficients less than 16.6% are releasable with no qualification. Coefficients between 16.6% and 25.0% are releasable with qualification (indicated by ‘q’ in tables). Estimates with coefficients of variation larger than this or whose unweighted estimates were based on less than 30 respondents are not releasable (indicated by ‘--’ in tables).

It is important to note that due to the manner in which the questions were asked in the NPHS, the reporting of various outcomes cannot be attributed to any specific health condition(s). For example, participants were asked if they had spent a night in a hospital in the previous 12 months but not the reason for the hospitalization. Although causation cannot be

shown, associations can be examined.

Descriptive analyses were performed to determine the prevalence of different chronic conditions, and the proportion of those people with the different chronic conditions who reported the various outcomes. These estimates were adjusted for age and gender to control for confounding by these factors. Direct standardization was employed for this adjustment, using the age and gender distribution of those with any of the 11 chronic conditions examined in this study as the ‘standard population’.

In order to examine the associations between the outcomes and the different chronic conditions, controlling for other factors, multiple logistic regression analyses were used. Outcomes which were ordinal or continuous level, were recoded into dichotomous variables based on the frequency distributions and logical cut points, as described in section 2.4. The odds ratios for each outcome were determined for each chronic condition, controlling for age, gender, and educational level attained. Income was not used as a covariate in the equations due to the large proportion of missing data. Odds ratios (OR) were plotted against the number of people in the population with each chronic condition who reported each outcome, in order to visually compare the risks of outcomes occurring for individuals with each condition and the absolute numbers of people experiencing the outcome in the population. Finally, the attributable risks (AR) were calculated using the adjusted odds ratios and the prevalences of the conditions. The AR is defined as the proportion of cases (e.g. disability) in the population associated with the risk factor (e.g. arthritis) (23). The AR takes into account the risk of the outcome associated with each condition, and the prevalence of the disease in the population. A condition which is associated with high risk of a particular outcome but is very rare, will have a lower attributable risk than one with high risk and high prevalence. The formula used was:

attributable risk = $p(OR-1) / 1 + p(OR-1)$ where p = prevalence of the condition and OR = odds ratio (adjusted for age, gender, and educational level).

3.0 RESULTS

3.1 Prevalence and Profile of People with the 11 Chronic Conditions

Forty-nine percent of people reported having at least one of the 11 chronic conditions analysed in this study. The percentage of people having different numbers of the chronic conditions in the different age categories is shown in Figure 1. The number of chronic conditions increased with age; among those aged 15 to 24, 62.9% had no chronic conditions, while among those aged 75 or older, only 21.5% were free of any chronic condition. Conversely, among those aged 15 to 24, 1.3% had four or more chronic conditions, while among those aged 75 or older, 10.9% had four or more chronic conditions. The demographic characteristics of those with different numbers of chronic conditions are shown in Table 1. Females tended to have more chronic conditions, as well as those with lower education and lower income.

Figure 2 shows the unadjusted and adjusted (for age and gender) prevalences of the 11 chronic conditions. Allergies were the most prevalent condition with 17.7% of the population affected, back problems were the second most prevalent (14.6%), and arthritis/rheumatism the third most prevalent (13.4%) (unadjusted). The least common condition was diabetes, with 3.0% of the population affected (unadjusted). After adjusting for age and gender, the prevalence of arthritis was highest at 17.1%, followed by allergies (16.9%) and back problems (15.5%). Bronchitis or emphysema was least common, affecting 3.6% of people. Table 2 shows the prevalence of the conditions by age group and gender. Several conditions increased in prevalence with age, specifically arthritis (Figure 4a), heart disease, hypertension, and diabetes. The prevalence of allergies (Figure 4b), asthma, and migraine declined with age, and the prevalence of back problems (Figure 4c), stomach/intestinal ulcers, sinusitis, and bronchitis/emphysema levelled in

middle to older ages. Allergies were the most prevalent conditions among those aged 15 to 44. Arthritis was the most prevalent among those 55 or older, followed by back problems, high blood pressure, and heart disease.

The prevalences of most of the 11 chronic conditions were similar in the Ontario file and the total NPHS (Appendix Table A). The largest difference was for allergies, with an unadjusted prevalence in the Ontario file of 20.0% (compared to 17.7% in the NPHS). Both files had a similar age and gender distribution; however, the proportion of married people was slightly higher in the total NPHS. The education and income distributions were similar (Appendix Table B).

The number of people in the population with different chronic conditions depends not only on the overall prevalence, but also on the age profile of people with that condition. As shown in figure 3, the majority of people in the Canadian population are aged 45 years or less. This means that conditions which have a high prevalence in the elderly but low prevalence among young and middle-aged people will affect fewer people in the population than conditions that have their highest prevalence in the middle ages and younger age groups. Although the prevalence of arthritis was highest in the oldest age category, it affected more people, in terms of numbers, in the middle ages due to the relatively large number of middle-aged people in Canada (Figure 4a). Hypertension, heart disease, and diabetes also followed this pattern. Allergies (Figure 4b) affected a large number of people in the population because of their high prevalence, particularly in the largest age categories (young adults to middle-aged people). Asthma and migraine also followed this pattern. Sinusitis, stomach/intestinal ulcers, and bronchitis or emphysema followed approximately the pattern of back problems (Figure 4c) in the population with prevalence levelling in the middle ages, and the majority of people affected being in the middle years of life.

3.2 Relative Impacts of the 11 Chronic Conditions - Percentage of Those with Each Condition Reporting Outcomes

In order to make comparisons of the impacts of different conditions on different outcomes, the proportions reported in the next section have been adjusted for age and gender to control for differences in the age distributions of the people with various conditions and outcomes.

Table 3a shows the unadjusted and the age and gender adjusted percentages of people with each condition who reported the various outcomes included in this study, as well as the rankings of the adjusted percentages for each condition. Table 3b shows the same results for the health care utilization in the Ontario file. It should be noted that people who reported the various outcomes may have had more than one chronic condition, and the condition responsible for causing the outcome to be reported cannot be determined from this data. Therefore, people with comorbidity may be counted more than once in the outcomes, causing the proportions of people with certain outcomes to be larger than would be expected. For example, 28% of people with allergies reported long-term disability, a higher proportion than would be expected for this condition. It is likely that people with allergies who reported disability have other comorbid conditions.

3.2.1 Pain and Long-Term Disability

Over one third of people with arthritis, back problems, heart disease, and bronchitis or emphysema reported pain which prevents activity (Table 3a). Smaller proportions of people with allergies, asthma, sinusitis, and high blood pressure reported pain which prevents activity. The top four conditions reporting a score of 'disabled' on the HUI were for people with bronchitis/emphysema (43.7%), arthritis (42.5%), heart disease (42.4%) and

stomach/intestinal ulcers (40.8%). Over two-thirds of the people with heart disease reported long-term disability (restriction of activity), followed by 55.7% for people with bronchitis or emphysema, 51.3% for arthritis, and 49.6% for back problems. A surprisingly high proportion of people with allergies (34.8%), high blood pressure (38.1%), and sinusitis (43.2%) also reported long-term disability.

3.2.2 *Two Week Disability*

People with bronchitis or emphysema ranked highest (37.6%) for two week disability, followed by people with stomach/intestinal ulcers (31.7%) and migraine (30.9%). Arthritis and heart disease, which ranked highly for long-term disability, did not rank highly for two week disability.

3.2.3 *Labour Force Participation*

Among people aged 20 to 64, the condition for which the largest proportion of people reported not being in the labour force due to illness or disability was heart disease (28.5%) (Table 3a). About 15% of people with bronchitis or emphysema and diabetes, and 13% of people with arthritis reported not being in the labour force due to illness or disability. The lowest proportion was for people with allergies (4.8%).

3.2.4 *Self-Reported Health*

Over 30% of those with heart disease, bronchitis/emphysema, and diabetes reported fair or poor health (Table 3a). The conditions for which the lowest proportions of fair or poor health were reported were sinusitis (21.6%) and allergies (16.4%). Among people with arthritis, 24.7% reported fair or poor health.

3.2.5 *Use of Health Services (Self-reported)*

The conditions associated most often with admission to a hospital in the previous year were heart disease (23.2%), diabetes (22.9%), and stomach/intestinal ulcers (22.7%) (Table 3a). Hospitalization was less common among people with allergies, asthma, back problems, and arthritis. A high proportion of people with any of the chronic conditions reported visiting

a general practitioner four times or more in the previous year, with the highest proportion for diabetes (66.1%), followed by bronchitis or emphysema (57.7%), high blood pressure (56.9%), and stomach/intestinal ulcers (55.4%). The proportions of people that reported visiting another type of physician four or more times in the previous year were lower. The highest proportion was for heart disease (22.1%), and arthritis ranked fifth at 12.9%.

3.2.6 *Use of Health Services in the Ontario file*

Similar to the self-reported data for all of Canada, the condition associated with the largest proportion of people in Ontario being admitted to a hospital in the two years following the survey was heart disease (33.7%), followed by diabetes (31.8%) and stomach/intestinal ulcers (26.5%) (Table 3b). Arthritis ranked seventh at 18.2%. The smallest proportion was for people with allergies, at 14.4%. Sinusitis and migraine also ranked very low.

The largest proportion of people who had same day surgery was for people with stomach/intestinal ulcers (26.3%), followed by back problems (23.8%), sinusitis (22.4%), and arthritis (21.1%). The lowest proportions were for heart disease (16.6%) and migraine (16.5%); however, the differences in the proportions for the different conditions were generally small.

The majority of people with any of the conditions had eight or more visits to a general practitioner and the differences between conditions were not large. The highest proportion was for diabetes (76.0%), followed closely by sinusitis (72.8%), and asthma (72.7%). People with arthritis ranked seventh with 69.4%. For most of the conditions, the majority of people also had eight or more visits to a specialist. The largest proportion was for people with heart disease (72.2%), followed by people with diabetes (67.4%). The next highest proportion was for people with asthma, which was considerably lower at 52.1%. People with arthritis ranked in the middle (fifth) with 48.8% reporting eight or more visits to a specialist.

Over half of all people with any of the conditions had eight or more lab/x-ray procedures. The proportion with eight or more lab/x-ray procedures was highest for people with heart disease (71.5%), followed by diabetes (68.8%), and high blood pressure (62.9%). People with arthritis ranked fifth at 62.0%. The lowest proportions were for people with asthma (55.1%) and allergies (55.2%).

Among people aged 65 or older, over half of those with any condition had 25 or more ODB claims. The highest proportion was for people with diabetes (84.7%), stomach/intestinal ulcers (84.1%), and asthma (81.8%). The lowest proportions were for arthritis (63.9%) and back problems (66.7%). Prescription drug claims were high for people aged 65 or older with any of the conditions, and it is likely that people with these high numbers of claims over the two years have multiple conditions requiring medications.

3.3 Odds Ratios for Reporting Outcomes Among Those with the 11 Chronic Conditions and Attributable Risks for the Outcomes

The odds ratios (OR) for reporting the various outcomes for the different conditions, controlling for age, gender, and education, and the numbers of people in the population with the conditions who report the outcomes, are shown in Figures 5a through 5i. Table 5a shows the odds ratios (OR) and attributable risks (AR) for the different outcomes for the entire NPHS data set and Table 5b shows the health care utilization results in the Ontario file.

3.3.1 Pain and Long-Term Disability

The results of the ORs were similar to those of the proportions (Table 4a). People with arthritis, back problems, and bronchitis or emphysema had the highest ORs for pain preventing activity (5.68, 5.23, and 3.66 respectively). The lowest OR was for people with allergies (1.68). It can be seen in Figure 5a that the numbers of people with the different conditions who reported pain preventing activity

were entirely dependent on the prevalence of the conditions. For example, the number of people in the population with bronchitis or emphysema was relatively small, even though the odds of reporting pain were large. Conversely, the number of people with arthritis and back problems was very high, due to the strong association between these conditions and pain, and the large number of people with these conditions.

The range of ORs for scoring disabled on the HUI was less variable than for pain. The largest ORs were for people with arthritis (3.60) and back problems (3.19), and bronchitis or emphysema ranked third (3.00) (see also Figure 5b). Heart disease had the highest OR for long-term disability (5.59), followed by bronchitis/emphysema (4.97), back problems (4.74), and arthritis (4.56) (see also Figure 5c).

The ARs for pain were the largest for arthritis (37.3%), back problems (37.0%), and migraine (13.8%). The ARs for other conditions were considerably lower. The largest ARs for scoring disabled on the HUI were also for arthritis, back problems, and migraine. The largest ARs for long-term disability were for back problems (31.5%), followed by arthritis (31.1%), and allergies (17.0%).

3.3.2 Two Week Disability

The largest OR for two week disability occurred for people with bronchitis/emphysema (3.43), followed by back problems (2.94) (Table 4a). People with heart disease, arthritis, migraine, and stomach/intestinal ulcers also had large ORs (see also Figure 5d). Back problems and arthritis also had the highest AR for two week disability (21.2% and 16.5% respectively), followed by allergies (11.8%).

3.3.3 Labour Force Participation

The ORs for not working due to illness or disability were largest for people with heart disease (5.48), followed by people with diabetes (3.95), bronchitis or emphysema (3.71), back problems (3.67), and arthritis (3.66) (Table 4a, Figure 5e). The smallest ORs were for people with sinusitis and allergies and

these were not statistically significant. The ARs were highest for back problems (32.0%), and arthritis (27.0%), while the AR for heart disease was 15.8%, for diabetes was 8.8%, and for bronchitis/emphysema was 7.5%.

3.3.4 Self-Reported Health

The highest OR for reporting fair or poor health occurred for people with bronchitis or emphysema (5.31), followed by heart disease (4.62), and migraine (3.55) (Table 4a). The OR for arthritis was also substantial (3.02) (Table 4a, Figure 5f).

The ARs for self-rated fair or poor health were highest for people with back problems (22.8%) followed by arthritis (20.4%). The ARs for the other conditions ranged from 15.7% for people with migraine, down to 5.2% for people with sinusitis.

3.3.5 Use of Health Services (Self-Reported)

The results for the ORs and the proportions showed similar patterns. People with heart disease had the largest OR (3.41) for hospitalization in the previous year (Table 4a). Arthritis ranked almost lowest for hospitalization (OR= 1.47). Despite the small odds ratios, the actual numbers of people reporting hospitalization were highest among those with allergies, arthritis, and back problems (Figure 5g). Diabetes and heart disease had the highest ORs for reporting four or more GP visits in the previous year (4.07 and 3.44 respectively), while the ORs for arthritis were lower (2.42). For visits to other physicians, people with heart disease had the largest OR (3.65), followed by people with bronchitis or emphysema (2.60).

The ARs for hospitalization in the previous year were all very low, suggesting that none of the chronic conditions contributed a great deal to the overall number of hospitalizations in the population. While the OR for hospitalization was highest for people with heart disease, the AR was highest for people with back problems (8.9%) followed by heart disease (8.4%). For visiting a GP four or more times in the previous year, back problems, high blood pressure, and arthritis were the three conditions with

the highest ARs, in contrast to the ORs, where diabetes and heart disease were the highest. The ARs for people with allergies, arthritis, and back problems ranked highest for having four or more visits to another physician in the previous year (12.8%, 11.3%, and 11.1% respectively).

3.3.6 Use of Health Services in the Ontario File ORs and ARs for these variables are shown in Table 4b. Figures 6a through 6e show the ORs plotted against the weighted estimated numbers of people in the population with each condition who experienced each health care utilization outcome.

Overall, ORs for hospitalization were low except for heart disease (2.93), stomach/intestinal ulcers (2.48), and diabetes (2.12). The proportions of hospitalization associated with the different conditions (AR) were also low. Although the OR for hospitalization for people with arthritis was only 1.43, the attributable risk was second (5.8%) only to heart disease (8.0%). Odds ratios for eight or more GP visits in the two years following the survey were highest for people with high blood pressure (2.72), heart disease (2.59), and diabetes (2.54). The OR for arthritis was relatively low (1.67). People with high blood pressure also had the highest AR (13.0%), for eight or more GP visits, followed by back problems (11.8%). The ORs for eight or more specialist visits were lower than the ORs for eight or more GP visits for most conditions, except for heart disease (3.55) and diabetes (2.66) which were higher than their ORs for GP visits. The ORs for eight or more lab/x-ray procedures were small for all conditions except heart disease (2.13) and diabetes (2.44). For prescription medications in people aged 65 or older, the highest OR was for people with diabetes (5.58), followed by heart disease (4.50), and stomach/intestinal ulcers (4.36). For people with arthritis, the OR ranked seventh (2.17), but the AR ranked third (14.3%).

4.0 DISCUSSION

Our results are in keeping with those of many other studies which demonstrate that arthritis

is a leading cause of disability (6,18-20,24-27). Although the outcomes in our study could not be attributed to specific conditions, the proportions of people with arthritis who reported disability outcomes were very high. In another Canadian study in which outcomes could be attributed to specific conditions, arthritis ranked first as a cause of long-term disability (6).

This study compared the relative impacts of several chronic conditions across several outcomes, in terms of impacts for individuals and impacts in the population. The two main findings were that:

different chronic conditions have their impacts on different outcomes
conditions which are strongly associated with negative outcomes are not always the same conditions which have large impacts in the population

In terms of the risk of the condition being associated with negative outcomes, our results demonstrate that different conditions have their impacts on different outcomes. In our study, people with high blood pressure and diabetes experienced high risks for health care utilization outcomes but lower risks for disability and pain. This is not surprising given the nature of these conditions and the medication management associated with them. Arthritis had moderate impacts for individuals for two-week disability, poor self-rated health, not currently being in the labour force due to illness/disability, and health care utilization, but large impacts on disability and pain. Other studies have also reported moderate impacts of arthritis for self-reported health (18), short-term disability (18) and health care utilization (19).

One condition which mirrors the patterns of arthritis very closely is back problems. This could be due to the high proportion of people who have both conditions, and to the fact that back problems would be expected to be associated with pain and disability in a similar way to arthritis. This study demonstrates that conditions which have the largest

impacts on individuals (as indicated by large odds ratios and large proportions reporting outcomes), do not always have the largest impacts in terms of numbers of people affected in the population and vice versa. For example, individuals with arthritis were less likely to report high health care utilization than individuals with heart disease or diabetes; however, as a group, more health care utilization was associated with arthritis than with heart disease or diabetes, as indicated by the high attributable risks for arthritis. This pattern was also seen for the variable 'not in the labour force due to illness/disability'. A relatively moderate risk of not being in the labour force combined with the high prevalence of back problems and arthritis caused these two conditions to have attributable risks of almost one third, yet the risk of not being in the labour force was much higher for people with heart disease. These apparent discrepancies are entirely due to differences in the prevalences of these conditions.

The importance of disease prevalence in terms of population impact of conditions has also been demonstrated in other studies. In the NHIS (1989-91), the absolute number of women in the population with arthritis who reported activity limitation (disability) was higher than for any other condition, even though other chronic conditions were associated with a greater likelihood of reporting disability (7). In another U.S. study of people aged 65 or older, arthritis ranked lower than visual and hearing impairments, cardiovascular diseases, diabetes, cancer, falls, and osteoporosis/hip fractures for restricted activity days. However, the attributable risk for people with arthritis was the second highest after falls. Another example of the discrepancy between numbers in the population and risk for individual was reported by Pope (1988), where musculoskeletal diseases ranked low compared to cardiovascular, respiratory and endocrine diseases for risk of perceived poor health, disability, and health service utilization (18). When estimates were adjusted for the prevalence of the conditions, musculoskeletal diseases ranked highest for all

outcomes except restricted activity days.

Our prevalence estimates for arthritis and other chronic conditions were similar to those found in surveys in the U.S. (17). One notable difference between our data and U.S. studies is the extremely high prevalence of sinusitis in the U.S. which was not seen in our study. In this report we have not attempted to compare the prevalence of arthritis in Canada to countries other than the U.S. The NPHS is comparable to the U.S. population health surveys in design and representativeness of results to the entire country; however, it is more difficult to compare North American data to other countries which have used different methodologies.

There are some limitations of our analysis of the NPHS. Conditions were self-reported and could not be verified; however, the survey asked respondents to report a condition only if it had been diagnosed by a health professional. People with mild forms of conditions may not seek health care and hence not be counted in prevalence estimates. Fatal conditions such as heart disease may have been under-represented and the impacts of fatal conditions may have been underestimated since only survivors who may have less severe disease were captured in this survey.

The use of the odds ratio rather than the relative risk in the calculation of the attributable fractions may not be entirely appropriate since the outcomes were not rare. This may have caused the attributable risks to be inflated, precluding their generalizability to other contexts. However, the calculations were done in the same manner for all outcomes across all conditions, for the purpose of comparing different conditions within each outcome.

In our study, eleven chronic conditions were compared for their relative impacts; however, there are other chronic conditions we did not examine, and a considerable proportion of people with none of the eleven conditions reported some outcomes. The presence of some conditions we did not study may explain some of the observed associations between conditions such as allergies and sinusitis which are usually considered to be mild, and outcomes such as

long-term disability and hospitalization. For example, although approximately one-half to over three-quarters of people with any of the chronic conditions had eight or more GP visits, specialist visits, and lab or x-ray procedures in the two years following the survey, odds ratios were not correspondingly high. These results suggest that a large number of people without the conditions we studied, also experienced these outcomes. Other literature has reported that acute conditions accounted for more office-based physician visits than chronic conditions (19). The presence of multiple chronic conditions (comorbidity) for some people may also partially explain some of the associations observed. For example, a person with allergies who reported disability, may also have arthritis or back problems. Comorbidity has implications for the management of chronic conditions. Given the high prevalence of arthritis, it is more likely that a person seeking health care for a heart problem will have comorbid arthritis, a highly prevalent condition, than comorbid bronchitis or emphysema, more rare conditions. The presence of comorbid conditions may influence the management of chronic conditions in many ways such as alterations to medication regimens and provision of different levels of care for people who are in hospital.

Caution must be used when inferring cause and effect relationships in this study, due to the cross-sectional nature of the survey. It is likely that most diseases precede negative health outcomes, but this is not necessarily the case. For example, for conditions such as heart disease or hypertension, activity restriction and immobility could exacerbate the disease. In addition to this limitation, the outcomes reported by respondents were not attributed to the specific conditions in the study.

The results of this study demonstrate that arthritis is highly prevalent in the population and has large impacts on individuals in terms of pain and disability, and moderate impacts in terms of several other health outcomes and health care utilization. When taking into account the prevalence of conditions, the impacts of arthritis in the population,

are large across all outcomes including health care utilization. Back problems mirror the pattern of arthritis impacts. Conditions such as heart disease, bronchitis or emphysema, and diabetes are strongly associated with poor health outcomes and health care utilization in individuals; however, their impacts in the population are relatively small, due to their lower prevalence.

It is a common perception that conditions such as heart disease, while severe and life-threatening for individuals, also have the greatest public health impacts. However, the greatest proportion of people in the population who experience disability, pain, poor health, being out of the labour force due to illness or disability, and increased health care utilization are people with arthritis and back problems. The results of the present study shed considerable light on the relative impacts of different chronic conditions and their importance in setting priorities for maintaining and improving the health of the population.

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Table 1: Demographic characteristics of people aged 15 and older with different numbers of the 11 chronic conditions in the Canadian population

	none (%)	one (%)	two (%)	three (%)	four or more (%)
age					
15-24	62.9	24.9	8.0	2.9	1.3
25-34	60.5	24.6	8.9	3.9	2.2
35-44	57.3	26.1	9.8	4.4	2.5
45-54	49.0	29.0	12.6	5.9	3.5
55-64	36.3	32.0	15.4	9.2	7.2
65-74	28.9	30.7	20.4	11.0	9.0
75+	21.5	34.0	23.5	10.1	10.9
gender					
male	52.0	49.9	44.4	38.7	31.7
female	48.0	50.1	55.6	61.3	68.3
education					
primary	5.2	8.0	9.6	14.7	14.2
secondary	38.6	36.9	35.8	35.2	39.0
college/trade/some university	41.6	40.8	41.9	40.8	38.1
university graduate	14.6	14.3	12.8	9.4	8.7
income					
lowest	5.4	5.8	6.2	6.3	11.3
lower-middle	11.3	11.7	14.1	13.6	19.2
middle	28.9	28.6	31.3	33.4	35.0
upper middle	37.5	36.6	33.9	34.0	27.7
highest	16.9	17.4	14.6	12.7	6.8

Data from the Canadian National Population Health Survey, 1994/95

Table 2: Age and Gender Specific Prevalence Rates of the 11 Chronic Conditions (per 100 Population) among those aged 15 or older in the Canadian Population

The 11 Chronic Conditions (listed in order of decreasing age and gender adjusted prevalence)											
AGE CATEGORY	arthritis/ rheumatism	allergies	back problems	high blood pressure	migraine	asthma	heart disease	sinusitis	stomach/ intestinal ulcers	diabetes	bronchitis or emphysema
15-24 (both)	1.8(q)	22.1	7.4	0.7(q)	6.9	10.3	--	2.0(q)	1.7(q)	0.3(q)	2.0(q)
male	1.1(q)	21.3	5.9	--	5.2	9.4	--	1.3(q)	1.3(q)	--	1.3(q)
female	2.5	23.0	9.0	--	8.7	11.2	--	2.6	2.0(q)	--	2.6
25-34 (both)	3.5	21.1	12.5	1.3	8.2	6.9	0.8	4.2	2.5	0.6	2.0
male	2.5	19.8	12.7	1.3(q)	3.2	6.9	--	3.1	2.4	--	--
female	4.4	22.4	12.4	1.4(q)	13.1	7.0	1.3(q)	5.3	2.5	--	0.8(q)
35-44 (both)	6.8	18.4	14.4	4.2	8.9	4.7	0.7	4.7	3.5	2.4	2.5
male	6.0	15.6	14.7	4.5	5.5	3.9	0.9(q)	4.0	3.3	1.2(q)	1.8
female	7.7	21.2	14.1	3.9	12.4	5.4	0.5(q)	5.4	3.7	1.8	3.5
45-54 (both)	13.9	15.0	18.0	10.0	8.9	4.7	3.3	4.8	4.1	2.4	2.5
male	10.4	12.4	19.5	9.5	5.1	4.3	4.4	3.4	3.7	2.9	1.5
female	17.7	17.7	16.4	10.5	13.0	5.1	2.1	6.3	4.7	1.9(q)	3.6
55-64 (both)	27.2	14.8	21.1	20.6	6.0	5.0	6.7	5.9	5.3	6.4	4.7
male	20.4	12.1	22.2	18.4	3.0	4.3	8.7	3.7	5.8	6.9	5.0
female	33.1	17.3	20.1	22.6	8.7	5.5	5.0	7.9	4.9	6.0	4.5
65-74 (both)	37.5	12.4	18.5	28.0	4.6	4.9	13.7	5.1	5.3	11.1	5.4
male	31.2	8.9	18.6	25.0	3.0(q)	5.5	16.8	4.6	5.6	12.5	6.6
female	42.7	15.2	18.4	30.4	5.9	4.5	11.1	5.5	5.1	9.9	4.4
75+ (both)	45.4	9.8	17.2	29.8	3.3(q)	4.5	21.8	5.7	4.4	11.4	8.3
male	38.1	6.9(q)	14.2	20.6	--	4.5(q)	22.1	5.1(q)	4.0(q)	13.0	9.1
female	50.4	11.8	19.2	36.1	4.0(q)	4.5(q)	21.6	6.0	4.6(q)	10.4	7.8

q- qualifiable estimate -- not releasable due to large variance

Data from the Canadian National Population Health Survey, 1994/95

Table 3: Rankings of age and gender adjusted proportions of people with the 11 chronic conditions* who reported the selected outcomes, the adjusted proportions, and the unadjusted proportions, for people aged 15 or older in the Canadian population

	arthritis/ rheumatism (%)	allergies (%)	back problems (%)	high blood pressure (%)	migraine (%)	asthma (%)	heart disease (%)	sinusitis (%)	diabetes (%)	stomach/ intestinal ulcers (%)	bronchitis/ emphysema(%)
pain prevents any activity											
<i>rank</i>	1	11	3	8	6	9	4	10	7	5	2
adjusted	35.6	18.5	33.9	25.0	29.7	24.8	32.6	24.6	28.0	30.5	34.6
unadjusted	39.1	15.2	33.3	26.2	26.0	19.8	34.5	23.8	33.6	30.7	36.3
disabled score on HUI†											
<i>rank</i>	2	11	5	8	6	9	3	10	7	4	1
adjusted	42.5	26.0	40.8	33.8	38.8	33.4	42.4	32.7	37.8	40.8	43.7
unadjusted	48.9	21.3	39.7	37.9	34.3	28.5	49.0	32.2	44.0	40.8	46.2
long-term disability											
<i>rank</i>	3	11	4	10	9	6	1	8	7	5	2
adjusted	51.3	34.8	49.6	38.1	42.8	48.3	68.3	43.2	43.5	48.8	55.7
unadjusted	54.0	29.3	49.3	41.6	37.0	44.0	67.9	42.0	50.9	48.5	58.7
two-week disability											
<i>rank</i>	8	11	4	10	3	6	5	7	9	2	1
adjusted	28.1	20.9	30.2	25.7	30.9	29.0	29.2	28.8	27.1	31.7	37.6
unadjusted	26.7	21.7	29.5	21.2	31.0	28.6	30.9	28.8	28.0	31.0	37.4
not currently in the labour force due to illness/disability (ages 20-64)											
<i>rank</i>	4	11	8	7	6	9	1	10	3	5	2
adjusted	13.1	4.8	10.8	11.6	12.1	9.8	28.5	5.9	15.4	12.2	15.5
unadjusted	14.0	4.3	10.8	11.6	10.2	8.0	23.8	6.4	18.3	12.4	14.3
poor self-reported health											
<i>rank</i>	7	11	8	9	5	6	2	10	3	4	1
adjusted	24.7	16.4	24.5	22.3	27.8	27.7	37.1	21.6	33.9	29.8	37.9
unadjusted	30.9	12.5	23.9	29.7	22.3	21.3	48.1	21.6	41.6	30.3	40.8
stayed overnight in hospital in previous year											
<i>rank</i>	10	11	7	6	8	9	1	5	2	3	4
adjusted	13.6	13.0	15.5	16.5	14.9	14.5	23.2	16.6	22.9	22.7	17.3
unadjusted	15.6	12.1	15.0	17.2	14.2	14.7	27.9	15.9	20.5	21.9	20.0
4+ GP‡ visits in previous year											
<i>rank</i>	7	11	8	3	10	6	5	9	1	4	2
adjusted	49.0	42.2	48.6	56.9	45.8	50.0	52.8	47.8	66.1	55.4	57.7
unadjusted	51.9	40.0	47.7	59.3	46.8	48.5	62.9	47.8	66.8	55.4	60.8
4+ other type of physician visits in previous year											
<i>rank</i>	5	9	8	4	10	7	1	6	11	3	2
adjusted	12.9	11.4	11.4	13.1	10.4	11.8	22.1	12.3	9.1	14.7	15.7
unadjusted	11.9	11.4	11.6	11.3	11.7	12.3	19.1	13.0	10.5	13.9	16.8

* listed in order of decreasing age and gender adjusted prevalence

Data from the Canadian National Population Health Survey, 1994/95

† Health Utility Index ‡ general practitioner

Table 4: Rankings of age and gender adjusted proportions of people with the 11 chronic conditions* with health care utilization outcomes, in the two years following the survey the adjusted proportions, and the unadjusted proportions, for people aged 15 or older in the Ontario file

	arthritis/ rheumatism	allergies	back problems	high blood pressure	migraine	asthma	heart disease	sinusitis	diabetes	stomach/ intestinal ulcers	bronchitis or emphysema
any hospital admission (excluding childbirth related)											
<i>rank</i>	7	11	8	4	10	6	1	9	2	3	5
adjusted	18.2	14.4	17.0	25.8	15.2	19.9	33.7	15.3	31.8	26.5	22.0
unadjusted	25.0	10.5	16.5	28.0	12.7	15.9	44.5	14.9	35.9	27.1	24.4
8 or more GP† visits											
<i>rank</i>	7	11	6	5	9	3	10	2	1	8	4
adjusted	69.4	63.9	69.8	71.5	68.9	72.7	66.1	72.8	76.0	68.9	72.1
unadjusted	75.0	59.8	69.0	81.7	69.3	66.0	83.7	74.6	83.0	68.6	77.4
8 or more specialist visits											
<i>rank</i>	5	11	7	6	9	3	1	8	2	4	10
adjusted	48.8	42.2	47.9	48.7	46.4	52.1	72.2	47.7	67.4	50.6	43.8
unadjusted	57.4	34.2	47.7	60.4	41.5	43.0	77.5	47.9	71.4	51.5	48.2
8 or more lab/x-ray procedures											
<i>rank</i>	5	10	7	3	4	11	1	9	2	6	8
adjusted	62.0	55.2	58.9	62.9	62.4	55.1	71.5	56.3	68.8	61.3	58.2
unadjusted	67.3	48.3	59.0	69.2	62.1	45.3	74.5	59.2	77.5	61.6	61.2
25 or more ODB‡ claims (among those aged 65 and older)											
<i>rank</i>	11	7	10	5	8	3	4	9	1	2	6
adjusted	63.9	69.3	66.7	75.6	68.3	81.8	82.1	68.1	84.7	84.1	69.8
unadjusted	65.5	68.2	65.2	76.1	72.4	80.1	80.8	69.0	84.7	84.6	69.7

* listed in order of decreasing age and gender adjusted prevalence

† general practitioner

‡ Ontario Drug Benefit Plan

Data from the Canadian National Population Health Survey, 1994/95

Table 5: Odds ratios and attributable risks (%) for the selected outcomes for people with the 11 chronic conditions*, a adjusted for age, gender, and education, among people aged 15 or older in the Canadian population

	arthritis/ rheumatism	allergies	back problems	high blood pressure	migraine	asthma	heart disease	sinusitis	diabetes	stomach/ intestinal ulcers	bronchitis or emphysema
pain prevents activity	5.68 37.3%	1.68 10.9%	5.23 37.0%	1.80 6.5%	3.19 13.8%	2.23 7.4%	2.50 5.4%	2.19 4.8%	2.47 4.2%	2.99 6.2%	3.66 7.6%
disabled score on HUI†	3.60 38.7%	1.35 5.9%	3.19 23.3%	1.61 5.0%	2.57 10.3%	1.96 5.9%	2.37 5.0%	1.84 3.4%	1.95 2.8%	2.52 4.8%	3.00 5.8%
long-term disability	4.56 31.1%	2.14 17.0%	4.74 31.5%	1.89 7.2%	2.82 11.7%	4.06 16.6%	5.59 14.9%	2.75 6.9%	2.57 4.5%	3.31 7.1%	4.97 11.0%
two-week disability	2.56 16.5%	1.75 11.8%	2.94 21.2%	1.56 4.7%	2.64 10.7%	2.46 8.7%	2.85 6.6%	2.28 5.1%	2.33 3.8%	2.62 5.1%	3.43 7.0%
not currently in the labour force due to illness/disability (ages 20-64)	3.66 27.0%	1.29(ns) n/a	3.67 32.0%	2.30 10.2%	3.30 14.4%	2.47 8.8%	5.48 15.8%	1.53(ns) n/a	3.95 8.8%	2.89 5.5%	3.71 7.5%
fair/poor self-reported health	3.02 20.4%	1.68 10.9%	3.12 22.8%	2.21 9.5%	3.55 15.7%	3.20 12.5%	4.62 12.1%	2.30 5.2%	3.44 6.8%	3.27 7.0%	5.31 11.8%
hospitalization	1.47 5.6%	1.41 6.8%	1.70 8.9%	1.68 5.6%	1.49 3.5%	1.71 4.4%	3.41 8.4%	1.62 2.5%	2.07 3.1%	2.49 4.7%	2.07 3.2%
4+ GP‡ visits in previous year	2.42 15.3%	1.93 14.3%	2.46 16.9%	3.31 16.7%	2.13 7.6%	2.59 9.4%	3.44 8.5%	2.08 4.3%	4.07 8.4%	2.85 5.8%	3.38 6.9%
4+ other type of physician visits in previous year	2.00 11.3%	1.82 12.8%	1.90 11.1%	1.69 5.7%	1.57 4.0%	1.88 5.4%	3.65 9.2%	1.84 3.4%	1.42 2.9%	2.16 3.7%	2.60 4.7%

ns - p value not significant at 0.01 level

n/a- attributable fraction not computed for non-significant OR

* listed in order of decreasing age and gender adjusted prevalence

† Health Utility Index

‡ general practitioner

Data from the Canadian National Population Health Survey, 1994/95

Table 6: Odds ratios and attributable risks (%) for the health care utilization outcomes for people with the 11 chronic conditions*, adjusted for age, gender, and education, among people aged 15 or older in the Ontario file

	arthritis/ rheumatism	allergies	back problems	high blood pressure	migraine	asthma	heart disease	sinusitis	diabetes	stomach/ intestinal uclers	bronchitis or emphysema
hospitalization	1.43 5.8%	1.08 (ns) n/a	1.32 (ns) n/a	1.67 5.5%	1.35 (ns) n/a	1.78 5.0%	2.93 8.0%	1.07 (ns) n/a	2.12 3.4%	2.48 4.8%	1.79 2.5%
8+ GP† visits	1.67 8.7%	1.45 8.3%	1.88 11.8%	2.72 13.0%	1.90 7.0%	1.98 6.3%	2.59 6.7%	2.11 4.4%	2.54 4.6%	1.69 2.3%	2.22 3.8%
8+ specialist visits	1.55 7.3%	1.21 (ns) n/a	1.70 9.6%	1.70 5.7%	1.60 4.7%	1.99 6.3%	3.55 10.3%	1.52 2.1%	2.66 4.9%	1.92 3.0%	1.33 (ns) n/a
8+ lab or x-ray procedures	1.48 6.4%	0.99 (ns) n/a	1.36 5.2%	1.58 4.8%	1.63 5.0%	0.97 (ns) n/a	2.13 4.8%	1.20 (ns) n/a	2.44 4.3%	1.56 (ns) n/a	1.24 0.8%
25+ ODB‡ claims (among those aged 65 and older)	2.17 14.3%	1.93 15.7%	1.80 10.8%	3.50 17.9%	2.39 (ns) n/a	3.54 14.7%	4.50 13.6%	1.90 (ns) n/a	5.58 12.4%	4.36 10.3%	1.90 (ns) n/a

ns - p value not significant at 0.01 level

n/a- attributable fraction not computed for non-significant OR

* listed in order of decreasing age and gender adjusted prevalence

† general practitioner

‡ Ontario Drug Benefit Plan

Data from the Canadian National Population Health Survey, 1994/95

Figure 1: The proportions of people with different numbers of the 11 chronic conditions in the different age categories among people aged 15 or older in the Canadian population

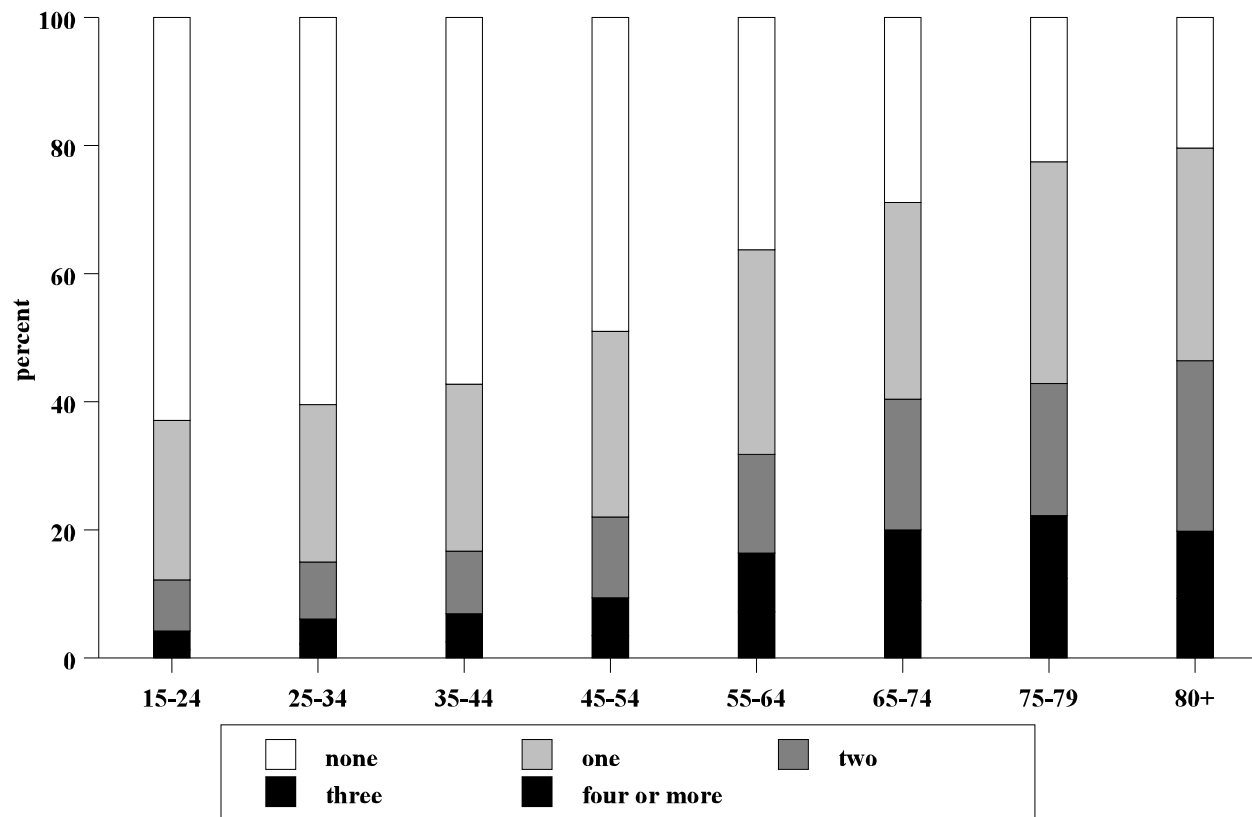


Figure 2: The unadjusted and adjusted (for age and gender) percent prevalence of the 11 chronic conditions among people aged 15 or older in the Canadian population

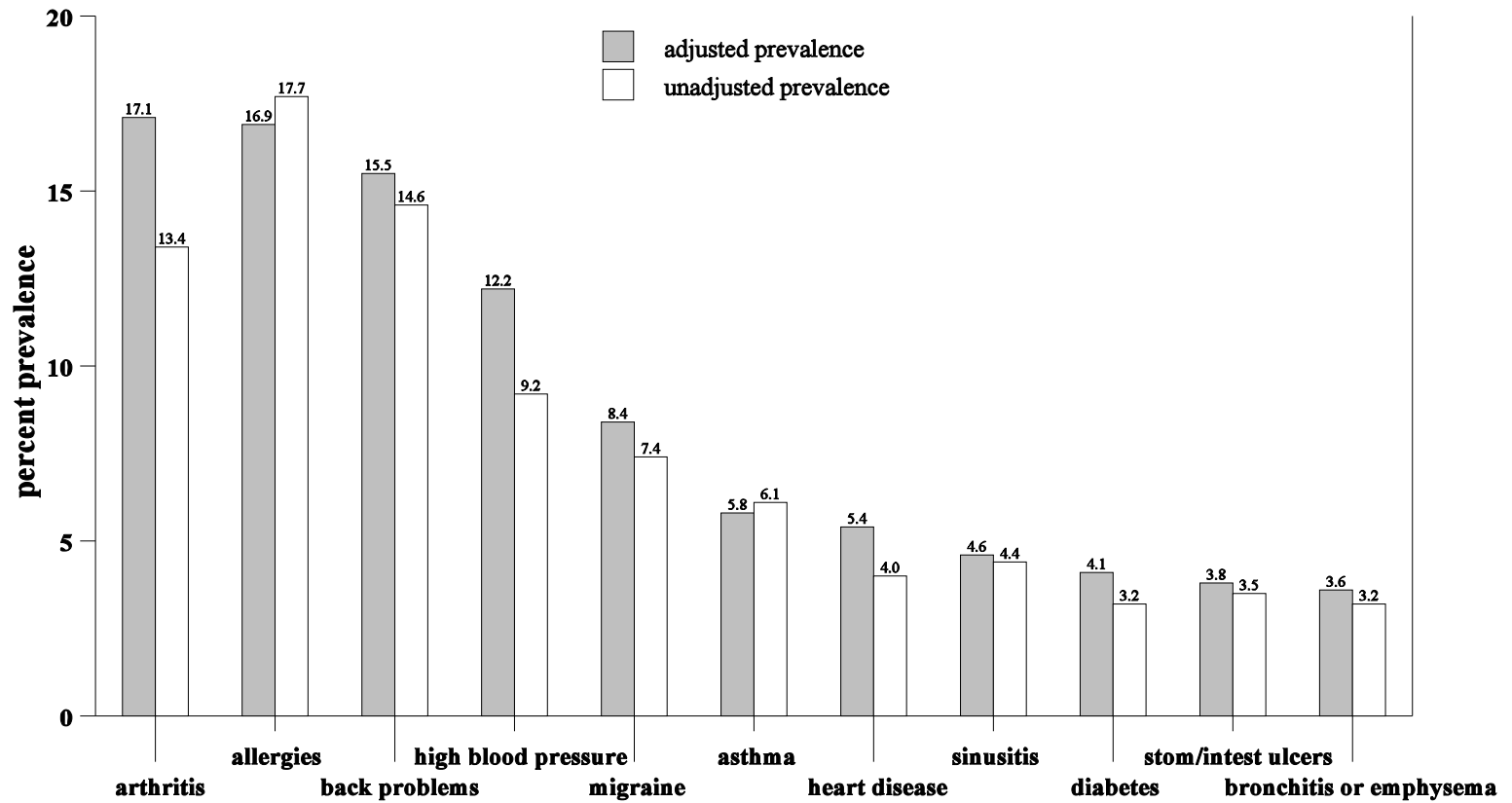


Figure 3: Age Distribution of the Canadian Population Estimated from the NPHS (1994/95)

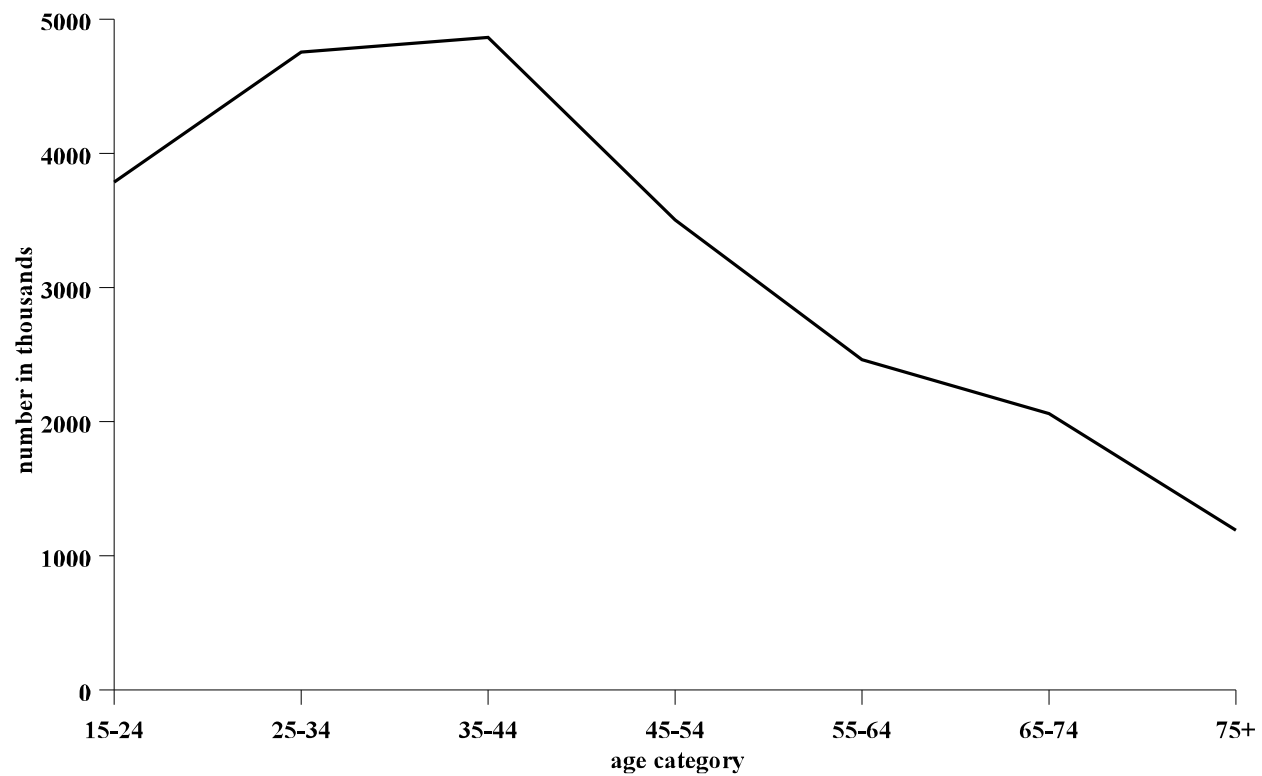


Figure 4: Percent prevalence and the numbers of people in the population in the different age groups with selected conditions among people aged 15 or older in the Canadian population: a) arthritis, b) allergies, c) back problems

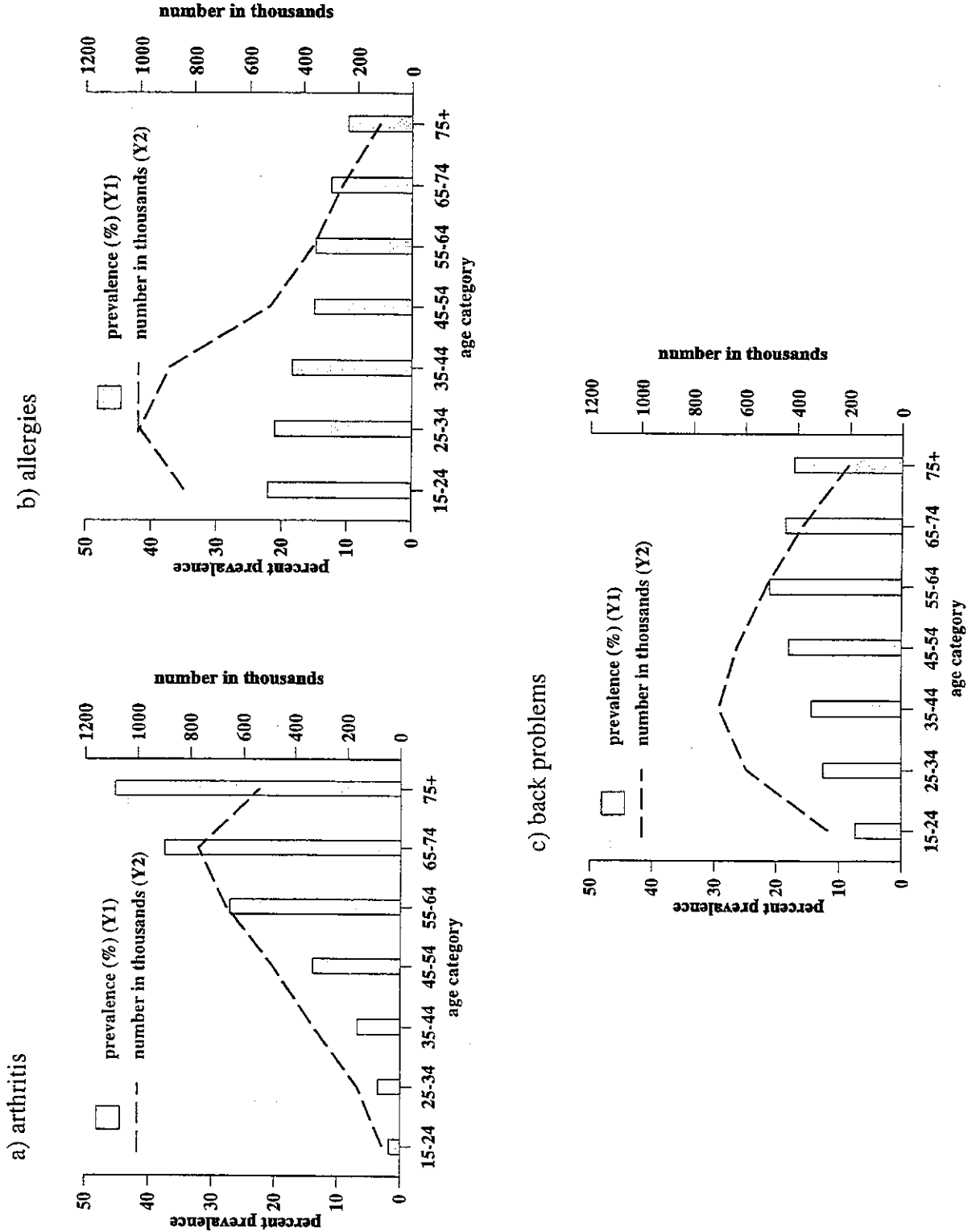
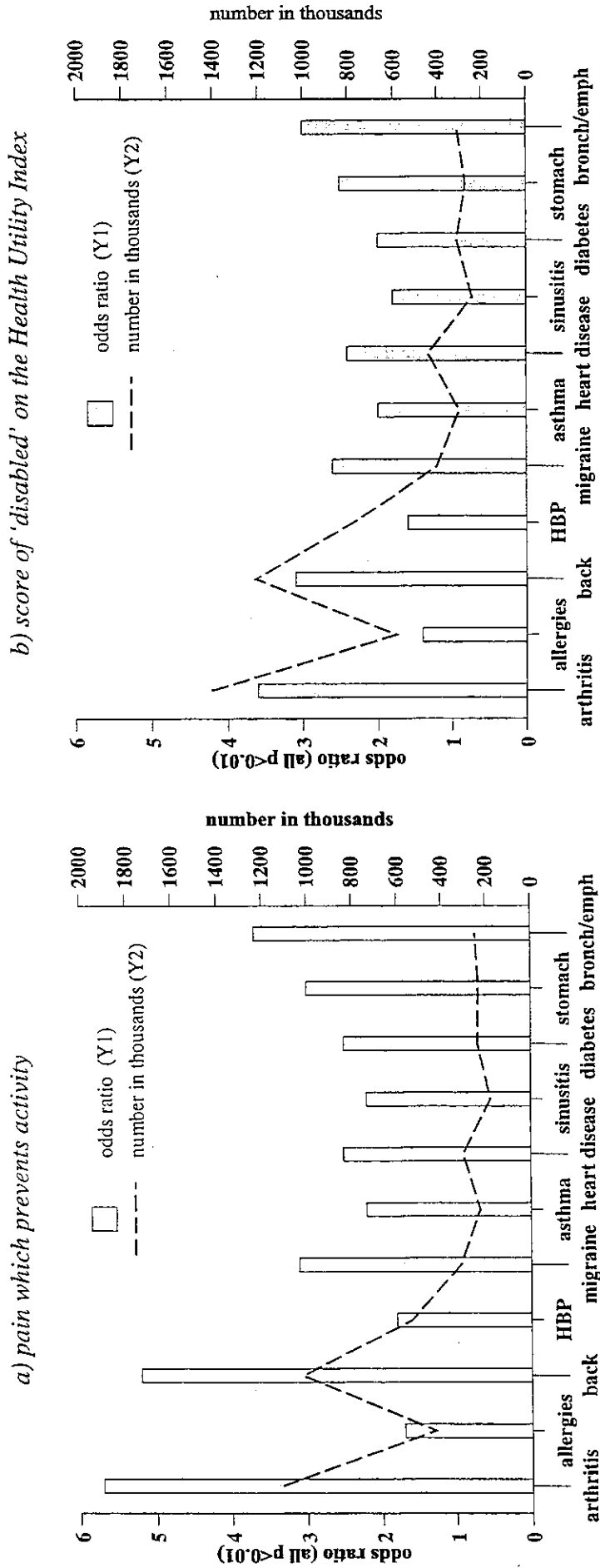


Figure 5: Adjusted odds ratios* and the numbers of people with the 11 conditions† who reported health outcomes among those aged 15 or older in the Canadian population

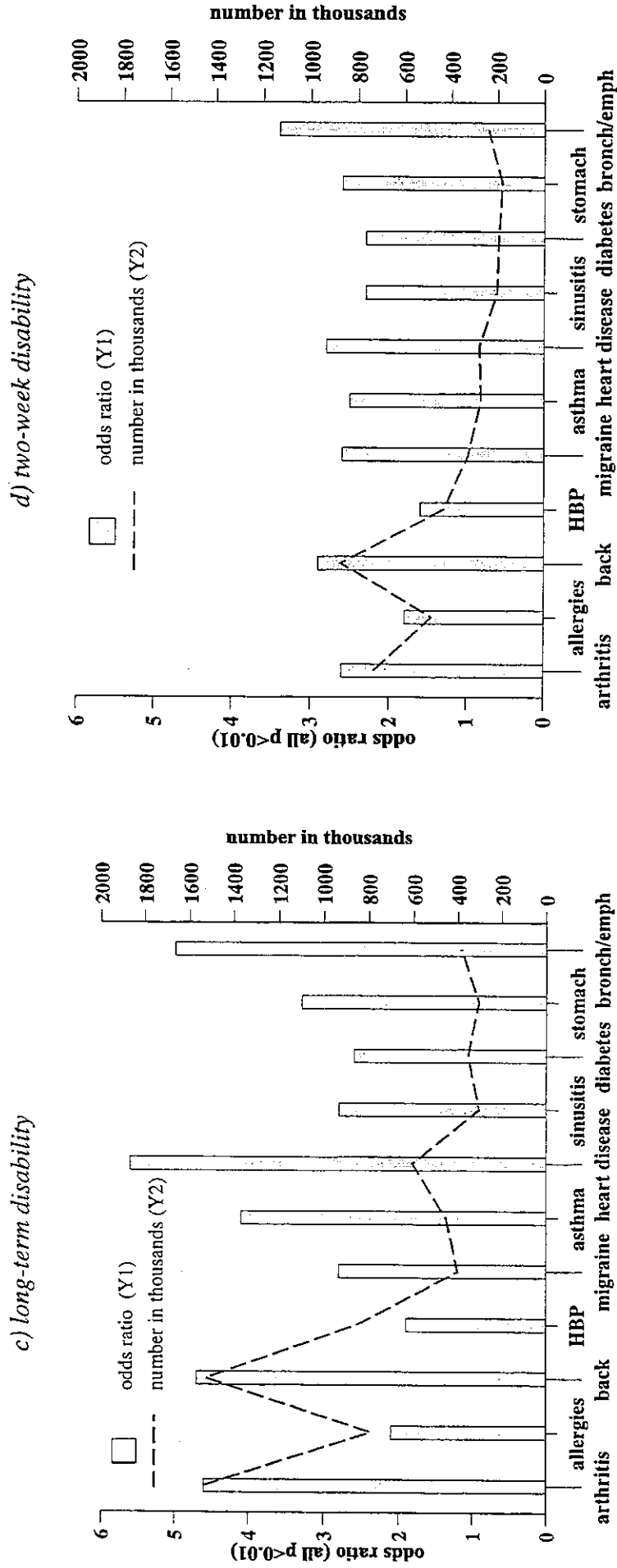


* adjusted for age, gender, and education

† listed in order of decreasing age and gender adjusted prevalence

back = back problems; HBP=high blood pressure; stomach=stomach or intestinal ulcers; bronch/emph = bronchitis or emphysema

Figure 5: Adjusted odds ratios* and the numbers of people with the 11 conditions† who reported health outcomes among those aged 15 or older in the Canadian population

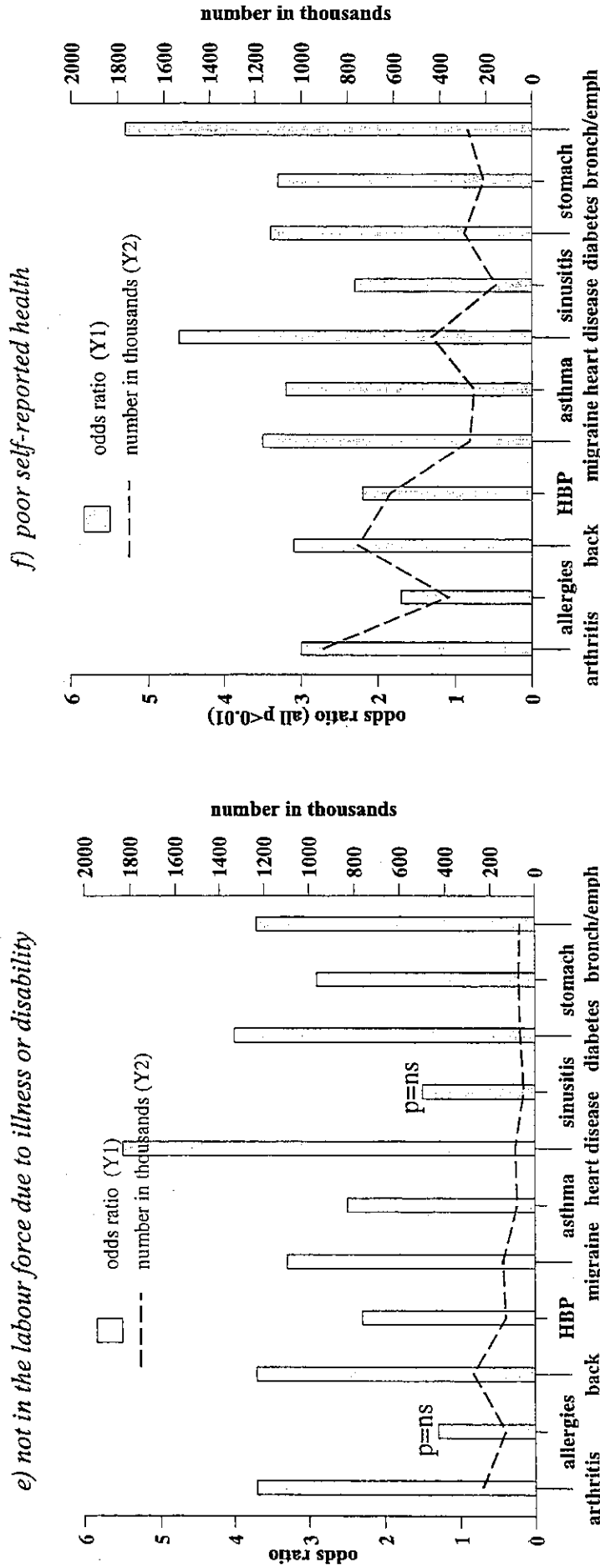


* adjusted for age, gender, and education

† listed in order of decreasing age and gender adjusted prevalence

back = back problems; HBP=high blood pressure; stomach=stomach or intestinal ulcers; bronch/emph = bronchitis or emphysema

Figure 5: Adjusted odds ratios* and the numbers of people with the 11 conditions† who reported health outcomes among those aged 15 or older in the Canadian population



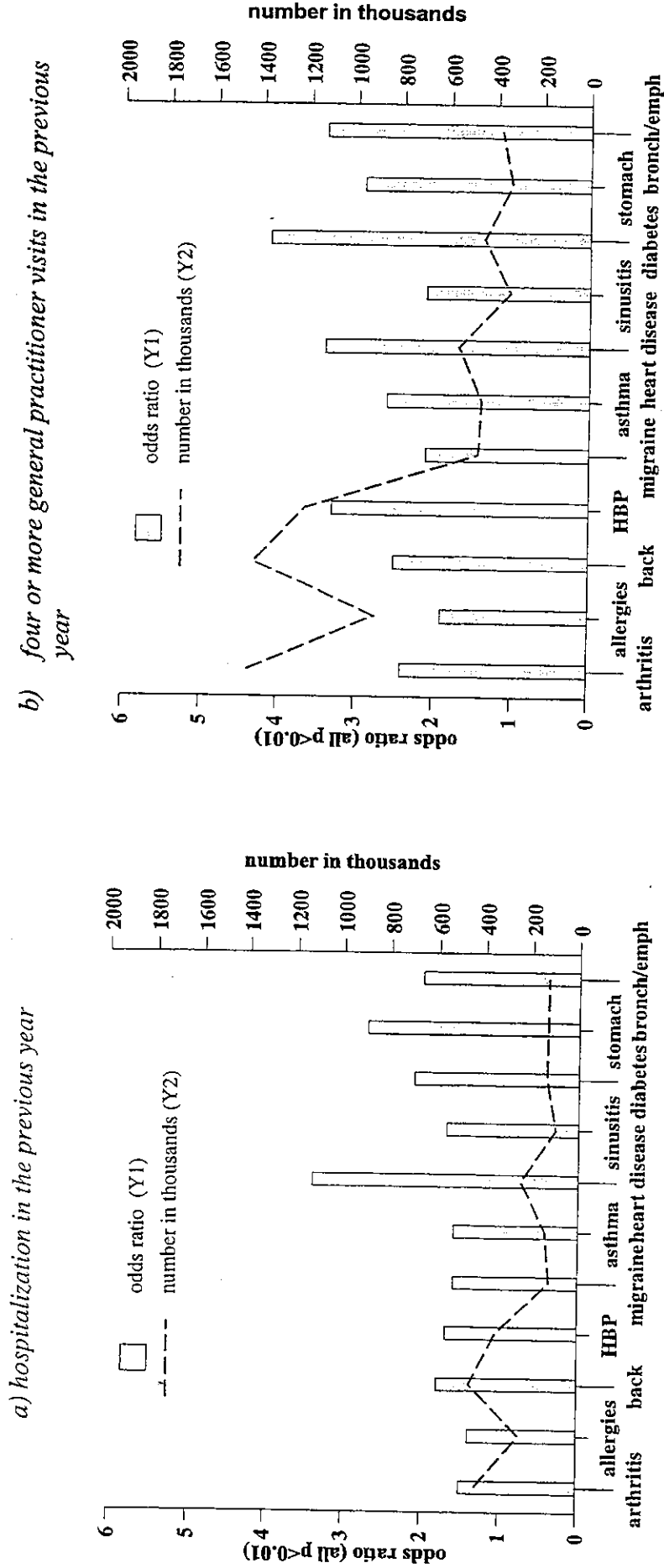
* adjusted for age, gender, and education

† listed in order of decreasing age and gender adjusted prevalence

ns = not significant, $p \geq 0.01$

back = back problems; HBP=high blood pressure; stomach=stomach or intestinal ulcers; bronch/emph = bronchitis or emphysema

Figure 6: Adjusted odds ratios* and the numbers of people with the 11 conditions† who reported health care utilization outcomes among those aged 15 or older in the Canadian population



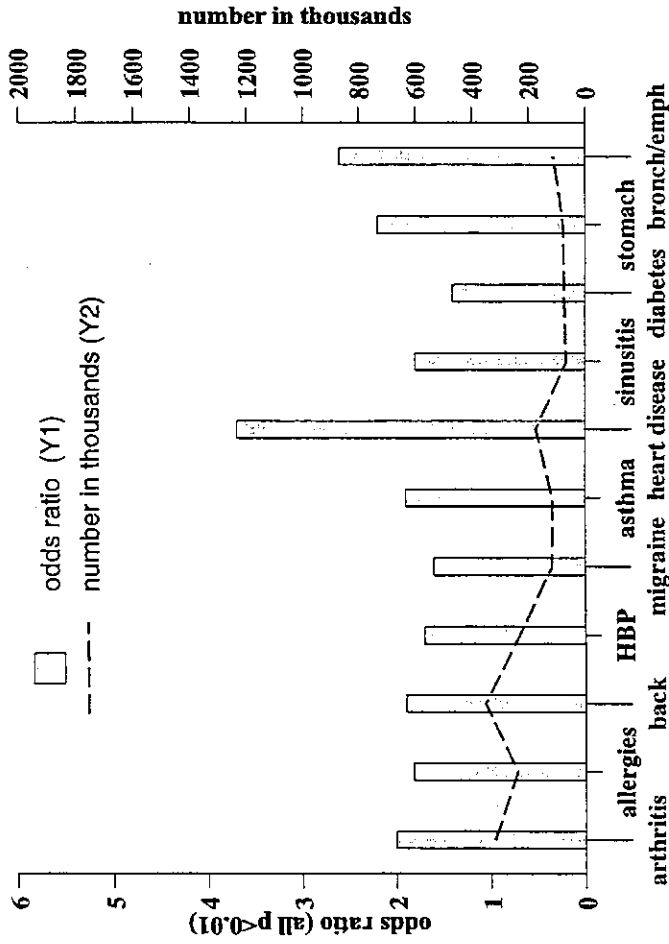
* adjusted for age, gender, and education

† listed in order of decreasing age and gender adjusted prevalence

back = back problems; HBP=high blood pressure; stomach=stomach or intestinal ulcers; bronch/emph = bronchitis or emphysema

Figure 6: Adjusted odds ratios* and the numbers of people with the 11 conditions† who reported health care utilization outcomes among those aged 15 or older in the Canadian population

c) *four or more visits to another type of physician in the previous year*



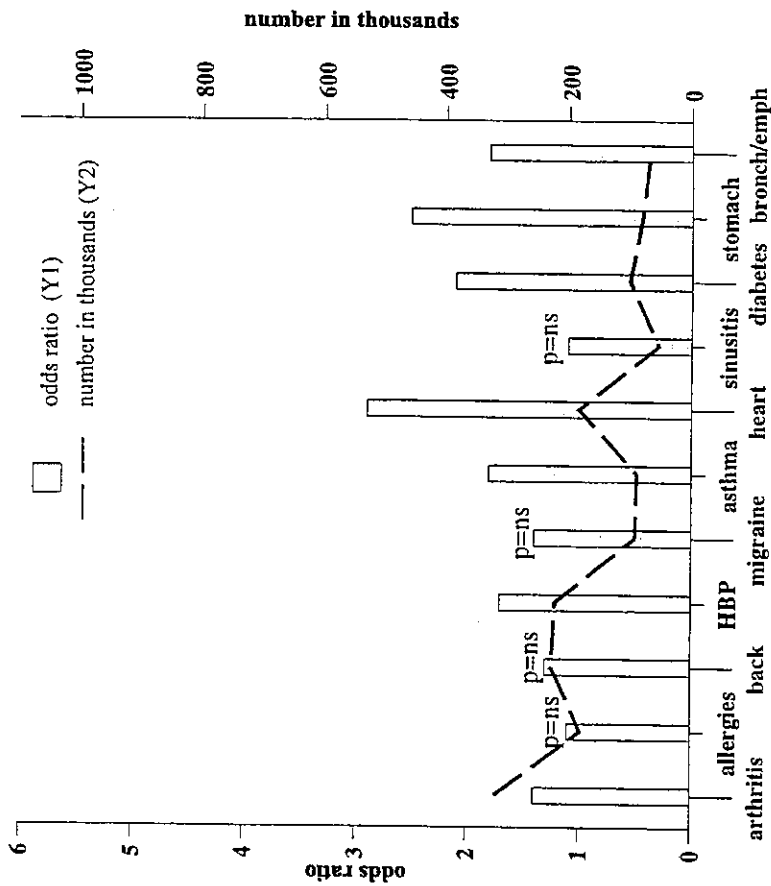
* adjusted for age, gender, and education

† listed in order of decreasing age and gender adjusted prevalence

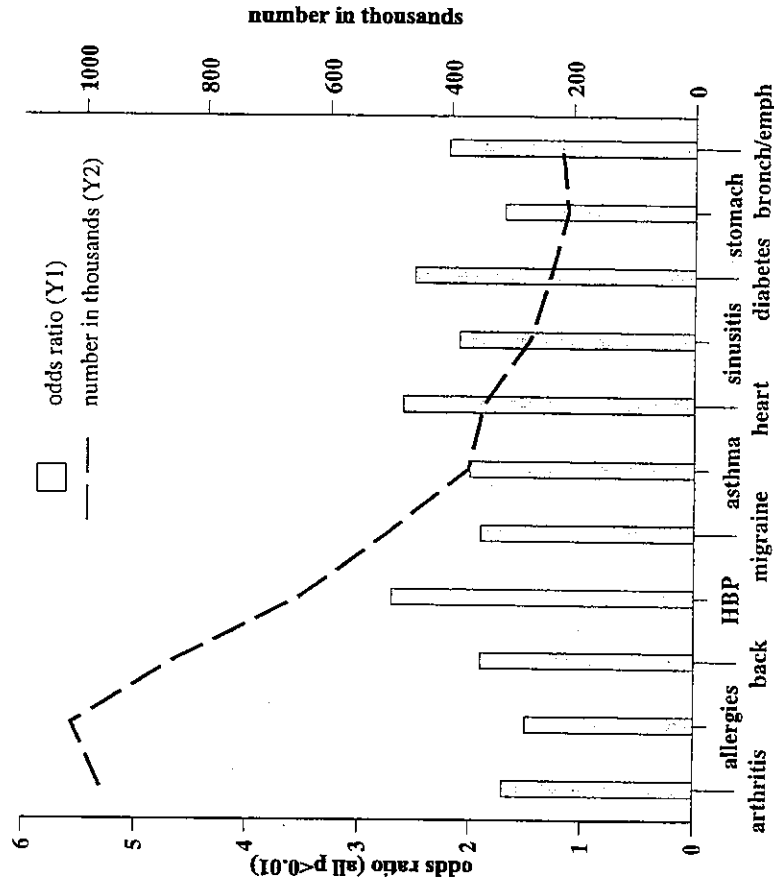
back = back problems; HBP=high blood pressure; stomach=stomach or intestinal ulcers; bronch/emph = bronchitis or emphysema

Figure 7: Adjusted odds ratios* and the numbers of people with the 11 conditions† with the health care utilization outcomes among those aged 15 or older in the province of Ontario

a) hospitalization in the two years following the survey



b) 8 or more visits to a general practitioner in the two years following the survey



* adjusted for age, gender, and education

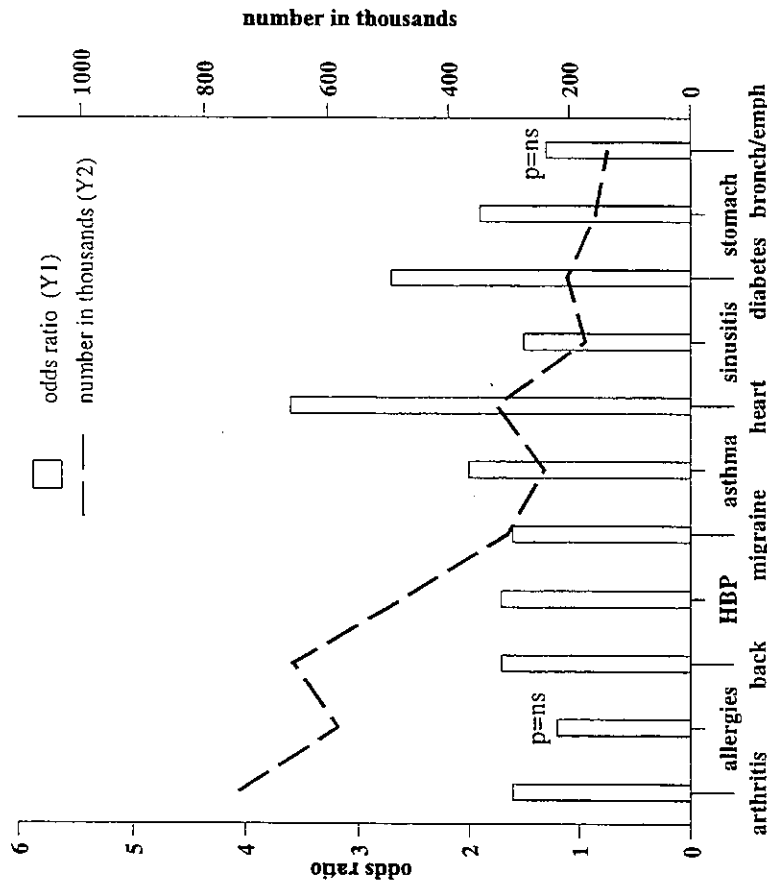
† listed in order of decreasing age and gender adjusted prevalence

ns = not significant, $p \geq 0.01$

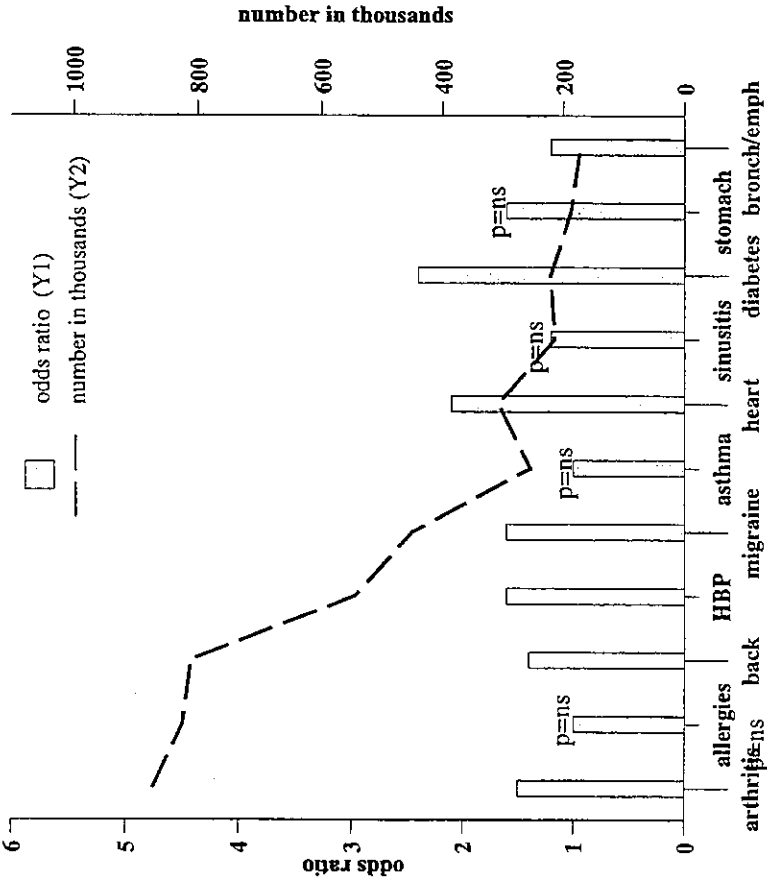
back = back problems; HBP=high blood pressure; stomach=stomach or intestinal ulcers; bronch/emph = bronchitis or emphysema

Figure 7: Adjusted odds ratios* and the numbers of people with the 11 conditions† with the health care utilization outcomes among those aged 15 or older in the province of Ontario

c) 8 or more visits to a specialist in the two years following the survey



d) 8 or more lab or x-ray procedures in the two years following the survey



* adjusted for age, gender, and education

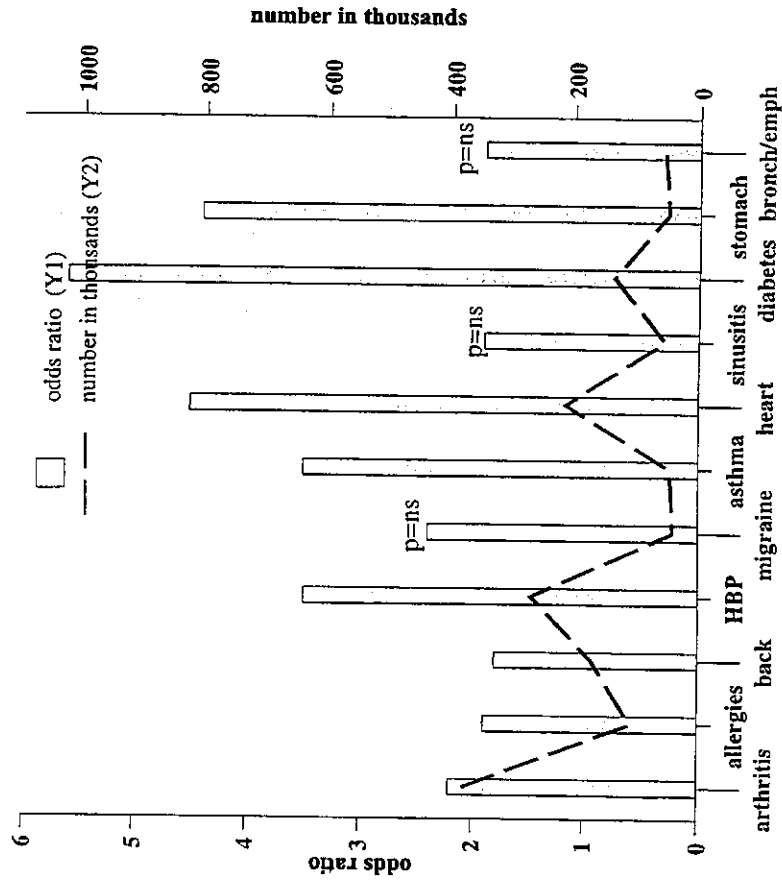
† listed in order of decreasing age and gender adjusted prevalence

ns = not significant, $p \geq 0.01$

back = back problems; HBP=high blood pressure; stomach=stomach or intestinal ulcers; bronch/emph = bronchitis or emphysema

Figure 7: Adjusted odds ratios* and the numbers of people with the 11 conditions† with the health care utilization outcomes among those aged 15 or older in the province of Ontario

e) 25 or more prescription medication claims in the two years following the survey among those aged 65 or older



* adjusted for age, gender, and education

† listed in order of decreasing age and gender adjusted prevalence

ns = not significant, $p \geq 0.01$

back = back problems; HBP=high blood pressure; stomach=stomach or intestinal ulcers; bronch/emph = bronchitis or emphysema

APPENDIX

- Table A: Prevalence of the 11 Chronic Conditions among respondents aged 15 years or older in the NPHS (representing all of Canada) and the Ontario File (representing people in the province of Ontario)
- Table B: Demographic Characteristics of Respondents aged 15 years or older in the NPHS (representing all of Canada) and People in the Ontario File (representing people in the province of Ontario)

Table A: Prevalence of the 11 Chronic Conditions among respondents aged 15 years or older in the NPHS (representing all of Canada) and the Ontario File (representing people in the province of Ontario)

condition	prevalence (%) in the NPHS	prevalence (%) in the Ontario File
allergies	17.7	20.0
arthritis or rheumatism	13.4	14.3
back problems	14.6	15.2
high blood pressure	9.2	8.7
migraine	7.4	8.3
asthma	6.1	6.8
heart disease	4.0	4.5
sinusitis	4.4	4.1
diabetes	3.2	3.1
stomach/intestinal ulcers	3.5	3.4
bronchitis or emphysema	3.2	3.2

Table B: Demographic Characteristics of Respondents aged 15 years or older in the NPHS (representing all of Canada) and People in the Ontario File (representing people in the province of Ontario)

	NPHS RESPONDENTS (percent in the categories)	ONTARIO FILE RESPONDENTS (percent in the categories)
AGE		
• 15-24	16.7	16.8
• 24-34	21.0	21.6
• 35-44	21.5	21.0
• 45-54	15.5	15.4
• 55-64	10.9	10.8
• 65-74	9.1	9.3
• 75+	5.3	5.1
GENDER		
• male	49.0	49.1
EDUCATION		
• some or completed primary	7.4	13.0
• some or completed secondary	37.6	33.1
• some or completed college/trade or some university	41.2	39.5
• university graduate	13.8	14.3
INCOME		
• lowest	5.9	4.6
• lower middle	12.2	9.9
• middle	29.6	26.6
• upper middle	36.2	35.1
• highest	16.1	19.7
MARITAL STATUS		
• married/common law	62.3	58.2
• other	37.7	41.8