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Determinants of Changes in Self-Reported Health and Outcomes Associated with those Changes

A report on the longitudinal component of the
1994-1996 National Population Health Survey

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DETERMINANTS OF CHANGES IN SRH AND OUTCOMES ASSOCIATED WITH THOSE CHANGES

EXECUTIVE SUMMARY

Objectives: This report uses the Canadian National Population Health Survey data (NPHS, longitudinal component) to examine self-reported health (SRH) and its relationship with chronic health conditions, demographic, personal health practice, and psychological resource factors. The four objectives of this research are: 1) To document stability or change in SRH and associated variables over time; 2) To investigate predictors of changes in SRH overall and for people with and without chronic conditions or disability; 3) To examine the relationship between initial SRH and the onset of new chronic conditions or disability, including the differential impact of type of chronic condition (e.g., life-threatening versus disabling conditions); 4) To investigate whether changes in SRH are related to changes in health care utilization.

Methods: Three NPHS data files were used for this study: two cross-sectional files (1994 and the 1996), and longitudinal file (1994-1996). The sample was restricted to people age 20 and over, to give analytical samples 15,779, 66,435, and 12,321 for the three data files respectively. The outcome measures are self-reported health (SRH), chronic health conditions, and health care utilization in 1996. To examine the predictors of SRH, the original 5-level Likert scale of SRH, was categorized SRH into two groups excellent health and poor health (objectives 1 and 2) and as three groups (excellent or very good, good, fair or poor; objectives 3 and 4). To examine the role of 1994 SRH on the newly reported chronic health conditions during the 2-year follow-up, we categorized chronic conditions into four hierarchical groups (i.e., no chronic health conditions, non-disabling conditions, disabling conditions, and life-threatening conditions). Health care utilization variables, which were used in this study were: overnight hospital stay, visits to health professionals (medical doctor (MD), nurse, dentist, chiropractor, physiotherapist), use of alternative health care services, and receipt of any home care services in the 12 months prior to the survey interview. The four blocks of predictor variables used in this study are: social demographic (e.g. age, sex), illness-related (e.g. pain, chronic health conditions, disability), personal health practice (smoking, physical activities), and psychological factors (e.g. coping). To explore the complex relationships between SRH and chronic health conditions and disability, we employed stratified logistic regression modeling technique investigating whether predictors affect SRH differently in people with and without chronic health conditions and disability. All statistical analyses were weighted to accommodate the stratified-cluster sampling scheme.

Results: Although overall reporting patterns for SRH were virtually identical at the two NPHS waves, there were substantial changes within individuals, with almost identical proportions (16%) reporting better and worse SRH. In general, older age, male gender, low education, low income, not working, having a chronic condition or disability, and smoking in 1994 were associated with reporting worse SRH in 1996. Decreasing income, losing a job, starting smoking, and reduced physical activity were all associated with poor health 1996. People with new disability or new pain were more likely to report worse health in 1996.

Multiple logistic regression analyses showed that older age, male gender, low education, low income, being inactive, smoking, having pain and chronic health conditions in 1994 were independently associated with increased risk of reporting worsening SRH. Stratified logistic regression analyses were carried out to examine whether 1994 predictors of changes in SRH were different in people with and without chronic conditions in 1994. Smoking was associated with worse SRH only in people without 1994 chronic conditions. Being physically active in 1994 significantly reduced the likelihood of worsening SRH in 1996 only in people with chronic conditions. The effects of older age and pain in 1994 were more pronounced in people with chronic conditions. People who changed from non-smokers to new smokers between 1994 and 1996 were more likely to report worse health in 1996. In contrast, people who became physically active or newly employed were less likely to report worse SRH in 1996.

When people were assigned to three groups (very good/excellent, good, and fair/poor health) according to their 1996 SRH, the weighted proportions of individuals developing any new health conditions were 22.4%, 28.1% and 42.3% respectively. When the types of health conditions were taken into account, the group with initial poor health were more likely to report new disabling (e.g. arthritis/diabetes) or life threatening (e.g. heart disease/cancer) conditions than the groups with better health. Multiple logistic regression analyses to look at potential predictors of newly reported chronic health conditions showed that older age, female sex, and pain significantly increased the likelihood of reporting at least one new chronic condition. Different associations were found between SRH and the type of new health condition: 1994 SRH was not associated with the reporting of new non-disabling conditions nor disabling conditions but moderately increased the likelihood of reporting life-threatening conditions. Older age was strongly associated with developing life-threatening conditions.

People with initially low or worsening SRH subsequently had more overnight hospital stays, used more home care service, and had more visits with medical doctors, nurses, and physiotherapists. In contrast, initial SRH did not seem to be related to use of alternative health care, dental, or chiropractor services.

Discussion: Overall, our findings in this longitudinal study corroborate the findings of our previous studies based on cross-sectional sample with respect to the predictors of good and poor health. Further studies are needed to confirm the distinct effects of smoking and physical activity on changes in SRH. The association between poor SRH in 1994 and the subsequent development of chronic health conditions is influenced by how health conditions were defined. It may be that the 1994 SRH represents early symptoms of as yet to be diagnosed conditions. Further, as chronic health condition variables are commonly used in epidemiological studies, the finding has important implications in terms of study design and statistical analyses. The findings that poor SRH in 1994 was generally associated with higher usage in over-night hospital stay, home care, seeing medical doctors, nurses, and physiotherapists as reported 1996 supports previous research, and suggest it is important to differentiate the types of health utilization measures in epidemiological studies.

DÉTERMINANTS DES CHANGEMENTS DE L'ÉTAT DE SANTÉ AUTODÉCLARÉ ET CONCLUSIONS À PROPOS DE CES CHANGEMENTS

SOMMAIRE

Objectifs : Le présent document s'appuie sur l'Enquête nationale sur la santé de la population du Canada (ENSP, enquêtes longitudinales) pour étudier la relation entre l'état de santé autodéclaré (ESAD) et les facteurs des maladies chroniques, de la démographie, des habitudes personnelles en matière de santé et des ressources psychologiques. Les quatre objectifs de cette recherche sont : 1) rendre compte de la stabilité ou du changement au cours du temps de l'ESAD et des variables qui lui sont liées; 2) étudier les variables explicatives des changements de l'ESAD global et chez les personnes souffrant ou ne souffrant pas de maladies chroniques ou d'invalidités; 3) étudier le lien entre l'ESAD initial et l'apparition de maladies chroniques ou d'invalidités nouvelles, y compris l'effet différentiel selon le type de maladie chronique (p. ex., les maladies constituant un danger de mort par rapport aux maladies incapacitantes); 4) déterminer si les changements de l'ESAD sont liés à des changements de l'usage des soins de santé.

Méthodes : Trois fichiers de données de l'ENSP ont été utilisés dans cette étude : deux fichiers de données transversales (1994 et 1996), et un fichier de données longitudinales (1994-1996). L'échantillon a été limité au groupe d'âges des 20 ans et plus, produisant des échantillons analytiques de 15 779, 66 435 et 12 321 personnes, respectivement, pour les trois fichiers de données. Les mesures ont porté sur l'état de santé autodéclaré (ESAD), les maladies chroniques et l'usage des soins de santé en 1996. Pour étudier les variables explicatives de l'ESAD, l'échelle originale de Likert à 5 niveaux d'ESAD a été divisée en deux groupes (excellente santé et mauvaise santé; objectifs 1 et 2) et en trois groupes (excellente et très bonne santé, bonne santé, et santé médiocre ou mauvaise; objectifs 3 et 4). Afin d'étudier le rôle de l'ESAD de 1994 sur les maladies chroniques nouvellement déclarées pendant les deux années au cours desquelles un suivi a été assuré, nous avons classé les maladies chroniques en quatre groupes hiérarchiques (à savoir, aucune affection chronique, affections non invalidantes, affections invalidantes et affections constituant un danger de mort). Les variables de l'usage des soins de santé utilisées au cours de cette étude ont été : le séjour de nuit en hôpital, les consultations d'un professionnel de la santé [médecin (*MD*), infirmière, dentiste, chiropraticien, physiothérapeute], l'usage de services de médecine douce, et l'utilisation de services de soins à domicile au cours des 12 mois précédant l'entretien d'enquête. Les quatre ensembles de variables prédictives utilisés pour cette étude sont : les facteurs de démographie sociale (p. ex., l'âge et le sexe), les facteurs liés aux affections (p. ex., douleur, maladies chroniques, invalidité), les habitudes personnelles ayant rapport avec la santé (tabagisme, activités physiques) et les facteurs psychologiques (p. ex., capacité de réaction au stress). Afin d'explorer les relations complexes entre l'ESAD et les maladies chroniques et l'invalidité, nous nous sommes servis de la technique de modélisation de la régression logistique stratifiée pour chercher à déterminer si les variables explicatives ont une

influence différente sur l'ESAD des personnes souffrant ou ne souffrant pas de maladie chronique ou d'invalidité. Toutes les analyses statistiques ont été pondérées afin de tenir compte du schéma d'échantillonnage en grappes stratifiées.

Résultats : Bien que les figures globales des ESAD aient été virtuellement identiques dans les deux vagues de l'ENSP, on a observé des changements intra-individuels substantiels, des proportions presque identiques (16 %) ayant déclaré avoir un meilleur et un pire ESAD. De manière générale, les individus qui, en 1994, étaient les plus âgés, de sexe masculin, les moins scolarisés, ayant les plus faibles revenus, souffrant d'une maladie chronique ou d'une invalidité, et fumant, avaient plus de chance de faire l'annonce d'un pire ESAD en 1996. Une baisse de revenu, une perte d'emploi, un commencement de tabagisme et une diminution d'activité physique ont tous été liés à une mauvaise santé en 1996. Les personnes ayant une invalidité nouvelle ou chez qui une nouvelle douleur était apparue avaient plus de chance de déclarer une plus mauvaise santé en 1996.

Les analyses de régressions logistiques multiples ont fait apparaître que l'âge avancé, le genre masculin, la faible scolarisation, le faible revenu, l'inactivité, le tabagisme, les douleurs et les maladies chroniques en 1994 étaient indépendamment liés à l'augmentation du risque d'aggravation de l'ESAD. Les analyses de régressions logistiques stratifiées ont été effectuées afin de déterminer si les variables explicatives en 1994 des changements de l'ESAD différaient chez les personnes souffrant ou ne souffrant pas de maladies chroniques en 1994. Le tabagisme n'a été lié à une aggravation de l'ESAD que chez les individus n'ayant pas d'affection chronique en 1994. Le fait d'avoir une activité physique en 1994 n'a réduit de façon importante les chances d'une aggravation de l'ESAD en 1996 que chez les personnes souffrant de maladies chroniques. Les effets de l'âge avancé et de la douleur en 1994 ont été plus prononcés chez les individus souffrant de maladies chroniques. Les personnes qui avaient commencé à fumer entre 1994 et 1996 avaient plus de chance de déclarer une aggravation de leur santé en 1996. À l'opposé, les personnes ayant commencé une activité physique ou ayant trouvé un emploi avaient moins de chance d'évaluer à la baisse leur ESAD en 1996.

Après avoir divisé les individus en trois groupes (très bonne ou excellente santé, bonne santé, santé médiocre ou mauvaise) selon leur ESAD de 1996, les proportions pondérées d'individus chez qui une nouvelle affection est apparue ont été de 22,4 %, 28,1 % et 42,3 % respectivement. Si on tenait compte du type d'affection, le groupe ayant initialement une mauvaise santé avait plus de chances de déclarer de nouvelles affections invalidantes (arthrite ou diabète, p. ex.) ou mettant la vie en danger (maladie cardiaque ou cancer, p. ex.) que les groupes bénéficiant d'une meilleure santé. Les analyses de régressions logistiques multiples ayant permis d'examiner les variables explicatives potentielles de maladies chroniques récemment annoncées ont fait apparaître que l'âge avancé, le sexe féminin et la douleur accroissaient de façon importante les chances qu'au moins une nouvelle maladie chronique soit déclarée. On a observé des relations différentes entre l'ESAD et le type de la nouvelle affection : il n'y avait pas de relation entre l'ESAD de 1994 et la déclaration de nouvelles affections non invalidantes ou invalidantes, mais on a trouvé que l'ESAD de 1994 augmentait modérément les chances que des affections mettant la vie en danger soient déclarées. L'âge avancé était très lié à l'apparition d'affections mettant la vie en danger.

Les personnes dont l'ESAD avait d'abord été précaire ou s'aggravait ont fait par la suite plus de séjours de nuit à l'hôpital, ont eu recours à plus de services de soins à domicile et ont consulté plus souvent des médecins, des infirmières et des physiothérapeutes. À l'opposé, l'ESAD initial ne semblait pas avoir de lien avec le recours aux services d'un dentiste, d'un chiropraticien ou à des services de médecine douce.

Discussion : Globalement, les résultats de notre étude longitudinale corroborent les résultats de nos études précédentes fondées sur un échantillon transversal en ce qui a trait aux variables explicatives de bonne et de mauvaise santé. D'autres études sont nécessaires afin de confirmer les influences distinctes du tabagisme et de l'activité physique sur les changements de l'ESAD. La manière de définir l'état de santé a eu une influence sur la relation entre un mauvais ESAD en 1994 et l'apparition subséquente de maladies chroniques. Il est possible que l'ESAD de 1994 incarne les symptômes précoces d'affections qui seront ultérieurement diagnostiquées. De plus, comme les variables des maladies chroniques sont couramment utilisées dans les études épidémiologiques, les résultats ont des conséquences importantes sur la méthodologie et les analyses statistiques. La découverte qu'un ESAD précaire en 1994 était généralement lié à plus de séjours de nuit en hôpital, plus de soins à domicile, plus de consultations de médecins, d'infirmières et de physiothérapeutes, comme le font voir les déclarations de 1996, confirme les recherches précédentes et indique qu'il est important, dans les études épidémiologiques, de distinguer les types de mesures de l'usage des soins de santé.

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1.0 INTRODUCTION AND STUDY OBJECTIVES

People's self-ratings of their health are important because they are related to many outcomes such as psychological well-being and use of health care and subsequent mortality¹⁻²⁹. Not surprisingly, people with poor self-reported health (SRH) are more likely to report negative health outcomes such as chronic diseases and disability. However, many people with chronic disease and disability report good health. This is because factors other than disease relate to people's SRH, such as age, education, marital status, physical activity, smoking, alcohol use, and coping efforts. For example, our previous research found that these factors were important for people with chronic disease or disability who report good health^{30,31}. However, we know relatively little about what factors predict changes in people's ratings of their health from good to poor and from poor to good, and whether the same factors are important for people with and without chronic disease.

This study looks at a sample of Canadians participating in the 1994 and 1996 National Population Health Surveys (NPHS), and investigates what factors are related to changes in SRH. Variables included new illnesses, newly reported disability, changes in physical activity, smoking, changes in marital status, and loss of a job. We also examine whether or not people with poor SRH in 1994 are more likely to get a new disease within the next 2 years, and the extent to which worsening health over the 2 years is associated with greater health care use. Results of the study will help us to identify factors associated with being at increased risk for deteriorating health and for using more health care. These findings will also provide information about whether people's own ratings of their health is associated with the development of a new illness.

The objectives of this research are:

- 1) To document stability or change in SRH and associated variables over a 2 year period.
- 2) To investigate predictors of changes in SRH overall for people with and without chronic conditions or disability.
- 3) To examine the relationship between initial SRH and the onset of the new chronic conditions or disability, including the differential impact of type of chronic condition.
- 4) To investigate whether changes in SRH are related to changes in health care utilization.

2.0 LITERATURE REVIEW

2.1 Effects of social, economic and demographic factors on SRH

SRH is associated with various health related outcomes. Thus, understanding the determinants of SRH is of considerable importance and, not surprisingly, studies on the determinants of self-reported have increased exponentially in the past few years^{26,31-47}. For example, in an international comparison of the relationship between socio-economic status (SES) and SRH, consistent relationships were found between lower education (as an indicator of lower SES) and the greater likelihood of reporting poorer health in several western countries⁴⁸. Other studies reported an independent effect of education on SRH, even after controlling for illness-related factors^{26,46,49-52}. In addition, older age, race, and marital status were related to SRH^{5,31,49,53,54}. A

population-based cross-sectional study by Denton and Walters⁴⁶ found that social inequity is an important determinant of health, acting both independently and influencing other determinants of health. Other research found a significant interaction between gender and other social economic factors such that social structural factors played a more important role in determining health in women than in men. Research has also demonstrated that employment is related to SRH. In cross-sectional studies, being unemployed was associated with poorer SRH^{31,46,54,55}. Similarly, in a longitudinal analysis, being employed full-time predicted less change in SRH⁵⁶. The effect of change in employment status on SRH or changes in SRH was not addressed in these studies.

2.2 Illness/disability Factors

Not surprisingly, a strong relationship exists between illness, disability, and SRH. A number of studies have demonstrated the effects of chronic conditions^{49,50,57-59} and disability^{49,51,52,57,60} on SRH. Our previous analysis of the NPHS found that chronic conditions and disability as well as pain severity and two-week disability, were important predictors of SRH. There is currently no consensus in how to examine the impact of chronic conditions on SRH. Most studies simply sum the number of conditions a person reports without taking into account how severe or disabling they are. As a result, the nature of the relationship between chronic conditions and health remains unclear. In this report, we examine the impact that different types of chronic illnesses (e.g. non-disabling, disabling, and life threatening) have on changes in SRH.

2.3 Personal Health Practices

Less information is available on the effects of personal health practices and SRH than for illness-related and demographic factors. However, factors such as exercise and smoking are related to SRH^{5,31,54,57,61}. A recent study suggested that the effects of personal health practice variables interact with gender. Specifically, smoking and alcohol consumption were more predictive of health status for men than women while body weight and being physically inactive were more important for women than men⁴⁶. All of these studies were cross-sectional and it is conceivable that those in better health engage in more activity. It is not known if better health practices, such as physical exercise and smoking cessation, predict better SRH or improvements in health in longitudinal data.

2.4 Psychological Resources

Whether and how psychological factors affect one's SRH is not well understood. Several studies have shown that psychological factors are associated with people's self-ratings of their health. For example, coping problems, depression, and psychological stress have been shown to be significantly associated with SRH^{31,58,59,62}, as well as higher mastery, perceived control over health, self-esteem and self-efficacy^{31,53,59,63}. Having a low level of life satisfaction was predictive of declining SRH⁵⁹.

It has been documented that a lack of social support and social integration is associated with physiological strain and health problems and mortality among the elderly^{13,64,65} and that

satisfaction with support can have a positive effect on well-being lack of support and loneliness are both associated with lower SRH⁵⁸ and changes in social activity levels have been shown to predict changes in SRH⁵².

2.5 Longitudinal Studies of Changes in SRH

There is little literature examining changes in SRH in longitudinal data. From the literature examined, people reported changes in their health even over the course of only one or two years. The percentage of people who reported improving and worsening health was roughly equal, and ranged from 11% to and 14% respectively⁵⁹ to 46% and 48% in older recently hospitalized people⁵². All seven studies we examined report an association between illness-related factors such as chronic conditions and functional impairment and changes in SRH. All studies also reported a relationship between some indicators of socioeconomic status and SRH. Two studies examined personal health practices; one study examined smoking status and found it to be related to changes in SRH⁵⁰ and the other examined physical activity, which was not related to changes in SRH⁵¹. Four studies examined psychological factors^{51,52,59,66} and two found them to be related to SRH^{52,59}. Only one study examined employment and found that it was related to better SRH⁵⁶. Similarly, the one study that examined social support also found it related to SRH⁵². Four studies assessed the effect of initial SRH on change in SRH^{52,56,59,66} and three found a significant relationship^{51,56,66}. Only one study used changes in variables to predict changes in SRH⁵². The other studies used the values of variables at baseline to predict changes in SRH.

With the exception of the study by Goldstein et al⁵⁰, none of the studies included people from all age ranges, with most using only elderly populations. In none of the studies were the analysis stratified by chronic illness or disability status, except our previous cross-sectional analysis. Furthermore, the role of psychological variables in predicting SRH was not clear from the four studies that looked at these factors, since only depression, life satisfaction⁵⁹, and an overall mental health score⁵² were found to be significant. One study examined self-efficacy but it was not related significantly to SRH⁵⁹. Our previous analysis demonstrated that mastery, self-esteem, and distress were all related to SRH³¹.

2.6 Outcomes Associated with Changes in SRH

The relationship between SRH and health service utilization has been well documented in the literature. The association persists, even after controlling for illness-related factors. For example, in longitudinal studies, SRH predicted hospitalization⁴, physician visits^{5,7-9}, medication use^{5,10,11}, services such as home help, meals on wheels, community nursing, geriatric day care⁶⁷, and institutionalization⁶⁸.

People's SRH also predicts mortality, even after controlling for other indicators of illness¹². In a recent review of all such studies up to 1996, the authors report very consistent findings across studies of the relationship between worse self-reported health and increased mortality¹⁵. While many studies included only elderly populations, the association was also found in the working-age population^{9,14}.

Very few studies have examined the ability of SRH to predict future onset of chronic illness. In one study among women only, it was found that in the absence of a chronic illness at 1994, SRH predicted subsequent diagnoses of an illness⁶⁶. The odds ratio of poor health for predicting the onset of an illness was 6.8, after adjusting for socioeconomic factors. This study also reported that 69% of those with no new chronic illness at follow-up rated their health the same, 19% rated it worse, and 12% rated it better at follow-up. In contrast to this, among those who developed a new illness, 45% rated their health as worse at follow-up.

In a study of the elderly⁵⁹, it was reported that a higher proportion of people whose SRH declined reported new illness, than among those whose health improved or stayed the same. Other studies have found that self-reported fair or poor health predicted the onset of severe locomotive disorders, cardiovascular disease⁶⁹, and coronary heart disease⁷⁰ after controlling for socio-demographic factors.

3.0 METHODS

3.1 Data Sources

The data for this report came from the non-institutional longitudinal samples of the 1994 and 1996 National Population Health Surveys (NPHS). Both surveys used a stratified cluster sample of households in each Canadian province, excluding populations on Indian Reserves, Canadian Forces bases, and some remote areas of Ontario and Quebec. In the first part of the two-part surveys, information about all household members was obtained from one knowledgeable member relating to demographic factors, health status, chronic health problems, and health care utilization. In the second part, one person in each household was randomly selected as the longitudinal respondent for a more in-depth interview. Three NPHS data sets were used in our study: the 1994 and 1996 cross-sectional surveys (N=17,626 and N=81,804 for 1994 and 1996 surveys respectively), and the longitudinal survey from 1994 to 1996. For the longitudinal survey, the 17,276 individuals interviewed in 1994 were followed-up till 1996, among whom 15,687 had complete information for both occasions⁷¹. Time between interviews ranged from 433 to 1174 days with 85% of the sample being followed up within one month of the second anniversary of the 1994 interview. The longitudinal response rate at the national level was 92.8%.

Because our research focus was on factors related to change in health and chronic health conditions in adulthood, the present sample was restricted to people age 20 and over. Age 20 was used as a cut-off as questions relating the psychological variables were only asked of subjects aged 18 years and older. Using this age cut-off allowed us to compare our findings to our previous studies. Consequently the available analytical samples were respectively 15,779 and 66,435 for the two cross-sectional surveys and 12,321 for the longitudinal survey.

3.2 Variable selections and definitions

To better address the research objectives, it was necessary to select and recode the original variables. Details regarding variable recoding are given in the Appendix.

3.2.1 Outcome variables

Three outcome variables were defined to address the objectives.

Self-reported health (SRH)

The question pertaining to SRH asks, “In general, would you rate your health as excellent, very good, good, fair, or poor”. The same question was administered in both the 1994 and 1996 surveys. In the bivariate analyses, several grouping schemes were explored. SRH is an ordinal variable that works well both in binary and categorical forms⁷². To meet objectives 1 and 2, we categorized SRH into two groups: “excellent health” which included ratings of excellent or very good SRH and “poor health” which included good, fair or poor SRH. This classification conformed to our previous studies³⁰. For objectives 3 and 4, SRH was categorized as trichotomous variable: excellent or very good, good, fair or poor.

To determine the predictors of changes in SRH, changes in SRH were considered a change of two levels on the five point scale: excellent, very good, good, fair, and poor, with the exception of a change from good to fair or fair to good. This categorization was chosen to account for possible biases that could occur due to testing, instrumentation, and regression to the mean of extreme scores⁷³. This categorization of change has been used in previous studies⁵⁹.

Onset of new chronic conditions

In the 1994 as well as the 1996 survey, participants were asked to indicate whether they had a specific health problem from a list of chronic health problems. A new chronic health condition was determined by comparing the difference in reporting between the two surveys. People were considered to have new chronic health conditions if the health condition was reported only in 1996, but not in 1994. New conditions could only be ascertained for conditions that were included in both surveys. Some health conditions, such as thyroid disorders were only asked about in the 1996 survey. A binary variable was created to indicate if a person had any new chronic health condition during the two-years. In addition, a hierarchical variable was formed to reflect the potential impact of the new conditions in 4 categories: no chronic conditions, non-disabling health conditions, disabling health conditions, and life-threatening health conditions. This was based on distinctions made in previous literature⁷⁴, expanded with a further separation of disabling and non-disabled health conditions⁷⁵. Respondents with more than one type chronic conditions were categorized according to the highest category in terms of disease impact.

No chronic health conditions: no any reported health conditions.

Non-disabling health conditions: allergies, asthma, migraine, high blood pressure, sinusitis, epilepsy, stomach or intestinal ulcer, and cataract.

Disabling health conditions: arthritis, back pain, bronchitis or emphysema, Alzheimer’s disease, and glaucoma.

Life threatening health conditions: heart disease, cancer, stroke, and diabetes.

Health care utilization in previous 12 months

Health care utilization variables, which were used in this study were: overnight hospital stay, visits to health professionals (medical doctor (MD), nurse, dentist, chiropractor, physiotherapist), use of alternative health services, and receipt of any home care services in the 12 months prior to the survey interview. Health professional visits were analyzed in two ways; binary (yes/no) and ordinal (0, 1, 2 to 4, and 5 or more visits or calls to a health care provider in the past 12 months). These approaches have been used in our previous work³¹ and by other researchers⁷².

3.2.2 Predictor Variables

Illness-related factors

Long-term disability (1994): This variable refers to restriction of activity that had lasted or was expected to last 6 months or more. It is a binary variable with a yes and no (comparison group) response.

Reported chronic health problems: 1994 chronic health problems as well as the changes between 1994 and 1996 were used.

Chronic condition(s) or disability: In determining the predictors of SRH in those with and without chronic conditions, subjects who reported at least one chronic condition, or who reported the presence of long-term disability but no chronic condition were included in the chronic condition group. Thus, the no chronic condition group consists of those persons who reported neither a chronic condition nor any long-term disability. This variable was developed for the purpose of performing a stratified analysis; it was not been used as a predictor in data analyses.

Severity of pain: This measure of pain or discomfort was based on Statistic Canada's derived Health Status Classification System which was originally coded as a four level variable: no pain or discomfort, mild, moderate and severe pain or discomfort. Based on the univariate frequency distribution, this variable was collapsed into two levels: mild or no pain (the comparison group) and moderate or severe pain.

Individual Demographic Variables

Sex: Male (comparison group) or female.

Age: Age categories were classified into 7 decades as follows: 20-29 (comparison group), 30-39, 40-49, 50-59, 60-69, 70-79, 80 and over. This categorization was consistent with our previous studies^{30, 31}. As the current longitudinal study only spans for two years, age-related possible cohort effect was not explored.

Education: The highest level of education was originally classified by Statistics Canada into one of the following: no schooling, elementary, some secondary, secondary school graduation, other beyond high school, some trade school, some community college, some university, diploma or

certificate trade school, diploma or certificate of community college, bachelor degree, master's or MD or PhD degree. Based on the univariate frequency distribution, this variable was collapsed into three levels <secondary, secondary, and post secondary, college or university.

Income: Income adequacy was classified by Statistics Canada into one of five discrete categories, which account for household income and family size: lowest, lower middle, middle, upper middle, and highest income. Based on the frequency distribution for this variable, the two lower levels were combined to form a new category for the lowest income. For multivariate analyses the higher income categories were further combined to give a dichotomous variable of low, or not low income.

Employment: The Statistics Canada derived variable for working status variable was collapsed into a dichotomous variable: currently employed or no currently working but had a job and did not work during the last 12 months' (comparison group).

Changes in these variables (except sex) were assessed by comparing the respective 1994 and 1996 measurements.

Personal Health Practices

Physical Activity: Statistics Canada's coding for this derived variable was active, moderate, and inactive. After examining its distribution and its bivariate association with SRH, physical activity was re-grouped into active and not active (moderate and inactive).

Smoking: A binary smoking status was derived. 1=current, 0=all others (1994).

Changes in smoking and physical activity were also examined by comparing reporting at two occasions. As we did not find alcohol drinking to be independently associated with SRH, it was not included in our statistical analyses.

Psychological Resources Factors

Most psychological information was only collected in 1994. Therefore, changes for these variables over time were not available to us. The psychological variables used in this study were a mastery scale, self-esteem, distress, and sense of coherence. The mastery scale measures the extent to which persons feel they have control in their lives, and is based on the work of Pearlin and Schooler⁷⁶. Self-esteem measures the amount of positive feelings an individual has about him/herself and sense of coherence measures whether subjects perceived events as comprehensible, manageable and meaningful. Distress index is based on a subset of six items from the Composite International Diagnostic Interview (CIDI). Scores ranged from 0 to 24, with higher scores indicating more distress. Further details regarding variable definitions please refer to our early work³⁰.

3.3 Statistical Analyses

The statistical analyses consisted of three major components: univariate, bivariate and multivariate analyses. All statistical analyses were conducted on data weighted to account for the unequal sampling probabilities and to produce descriptive estimates generalizable to the corresponding adult Canadian general household population. Descriptive and multivariate analyses were used to meet objectives 1 to 3. Objective 4 was met largely through descriptive analyses, univariate and bivariate, analyses. All proportion and prevalence estimates derived from bivariate analyses were weighted to accommodate the stratified-cluster sampling scheme. Therefore, they were generalizable to corresponding general populations. In statistical testing, the original weights assigned to each participant by Statistics Canada were divided by a mean weight to produce analytical weights, which both account for the stratified-cluster sampling scheme and restore the original sample size. All statistical tests were two-tailed. Ninety-five percent confidence intervals have been provided for all odds ratios. All analyses were conducted using the SAS (Statistical Analysis Systems) package. Specific analyses were as follows:

Predictors of self-reported health (SRH)

Since we were interested in longitudinal changes in SRH, the effects of potential predictors of SRH were examined in two ways: by using the 1994 values for potential predictor variables and changes over time. However, for variables of sex, age, and most psychological resource factors, only 1994 measurements were used, as data on change were either inappropriate (e.g. for sex) or unavailable.

To capture the effects of changes in predictors on the changes in SRH, 1996 SRH was used as an outcome variable in the logistic models with 1994 SRH and other factors as potential predictors.

The general model can be expressed as follows:

$$\begin{aligned} \text{Logit}(P) &= \alpha + \beta_{0,i}X_{0,i} + \beta_{1,i}X_{1,i} \\ &= \alpha + \beta_{0,i}X_{0,i} + \beta_{1,i}(X_{0,i} + \delta) \\ &= \alpha + \beta_{0,i}X_{0,i} + \beta_{1,i}X_{0,i} + \beta_{1,i}\delta \end{aligned}$$

Where: P is probability of SRH=1 in 1996

Subscripts 0 and 1 represent 1994 and 1996 measurements for a given variable; $\beta_{1,i}$ is the effect of change in predictor variable on the change in outcome variable.

To examine if predictor variables affected the outcome variable (SRH) differently in people with and without chronic conditions/disability, logistic regression models were run in a stratified fashion. Hence logistic models adjusting for the number of other reported chronic conditions and other covariates were run for all participants, and people with and without chronic conditions/disability.

Predictors of new onset of chronic conditions

In this part of the analyses, the outcome of interest was newly reported chronic health conditions, which were determined by comparing the 1994 and 1996 surveys in the same panel of participants.

Predictors of changes in health care utilization

All analyses were bivariate with all of the health care utilization variables in 1996 assessed in relation to 1994 SRH level and chronic condition/disability status.

4.0 RESULTS

4.1 Changes in SRH (SRH) and associated variables

Weighted univariate and bivariate data analyses were performed using the 1994 and 1996 cross-sectional data. These analyses provide information in terms of stability of SRH and other characteristics over time at the population level. The results suggest that the overall reporting patterns for SRH were virtually identical at the two NPHS waves. The proportions of respondents reporting very good/excellent health were 48.8% and 49.8% for 1994 and 1996 NPHS respectively. The striking similarities in distributions of SRH and other variables also provided justification for use of the same categorizations that we used in our earlier study of the 1994 NPHS³⁰. Table 1 provides the distributions of SRH from both years by selected characteristics.

In table 2, chronic conditions were assigned to three groups, which approximately reflect the impact of these conditions. Comparisons for chronic conditions between 1994 and 1996 again suggest that the prevalence of most health conditions is stable over time. Greater variation was seen in conditions in the non-disabling group, such as allergy, which was 5 percent higher in 1996 (25.0%) than in 1994 (19.4%).

4.2 Predictors of SRH

Changes in SRH were further evaluated at the individual level using the data from the NPHS longitudinal component. As work on this objective was a prerequisite for the other analyses proposed, substantial descriptive analyses were carried out to document the changes in SRH in relation to other factors. For the purpose of univariate and bivariate analyses, a change in SRH was considered to be a change of two levels from the 1994 survey, with the exception of a change from good to fair or good to very good. The results show that 67.2% of participants reported no changes in SRH at the two-year follow-up study (table 3). In those who reported changes in SRH, there were similar proportions getting better and worse, 16.2% and 16.7% respectively.

Bivariate analyses show that the changes in SRH were not evenly distributed with respect to other factors. In general, older age, male gender, low education and income, not working,

having a chronic condition, and smoking were associated with increased likelihood of reporting worsening SRH. For example, 24.2% of people aged 80 or older reported worsening SRH, while only 13.9% people aged 20-29 did so. However, it should be noted that these findings are likely affected by ceiling and floor effects; people started with excellent health could not possibly report “getting better”. In table 3 changes in SRH by selected characteristics were also examined in people with and without chronic conditions. The results suggest that people having a chronic condition or disability in 1994 were more likely to report worse SRH in 1996. In table 4, we examined the effects of changes in potential predictor variables on changes in SRH in this longitudinal sample. The results suggest that decreasing income, losing a job, starting smoking, and reduced physical activity was all associated with poor health 1996. People with new disability or new pain were more likely to report worse health in 1996.

Based on the initial bivariate statistical analyses, multiple logistic regression analyses were performed to examine the independent effect of a range of factors on the changes in SRH while controlling for other factors simultaneously. In this part of analysis, the 1994 and 1996 SRH variables were dichotomized as 0=good/fair/poor health, 1=very good/excellent. This categorization was consistent with, and supported by, our earlier work. 1996 SRH was modeled as an outcome variable, while 1994 SRH was treated as a control variable. This approach allowed us to detect the effect of changes in SRH. Other independent variables in the logistic models comprised: 1) illness related factors, 2) individual demographic factors, 3) personal health practices, 4) psychological resources. Two sets of logistic regression analyses were performed: a) using the 1994 characteristics to predict the changes in SRH in 1996, b) using the 1994 as well as changes in 1994 characteristics to predict the changes in SRH in 1996. Each set of analyses was carried in the general population, people with chronic conditions/disability, and people without chronic conditions/disability.

The results show that older age, male gender, low education and low income were associated with increased risk of reporting worsening SRH (table 5). However, in general the strength (measured by odds ratio) of these associations was low or moderate with odds ratios ranging from 1.2 to 2.2. Personal health practices and psychological resource factors were also statistically associated with the changes in SRH. People engaging in more physical activity were less likely to report worsening health in comparison with people taking part in fewer activities. Conversely, smokers were more likely to report worsening health. However, similar to the findings for social demographic factors, these associations were generally weak and cannot be regarded as conclusive. Illness related factors were consistently strong predictors for the changes in SRH. For example, people with pain in 1994 were about 6 times more likely than people without pain to report worsening health in 1996. Having chronic health conditions in 1994 was also a strong predictor of worsening health in 1996. When chronic condition status was classified into 4 hierarchical groups (no condition, non-disabling, disabling, or life threatening conditions), the likelihood of reporting worsening health increased with each level with an odds ratio of 1.4.

Stratified logistic regression analyses were performed to examine whether 1994 predictors of changes in SRH may act differently in people with and without chronic conditions. The results showed notable differences between the two groups. Smoking was associated with worse SRH only in people without 1994 chronic conditions with an odds ratio of 1.35 (95%CI 1.14, 1.54).

The corresponding odds ratio for people with 1994 chronic conditions was 1.08 (95% CI 0.95, 1.23). Being physically active in 1994 significantly reduced the likelihood of worsening SRH in 1996 in people with chronic conditions (OR=0.71, 95% CI 0.60-0.82); however it did not seem to affect SRH in people without chronic conditions (OR=1.08, 95% 0.89-1.32). While older age and pain in 1994 were both significantly related to worse SRH in 1996, the effects were more pronounced in people with chronic conditions.

The effects on SRH of including changes between 1994-1996 in some predictor variables are depicted in table 6. People who changed from non-smokers to new smokers between 1994 and 1996 were more likely to report worse health in 1996 (OR=1.33, 95% CI 1.10, 1.61). In contrast, people who became physically active or newly employed were less likely to report worse SRH in 1996 with odds ratios of 0.71 and 0.73.

4.3 The relationship between initial SRH and the onset of the new health conditions

The impact of 1994 SRH on new health conditions in 1996 was examined for the number of new conditions and for each type of health condition. When people were assigned to three groups (very good/excellent, good, and fair/poor health) according to their initial SRH, the weighted proportions of individuals developing any new health conditions in these three groups were 22.4%, 28.1% and 42.3% respectively. Figure 1 displays the number of newly reported chronic conditions (excluding allergies) in people without chronic conditions at 1994 by three SRH groups. These proportions are equivalent to cumulative incidence. The results suggest that people with initial poor health were more likely than people with initial good health to develop new and more health conditions.

Table 7 displays the proportions of individuals participating in both the 1994 and 1996 surveys with newly reported and no longer reported self-reported chronic health conditions. These proportions were examined according to the three-level 1994 SRH variable. Overall the proportions with changes in particular chronic conditions, i.e. new or no longer reported conditions, were higher for initial fair or poor SRH. When the types of health conditions were taken into account, the group with initial poor health was more likely to report new disabling (e.g. arthritis/diabetes) or life threatening (e.g. heart disease/cancer) conditions than the groups with better health. The proportions of newly reported allergy, migraine and back pain did not vary much with the 1994 level of SRH. Similar associations remained after potential confounding factors were controlled for in multivariate analyses.

Results from multiple logistic regression analyses are presented in tables 8 and 9. In table 8, newly reported chronic health conditions were dichotomized to yes/no as a dependent variable in the model. Analyses were carried out for the total population and for people without chronic conditions or disability in 1994. The results show that increasing age (OR ranging from 1.12 to 2.06 for every 10 year increment), female sex (OR=1.33), and pain (OR=1.73) significantly increased the likelihood of reporting at least one new chronic condition. Other socio-demographic, personal health practice and psychological resource factors were either marginally or not associated with newly reported health conditions. 1994 SRH had little effect on the odds of reporting broadly defined new health conditions. 1994 levels of the psychological resource

factors also had little impact.

Different associations between SRH and the type of new health condition were found (table 9) when new chronic health conditions were assigned to three groups (non-disabling, disabling, and life-threatening conditions) and modeled separately in three logistic regression analyses. Juxtaposing the results from three models, table 9 depicts distinct effects in three models for some predictors. 1994 SRH was not statistically associated with the reporting of new non-disabling conditions (OR=0.96, 95% CI 0.90, 1.04) nor disabling conditions (OR=1.02, 95% CI 0.95, 1.10), but moderately increased the likelihood of reporting life-threatening conditions (OR=1.58, 95% CI 1.42, 1.76). Increasing age had little effects on the occurrence of new non-disabling health conditions, however; it was strongly associated with developing life-threatening conditions. Females were more likely than males to report disabling condition (1.52, 95% CI 1.39, 1.65) and less likely to report life-threatening conditions (OR=0.75, 95% CI 0.65, 0.87).

Differential effects (in terms of the magnitude and direction) for some predictors on outcomes were also observed for pain and smoking. Like the results in table 8, the impact of psychological resource factors on newly reported health conditions were not very distinguishable even after taking the unit of measurement into account.

4.4 SRH and changes in health care utilization

Given the greater availability of health care utilization measures in the 1996 NPHS, choices were needed regarding numbers and types of utilization measures to be used in our analyses. These choices were based on our previous study as well as on literature review. Health care utilization indicators used in this study comprise variables for medical consultation in the previous 12-month period (any medical health professional, MD, nurse, dentist, chiropractor, physiotherapist), overnight hospital stay, use of home care services and use of alternative health care services. We expected that poor SRH in 1994 would be associated with higher reported health care utilization in 1996.

Results from bivariate analyses show that people with initially low or worsening SRH subsequently used more overnight hospital service (20.1% at least once) and home care service (9.7% at least once), compared with the corresponding percentages for the general population of 9.2% and 2.6% respectively (Table 10). Similarly, a greater proportion of people with poor health reported visits with MDs (83.9% vs 77.0% for general population), nurses (9.5% vs 6.4% for the general population), and physiotherapists (10.9% vs 7.3% for the general population) in 1996. In contrast, initial SRH did not seem to be related to use of alternative health care services, or chiropractor services. These findings are reflected in the number of visits to health care professionals (Table 11), where people with poor SRH reported were more frequently reported five to more visits to medical doctors, nurses and physiotherapists in the previous 12 months.

Generally people whose SRH has worsened between 1994 and 1996 were slightly more likely than those whose SRH was better to have reported staying overnight in hospital or have consulted health professionals (Table 12). They also reported making more visits to health

professionals, except for dentists (Table 13).

5.0 CONCLUSIONS AND DISCUSSION

5.1 Determinants of SRH

In this study, we examined longitudinal change in SRH and its determinants in a Canadian representative sample over a period of two years. Overall, our findings corroborate the findings of our previous studies based on cross-sectional sample with respect to the predictors of good and poor health. Compared with most population-based studies of SRH, our current study has two distinct aspects. In this study, we considered SRH in those with and without chronic health conditions/disability and examined the effects of 1994 characteristics as well as the changes in these characteristics on SRH.

Although cross-sectional proportions of people in each SRH category remain consistent, longitudinally there were substantial changes in SRH within individuals during the two years. About 33% of participants reported changes in SRH, with the changes in SRH being almost evenly split between getting better (16.2%) and getting worse (16.7%). Bivariate analyses suggested that older people, and people with low education, low income, and chronic health conditions were more likely to report worsening SRH. Compared with people without chronic conditions and disability, people with pre-existing health problems were more likely to report their health getting better. Floor effects may largely explain this finding because people with chronic health conditions and disability tended to have fair or poor health in 1994 and their SRH level could not get any worse.

SRH has been described as a complex process of internalized calculations that encompass both life experience and knowledge of disease causes and consequences⁶⁶. Consequently, factors affecting SRH are likely to be broad and inter-related. In this study we were able to examine a large array of factors, which were culled from previous research and theoretical plausibility. These factors can be conceptually categorized into four groups, which are illness factors, demographics, personal health practice factors, and psychological factors (see method section). In general, most of findings corroborate our earlier work and other previous research. For brevity, discussion in this section will focus on distinct findings and is not intended to be comprehensive.

Findings on personal health practice factors support previous research^{32,38,77} demonstrating the negative effects of smoking and physical inactivity. However, these factors seem to be affected by people's pre-existing health conditions and disabilities. That smoking is a predictor of poor SRH has been reported in previous studies^{38,77}. Our results support previous research and extend that research by demonstrating that smoking may have differential effects on SRH in people with and without chronic conditions and disability. The significant association between smoking in 1994 and future SRH only appears in people without chronic conditions and disability. This finding may suggest that the effects of smoking on SRH may be mediated by illness factors. When both illness factors and smoking are in the model, the direct effects from illness factors on SRH become dominant and indirect effects of smoking SRH are concealed. In people without

chronic conditions, smoking may lead to sub-clinical illnesses, which are not yet measured and not incorporated into the statistical model. The above explanation is supported by a recent Swedish study⁴⁰, in which the authors indicate that health behaviors do not generally directly contribute to self-rated health, instead, their effect is mediated by more specific health problems.

Our study further suggests that being physically active is associated with better health. However, this association was statistically significant only in people with chronic health conditions or disability. This finding may be, in part, explained by ceiling effects as people without chronic conditions and disability were more likely than people with health conditions to have excellent/very good SRH. Therefore, subtle improvement in SRH may not be measurable. In an 8-year longitudinal study, Johansson and Sundquist⁷⁷ found that the adverse effects of physical inactivity and smoking are multiplicative rather than simply additive.

The distinct effects of smoking and physical activity on SRH reported in this study should not be over-interpreted. Despite the statistical significance, the magnitude of the reported associations is relatively weak with ORs of 1.35 (95% CI 1.14, 1.74) and 0.71 (95% CI 0.60, 0.82) respectively for smoking and physical activity. Unmeasured confounding factors that may account for the observed associations, still remains as an alternative explanation. Moreover, when stratified logistic regression is performed, the sample size in each model becomes smaller. This may bring some instability to the results. Thus, the results are best considered as tentative and suggestive rather than conclusive. Further studies are warranted.

The effects of psychological factors on the changes in SRH are not well understood. A number of studies have reported that a greater sense of personal control over events is associated with better health⁷⁸. A recent Canadian study⁷⁹ suggests that emotional, social and spiritual health had no effects on individuals' ratings of their health status. We are unable to draw conclusive findings from the present study. It is possible that the two-year follow-up is still not long enough to detect the effects of these factors on the changes in SRH. In this study 1994 psychological factors were treated as continuous variables in the models, which assume the effects on changes in SRH follow a linear relationship. Explorations on non-linear relationships between psychological factors and SRH ought to be encouraged in future studies. Unfortunately, the longitudinal NPHS data set does not contain 1996 measurements for most of psychological factors. Hence, we were unable to examine how changes in psychological factors affect changes in SRH.

5.2 New onset of chronic health conditions

While there is a large research body assessing the impact of chronic health conditions and disabilities on SRH⁸⁰, literature studying the effects of SRH on occurrence of chronic health problems is scant. Results from a 4-year longitudinal study in women shows that 1994 SRH were associated with subsequent chronic disease status⁶⁶. In another cohort study, Moller and colleagues⁷⁰ found that SRH was an independent predictor of coronary heart disease. The generic term chronic health conditions, encompasses an array of etiologically and pathologically diverse medical problems. Therefore, it is unrealistic to assume that self-reported health is associated in a similar fashion with all chronic conditions. We explored chronic

conditions as the number of conditions and in hierarchical groups. For the hierarchical grouping approach we categorized these conditions into four groups: no health condition, non-disabling, disabling, and life threatening, which can be largely regarded as measures of disease impact.

The major finding in studying the effects of SRH on subsequent chronic health conditions is that association is greatly influenced by how health conditions were defined. When presence/absence was used to measure chronic condition status, 1994 SRH was not associated with reporting of new chronic conditions in people without chronic conditions in 1994 (OR=1.11, 95% 0.97, 1.27). However, when four hierarchical chronic condition variables were modeled separately, the results show that 1994 SRH was significantly associated with life-threatening conditions in 1996. It may be that the 1994 SRH represents early symptoms of as yet to be diagnosed conditions. Further, as chronic health condition variables are commonly used in epidemiological studies, the finding has important implications in terms of study design and statistical analyses.

5.3 Health Utilization

The NPHS provides a broad range of indicators for utilization of health care services. The association between 1994 and 1996 SRH and health care utilization in the previous 12 months to the 1996 survey varies according to the type of service (Tables 10 to 13). However, as hypothesized, poor SRH in 1994 was generally associated with higher usage in over-night hospital stay, home care, seeing medical doctors, nurses, and physiotherapists as reported 1996. Level of SRH in 1994 did not seem to be related to use of alternative care services. People with low SRH in 1994 were less likely to visit dentists or chiropractors. These findings support our earlier work and other previous research^{6, 7, 13, 50, 65, 79}. The relationships between SRH in 1996 and health care utilization are similar to the cross-sectional findings from our analyses of the 1994 survey³⁰. These findings suggest it is important to differentiate the types of health utilization measures in epidemiological studies.

5.4 Dissemination of the findings

Parts of the study results have been presented in two international conferences: American College of Rheumatology (ACR) Philadelphia, October 2000 and Gerontology Society of America (GSA), November 2000. We are also planning to publish at least two articles based on this study in peer reviewed journals; one focusing on determinants of SRH in a longitudinal sample and the other on the effects of changes in SRH on newly reported chronic health conditions and health care utilization. Copies of this report will be issued as an ACREU working paper and sent to key stakeholders, which include a range of community and health care agencies, as well as the Ontario Ministry of Health. We will also send copies to relevant policy makers and researchers in Canadian universities. More generally, the increased understanding of the role of SRH, and its association with chronic health conditions and health care utilization will be incorporated into our ongoing work.

Appendix: Derivation of Variables from the NPHS 1994-1996 longitudinal file

Variable block	Variable Name	Derived from	Variable type	Definition*
Individual demographic factors	Age	DHC4_AGE	Nominal	20-29, 30-39, 40-49, 50-59, 60-69, 70-70, 80 and over. Baseline 20-29
	Sex	SEX	Binary	0=male, 1=female
	Education	EDC4D3	Ordinal	Low to high
	Income	INC4DIA4 INC6DIA4	Binary	Not low=0 Low=1
	Employment	LFC4DCWS LFC6DCWS	Binary	0=Not employed 1=Employed
	Marriage	DHC4_MAR DHC6_MAR	Binary	0=All others 1=Married
Personal health practices	Smoking	SMC4_2 SMC6_2	Binary	0=Nonsmoker / exsmoker 1=Current smoker
	Physical activity	PAC4DPAI PAC6DPAI	Binary	0=Not / moderate active 1=Active
Psychological resources	SRH	GHC4_1 GHC6_1	-	Explored in various formats
	Mastery	PY_4DM1	Continuous	2-28
	Self-esteem	PY_4DE1	Continuous	1-24
	Sense of coherence	PY_4DH1	Continuous	4-78
Illness related factors	Distress sale	MHC4DDS	Continuous	0-24
	Pain	HSC4DPAD HSC6DPAD	Binary	0=No pain or not limiting activities 1=Pain limiting activities
	Disability	RAC4F1 RAC6F1	Binary	0=No 1=Yes
Health care utilization	Chronic conditions	A range of variables	-	Explored in various formats
	Over night patient	HCC6_1	Binary	0=No, 1=Yes
	Home care	HCC6_9	Binary	0=No, 1=Yes
	Alternative care	HCC6_4	Binary	0=No, 1=Yes
	Consultations with GP	HCC4_2A HCC6_2A	-	0-300, explored in various formats
	Other medical Specialists	HCC4_2B, C HCC6_2B, C	-	0-300, explored in various formats
	Consultations with nurse	HCC4_2D HCC6_2D	-	0-365, explored in various formats

* Coding for multivariate analyses

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TABLES AND FIGURE

Table 1. Percent distributions of level of self-rated health by selected characteristics based on 1994 and 1996 National Population Health Surveys

	Self rated health, 1994 NPHS (N=15,779)					Self rated health, 1996 NPHS (N=66,435)				
	Exclt.	Very good	Good	Fair	Poor	Exclt.	Very good	Good	Fair	Poor
Overall	24.8	36.7	27.1	8.9	2.5	22.9	37.7	27.2	9.1	3.1
<u>Illness-related factors:</u>										
No. of Chronic Conditions:										
0	36.2	40.9	20.2	2.5	0.3	35.8	40.7	20.5	2.6	0.4
1	21.6	40.0	28.8	7.5	2.1	24.4	41.5	27.5	5.6	0.9
2	14.5	31.9	35.8	15.0	2.8	14.1	36.6	35.5	10.8	3.0
3	8.4	26.6	39.7	20.4	4.9	9.3	31.3	36.9	17.7	4.8
4+	3.2	16.9	33.5	30.7	15.7	5.2	19.7	35.8	25.7	13.5
Restriction of Activity:										
No	29.7	40.7	24.8	4.4	0.5	28.3	41.5	25.5	4.2	0.5
Yes	7.3	22.5	35.3	25.0	10.0	6.1	19.4	36.8	25.9	11.7
Pain:										
No	28.7	40.0	25.6	5.1	0.7	27.6	40.9	26.0	4.8	0.8
Yes	7.3	22.1	33.7	25.8	11.1	5.0	18.8	36.9	27.0	12.2
<u>Individual Demographic Factors:</u>										
Sex:										
Male	25.5	38.1	26.3	7.7	2.3	25.1	38.3	26.8	7.4	2.4
Female	24.1	35.4	27.8	9.9	2.8	23.7	37.0	28.2	8.6	2.5
Age:										
20-29	31.7	42.7		3.5	0.9	32.7	41.8	21.3	3.7	0.5
30-39	30.5	39.0	21.1	4.4	1.0	28.1	41.6	24.5	4.7	1.1
40-49	26.3	39.1	25.2	7.3	1.8	25.9	39.0	26.5	7.0	1.7
50-59	20.7	34.1	25.4	10.6	4.0	21.1	36.5	29.1	9.4	4.0
60-69	14.1	30.3	30.6	15.9	4.5	16.5	30.9	34.9	13.4	4.3
70-79	12.4	27.0	35.2	22.2	6.0	12.2	26.5	38.2	18.0	5.1
80+	11.9	23.3	32.5	23.7	8.7	8.7	27.7	35.6	18.2	9.6
Marital Status:										
Married/common law	25.1	37.3	27.4	8.0	2.2	24.0	38.9	29.0	7.4	2.2
Single/widowed/separated	24.1	35.6	26.4	10.7	3.2	25.0	35.3	25.1	9.2	3.0
Education:										
<=Primary	12.0	21.7	35.6	22.0	8.8	14.9	30.1	34.1	15.7	5.2
Secondary	20.1	34.9	30.9	11.4	2.7	22.7	38.7	30.4	6.4	1.8
Post secondary/ college or univ.	29.3	39.8	23.8	5.6	1.6	28.7	40.3	24.0	5.4	1.5

Cont'd...

Table 1. Percent distributions of level of self-rated health by selected characteristics (continued)

	Self rated health, 1994 NPHS (N=15,779)					Self rated health, 1994 NPHS (N=66,435)				
	Exclt.	Very good	Good	Fair	Poor	Exclt.	Very good	Good	Fair	Poor
Income:										
Lowest, Lower middle	17.5	30.4	31.8	14.9	5.4	17.0	28.6	33.0	16.1	5.3
Middle	19.9	35.2	30.6	11.2	3.2	20.5	37.9	30.0	8.7	2.9
Upper-middle	27.5	40.0	24.7	6.4	1.4	25.9	41.3	26.0	5.6	1.3
Upper	34.4	40.8	20.9	3.3	0.7	34.7	39.6	21.2	3.8	0.7
Employment status:										
Not employed	17.1	30.0	31.5	15.9	5.5	18.4	31.7	31.5	13.2	5.2
Employed	29.7	41.0	24.2	4.4	0.6	28.8	41.9	24.6	4.2	0.5
Employment status:										
Not employed	17.1	30.0	31.5	15.9	5.5	18.4	31.7	31.5	13.2	5.2
Employed	29.7	41.0	24.2	4.4	0.6	28.8	41.9	24.6	4.2	0.5
Personal health practices										
Smoking:										
Daily smoker	19.0	36.3	31.52	9.8	3.3	19.8	38.5	29.8	9.8	3.1
Occasional smoker	26.1	35.5	26.91	9.1	2.5	25.5	38.0	27.1	7.5	1.9
Non-smoker	26.9	36.9	25.4	8.5	2.3	26.0	37.7	26.8	7.4	2.2
Physical activity:										
Active	34.2	36.5	22.1	5.7	1.5	34.1	38.9	21.3	4.8	0.9
Moderate	27.0	41.0	24.0	6.8	1.1	27.5	40.4	24.9	5.8	1.4
Not active	21.1	35.6	29.9	10.3	3.1	20.5	36.8	30.3	9.6	2.9

Table 2. Percent prevalence of chronic health conditions among people aged 20 and older: 1994 and 1996 National Health Population Survey

Chronic health conditions	1994			1996		
	Male	Female	Total	Male	Female	Total
No chronic health condition	48.8	36.7	45.7	45.2	34.8	39.9
Non-disabling condition:						
Allergy	16.8	21.9	19.4	20.4	29.5	25.0
Asthma	5.2	5.9	5.6	5.0	7.6	6.3
High blood pressure	8.6	11.5	10.1	10.1	13.0	11.5
Migraine headache	4.1	10.8	7.6	4.5	11.8	8.2
Sinusitis	3.5	5.6	4.6	3.8	6.2	5.0
Epilepsy	0.6	0.8	0.7	0.7	0.7	0.7
Intestinal ulcers	3.5	3.8	3.7	2.9	3.2	3.0
Cataract	1.9	3.6	2.8	2.4	3.8	3.1
Disabling health condition:						
Arthritis	11.1	18.0	14.7	11.2	20.3	15.8
Back pain	15.7	15.2	15.4	14.8	16.1	15.5
Bronchitis/emphysema	2.8	3.8	3.3	2.5	3.5	3.0
Alzheimer	0.1	0.1	0.1	0.4	0.3	0.3
Glaucoma	1.9	3.6	2.8	1.1	1.4	1.3
Urinary incontinence	0.7	1.6	1.2	1.1	2.3	1.7
Life threatening condition:						
Heart disease	4.7	4.1	4.4	4.6	4.3	4.4
Stroke	1.0	0.9	1.0	1.1	0.9	1.0
Cancer	1.2	2.3	1.8	1.4	2.0	1.7
Diabetes	3.6	3.4	3.5	4.0	3.3	3.6

Table 3. Percentage of people reporting changes in self-rated health (better, no change, worse) by selected characteristics: findings from the National Population Health Survey longitudinal study, 1994-1996

Status in 1994	People without a chronic condition or disability in 1994			People with a chronic condition or disability in 1994			Total Population		
	Better	No change	Worse	Better	No change	Worse	Better	No change	Worse
Total	11.3	73.7	15.1	19.7	62.5	17.8	16.2	67.2	16.7
<u>Individual demographic factors</u>									
Age:									
20-29	11.4	76.5	12.1	19.1	65.0	15.9	15.0	71.2	13.9
30-39	10.5	74.7	14.8	19.1	64.2	16.7	14.8	69.5	15.7
40-49	10.5	74.7	14.9	19.4	63.2	17.5	15.3	68.4	16.3
50-59	13.4	70.6	16.0	18.0	65.1	16.9	16.5	67.0	16.6
60-69	11.2	68.8	20.0	23.6	58.9	17.5	20.5	61.4	18.1
70-79	14.9	57.6	27.4	19.4	57.8	22.9	18.6	57.7	23.7
80+	14.6	58.5	26.9	21.0	55.1	23.8	20.2	55.6	24.2
Sex:									
Male	11.0	72.5	16.6	19.6	62.4	18.1	15.7	66.9	17.4
Female	11.6	74.9	13.5	19.8	62.7	17.5	16.6	67.4	16.0
Marital status:									
Married/common law	10.8	75.3	14.0	19.6	62.6	17.7	16.3	66.7	17.0
Other	11.6	72.6	15.9	19.9	62.4	17.8	16.0	67.9	16.1
Education:									
<Secondary	15.4	64.3	20.3	23.3	56.2	20.5	20.6	59.1	20.4
Secondary	13.9	68.3	17.8	20.0	63.3	16.7	17.1	65.7	17.2
Post secondary	11.8	77.0	11.2	20.1	62.2	17.7	16.7	68.2	15.1
College or Univ.	7.2	79.3	13.5	16.3	67.8	15.9	12.3	72.9	14.9
Income									
Lowest, lower middle	16.2	65.8	18.0	23.4	56.0	20.6	20.7	59.7	19.6
Middle	12.3	73.0	14.8	21.3	60.5	18.2	17.6	65.6	16.8
Upper middle	9.7	75.7	14.6	19.1	63.9	17.3	15.0	68.9	16.1
Highest	8.8	78.8	12.4	13.9	70.5	15.6	11.8	73.9	14.3
Employment status									
Employed	18.3	65.1	16.6	10.6	75.6	13.8	14.6	70.2	15.3
Not employed	22.3	59.1	18.6	14.0	65.5	20.5	20.1	60.8	19.1

Continued...

Table 3. Percentage of people reporting changes in self-rated health (better, no change, worse) by selected characteristics (continued)

Status in 1994	People without chronic cond. or disability in 1994			People with chronic cond. or disability in 1994			Total		
	Better	No change	Worse	Better	No change	Worse	Better	No change	Worse
<u>Illness-related factors</u>									
Chronic health conditions:									
No condition	-	-	-	-	-	-	11.7	72.6	15.8
Non-disabling	-	-	-	17.5	65.1	17.4	17.5	65.2	17.3
Disabling	-	-	-	22.6	59.7	17.7	22.5	59.7	17.8
Life-threatening	-	-	-	21.4	61.8	16.8	21.4	61.8	16.8
Pain:									
None	11.0	74.2	14.8	17.9	64.1	18.1	14.6	68.9	16.5
Not affecting activities	-	-	-	24.5	54.3	21.2	20.5	58.4	21.1
Affecting few activities	-	-	-	26.5	56.5	17.0	26.4	56.3	17.2
Affecting some activities	-	-	-	24.5	63.6	11.9	24.5	63.4	12.1
Affecting most activities	-	-	-	22.8	61.8	15.4	22.5	62.7	14.9
Disability:									
No	11.3	73.6	15.1	17.9	64.4	17.7	14.4	69.2	16.4
Yes	-	-	-	13.1	59.1	17.8	23.1	59.1	17.8
Personal health practice									
Smoking:									
Smoker	14.5	68.5	17.0	21.4	59.0	19.6	18.5	63.0	18.5
Non-smoker	9.8	75.7	14.6	21.7	64.9	13.4	15.3	68.5	16.2
Physical activity:									
Active	9.7	77.0	13.3	17.7	65.9	16.5	14.3	70.6	15.1
Moderate	8.4	78.1	13.4	17.7	63.6	18.7	14.0	69.4	16.6
Inactive	12.7	71.8	15.5	21.1	61.3	17.6	17.6	65.7	16.7

Table 4. Percentage of individuals reporting changes in self-rated health by change in selected potential predictors* of self-rated health: findings from the National Population Health Survey longitudinal study, 1994-1996

Status in 1994	Total Population			People with chronic cond. or disability in 1994			People without chronic cond. or disability in 1994		
	Better	No change	Worse	Better	No change	Worse	Better	No change	Worse
Total	11.3	73.7	15.1	19.7	62.5	17.8	16.2	67.2	16.7
Income:									
Increase	17.8	66.0	16.3	21.5	61.7	16.8	13.3	71.1	15.6
Decrease	16.1	65.0	18.9	20.4	60.2	19.5	9.3	72.6	18.1
Employment:									
Not employed to employed	22.8	64.1	13.2	28.0	62.1	9.9	17.2	66.1	16.6
Employed to not employed	18.0	59.9	22.1	23.2	54.4	22.4	9.3	69.2	21.6
Smoking:									
Nonsmoker to smoker	15.7	62.4	21.8	22.7	53.0	24.3	8.3	72.5	19.2
Smoker to nonsmoker	18.7	65.1	16.2	17.6	65.9	16.5	20.3	64.0	15.7
Physical activity:									
Less	15.0	67.0	18.1	-	-	-	9.6	73.6	16.8
More	16.3	66.4	17.3	-	-	-	11.3	73.1	15.5
Pain:									
New pain	15.0	58.2	26.9	15.9	59.2	24.9	7.9	50.4	41.7
Other	16.5	68.2	15.3	20.7	63.0	16.3	11.3	74.5	14.2
Disability:									
No to yes	12.8	50.9	18.9	-	-	-	-	-	-
Yes to no	26.5	58.2	15.3	-	-	-	-	-	-

* Predictors with no or little changes, such as sex, age, education were not included in the table.

- Not statistical significant or not available; all associations presented in table are statistical significant.

Table 5. Predictors of worsening self rated health in the Canadian household population aged 20+ years using 1994 characteristics as predictors: results from logistic regression analyses of the National Population Health Survey longitudinal data, 1994-1996

Predictor	Category	No chronic condition or disability		Chronic condition or disability		Total population	
		Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
<u>Individual Demographic factors</u>							
Age in 1994:	20-29	1		1		1	
	39-39	1.30	1.07, 1.61	1.46	1.20, 1.77	1.38	1.20, 1.59
	40-49	1.26	1.00, 1.57	1.66	1.35, 2.03	1.47	1.26, 1.71
	50-59	1.37	1.04, 1.79	1.81	1.45, 2.26	1.65	1.39, 1.95
	60-69	1.74	1.25, 2.41	2.08	1.62, 2.67	1.93	1.59, 2.35
	70-79	1.70	1.10, 2.65	2.57	1.94, 3.41	2.32	1.85, 2.91
	80+	2.21	1.00, 4.88	2.03	1.37, 3.02	2.00	1.42, 2.83
Gender:	Male	1		1		1	
	Female	0.81	0.70, 0.94	0.91	0.81, 1.02	0.87	0.80, 0.95
Education:	Low to high	0.86	0.80, 0.91	0.91	0.86, 0.95	0.89	0.86, 0.93
Income:	Not low	1		1		1	
	Low	1.08	0.89, 1.32	1.25	1.06, 1.46	1.17	1.03, 1.32
Marital status:	All other	1		1		1	
	Married/common law	1.03	0.88, 1.20	0.99	0.87, 1.12	0.99	0.90, 1.10
Employment:	Not employed	1		1		1	
	Employed	0.78	0.63, 0.96	0.80	0.68, 0.93	0.79	0.70, 0.90
<u>Illness-related factors</u>							
Chronic condition:	None	-	-	-		1	
	Non-disabling	-	-	1		1.23	1.10, 1.37
	Disabling	-	-	1.03	0.91, 1.17	1.32	1.17, 1.48
	Life-threatening	-	-	2.10	1.74, 2.54	2.69	2.24, 3.23
Pain in 1994:	No pain limiting activity	1.45	0.91, 2.33	1		1	
	Pain limiting activity			2.61	2.22, 3.07	2.53	2.17, 2.94

Continued ...

Table 5. Predictors of worsening self rated health in the Canadian household population aged 20+ years using 1994 characteristics as predictors (continued)

Predictor	Category	No chronic condition or disability		Chronic condition or disability		Total population	
		Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
<u>Personal health practice</u>							
Smoking in 1994:	Nonsmoker/ex-smoker	1		1		1	
	Current smoker	1.35	1.14, 1.54	1.08	0.95, 1.23	1.17	1.06, 1.29
Physical Activities in 1994:	Not active	1		1		1	
	Active	1.08	0.89, 1.32	0.71	0.60, 0.82	0.71	0.63, 0.80
<u>Psychological factors</u>							
Mastery scale:	Pearlin score 1-28	1.01	0.99, 1.03	0.97	0.96, 0.99	0.98	0.97, 1.00
Self esteem:	Score 0-24	0.97	0.94, 1.00	0.97	0.95, 0.99	0.97	0.95, 0.98
Distress:	0-24	1.00	0.97, 1.03	1.05	1.03, 1.07	1.03	1.02, 1.05
Sense of coherence:	4-78	0.99	0.98, 1.00	1.00	0.99, 1.01	1.00	0.99, 1.00
Self-rated health in 1994:	Excellent, very good	1		1		1	
	Good, fair, poor	4.15	3.56, 4.85	3.69	3.28, 4.15	3.87	3.53, 4.25

Table 6. Predictors of worsening self rated health in the Canadian household population aged 20+ years using 1994 characteristics and changes in characteristics as predictors: results from logistic regression analyses of the National Population Health Survey longitudinal data, 1994-1996

Predictor	Category	No chronic condition or disability		Chronic condition or disability		Total	
		Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Demographic variables							
<u>Individual Demographic factors</u>							
Age in 1994:	20-29	1		1		1	
	39-39	1.30	1.05, 1.61	1.30	1.06, 1.60	1.29	1.11, 1.49
	40-49	1.23	0.97, 1.55	1.50	1.21, 1.86	1.34	1.15, 1.57
	50-59	1.19	0.88, 1.60	1.64	1.29, 2.07	1.43	1.19, 1.71
	60-69	1.53	1.07, 2.19	1.89	1.44, 2.49	1.69	1.36, 2.09
	70-79	1.36	0.74, 2.49	2.37	1.64, 3.42	2.02	1.49, 2.73
	80+	-	-	-	-	-	-
Gender:	Male	1		1		1	
	Female	0.76	0.65, 0.89	0.85	0.75, 0.97	0.80	0.73, 0.89
Marital status:	Not married	1		1		1	
	Newly married	0.97	0.68, 1.38	0.92	0.69, 1.24	0.96	0.76, 1.20
Education:	Low to high	0.89	0.83, 0.96	0.92	0.87, 0.97	0.91	0.87, 0.95
Income:	Not low	1		1		1	
	becoming low	1.08	0.83, 1.39	1.34	1.09, 1.64	1.23	1.05, 1.44
Employment status:	Not employed	1		1		1	
	Newly employed	0.56	0.43, 0.74	0.85	0.68, 1.06	0.73	0.62, 0.86
<u>Illness-related factors</u>							
Pain	No new pain	1		1		1	3.70, 5.51
	New pain	8.57	5.44, 15.52	3.71	2.96, 4.64	4.51	

Cont'd...

Table 6. Predictors of worsening self rated health in the Canadian household population aged 20+ years using 1994 characteristics and changes in characteristics as predictors (continued)

Predictor	Category	No chronic condition or disability		Chronic condition or disability		Total	
		Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Self-rated health in 1994	Excellent, very good Good, fair, poor	1 4.28	 3.63, 5.06	1 3.90	 3.42, 4.43	1 4.04	 3.65, 4.47
<u>Personal health practice</u>							
Smoking:	Non-smoker New-smoker	1 1.34	 1.00, 1.79	1 1.31	 1.02, 1.70	1 1.33	 1.10, 1.61
Physical activity:	Non-active More active	1 0.68	 0.54, 0.84	1 0.74	 0.61, 0.88	1 0.71	 0.61, 0.81
<u>Psychological factors</u>							
Mastery	1-28	1.02	1.00, 1.04	0.98	0.96, 1.00	0.99	0.98, 1.01
Self-esteem	0-24	0.96	0.93, 0.99	0.97	0.94, 0.99	0.96	0.94, 0.98
Distress	Change low to high	1.00	0.99, 1.01	1.01	1.002, 1.014	1.005	1.001, 1.009
Sense of coherence	Score	0.99	0.98, 1.00	1.00	0.99, 1.01	1.00	0.99, 1.00

Table 7. Proportion of people reporting changes in chronic health condition status by level of self-rated health in 1994

Non-disabling		Excellent			Disabling	Excellent			
		Very good	Good	Fair/poor		Very good	Good	Fair/poor	
Food allergy	Newly reported	3.7	4.5	4.8	Arthritis	Newly reported	4.7	7.5	8.4
	No longer reported	2.0	3.3	3.7		No longer reported	1.6	3.0	4.7
Allergy	Newly reported	10.5	12.4	14.4	Back pain	Newly reported	7.5	8.1	10.0
	No longer reported	4.9	6.1	6.9		No longer reported	5.0	9.7	15.3
Asthma	Newly reported	1.4	2.1	3.5	Bronchitis	Newly reported	1.0	2.3	3.8
	No longer reported	0.6	0.8	0.8		No longer reported	1.1	1.9	4.9
High blood pressure	Newly reported	2.9	4.4	7.1	Alzheimer	Newly reported	-	-	-
	No longer reported	0.9	1.7	4.7		No longer reported	-	-	-
Migraine	Newly reported	2.9	2.3	3.9	Life threatening	Excellent			
	No longer reported	1.7	2.34	4.3		Very good		Good	Fair/poor
Sinusitis	Newly reported	3.5	3.9	4.7	Heart disease	Newly reported	1.4	2.7	6.1
	No longer reported	1.9	3.7	4.5		No longer reported	0.4	1.7	4.7
Ulcers	Newly reported	1.2	1.7	3.6	Cancer	Newly reported	0.9	1.3	1.9
	No longer reported	1.0	2.1	3.7		No longer reported	-	1.6	2.6
Cataract	Newly reported	-	-	-	Diabetes	Newly reported	0.7	1.1	2.3
	No longer reported	-	-	-		No longer reported	-	-	0.8
					Stroke	Newly reported	-	-	-
						No longer reported	-	-	-

Table 8. Predictors of the development of chronic health conditions between 1994 and 1996 in the total population and in people without chronic health conditions or disability in 1994: results from logistic regression models (only significant predictors are reported)

		Total population		People without chronic condition or disability in 1994	
		OR		OR	
		95%	CI	95%	CI
<u>Individual</u>					
<u>Demographic factors</u>					
Age	20-29	1		1	
	30-39	1.12	0.99, 1.26	1.06	0.88, 1.27
	40-49	1.27	1.12, 1.45	1.34	1.10, 1.63
	50-59	1.53	1.32, 1.77	1.46	1.46, 1.15
	60-69	1.99	1.68, 2.35	2.05	1.53, 2.74
	70-79	2.20	1.81, 2.68	3.13	2.11, 4.65
	80+	2.06	1.56, 2.71	3.98	1.95, 8.14
Sex	Male	1		1	
	Female	1.33	1.22, 1.44	1.27	1.12, 1.45
Education	Low to high	1.01	0.97, 1.04	1.04	0.98, 1.10
Income	Not low	1		1	
	Low	0.97	0.87, 1.08	0.84	0.70, 1.01
Marital status	All other	1		1	
	Married/common law	1.07	0.95, 1.19	0.89	0.78, 1.03
Employment	Not employed	1		1	
	Employed	1.07	0.95, 1.19	1.12	0.92, 1.36
Personal health practice					
Physical activities	Not active	1		1	
	Active	1.01	0.91, 1.12	0.91	0.77, 1.08
Smoking	Non-smoker/ex smoker	1		1	
	Current smoker	1.04	0.96, 1.14	1.05	0.92, 1.21
Pain	No pain/not-limiting act.	1		1	
		1.73	1.52, 1.96	2.37	1.54, 3.65
<u>Psychological factors</u>					
Mastery	1-28 low to high	0.99	0.98, 1.00	1.01	0.99, 1.03
Distress	0-24	1.00	0.98, 1.01	0.99	0.97, 1.02
Self esteem	0-24	1.03	1.01, 1.04	0.99	0.99, 1.00

Cont'd...

Table 8. Predictors of the development of chronic health conditions between 1994 and 1996 in the total population and in people without chronic health conditions or disability in 1994: results from logistic regression models (only significant predictors are reported)

		Total population		People without chronic condition or disability in 1994	
		OR		OR	
		95%	CI	95%	CI
Sense of coherence	Score 4-78	0.99	0.986, 0.99	0.99	0.99, 1.00
No. of conditions in 1994	Every one increment	1.03	1.00, 1.06	-	-
1994 self-reported Health	3-level ordinal (exclt. to poor)	1.10	1.02, 1.17	1.11	0.97, 1.27

Table 9. Predictors of the development of non-disabling, disabling, and life-threatening chronic health conditions between 1994 and 1996: results from logistic regression models

		Non-disabling condition		Disabling condition		Life-threatening condition	
		OR	CI	OR	CI	OR	CI
		95%		95%		95%	
<u>Individual Demographic factors</u>							
Age	20-29	1		1		1	
	30-39	1.04	0.91, 1.18	1.37	1.17, 1.60	0.95	0.67, 1.36
	40-49	1.01	0.88, 1.16	1.97	1.67, 2.31	1.95	1.40, 2.72
	50-59	0.95	0.82, 1.12	2.61	2.19, 3.11	4.26	3.08, 5.88
	60-69	1.03	0.86, 1.24	3.50	2.87, 4.26	5.02	3.56, 7.08
	70-79	0.84	0.68, 1.05	2.51	1.99, 3.15	9.29	6.49, 13.30
	80+	0.46	0.33, 0.63	2.26	1.65, 3.10	7.54	4.94, 11.51
Sex	Male	1		1		1	
	Female	1.52	1.39, 1.65	1.19	1.01, 1.31	0.75	0.65, 0.87
Education	Low to high	1.03	0.99, 1.07	1.01	0.97, 1.05	1.03	0.86, 1.24
Income	Not low	1		1		1	
	Low	0.88	0.79, 1.00	1.01	0.89, 1.14	1.10	0.92, 1.32
Marital status	All other	1		1		1	
	Married/common law	0.90	0.82, 0.98	1.09	0.99, 1.21	1.15	0.98, 1.35
Employment	Not employed	1		1		1	
	Employed	1.12	0.99, 1.26	0.94	0.83, 1.07	0.93	0.76, 1.12
<u>Personal health practice</u>							
Physical activities	Not active	1		1		1	
	Active	0.93	0.83, 1.04	1.13	1.00, 1.28	0.87	0.72, 1.06
Smoking	Non-smoker/ex-smoker	1		1		1	
	Current smoker	0.92	0.84, 1.01	1.18	1.07, 1.31	1.01	0.86, 1.18
<u>Illness-related factors</u>							
Pain	No pain/not limiting act.	1		1		1	
	Pain	1.12	0.96, 1.30	3.35	2.91, 3.86	1.03	0.86, 1.24
No. of condition in 1994	Every one increment	2.64	2.52, 2.77	1.77	1.70, 1.84	1.53	1.46, 1.60
<u>Psychological factors</u>							
Mastery	1-28 low to high	1.00	0.98, 1.01	1.00	0.99, 1.01	1.00	0.98, 1.02
Distress	Score 0-24	0.99	0.98, 1.01	0.99	0.97, 1.01	0.98	0.95, 1.00
Self esteem	Score 1-24	1.03	1.01, 1.04	0.99	0.98, 1.01	1.00	1.98, 1.03
<u>1994 Self-reported health</u>	3-level ordinal (exclt. to poor)	0.96	0.90, 1.04	1.02	0.95, 1.10	1.58	1.42, 1.76

Table 10. Percent prevalence of selected types of health care utilization in the 12 months prior to the 1996 NPHS by level of SRH 1994 and 1996.

Type of health care utilization	1994 SRH			1996 SRH		
	Excellent/ very good	Good	Fair/poor	Excellent/ very good	Good	Fair/poor
Overnight hospital stay	6.6	10.8	20.0	6.2	10.2	25.4
Alterative health care services	7.1	6.8	7.2	6.7	7.6	8.6
Home care services	1.1	3.0	9.7	0.9	2.9	12.3
Visiting health professionals	92.4	93.3	97.1	92.0	93.5	96.0
Medical doctor	74.5	79.8	83.9	74.2	83.3	90.4
Nurse	5.7	6.8	9.5	5.1	7.0	13.5
Dentist	59.9	50.6	35.3	61.5	48.5	40.3
Chiropractor	10.6	11.5	9.3	10.4	12.1	10.9
Physiotherapist	6.3	8.16	10.9	5.6	8.9	14.0

Table 11. Percent distribution of the number of visits to health care professionals in previous 12 months reported in the 1996 NPHS by SRH in 1994

Type of health care professional	SRH in 1994	No. of visits in previous 12 months reported in 1996			
		0	1	2-4	5+
Medical doctor	Excellent / very good	24.7	26.6	34.1	14.7
	Good	18.0	18.4	37.2	26.4
	Fair / poor	8.2	10.6	32.1	49.1
Nurse	Excellent / very good	94.3	2.5	2.0	1.2
	Good	93.0	2.3	2.0	2.7
	Fair / poor	89.6	2.9	4.0	3.5
Dentist	Excellent / very good	39.5	28.1	30.1	2.3
	Good	48.3	23.7	25.4	2.6
	Fair / poor	61.7	14.1	22.1	2.3
Chiropractor	Excellent / very good	89.3	1.6	3.0	6.0
	Good	88.2	1.8	3.4	6.6
	Fair / poor	89.8	0.6	2.7	6.9
Physiotherapist	Excellent / very good	93.8	0.8	1.5	4.0
	Good	91.9	1.0	1.2	5.9
	Fair / poor	88.5	0.8	1.8	9.0

Table 12. Percent prevalence of selected types of health care utilization in the 12 months prior to the 1996 NPHS in individuals with better and worse SRH in 1996

Type of Health Care during the last 12 months	Change in SRH	
	Better	Worse
Overnight hospital stay	10.9	13.2
Alterative health care services	6.5	8.4
Home care services	2.7	4.1
Visiting health professionals	92.8	93.6
Medical doctor	81.2	83.5
Nurse	5.7	9.1
Dentist	51.6	49.3
Chiropractor	10.3	11.3
Physiotherapist	7.0	9.8

Table 13. Percent distribution of the number of visits to health care professionals in previous 12 months reported in the 1996 NPHS by SRH in individuals with better and worse SRH in 1996

Type of health professional	Change in SRH during follow-up	No. of visits			
		0	1	2-4	5+
Medical doctor	Better	18.4	22.0	38.0	21.6
	Worse	15.4	17.5	34.7	32.4
Nurse	Better	94.3	2.3	1.9	1.6
	Worse	90.8	2.9	2.3	4.0
Dentist	Better	48.2	23.3	25.7	2.9
	Worse	50.4	22.7	24.3	2.6
Chiropractor	Better	89.6	0.8	3.8	5.8
	Worse	88.6	1.2	3.2	7.0
Physiotherapist	Better	93.2	0.3	1.4	5.1
	Worse	90.2	1.2	1.7	6.9

Figure 1 Number of new chronic conditions developed in people without chronic conditions at 1994 by SRH

