UNMET NEEDS FOR COMMUNITY SERVICES AMONG THE ELDERLY: IMPACT ON HEALTH SERVICES UTILIZATION

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ABSTRACT

Seniors 75 years of age and older, the majority of whom live in the community, constitute a segment of the population that is vulnerable to loss of autonomy. Indeed many community dwelling seniors have difficulty performing daily living activities, such as bathing, toileting, walking, preparing meals and housekeeping.

In the setting of a population based cohort study of community-dwelling seniors 75 years of age or older, we examined the effect of unmet needs for community services for activities of daily living (ADL) and instrumental activities of daily living (IADL) on health services utilization. Self-perceived unmet need status was determined using a baseline in-home interview. A total of 839 subjects were recruited from the Greater Montreal Region, Quebec, Canada, using random telephone number dialling.

Health services utilization data were obtained from administrative databases from the Quebec Health Insurance Board (Régie de l'Assurance-Maladie du Québec - RAMQ). Multivariable negative binomial regression models were used to examine the association between unmet need status and health services utilization during the six month period following the baseline interview.

The results of this study indicate that unmet needs are associated with higher rates of emergency department visits, hospitalization and prescription drug use. No statistically significant association was found between unmet needs and physician utilization among single seniors, although married seniors with unmet needs in activities of daily living had 2.8 times the rate of medical specialist visits as compared to those who reported no unmet ADL needs.

Unmet need for community services among the elderly has implications for the use of more expensive acute and long-term health care services. The results of this research suggest that developing programs to address unmet needs in the elderly population can potentially reduce health services utilization by the elderly.

RESUME

Les personnes âgées de 75 ans et plus, dont la majorité vivent dans la communauté, constituent un segment de la population vulnérable à la perte de l'autonomie. En effet, beaucoup d'aînés vivant dans la communauté ont de la difficulté avec les activités de la vie quotidienne telles que prendre un bain, marcher, préparer les repas et faire le ménage.

Dans le cadre de l'étude d'une cohorte de population de personnes âgées de 75 ans et plus vivant dans la communauté, nous avons examiné l'effet des besoins non comblés de services communautaires pour les activités de la vie quotidienne (AVQ) et les activités de la vie domestique (AVD) sur l'utilisation des services de santé. Le statut des besoins non comblés, tel que perçu par les sujets, a été déterminé à l'aide d'entrevues, qui dans un premier temps (temps 1) ont été effectuées à domicile. Un total de 839 sujets a été recruté dans la grande région de Montréal, Québec, Canada, en utilisant la composition aléatoire de numéro de téléphone.

Les données concernant l'utilisation des services de santé ont été obtenues à partir des bases de données administratives de la Régie de l'Assurance maladie du Québec. Les modèles de régression binomiale négatifs multi variables ont été utilisés pour examiner l'association entre le statut des besoins non comblés et l'utilisation des services médicaux pendant la période de six mois suite à la première entrevue.

Les résultats de cette étude indiquent que les besoins non comblés sont associés à un plus haut taux d'hospitalisation et de visites aux départements d'urgence et à une plus grande consommation de médicaments prescrits sur ordonnance. Aucune association statistiquement significative n'a été trouvée entre les besoins non comblés et le nombre de visites chez un médecin parmi les aînés célibataires, bien que les aînés mariés ayant des

besoins non comblés pour les activités de la vie quotidienne (AVQ) aient 2.8 fois le taux de visites à un spécialiste en comparaison de ceux qui n'ont pas signalé de besoins non comblés pour les AVQ.

Les besoins non comblés de services communautaires chez les personnes âgées ont des implications sur le coût, sur l'acuité et sur l'utilisation à long terme des services de santé. Les résultats de cette étude suggèrent que la mise sur pied de programmes abordant la question des besoins non comblés chez la population âgée pourrait potentiellement réduire l'utilisation des services de santé par celle-ci.

STATEMENT OF ORIGINALITY

The focus of this study was to examine the association between self-perceived unmet needs for community services and health services utilization by seniors, 75 years of age and older, using a prospective cohort study design. Very few studies have examined this association and those that have used cross-sectional study designs. This study is unique in that it not only looks prospectively at health services utilization associated with unmet needs but also uses a linked population-based survey and administrative health data.

Finally, because health service data were available from both questionnaire data and administrative health databases I was able to compare the estimates of association obtained using these two different data sources.

The results of this investigation provide the best available evidence for the association between unmet needs and health services utilization.

My roles in this thesis included participating with the study team in the development of the baseline questionnaire, developing the six month telephone administered follow-up questionnaire, design and development of the study databases, obtaining permission from the Quebec Access to Information Commission to obtain the subjects' health services data and subsequently obtaining the data from the Ministry of Health and Social Services, data management, and the statistical analyses.

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In addition, I received Doctoral Awards from the CIHR, McGill University-Université de Montréal Research Group on Integrated Services for Older Persons (SOLIDAGE), and the McGill University Faculty of Medicine.

ABBREVIATIONS

Abbreviation	Description
ADL	Activities of Daily Living
AHF	American Hospital Formulary Services pharmacologic-therapeutic classification system for coding drugs
ALFI	Adult Lifestyles and Function Interview
BNPS	Brief Neuropsychological Screening
CDS	Chronic Disease Score
CHSRF	Canadian Health Services Research Foundation
CI	Confidence interval
CIHR	Canadian Institutes for Health Research
CLSC	Centre Local de Service Communautaire (Local Community Service Centre)
CVA	Cerebrovascular Accident
ED	Emergency Department
FADOQ	Fédération de l'Âge d'Or
FRSQ	Fonds de la Recherche en Santé du Québec
GP	General Practitioner
IADL	Instrumental Activities of Daily Living
ICDH	International Classification of Disease and Handicap
IHRT	Interdisciplinary Health Research Team
IOM	Institute of Medicine
MEDECHO	**M**aintenance et **E**xploitation des **D**onnées pour l'**É**tudes pour la **C**lientète **Ho**spitalière (Quebec hospital discharge database)
MMSE	Mini-Mental State Examination
NB	Negative Binomial

NLTCS	National Long-Term Care Surveys
NSAID	Non Steroidal Anti-Inflammatory Drug
OR	Odds Ratio
RAMQ	Régie de l'Assurance-Maladie du Québec (Quebec Health Insurance Board)
RR	Rate Ratio
SD	Standard Deviation
SE	Standard Error
SIPA	Sytème de Service Intégrés pour personnes Âgées en perte d'Autonomie (Integrated Service System for Elderly Persons with loss of Autonomy)
SOLIDAGE	McGill University-Université de Montréal Research Group on Integrated Services for Older Persons
WHO	World Health Organization

1 INTRODUCTION

1.1 Background

As people age disease processes and the onset of functional performance limitations can result in a loss of independent function. The incidence of many of the health conditions that cause disability increases with age, with disability being approximately four times more prevalent among elderly adults compared to younger adults (Guralnik and Simonsick 1993). The population in Canada, and indeed most western countries, is aging. The proportion of the population 65 years of age and older in Canada is projected to increase from its current level of approximately 13% to about 22% by the year 2026, while the proportion of those 75 and older is expected to increase from 5% to almost 10% over the same time period (Statistics Canada 2004). Longer life spans may have the effect of increasing the proportion of the elderly with disabilities in the future (Manton and Soldo 1985; Verbrugge 1984). Moreover, seniors have been found to account for a disproportionate proportion of health care expenditures relative to the overall population (Rosenberg and James 2000). Therefore, with the aging of the population and increased life expectancy, it has been suggested by some that, as this segment of the population grows health care costs will result in a crisis for the publicly funded health care system (Foot 1996; Henripin 1994; Marzouk 1991; Foot 1982; Gross and Schwenger 1981). Others argue that the aging of the population will be economically manageable (Denton and Spencer 1997; Barer et al., 1995; Denton and Spencer 1995; Fellegi 1988; Denton and Spencer 1985). While it is not clear which side of this debate is correct, it is likely that there will be increased demands for health care and community services among this

segment of the population. Indeed, difficulty in performing daily living tasks is a risk factor for institutionalization (Wolinsky et al., 1993; Branch and Jette 1982) and is related to increased health services utilization and depression (Dendukuri et al., 2004; Simon et al., 2002; Luber et al., 2001; LaPlante 1998).

Seniors often require assistance with daily living activities and when this assistance is absent or the assistance that is provided is insufficient there is a need for care. This deficit in needed care defines "unmet need". In Canada, very few studies have estimated the prevalence of unmet needs for assistance among community-dwelling seniors, and even less data are available about the association between unmet needs and health services utilization. While it is known that people with disabilities use more health care services than non-disabled people (Allen and Mor 1998), the relationship between unmet needs and health services utilization has been examined in only a few studies (this will be addressed in Chapter 2). Even less is known about the effect of unmet needs on subsequent use of health services by the elderly. Individuals with disabilities do not necessarily experience unmet need. Services and care provided by formal and informal care givers can reduce or eliminate unmet need. Thus, while health services use may be higher among the disabled, this does not necessary imply that unmet needs are associated with increased health services utilization. It has generally been accepted that providing community-based services, such as assistance in daily living activities, will reduce health care costs by reducing the need for more expensive acute care or long-term care services. This is based on the assumption that unmet needs for Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) result in adverse events or health problems that themselves lead to an increased use of acute care or long-term care services. Thus the

assumption is that there is a causal relationship between inadequate assistance at home and deterioration of health, which leads to increased use of health services. There has, however, been little empirical evidence to support this assumption.

This thesis research took place within the framework of a larger study called "Unmet needs for community-based services for the elderly aged 75 years and over" (I will hereafter refer to as the "Montreal Unmet Needs Study"). The three objectives of the Montreal Unmet Needs Study were:

1. To estimate the prevalence of, and describe self-reported unmet needs for community services in the community dwelling elderly 75 years of age and older.
2. To provide a profile of those with unmet needs.
3. To examine the link between unmet needs and health services use.

The purpose of my thesis research was to address the third objective, the examination of the link between unmet needs and health services utilization.

To examine these three objectives we conducted a population based prospective cohort study that used random telephone number dialling to recruit community-dwelling seniors living in the Greater Montreal area. Using health care data obtained from interviews with seniors themselves as well as administrative health services databases the association between unmet needs and emergency department visits, hospitalizations, physician utilization and prescription medication use in the subsequent six month period was examined.

The Montreal Unmet Needs Study was developed in partnership with health planners and providers at the provincial, regional and community levels, including the Ministry of Health and Social Services (Ministre de la Santé et des Services Sociaux), the

Régie de la santé Régionale, Centres local de services communautaires (CLSCs [Local Community Service Centre]), and la Fédération de l'Âge d'Or (FADOQ), a representative organization of the aged. The active involvement of these organizations in the development of this project ensured that the results of this research will be useful for health care policy planners and makers responsible for ensuring proper allocation and availability of community-based services.

1.2 Study Objectives and Research Question

The objective of my thesis research was to determine whether unmet needs for community-based services among seniors, 75 years of age and older, is associated with health services utilization: specifically, to examine the association between unmet needs at study entry and emergency department visits, hospitalizations, physician utilization and prescription medication use during the six months following entry into the study.

Epidemiological and health services research often use self-reported health services utilization data. Published research indicates there are substantial discrepancies between self-reported and administrative health services data among older adults (Raina et al., 2002). In this study health services utilization was available from two sources: administrative databases and self-reported data. This allowed for estimates of the associations between unmet needs and health services utilization data obtained from administrative health databases and from self-reported health services utilization data.

1.3 Hypothesis

The study hypothesis is that community-dwelling seniors with unmet needs for community services are more likely to use health services, such as physician visits, emergency department visits, medications, and be at higher risk of hospitalization than

those who are receiving community services appropriate to their needs and those who have reported no unmet needs for community services.

1.4 Organization of the thesis

The next chapter (Chapter 2) critically reviews the literature related to unmet needs for community services and health services utilization by the elderly and what is known about the relationship between unmet needs and the use of health services by the elderly. In Chapter 3 a detailed description of the study methodology and the sources of data are presented. The results of the statistical analyses are presented in Chapter 4. Finally, Chapter 5 discusses the results, implications, relevance, strengths and limitations of this research project, and provides suggestions for future research.

2 LITERATURE REVIEW

2.1 Introduction

The aging process is frequently associated with physical and cognitive decline. As we enter into the so called *golden* years people often develop chronic medical conditions which can result in functional limitations and need for assistance, either from others or from assistive devices. The population in Canada is aging which raises concerns for the management and financing of the publicly funded health care system. This makes unmet needs for community services, and its association with health services utilization an important area of research. This review will discuss the literature pertaining to unmet needs for community services and what is known about the association between unmet needs for community services and health services utilization by seniors.

2.2 Aging of the population

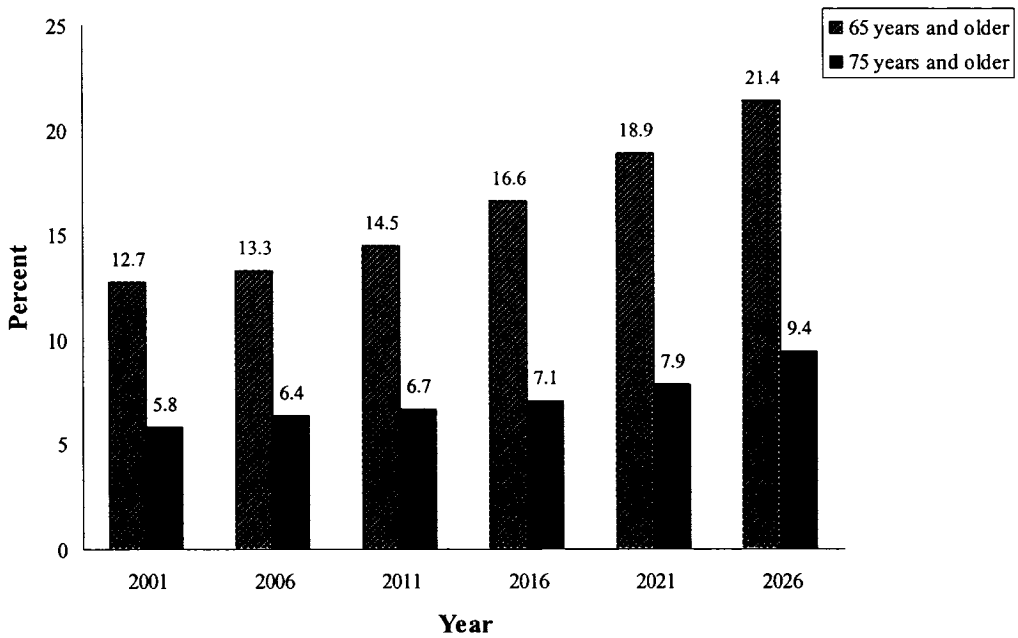
Unmet needs among the elderly is a growing concern, particularly because of demographic changes which have been occurring over the past century and which will continue over the next few decades. The population in Canada and indeed most industrialized countries is aging as a result of increasing life expectancy and declining birth rates. In Canada, seniors over the age of 65 constitute the fastest growing segment of the population.

Data from Statistics Canada indicate that there has been a steady increase in the proportion of seniors, over the age of 65 in the population since 1921. Seniors in Canada made up 12.7% of the population in 2001 compared to only 4.8% in 1921. Over the last

few decades the proportion of seniors in the population has increased from 8.0% in 1971 and 9.6% in 1981.

Furthermore, the population of seniors is expected to increase more rapidly during the next few decades as the people born during the Baby Boom years, between 1946 and the early 1960s, begin turning 65 years of age (Figure 2-1). Statistics Canada has projected that seniors will make up 16.6% of the population by 2016 and 21.4% by the year 2026. Older seniors, over the age of 75, constituted 5.8% of the population in 2001. The proportion of this segment of the population is anticipated to increase to 9.4% by the year 2026.

Figure 2-1: Population aging projections



Source: Statistics Canada, Population projections for 2001, 2006, 2011 2016, 2021 and 2026 (http://www.statcan.ca/english/Pgdb/demo23a.htm)

In addition to the demographic shift that has been taking place; the life expectancy of seniors in Canada has substantially increased over the past century. In 1921 life expectancy was almost 60 years and by 2001 life expectancy had increased to 79.6 years. The gap in life expectancy between men and women has also increased. In 1921 women's life expectancy was 1.8 years longer than that of men. By the year 2001 this difference had increased to 5.1 years (Table 2-1). Senior women have longer life expectancy than men. In 2001, a 65 year old woman could expect to live an additional 20.6 years compared to only 17.1 years for a 65 year old man.

This increase in life expectancy in Canadian seniors reflects declines in mortality rates among people in this age group. While life style changes, advances in medical technology and treatment have all contributed to extending life, the process of aging often brings with it the onset of diseases. Gains in life expectancy suggest that more people live long enough to develop chronic illnesses and conditions, which may in turn be associated with functional limitations and disability.

Table 2-1: Life expectancy at birth and age 65, 1921 - 2001

Year	Remaining Life Expectancy					
	At birth			At age 65		
	Males	Females	Total	Males	Females	Total
1921[a,b]	58.8	60.6	59.7	13.0	13.6	13.3
1931[b]	60.0	62.1	61.0	13.0	13.7	13.3
1941[b]	63.0	66.3	64.6	12.8	14.1	13.4
1951	66.4	70.9	68.5	13.3	15.0	14.1
1961	68.4	74.3	71.1	13.6	16.1	14.8
1971	69.4	76.4	72.7	13.8	17.6	15.7
1981	71.9	79.1	75.4	14.6	18.9	16.8
1991	74.6	81.0	77.8	15.8	20.0	18.0
2001	77.0	82.1	79.6	17.1	20.6	19.0

[a] Excludes Quebec.
[b] Excludes Newfoundland.
Sources: Statistics Canada, Catalogue no. 84-537-XPB, and 84-F0211-XIE.

2.3 The disablement process

When individuals develop functional limitations and disabilities they often develop needs for assistance which require help from others. As was mentioned in the Chapter 1, unmet need for assistance with daily living activities can arise when required assistance is absent or is inadequate to meet the need required. Before elaborating on the concept of unmet need it is first useful to review some conceptual schemes on the disablement process, which provide useful models for terminology and measurement for studying unmet need.

A number of conceptual models of the disablement process have been developed to describe how acute and chronic medical conditions affect the functioning of physiologic systems and the effect of medical illness on function and disability.

The International Classification of Impairments, Disabilities, and Handicaps (ICIDH) is one such model that was published by the World Health Organization (1980). It describes a taxonomy of disease impacts (Figure 2-2). In this model a pathological lesion or disorder (disease) impairs the physiological, anatomical or psychological structure or function of an organ which restricts the ability to perform tasks (disability) and consequently interferes with one's social role (handicap). The ICIDH defined the three consequences of disease as:

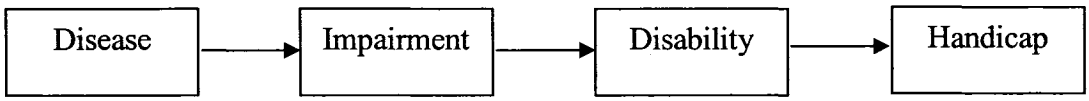
1. ***Impairment***: any loss or abnormality of psychological, physiological or anatomical structure or function.
2. ***Disability:*** any restriction or limitation in the ability of an individual to perform an activity due to impairment.
3. ***Handicap:*** a disadvantage to the individual as a result of an impairment or disability that limits or restricts the ability to fulfill normal roles.

Nagi developed another conceptual framework (Nagi 1991; Nagi 1979; Nagi 1965). Like the WHO model, Nagi's conceptual model contains four central stages in the disablement process: Active Pathology, Impairment, Functional Limitation and Disability (Figure 2-3). Nagi's model was not well known before the late 1980s, but did gain gradual acceptance by disability researchers (Verbrugge and Jette 1994). This scheme was later adopted by an Institute of Medicine (IOM) panel convened to consider disability and prevention (Verbrugge and Jette 1994; Pope and Tarlov 1991). In the IOM model *Pathological Lesion* and *Impairment* cover the same concepts as *Disease* and *Impairment* in the WHO model. However, *Functional Limitation* and *Disability* replace the WHO's

concept of Disability and there is no comparable concept of Handicap. Functional Limitation in the IOM model refers to a difficulty in performing the tasks, while Disability refers to an actual limitation in the performance of tasks in daily life.

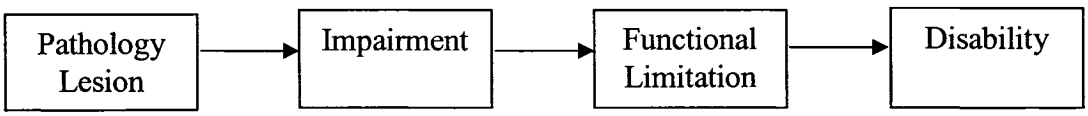
Kane and Boult (1998) extended the IOM model to include two additional constructs in the causal pathway: They suggest that disability leads to *Need* for supportive services to help the individual cope with functional restriction or disability, which then creates *Demand* for services (Figure 2-4).

Figure 2-2: Disablement Process (World Health Organization)



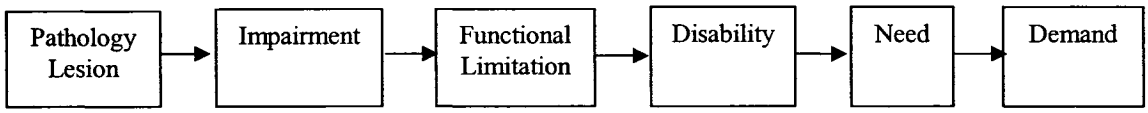
Adapted from: Verbrugge, LM, Jette, AM. 1994, The disablement process: Soc Sci Med, v. 38, p. 1-14.

Figure 2-3: Disablement Process (Institute of Medicine)



Adapted from: Nagi, SZ. 1991, Disability concepts revisited: implications for prevention, in AM Pope and AR Tarlov (eds), Disability in America: Toward a National Agenda for Prevention: Washington, D.C., National Academy Press.

Figure 2-4: Disablement Process (Kane and Boult)



From: Kane RL, Boult C. 1998 Defining the service needs of frail older persons. In Allen SM, Mor V, eds. *Living in the Community with Disability: Service Needs, Use, and Systems.* New York: Springer Publishing Company, 15-41.

These models provide a linear pathway from pathology to disability to need. However, it is clear that other factors can also influence and modify the disablement process. As described by Verbrugge and Jette (1994), social and physiologic factors can play a role in the modification of the disablement pathway (Figure 2-5). Verbrugge and Jette group these factors into three categories: risk factors, extra-individual factors, and intra-individual factors.

Risk factors, such as demographic, social, behavioural, psychological, environmental, and biological characteristics can influence the presence and severity of impairments, functional limitation or disability in an individual. Since these characteristics exist before the onset of the disablement process these factors are considered as predisposing.

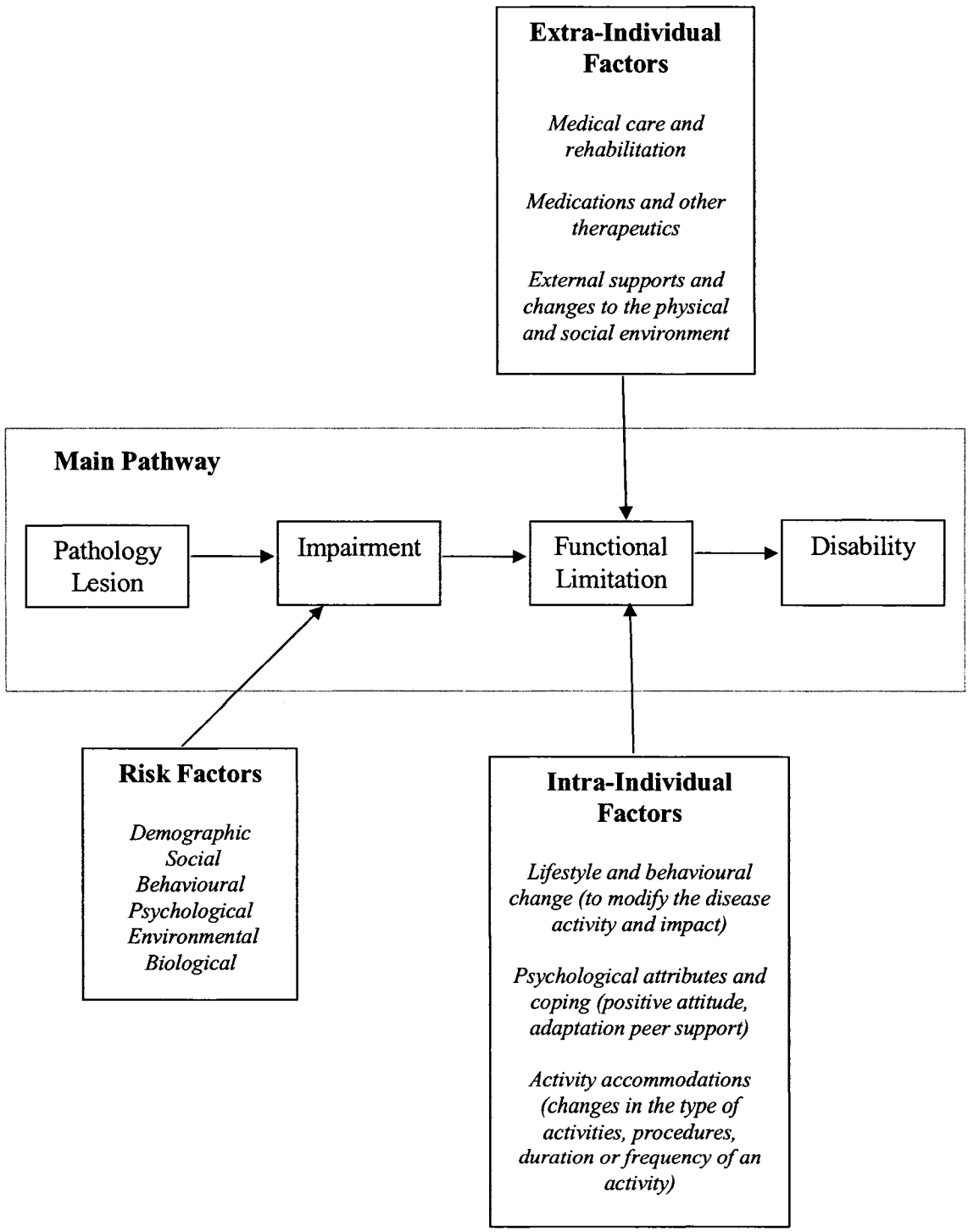
Extra-individual factors include interventions, such as medical care and rehabilitation, medications and other therapeutics, external supports and changes to the physical and social environment, which can lessen the difficulties or problems individuals experience as a result of the disablement process. These are interventions that can delay or reverse functional limitations or disabilities. For example, medical care can include surgery or physical therapy; medication and other therapeutic regimens can include a variety of treatments such as drugs, exercise, rest or energy conservation; external supports include personal assistance, special equipment and devices, supervision, day care, and meals-on-wheels. And finally, modification to physical and social environment, such as structural modification to homes, public transportation, and health insurance can also serve to reduce disability.

While extra-individual factors relate to actions that occur from outside of the individual, the disablement process can also be influenced by intra-individual factors. That is, factors that occurs from within the individual, such as lifestyle and behavioural change (to modify the disease activity and impact), psychological attributes and coping (positive attitude, adaptation peer support), and activity accommodations (changes in the type of activities, procedures, duration or frequency of an activity).

While the extra and intra-individual factors described have been portrayed as positive factors it is also possible for these types of interventions to exacerbate the disablement process. Medical interventions such as surgery can have negative consequences, and drugs can have side effects. Individuals experiencing medical problems and functional difficulties can adopt negative attitudes and behaviours that can worsen disabilities. For example, fear of falling may result in an individual becoming more sedentary and consequently the person may become less fit and develop other functional limitations.

In 1993, Johnson and Wolinsky (1993) proposed yet another variant of the disablement process. While accepting Nagi's conceptual model, they changed the causal sequence. In their view, since disability can create problems of adaptation that can limit functional performance, the authors suggested that disability precedes functional limitation in the causal pathway.

Figure 2-5: Disablement Process (Verbrugge and Jette)



Adapted from: Verbrugge, LM and Jette, AM. The disablement process. Soc Sci Med 38 (1): 1-14, 1994.

2.4 Chronic illness and disability

Physiologic decline is an inevitable part of the human condition, cells age, and organ systems eventually deteriorate. The aging process is often associated with the onset of acute and chronic illnesses. On a social level, this can result in compromised autonomy for the individual. As this thesis deals with health services utilization among the elderly as a consequence of *unmet needs*, in this section I will focus my discussion on chronic conditions, which are often associated with aging and can also result in need for care.

Chronic conditions are long-term diseases that result from disease processes or injury and result in physical, cognitive or emotional abnormalities. According to Statistics Canada (1999), among the elderly, the most common chronic health problem is arthritis and rheumatism, reported by 42% of seniors. One third suffer from high blood pressure, 22% report food or other allergies, 16% chronic heart disease (excluding the effects of strokes), 15% cataract, and 10% diabetes. Fewer than 10% of the elderly population suffer from other chronic health conditions.

In 1996-97, 28% of seniors, 65 years of age and older, living in the community reported some level of restriction in their activities as a result of chronic illness (Statistics Canada 1999). Not surprisingly, older seniors are more likely to report some level of restriction in their activities compared to younger seniors. Fifty percent of seniors 85 years of age or older reported activity limitations, while 34% among those age 75 to 84, and 22% among those between age 65 and 74 were so limited.

While disability can manifest itself at any age, the percentage of seniors with disability is higher among older age groups. For example, 45% of seniors over age 85 had a

disability or handicap compared to 28% of those between 75 and 84, and 21% of those 65 to 74 years of age (Statistics Canada 1999).

2.5 Assessing disability and functional limitation

Research over the past few decades had greatly expanded our understanding of disability and functional limitations. There is a large body of published literature that has examined disability and functional limitation among the elderly.

Nagi viewed disability from a sociologic perspective contending that there are major social components that influence the extent to which activities are limited and the impact of those limitations on the individual (Nagi 1991; Nagi 1979; Nagi 1965). The level of disability can vary over time and from individual to individual. Williams et al. (1997) defined disability "as [being] a point on a continuum between complete independence in daily life and work, and complete inability to perform any activities".

Chronic and acute health conditions can affect many different domains of activity from personal hygiene to social activities. Different approaches have been developed to measure functional performance limitations; however, in order to assess functional limitations or disability among the elderly, most studies have focused on two domains: personal care (Activities of Daily Living), and household activities (Instrumental Activities of Daily Living).

Activities of Daily Living or ADLs refer to basic tasks of everyday life, such as bathing, eating, toileting, and transferring (from a bed to a chair). When people are unable to perform these activities they require help from others or from mechanical devices or both. Although people of all ages can experience difficulties in performing activities of daily living, the prevalences are higher for the elderly than younger adults. Not

surprisingly, in the elderly population the prevalence of ADL problems rise with increasing age, with the highest prevalence among those 85 years of age and older (Rivlin and Wiener 1988). In addition, the prevalence of disability is higher among elderly women than elderly men. This is explained, in part, by the longer life spans of women who are more likely to develop chronic conditions and live longer with these illnesses.

Katz developed a commonly used set of measures of limitations in activities of daily living among the elderly (Katz and Akpom 1976). In empirical studies Katz observed that loss of functional skills occurred in a specific order with the most complex functions being lost first. The six activities included in the ADL index were found to occur in a hierarchical order: bathing, dressing, toileting, transfers from bed, eating, and continence. The index, originally developed for elderly and chronically ill patients with stroke or hip fracture, gained broader acceptability because it contains well-defined criteria and was found to be sensitive to changes in functional status. It has been used in all age groups from children to the elderly, with the mentally and physically impaired, in the community and in institutions.

Poorer ADL scores was found to be a significant predictor of admissions to a nursing home (Wolinsky et al., 1993; Branch and Jette 1982), use of paid home services (Garber 1988; Soldo and Manton 1985) use of hospital services (Branch et al., 1981; Wan and Broida 1981), use of physician services (Wan and Broida 1981) and mortality (Wolinsky et al., 1993; Manton 1988). The ADL index has become a standard measure of use in studies of the elderly.

The term *Instrumental Activities of Daily Living* or IADLs refers to more complex routine activities. Developed by Lawton and Brody (1969) the IADL scale measures

limitation in activity including: transportation, shopping, light and heavy housework, meal preparation, handling money, and using the telephone. In 1987, Spector et al. (1987) suggested that IADLs should be included in measuring functional limitations among the elderly as ADLs alone are insufficient to measure disability since they do not measure adaptation to the environment. The authors suggested a hierarchical relationship existed between IADLs and ADLs since community-dwelling seniors are more likely to have IADL limitations while institutionalized seniors are more likely to have limitations in both ADLs and IADLs. Through his analysis, Spector showed that there is a hierarchical relationship with IADL limitations occurring first, followed by ADLs. Using a longitudinal study design to assess the patterns of the onset of disability in activities of daily living among seniors 75 years of age and older, Jagger et al. (2001) found that ADLs associated with lower-extremity strength (bathing, mobility, toileting) are lost earlier that ADLs related to upper-extremity strength (dressing, feeding). Women were found to be at higher risk of developing a limitation in bathing compared to men (relative risk = 1.6; 95% CI: 1.3, 1.9) and toileting (relative risk = 1.7; 95% CI: 1.2, 2.5).

2.6 Need for Assistance

In population studies functional disability has generally been assessed based on whether assistance is received or needed (Williams et al., 1997). The types of assistance reported have included assistance by another person, stand-by assistance, supervision and assistance from various types of equipment and devices, such as grab bars, walkers, and canes.

As Williams et al. (1997) discuss, there have been attempts to assess the amount of assistance needed to accomplish a task; however, these attempts are not necessarily

adequate to study unmet need. Estimates of the amount of human assistance needed are often based on whether the individuals can perform the task without help, with some help, or are unable to perform the task at all without assistance. Certainly, functional limitations, disability and need can be very subjective experiences. Even when suffering from the same level of disability, one person's needs may be different from that of another's. Social factors and individual physical ability and coping skills can influence one's functional limitations and the degree to which assistance is needed. Moreover, an individual's needs for assistance can change over time.

Need is a complex concept and can involve felt needs, expressed needs, met needs, unmet needs, normative needs and comparative needs (Verbrugge and Patrick 1998).

Felt needs are defined in Verbrugge and Patrick (1998) as "perceived wants or desires for services by people with chronic conditions or disabilities, regardless of whether effective services are available". Whereas, *expressed* needs are requests for assistance and services by disabled individuals. When an expressed need has been satisfied by the provision of a service or special equipment or device the need is considered *met*. *Unmet* needs occur when expressed needs are not satisfied as evaluated by the disabled or sick person.

Need for assistance with personal activities may also be assessed by health care professionals. *Normative* needs are those defined by health professionals using clinical records and interviews; while *comparative* needs involve comparing ill or disabled people who receive services with those who do not.

I will now turn to a more detailed discussion of the concept of unmet needs.

2.7 Defining unmet needs

2.7.1 Conceptual definition

Conceptually, needs are considered unmet when assistance from another person is unavailable or insufficient to meet the level of assistance that is required. Unmet needs have been operationally defined in a variety of ways in different studies. There are two components of unmet need, the assessment of need and the determination of whether this need has or has not been met either completely or in part. Since unmet need is closely related to the assessment of whether an individual receives any assistance, a person who cannot perform a necessary task without aid can be classified as being in need of assistance, and therefore, have an unmet need if that assistance is not received. The definition of unmet need can also be based on the amount of assistance received. If an individual is unable to perform an activity and requires assistance but does not receive any help then the person's need is unmet. Need may be unmet to varying degrees. Assistance may be only available for part of the time, or it may be present but insufficient to meet the required need (for example, a spouse may be present and willing to help with bathing but may not have sufficient strength to help every time). In this case the person's needs are being insufficiently met; and so, the person has under-met needs.

Most commonly, unmet needs have been assessed using self-reported functional performance measures based on ability to carry out activities of daily living (i.e. bathing, dressing, transferring from bed to chair, toileting, and eating) and instrumental activities of daily living (i.e. shopping, meal preparation, housework, and transportation). These are activities which are normally performed alone by functionally independent persons.

2.7.2 Operational definitions

Surveys that have used functional performance measures to assess unmet needs generally ask if the individual is able to perform the ADL or IADL activity alone or whether help is required. Unmet need has been operationally defined in different ways by different researchers:

1. Manton (1989), using data from the National Long-Term Care Surveys (NLTCS) to estimate unmet needs, defined unmet need to exist if a person met one of the following criteria:
    - Did not perform the activity at all.
    - Received no human assistance, did not use an assistive device, but reports needing help.

    And an additional ADL specific criteria:

    - Persons who were incontinent (of bowel or bladder) were considered to have an unmet need.

    Those who initially reported that they did not bathe at all, but later in the interview stated that they took a bed/basin/sink bath were not considered to have had an unmet need in bathing.

2. Jackson 1991 also used the NLTCS data to estimate the prevalence of unmet need. She compared estimates based on three different definitions.
    a. The first used Manton's definition.

b. The second slightly modified Manton's definition by dropping incontinence as evidence of unmet need in toileting from the list of criteria.

c. The third definition used a different approach from that of Manton, and considered an unmet need to exist if the person:

- Received no human assistance, did not use an assistive device, but reported needing help.

3. Unmet need was defined to exist in an elderly disabled population by Tennstedt et al. (1994) if:

a. The person reported substantial physical difficulty with a specific activity of daily living activity; *and*

b. Did not receive any assistance from another person with that specific activity of daily living.

4. In 1997, Allen and Mor developed a more complex approach to define unmet need status which included both directly reported self-perceived need for assistance with ADL and IADL activities and indirectly reported unmet need based on the responses to *consequence questions*. Subjects were classified into one of three categories: *no need*, *met need* or *unmet need*. For each of six ADL activities (bathing, dressing, eating, transferring to and from bed, toileting and moving around indoors) and five IADL activities (cooking, light housekeeping, heavy housekeeping, shopping and transportation) subjects

were asked if they were able to perform the functional activity alone or whether help was needed from someone.

Allen and Mor defined unmet need as occurring if the subjects had difficulty performing a task alone and met one of the following criteria:

1. Did not have help, and reported needing help;
2. Had disability-related help, but reported needing more help; *OR*
3. Did not report needing help (or more help), but reported the occurrence of a negative consequence attributed to the absence of help

Regardless of whether or not a subject reported an unmet need for help or more help Allen and Mor asked a series of consequence questions associated with the activity. The consequence questions were designed to link consequences with the absence of help for a specific activity. For example, for difficulty in bathing, subjects were asked if there had been times in the past month when he or she was unable to bath as often as would have been liked. Even if a subject did not perceive having a need for assistance with an activity the presence of an adverse consequence was considered indicative of an unmet need. This approach was used in this thesis project. A more detailed discussion of the consequence questions is presented in the methodology chapter.

5. In a study which examined unmet needs among older community-dwelling seniors (70 years of age and older), Desai and colleagues (2001) used yet another definition for estimating the prevalence of unmet ADL needs among

the elderly. A person was defined to have an unmet need if he or she reported having difficulty with an activity; AND

1. Reported receiving help with the activity *and* needing more help with the activity; OR
2. Reported not receiving help with the activity but reported needing help with the activity.

2.8 Prevalence of unmet needs

A number of studies have estimated the prevalence of unmet needs. Not surprisingly, on the background of different definitions of unmet need, as well as differences in study methodology and sample characteristics the prevalence estimates have been found to vary. Many studies have focused on the estimation of unmet need amongst seniors with disabilities. Prevalence estimates for unmet needs among the disabled community-dwelling seniors have ranged from 2 to 42% (Allen and Mor 1997; Williams et al., 1997; Tennstedt et al., 1994; Jackson 1991; Manton 1989). Estimates of the prevalence of unmet needs are sensitive to the definition that is used by the researcher.

In the United States, the National Long-Term Care Surveys (NLTCS) conducted in 1982, 1984 and 1989 were used to provide estimates of the prevalence of unmet needs in the population. One of the first studies to report unmet need, conducted by the United States (General Accounting Office 1988), found that despite receiving informal help from family and friends, close to 40% of disabled seniors needed additional ADL (5%) and IADL (34%) assistance. In 1989, using data from the 1984 NLTCS, Ken Manton estimated that 34.6% of community-dwelling elderly people with disability had unmet need for long-term care (Manton 1989). Analyses of the NLTCS data by another researcher resulted in somewhat different unmet need prevalence estimates. Using data from the 1984

NLTCS, Jackson (1991) compared the prevalence estimates of unmet need using different definitions of unmet need (see Section 2.7.2) in a community-dwelling (non-institutionalized) sample of elders over the age of 65 with those obtained by Manton. Using Manton's definition of unmet need, Jackson estimated the prevalence of unmet needs at 42.2% instead of 34.6%. She attributed this discrepancy to possible error in replicating Manton's operationalization of unmet need (Manton's exact coding scheme was not available to her), or the use of slightly different datasets (Manton used public use NLTCS data while Jackson used a version edited by the staff at the Agency for Health Care Policy and Research). Jackson also found that exclusion of incontinence as an ADL difficulty resulted in dramatically lower estimates of the prevalence of unmet needs (8.9% versus 42.2%). The estimates did distinguish between fully and partially met needs. Using data from the 1987-88 National Survey of Families and Household, (Montgomery and Hirshorn 1991) estimated unmet IADL needs to be 22.3% among community-dwelling seniors 60 years of age and older.

Tennstedt and colleagues (1994) in a longitudinal study of a representative sample of disabled elderly people 70 years of age and older estimated the prevalence of unmet need. Using the baseline data Tennstedt found that 10.2% of the community-dwelling, disabled seniors had experienced an unmet IADL need and 8.5% unmet ADL needs. At the follow-up, four years later, the proportion of participants with unmet IADL needs had increased to 15.3%, while that of unmet ADL need remained unchanged.

In 1997, Allen and Mor, in a cross-sectional study using a random sample of disabled adults (including younger and older adults) residing in Springfield, Massachusetts (The Springfield study), estimated the prevalence of unmet need for assistance with ADL

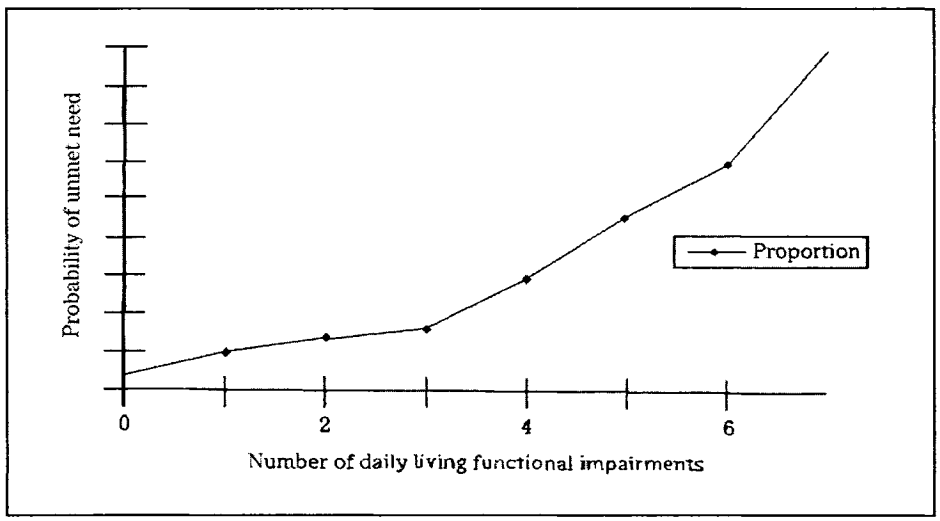
and IADL activities. In this study, estimates of the prevalence of unmet ADL needs ranged from 4.1% for eating to 22.6% for transferring. Prevalence estimates for IADL needs ranged from 15.9% for cooking to 34.6% for heavy housekeeping. In a stratum of seniors 65 years of age and older the prevalence of unmet ADL needs was estimated at 4.3% for eating, 7.0% for toileting, 11.7% for moving around indoors, 16.2% for dressing, and 17.1% for transferring. Bathing was found to be the activity associated with the greatest unmet need (22.6%). The prevalence of unmet need for assistance with IADLs in this older stratum was highest for light and heavy housework (31.3% and 30.1%, respectively), followed by transportation (25.8%), shopping (20.9%) and cooking (14.9%). The prevalence of unmet need in the younger respondents (age stratum between 18 – 64 years) was higher for each of the ADLs and IADLs, and the prevalence of negative consequences, for all but two of the domains, in this group was also higher compared to the older respondents; suggesting that the younger adults were more severely disabled.

More recently, a United States population based study of non-institutionalized seniors 70 years of age and older, using data from the 1994 National Health Interview Survey Supplement on Aging, found that the prevalence of unmet need ranged from 10.2% (eating) to 20.1% (transferring) with an overall prevalence of unmet need in Activities of Daily Living of 20.7% (Desai et al., 2001). Overall, almost half of the study participants reported needing help with one or more ADLs and, of those with need, 20.7% were found to have unmet needs.

Several studies have shown that, in general, the prevalence of unmet needs among the disabled increases with the amount of disability (Mor et al., 1992; Jackson 1991). Jackson (1991), in a sample of community-dwelling seniors 65 years of age and older,

found that individuals with 5 to 6 ADL limitations had higher levels of unmet need. Unmet needs were also found to increase with the number of ADLs in a population of cancer patient residing at home (Mor et al., 1992). More severely disabled patients were approximately twice as likely to have unmet needs for IADLs compared to those who were less disabled. A synthesis of the results of these two studies by Mor (1998) is presented in Figure 2-6.

Figure 2-6: Unmet need and the number of impairments



Source: Mor V. A Modern Lexicon of Disability. In Allen SM, Mor V, eds. *Living in the community with disability: service needs, use, and systems.* New York: Springer Publishing Company, 353-71

Synthesis of work by Jackson et al. (1991) and Mor et al. (1992)

In Canada there have been very few studies that have examined unmet need. In 1991, unmet needs were assessed in the Enquête sur la santé et les limitations d'activité (ELSA) but this study was limited to the use of home services for personal care

(Statistiques Canada 1991). Crowell et al. (1996), examined demographic and functional characteristics of elderly users and non-users of home care services in urban Nova Scotia and Newfoundland. They reported that, in Nova Scotia, being over 85 years of age without a supporter living in the same residence, not being married and having a limitation in an Instrumental Activities of Daily Living significantly increased the likelihood of use of home care services. Among subjects receiving home care services, unmet needs were reported by 16% of respondents suggesting that receipt of services does not necessarily imply that needs are being adequately met. In Crowell's study, unmet needs were reported for those who needed help with instrumental activities of daily living.

Comparisons across different studies are problematic since different definitions of unmet need and different functional activities are often used to estimate unmet need status.

2.9 Correlates of unmet needs

Predictors and correlates of unmet needs are useful in better understanding the reason that needs may go unmet. The interplay of a variety of factors, such as lack of knowledge about available services, financial constraints, unwillingness to use services, cultural and social issues, can all contribute to needs being unmet.

Several studies have examined correlates of unmet need. Allen and Mor (1997) found that individuals that reported indicators of impairment (i.e. number of ADLs, number of IADLs) and morbidity (i.e. number of symptoms, and spending one or more days in bed during the two weeks before the interview) predict increased risk of unmet ADL and IADL need. Among individuals who had three or more people they could count on for help, the risk of unmet ADL needs was significantly less than for those with fewer helpers (ADL Odd Ratio = 0.6, 95% CI: 0.38,0.94). Sex, age, ethnic minority status, education, living arrangement and marital status were not found to significantly influence unmet need.

Desai et al. (2001) also found that the prevalence of unmet needs for ADL activities did not vary by age, race, number of chronic conditions, sex, and education. Poorer individuals (i.e. household income less that US $20,000), who lived alone, and those with more ADL limitations were at increased risk of having unmet need. In Tennstedt et al.'s (1994) longitudinal study, baseline unmet need for activities of daily living was correlated with higher levels of functional disability, while unmet need for instrumental activities of daily living was found to be more likely for younger, less disabled seniors who reported fewer caregivers providing help, and whose primary caregiver was either an offspring or non-relative. Disabled elderly individuals who lived alone were found to be more likely to have unmet needs (16.5% versus 5.1% living with a spouse, and 4.9% living with a spouse and someone else); suggesting that informal support networks play a role in meeting the needs of the disabled elderly (Jackson 1991). In addition, older seniors (85+) are slightly more likely to have unmet need compared to younger seniors (9.2% for 85+ versus 8.1% and 7.8% for the 65-74 and 75-84 age groups, respectively). In contrast to other studies, Jackson found that disabled males are slightly more likely to have unmet needs (8.6%) compared to disabled women (7.9%).

2.10 Consequences of unmet needs

A number of studies have found that unmet need for personal assistance activities is associated with numerous negative consequences, including falls, burns, weight loss, dehydration, as well as increased risk of institutionalization and death (Desai et al., 2001; Lima and Allen 2001; Allen and Mor 1997). Unmet needs can result in reduction in quality of life, compromised safety, and other adverse consequences.

In a representative sample of disabled adults that included both young and old adults (18 – 64 years and 65 years and older), Allen and Mor (1997) found that self-

reported unmet need was linked with a variety of negative consequences. More than 25% of respondents impaired in toileting reported wetting or soiling themselves because they did not have enough assistance getting to the bathroom or using a bedpan. Other activities where insufficient help affected more than 25% of those with need included bathing (could not bath), transferring from a bed to a chair by oneself (fell), housework (distressed) and transportation (missed physician's appointment or unable to go places for recreation).

LaPlante et al. (2004) found that adults who require help with two or more ADLs have significantly greater risk of adverse consequences compared to individuals whose needs are met. The authors examined 53 consequence measures and found that individuals with unmet needs had higher prevalence of adverse consequences on 48 of the measures. Those with unmet needs were more likely to experience adverse consequences, including discomfort, burns, hunger, weight loss, dehydration, falls, and injuries resulting from falls compared to those individuals whose needs are met, particularly for people who live alone. This suggests that adverse consequences may be of greater concern for an elderly population since approximately two thirds of seniors live alone.

In addition, the likelihood of experiencing adverse consequences related to unmet need for ADL personal assistance has been shown to be significantly associated with lower income, and increasing number of ADL disabilities (Desai et al., 2001).

2.11 The coming health care crisis due to the aging population

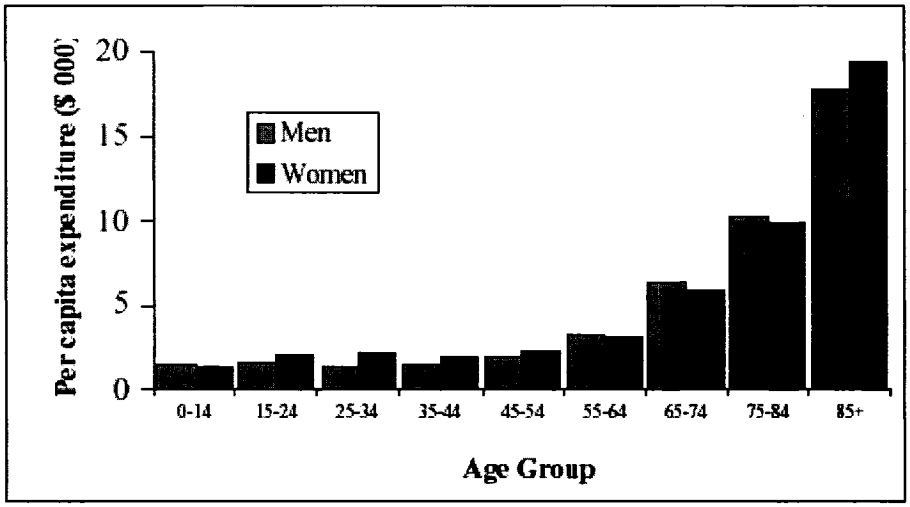
Population aging impacts on the health care utilization as the elderly have proportionally more chronic illness than younger adults. Over the past decade there has been great interest concerning the effect of the aging population on the health care system. There has been substantial discussion about issues such as whether the elderly population

over utilize health care resources, whether the health care system is responding appropriately to the needs of the elderly, and whether the health care system will be able to cope with the elderly population as it almost doubles in size over the next few decades.

It is known that health services utilization and expenditures tend to increase with age. As described by Hogan and Pollock (2001) health care expenditures dramatically increase after the age of 65, with the largest increases among those 85 years of age and older (Figure 2-7).

The aging of the population has raised concerns among some researchers and policy makers because seniors account for a disproportionate part of health services utilization relative to their portion of the population (Soldo and Manton 1985; Waldo and Lazenby 1984). The impact that the aging of the population will have on health care expenditures has been substantially debated. One school argues that the growth of the elderly population will generate significant cost to the health care system (Foot 1996; Henripin 1994; Marzouk 1991; Foot 1982; Gross and Schwenger 1981). The other, argues that growth of the elderly population will be manageable since declines in expenditures of other sectors or new forms of health care delivery and increased productivity will mitigate against the growth in expenditures on a per capita basis (Denton and Spencer 1997; Barer et al., 1995; Denton and Spencer 1995; Fellegi 1988; Barer et al., 1987; Denton and Spencer 1985). In other words health care costs will be manageable since as the population grows so does the economic base to sustain the increased costs. A review of this debate is beyond the scope of this thesis. For a more detailed discussion of this topic see Rosenberg (2000). This concern has fostered a great deal of research into health services utilization and expenditure as it relates to the elderly.

Figure 2-7: Health-Care Expenditure and Age (Canada, 1997)



Source: Hogan S and Pollock A. Why Does Health-Care Utilization Increase With Age: The Cost of Living or the Cost of Dying? University of Canterbury, New Zealand, and Applied Research and Analysis Directorate, *Health Canada*. 2001

Whichever view of the impact of aging on health care expenditures proves to be correct, it is likely that the aging population will place pressure on the delivery of health care services in the future. This has made research into health services utilization by the elderly a particularly salient field of study. Understanding factors that influence health service utilization by the elderly will enable policy makers and planners to develop programs and make appropriate changes to the health care system to better deal with the use of health services in the future.

2.12 Health services utilization by the elderly

Aging is often associated with cognitive and physiological deterioration, so not surprisingly, health services use tends to increase in the later stages of life. Numerous studies have found that the elderly are higher users of health care resources (Rosenberg and

James 2000; Tomiak et al., 1998; Rosenberg and Moore 1997; Back et al., 1995; Barer et al., 1987).

In a study using hospital utilization data by age from British Columbia for the period from 1971 to 1982-83, Barer et al. (1987) found that hospital use is a function of age, with older age groups having higher hospitalization rates. In addition, Barer found that the elderly in 1982-83 had higher hospital utilization than in 1971. Overall, people over the age of 65 use over half the hospital days, undergo about half the surgical procedures, account for about a quarter of physician billing, and use about 40% of prescription drugs (Barer et al., 1995). Seniors over the age of 65 also tend to stay in hospital longer, with an average hospital stay of 17 days compared to only 9 days among those between the ages of 45 and 64 (Statistics Canada 1999).

Population age changes are less important for trends in medical services utilization. Increased physician utilization appears to reflect higher volumes of services being billed per patient. The increase of age accounted for only a small percentage of the increase in service use (Demers 1996; Barer et al., 1995; Roch et al., 1985).

2.13 Association between health services utilization and disability

In Canada, while overall the population is getting healthier, gains in life expectancy have resulted in a mixture of increases in disabled and non-disabled life years (Wilkins and Adams 1992). With increased life expectancy come increases in the number of years of disability in the average lifespan. Wilkins and Adams (1992) found that the proportion of life spent in disability is increasing.

Numerous studies have demonstrated increased health services utilization and medical costs associated with functional limitation and disability (Tranmer et al., 2003; Gill

et al., 2001; Tomiak et al., 1998; LaPlante 1998; Shapiro and Tate 1997; Wolinsky et al., 1995; Wolinsky and Johnson 1991; Fried and Bush 1988; Wolinsky et al., 1986; Wolinsky and Coe 1984; Wolinsky et al., 1983; Coulton and Frost 1982; Wan and Arling 1982). Hospitalization rates have been reported to be two to three times greater in older adults who develop severe progressive disability compared to those who have little or no disability (Ferrucci et al., 1997). Researchers have also found that disability is associated with increased use of physician services and home health care (Weiner et al., 1990; Soldo and Manton 1985). The increased use of health services utilization by the disabled is associated with substantial costs. In the United States it has been estimated that the per capita cost of medical care among older disabled adults is three times greater than for that of non-disabled seniors (Pope and Tarlov 1991).

2.14 Health services use due to unmet needs

While it is known that people with disabilities use more health care services than non-disabled people, and seniors are heavier users of health services than younger adults, very little is known about the relationship between *unmet needs* and health services utilization. It has generally been believed that providing community-based services, such as assistance in activities of daily living, will reduce health care costs by reducing the need for more expensive acute care or long-term care services. This is based on the hypothesis that unmet needs for Activities of Daily Living and Instrumental Activities of Daily Living results in adverse events and health problems that consequently lead to an increased use of acute care or long-term care services. Underlying this hypothesis is the assumption that there is a causal relationship between inadequate assistance at home and deterioration of

health, which leads to increased use of health services. There has been little empirical evidence to support this assumption.

Only two studies have been published that examined the association between unmet needs and health service utilization (Allen and Mor 1997; Tennstedt et al., 1994). Both of these studies used samples of disabled individuals. There have been no published studies that used representative samples of seniors. As described earlier, Tennstedt and colleagues (1994) carried out a study on a representative sample of disabled seniors in the United States to examine the extent, type, and predictors of unmet needs. They also examined the relationship between unmet needs and nursing home admissions over a four-year period, but did not find a higher rate of unmet need among respondents admitted to nursing homes compared to disabled elders who continued to live in the community. Their inability to observe a difference may have been due to small numbers of subjects with unmet needs admitted to nursing homes over the four year follow up period of the study (4 admissions for subjects with ADLs; and 9 admissions for subjects with IADLs).

Allen and Mor's (1997) cross-sectional study of people with disabilities (including younger and older adults) found that respondents with unmet needs for assistance with activities of daily living had higher levels of health services utilization. In this study the population was restricted to subjects with an ongoing illness or impairment and who required assistance with at least one ADL. These subjects were found to have significantly more physician visits, emergency room visits, and hospitalizations compared to respondents without unmet ADL needs.

There are a number of limitations to this study. The cross sectional design of the study precludes a causal interpretation of the relationship between unmet needs and health

services utilization. In addition, the authors reported only bivariate associations between reported unmet need and health care utilization outcomes, and did not stratify their analysis of health services use by age, a likely confounder or effect modifier of this association. Consequently, this study did not provide information specifically addressing the association between unmet needs among the elderly and health services utilization. In their analysis the authors did not adjust for other potential confounders, such as socio-demographic factors, health status, cognitive status, income, and social support that are likely to introduce bias in the association between unmet needs and health services utilization. In particular, age and health status are likely to confound the association between perceived unmet needs and health services use. Furthermore, the data on health utilization outcomes were limited to self-reported health service use, which may be unreliable. Differences in access to health care services between the for profit health care system in the United States and the publicly funded Canadian health care system raises questions as to the applicability of the Springfield study to the Canadian context. Indeed, the Springfield study is likely to have underestimated the effect of unmet needs on the use of health services as the United States health care system has inherent financial disincentives to obtain medical care. The universal nature of the health system in Canada does not have the same financial disincentives and this will enable a more reliable estimate of the effect of unmet need among the elderly on health services utilization.

2.15 Self-reported versus administrative health services data sources

Self-reported measures of health services utilization are often used in population-based studies, however, these self-reported measures may not be consistent with administrative records. It has previously been reported that there is substantial discrepancy

between self-reported and administrative health services data. Using a sample of 1,500 seniors aged 65 and older in Ontario, Raina et al. (2002) examined the agreement between self-reported and administrative health care utilization data. In this study, contact utilizations measures were found to have higher agreement than volume utilization measures. The agreement, as measured by Cohen's kappa statistic, ranged from moderate to high, while volume utilization measures ranged from poor to moderate as assessed by the interclass correlation coefficient (ICC). The lowest agreement was found for the numbers of contacts between general practitioner and other medical specialists, while the highest agreement was observed for contacts with physiotherapists and chiropractors. In a comparison of self-reported use of mental health services with administrative records in Ontario the agreement for the use and volume of services was low to moderate (Rhodes et al., 2001).

2.16 Concluding remarks

The National Health Survey (Statistics Canada 1995) reported that the level of functional limitation and the prevalence of chronic illness and related disabilities in the elderly aged 65 years and older are similar to that of the adult population until the age of 75. Seniors 75 years and over are more likely than younger elders to have multiple health problems and to need community based services to help them cope with disability (Rosenberg and Moore 1997).

The aging of the population is expected to place even greater demands on community based services and health care resources. The ability to properly plan and allocate health care resources requires empirical data. As we have seen, very little is known about the association between unmet needs for community services and health services

utilization by the elderly. Allen and Mor's (1997) study used a cross-sectional design making it difficult to infer a causal relationship between unmet needs and health services utilization. In addition, while this study included older subjects (65+), the association between unmet needs and health service use was not assessed for this age stratum. While Tennsedt et al. (1994) used a longitudinal study design, only nursing home admissions were examined.

There is very limited information about the association between unmet need and health services utilization in the published literature, and even less as it related to seniors. This thesis expands current knowledge by examining the association between unmet needs and health services utilization (emergency department visits, hospitalizations, physician visits, and prescription medication use) among the very old. Moreover, this study addresses the limitations of previous studies that have examined the association between unmet needs and use of health services by using a longitudinal study design, and combining questionnaire and administrative health data

3 METHODS

3.1 Introduction

As previously described, this thesis research took place within the framework of the larger Montreal Unmet Needs Study, which had three objectives:

1. To estimate the prevalence of, and describe self-reported unmet needs for community services in the community dwelling elderly 75 years of age and older.
2. To provide a profile of those with unmet needs.
3. To examine the link between unmet needs and health services use.

To address these objectives a cohort study was conducted. The purpose of my thesis research was to examine the third objective, the examination of the link between unmet needs and health services utilization.

3.2 Ethics

In addition to signing a consent form to participate in the active data collection for the Montreal Unmet Needs Study, subjects signed a separate consent form permitting the release of their health care data from the Provincial Ministry of Health and Social Services administrative databases and for data linkage of questionnaire data with the administrative data (APPENDIX A). In Canada, a unique health insurance number is issued to each resident through the province of residence, as part of the universal publicly funded health insurance program. In the Province of Quebec, the **R**égie de l'**A**ssurance-**M**aladie du **Q**uébec (Quebec Health Insurance Board), known as the RAMQ (pronounced "RAM" – "Q"), issues each resident of the province a RAMQ health insurance number. The Health Insurance numbers of the study subjects were provided to the RAMQ to identify the

subjects for whom data would be extracted from the administrative databases. For reasons of confidentiality, the RAMQ scrambles the subjects' Health Insurance number before sending data to the researcher. Therefore, in order to link the questionnaire data with the administrative data we provided the RAMQ with each subject's unique study identification number. This unique identifier enabled us to link the administrative and questionnaire data.

Ethics approval for this study was received from the McGill University Institutional Review Board, the Ethics Committees of the Jewish General Hospital, and the l'Institut Universitaire de Gériatrie de Montréal (APPENDIX B).

Approval for access to administrative health services data and data linkage of these data with the questionnaire data was granted by the Quebec Access to Information Commission (APPENDIX C).

3.3 Study Design

This study used a prospective cohort design. A random sample of seniors was recruited from the Greater Montreal region, Quebec, Canada. This was the most appropriate study design to achieve the objectives of the Montreal Unmet Needs Study. More specifically, a prospective design enabled us to ascertain the unmet need status of each of the study subjects at the start of the study and then follow the sample forward in time to assess the relationship between unmet needs at baseline and subsequent health services utilization.

In addition, because health care utilization data were available from self-reported questionnaires and administrative health databases; it was possible to compare these sources of data for use in examining the association between unmet needs and health services utilization.

3.4 Study Population

Elderly subjects 75 years of age or older were recruited from the Greater Montreal area, for a total of 839 participants.

3.5 Subject recruitment

Study subjects were recruited between February 2001 and February 2002. The recruitment process was contracted out to a Montreal-based market research firm (Léger Marketing).

Each week Léger Marketing conducts an "Omnibus Survey" in which a random sample of approximately 5000 households in the Province of Quebec is contacted by telephone. The Omnibus Survey is used as part of regular polling of the Quebec population to obtain random samples that are used to survey the opinions of the population on various topics. The Omnibus Survey includes a question on the age category of the respondent. Prior to conducting the recruitment for our study the oldest age category used in the Omnibus Surveys was 65 years of age or over. An additional age category (75 years and over) was included in the Omnibus Survey to accommodate the requirements of our study. Léger Marketing uses random telephone number dialling to obtain the random population samples for the Omnibus Survey. This approach uses software that randomly dials telephone numbers contained in a database of telephone numbers for the Province of Quebec. The contact information for each of the Omnibus Survey respondents are banked creating lists that are, in effect, random samples of Quebec households with telephones. For the purposes of our study, sub-lists were created of all respondents living on the Island of Montreal and the South Shore of the Island that were 75 years of age or older. From these weekly generated sub-lists, trained recruiters at Léger Marketing telephoned the

household in which an elderly person was known to reside. In order to have a large enough pool of households from which to recruit our desired sample size within a reasonable time frame, Léger Marketing also used Omnibus Survey lists that were banked in the 12 months prior to the start of our project.

Using trained recruiters, Léger Marketing conducted a brief telephone recruitment interview designed by our study team to identify potential study subjects who met the following study eligibility criteria:

Inclusion criteria:

1. Respondent was 75 years of age or older;
2. Living in a community dwelling (i.e. not living in an institution);
3. Spoke and understood English or French;
4. Not cognitively impaired as determined by a score of 14 or more on the telephone administered Adult Lifestyles and Function Interview (ALFI).

Exclusion criteria:

1. Seniors who reported being participants in an ongoing study of home care needs among the elderly (SIPA: **S**ystème de Service **I**ntégrés pour **P**ersonnes **Â**gées en perte d'Autonomie [*Integrated Service System for Elderly Persons with loss of Autonomy]) (Solidage Research Group 2004a; Solidage Research Group 2004b)* were excluded.

Recruiters were instructed to identify, in each household, that member of the household who was 75 years of age or older. If there was more than one person living in the household who met the age criterion the recruiter selected the person who answered the

telephone call. If the person who answered the call was under the age of 75 the recruiter would ask to speak to a household member who was 75 or older.

A person was considered living in the community if he or she lived in a house, an apartment, or a residence for seniors. Seniors who lived in nursing homes, Residential and Long-Term Care Centres, or long-term care hospitals receive services from these institutions and are not eligible to receive community services, and were therefore, excluded from the study.

Only subjects who scored 14 or more on the ALFI cognitive screening test in the recruitment telephone interview were included in the study. The ALFI, a telephone administered version of the Mini-Mental State Examination [MMSE] (Folstein et al., 1975), has a sensitivity of 67% (compared to 68% for the Mini-Mental State Examination) and a specificity of 100% relative to the Brief Neuropsychological Screening (BNPS) test (Roccaforte et al., 1992) for the detection of cognitive impairment. The ALFI maximum total score is 22 (compared to 30 for the MMSE) and a cut-off of 17/22 has been used to define cognitive impairment as compared to 24/30 for the MMSE. Elderly who score between 15 and 24 on the MMSE are often declared as suffering from mild cognitive impairment. The corresponding range on the ALFI is 14 to 17. We chose to use a score of 14/22 or greater on the ALFI as a cut-off for inclusion into this study. This insured that only those subjects who were cognitively normal, or at worst suffering from very mild cognitive impairment, were included in the study. The ALFI has been translated into French and validated for use in the French language (Kakuma et al., 2003; Monette et al., 2001). It would, of course, have been of interest to assess the unmet needs for community services among the elderly suffering from more severe cognitive impairment or from

dementia, however, practical difficulties, financial constraints and ethical considerations made inclusion of seniors with significant cognitive impairment in the study unachievable.

During the recruitment period of this study, SIPA, a randomized controlled trial of home care needs among the elderly, was ongoing in some municipalities on the Island of Montreal. We excluded any individuals who were concurrently participating in the SIPA study as they would have been assessed for their home care needs and may have been receiving an intervention to address these needs.

Following the recruitment telephone interview, Léger Marketing forwarded the names and telephone numbers of subjects, who provided oral agreement to participate in the study and to be contacted by telephone by a member of our study team, to the study coordinator. Potential subjects were then sent an introductory letter by our study coordinator, followed by a telephone call approximately one week later from one of our seven trained study interviewers. The interviewers arranged a time to complete the consent forms and to conduct the in-home interview.

3.6 Interviewer training

The study interviewers each received a training manual and participated in a one week training program which included extensive practice interviews with the study coordinator and other interviewers. The interviewers were also provided with guidelines for the proper completion of the study questionnaire, and were instructed how to respond to questions of confidentiality and consent. Before the commencement of the follow-up interviews the study interviewers were required to participate in additional training sessions so as to familiarize themselves with the new questionnaires.

3.7 Sources of data

3.7.1 Interviews

Each subject who consented to participate in the Montreal Unmet Needs Study underwent an extensive in-home baseline interview, a brief telephone interview 6 months after the baseline interview, an extensive in-home interview 12 months after the baseline interview and a telephone interview 18 months after the baseline interview. Letters were sent to the subjects approximately 3 weeks before the projected date of the follow-up interview as a reminder that a follow-up interview was to take place in the near future. For the in-home 12-month follow-up, the subjects were contacted by the interviewers and a date for the interview was arranged. For the 6- and 18-month telephone interviews the interviewer called the subject and conducted the interview. If the time was inconvenient for the subject the interviewer arranged to call back at another time. An interview was considered to have been completed if it took place within a period of 3 weeks before to 3 weeks after the anniversary date for the follow-up interview.

The baseline and 12-month in-home interviews included the collection of detailed information on Activities of Daily Living and Instrumental Activities of Daily Living. This information was used to determine the unmet need status of the subjects. In addition, data on socio-demographic characteristics, use of medical and health services, use of community services, psychological well-being and control, social network and social support, psychosocial needs, attitudes towards the use of community services, nutritional status, health needs, physical health and mobility, and socio-economic status were collected. On average study subjects completed the baseline interview in 107 minutes (SD = 27) with a range of 40 to 280 minutes.

The brief 6- and 18-month follow-up telephone interviews collected information on changes in health status, use of services, and residential status. The 18-month interview also collected information on transportation needs. The 6-month interview lasted between 5 and 50 minutes with a mean duration of 13 minutes (SD = 5.6). The baseline and 12-month questionnaires were designed to be partly administered by telephone if the respondent became too tired to complete the questionnaire. Sixty of the 839 study subjects availed themselves of this option for the baseline interview.

This thesis uses the information collected during the baseline and 6-month interviews. Income data from the 12-month interview were used in the algorithm to impute missing baseline income data (described in detail in Section 3.11.5). The sections of the baseline interview and the 6-month telephone interview that are relevant for this thesis are included in APPENDIX D and APPENDIX E.

3.7.2 Administrative databases

Three databases administered by the Quebec Ministry of Health and Social Services were used as the sources of data for health services utilization. The RAMQ maintains databases on medical services billing (contains physician billing) and prescription claims. The MEDECHO (**M**aintenance et **E**xploitation des **D**onnées pour l'**É**tudes pour la **C**lientète **H**ospitalière) database contains data on hospital discharge in the province. In order to gain access to these data sources a request was made to the Quebec Access to information Commission in June 2002. Approval for linkage of the questionnaire data with the RAMQ and MEDECHO databases was granted from the Quebec Access to Information Commission in November 2002 (APPENDIX C). Information on health services and medication use was extracted by the staff at the RAMQ from the corresponding administrative databases and information concerning hospitalizations was obtained from

the MEDECHO database for the period starting two years before and six months after each subject's baseline interview. Health services utilization data preceding the baseline interview were also obtained so that prior health services utilization could be compared with health services utilization during the follow-up period, and for use in computing the Chronic Disease Score (described in Section 3.10.3.2). The RAMQ data linkage provided detailed information on physician visits, emergency department (ED) visits, hospitalizations and prescribed medications. The Quebec publicly funded health plan insures all Quebec residents basic medical services. In 1991, 98% of seniors 65 years of age and older in Quebec were registered with RAMQ (Régie de l'assurance-maladie du Québec 1996 1997; Statistics Canada 1992).

3.7.2.1 RAMQ Prescription Claims Database

The RAMQ prescription claims database contains information on all prescription drugs dispensed by pharmacists in Quebec from community pharmacies (i.e. excluding hospital pharmacies). Each prescription record contains the patient's RAMQ health insurance number, the drug dispensed (drug class and drug code), dispensing date, quantity dispensed, the duration of the prescription and whether it is a new prescription or a refill. Only drugs identified in the provincial formulary of reimbursed medications, revised every six months, are contained in this database (the formulary is published by the Conseil des Médicaments [Drug Formulary Council]). Over-the-counter drugs are not recorded in the prescription database, unless they have been prescribed by a physician. In addition, free samples, provided to a patient by a physician, are not recorded in the prescription database. In a study to assess the validity of the RAMQ prescription claims database, 89% of the prescriptions filled by a sample of elderly patients were found to correctly identify the prescribing physician and the drug (Tamblyn et al., 1995). Fewer than 0.4% of records

contained missing data or out-of-range data for the RAMQ health insurance numbers, drug, quantity, dispensing date and duration of the prescription. It is, however, possible that prescription claims data may underestimate the number of prescriptions written by physicians since not all prescriptions issued by physicians are filled by the patient. This could introduce misclassification bias if subjects with unmet needs are less likely to be able to fill prescriptions than subject without unmet needs. However, this is unlikely to introduce a large bias as it has been shown that 87% to 97% of all prescriptions that are written are filled (Mateos and Camacho 1997; Gardner et al., 1996; Beardon et al., 1993). This potential bias may be differential if subjects with unmet needs are less able to reach a pharmacy to fill a prescription compared to those that do not have unmet needs. However, any bias should be small since most prescriptions are filled and many pharmacies provide home delivery service. Also, the vast majority of elderly take at least one medication regularly (Statistics Canada 1999); therefore, they have the opportunity to fill new prescriptions when they renew old prescriptions.

3.7.2.2 RAMQ Medical Services Database

The RAMQ medical services database contains information on medical services provided to patients on a fee-for-service basis. This includes services provided in hospitals, private offices, and in the home. Some services performed in hospital (e.g. blood tests etc.) do not appear as services billed to the RAMQ for the patient but rather form part of the hospital budget, and as such do not appear in the medical services database. Salaried physicians, such as those working at CLSCs are not included in this database. In addition, the method of payment for geriatricians changed approximately 3 years ago. Geriatricians are now paid on a mixed remuneration system. This is a combination of a daily rate and

fee-for-service for new consultations, admissions and discharges from the ward. It does not cover follow up visits. Before this change to the remuneration system, geriatricians were paid on a daily or hourly rate; there was no fee-for-service component. Geriatricians see patients in consultation as in-patients or out-patients, as well as follow patients when admitted to hospital wards. Patients continue to see their family physician or other specialists, who are paid on a fee-for service basis unless the visit occurred in a CLSC. Geriatricians see the most frail seniors and those with moderate to severe ADL and IADL deficits (Gold and Bergman 1997). General practitioners who work in geriatrics are paid on an hourly rate. Both geriatricians and family physicians (working in geriatrics) are paid on a fee-for-service basis for patients seen on weekends. This combination of fee-for-service and salaried physician therefore, may underestimate the number of physician visits in the medical services database. However, the impact of any bias is likely to be minimal as 93.2% of physicians in Quebec bill on a fee-for-service basis (Régie de l'assurance-maladie du Québec 2000). Each physician claim record includes the patient's health insurance number, the date of the service, the location of service (i.e. emergency department, critical care, private office, in-patient ward, or out-patient), code for the service, and the diagnosis for the visit. Underreporting of services is unlikely to be a significant problem as it is not in the physician's financial interest to under bill. The RAMQ has internal validation checks to monitor physician billings and investigate fraudulent claims. Moreover, physicians submitting fraudulent claims are subject to penalty. The sophisticated nature of the monitoring system should insure that over billing is rare.

3.7.2.3 MEDECHO Hospital Discharge Database

The MEDECHO database contains information on patient hospitalizations from all acute care hospitals in the Province of Quebec. Each record includes personal identification and demographic information, admission date, discharge date, and details about the hospitalization, including the diagnoses, treatments, hospital code, physician code, and discharge diagnosis. The validity of these data should be high given the number of beds occupied and the fact that lengths of stay are key components in calculating workload and budgetary consideration of the institutions. In a validation study which re-abstracted 1275 hospital admissions from the MEDECHO database from 14 Montreal hospitals 99.5% agreement was found in the date of admission (Delfino et al., 1993).

3.8 Duration of follow-up

Health services utilization was obtained for the six months following the baseline interview for each of the study subjects. A six month follow-up period was, in part, selected for feasibility reasons. Data from the RAMQ and MEDECHO databases are only accessible to researchers after the data have been validated and "closed" by the Quebec Ministry of Health and Social Services. There is a lag period of approximately four months before the RAMQ databases are validated and closed. The lag period before the MEDECHO database is closed is currently approximately one year. So, for example, a request for MEDECHO data up to December 31, 2004 would not be available until approximately December 31, 2005. Therefore, in order to be able to complete this thesis in a timely manner a six-month follow-up period was selected. This follow-up period was also selected because it coincided with the timing of the 6-month follow-up interview which was used to obtain self-reported health services utilization data, and therefore, allowed comparison of these two data sources when estimating the associations between unmet

need and health services utilization. Moreover, because this study used a sample of older seniors we expected sufficient health service utilization during the six month follow-up period (Rosenberg and James 2000; Tomiak et al., 1998; Rosenberg and Moore 1997; Back et al., 1995; Barer et al., 1987).

Often health services researchers follow subjects for longer periods to guard against seasonal effects. As mentioned, because of feasibility considerations, I was not able to use a longer follow-up period for this investigation so health services utilization over the course of four seasons is not available for each subject. However, since the study subjects were recruited over an entire calendar year the sample contains a mixture of subjects whose health services utilization spanned all four seasons. Therefore, the effect of seasonal variation in health services utilization should not be of concern since any seasonal variation in health services utilization will likely only reduce the precision of the estimate of any associations but not the magnitude of the estimate itself.

3.9 Data management

Questionnaire data were entered into a relational database management system that I designed using Microsoft Access software. A relational model is a data model that represents data in the form of relations (tables) that are linked together through primary keys, which uniquely identify each row in the table. Relational databases ensure data integrity of the data stored in the database (i.e. ensure the consistency, accuracy and correctness of the data).

I developed the user interface, which was linked to the database, using Microsoft Visual Basic for Applications. The interface was designed to replicate the study questionnaire. Objects and controls on the user interface, that were linked to the fields

(variables) created in the database, were designed to minimize the risk of data entry errors by restricting entry of responses using combo boxes (i.e. drop-down lists that allow data entry to be restricted to specified choices), option boxes, and check boxes that only allowed selection of mutually exclusive choices. The data values selected were automatically stored in the database as their corresponding coded values. Questions requiring text responses were entered into interface controls linked to text fields in the database, which allowed the verbatim entry of responses into the database.

Double data entry was deemed unnecessary as the user interface was designed to replicate the study questionnaires. The user friendly interface design was easy for data entry personnel to learn and use, and was designed to minimize the possibility of data entry errors. Both single and double data entry have been shown to produce an accuracy over 99% (Meeuwisse et al., 1999), with no practical benefit of double data entry accuracy over single entry systems when forms (i.e. data entry screens) are designed with features such as combo boxes, option boxes and check boxes.

All the data in the database were validated twice to ensure the accuracy of the data and to detect any data entry errors that may have occurred. The validation included having a data entry clerk compare the responses on the paper copy of the questionnaire with the data displayed on the interface of the questionnaire database. Any inconsistencies were corrected. The questionnaire database was password protected with access only available to myself, the study coordinator and data entry personnel.

I also developed a separate "subject" database for study management purposes. This database contained nominal information on each patient, including contact information, completion status of the interviews, and follow-up details. This enabled the study

coordinator to manage the study interviews, and allowed both myself and the study coordinator to automatically generate contact letters that were sent to the subjects at specific times, and create various reports and interview schedules to ensure efficient management and coordination of the Montreal Unmet Needs Study. The subject database was password restricted with access only available to myself and the study coordinator. Data entry personnel could not access this database. The subject and questionnaire databases were not linked to ensured confidentiality of the personal contact information.

3.10 Variable definitions

3.10.1 Determining unmet needs for help in ADLs and IADLs

The level of unmet needs was operationally defined according to the methods of Allen and Mor (1997). The Unmet Needs Indices are numeric scores created by Allen and Mor and are based on two established functional assessment instruments: the Activities of Daily Living Index and the Instrumental Activities of Daily Living Scale (Katz and Akpom 1976; Lawton and Brody 1969). The ADL index measures the subjects' ability to perform activities of daily living such as bathing, dressing, transferring from a bed to a chair, toileting, eating and indoor mobility. The IADL scale measures the ability of an individual to perform activities that involve higher levels of behavioural complexity than the ADL index. The IADL scale thus includes activities needed for community living, such as shopping, meal preparation, light and heavy housework, and transportation. The unmet need indices combine information on functional status (i.e. ADL or IADL) with the subject's self-perceived adequacy of the assistance received for those activities that the subject reported having difficulty performing alone.

In this study, a subject was classified as having an unmet need if he or she had difficulty performing OR was unable to perform an ADL or IADL task alone AND met at least one of the following conditions:

1. Did not have help, but reported needing help;
2. Had disability-related help, but reported needing more help; or
3. Did not report needing help (or more help), but reported the occurrence of a negative consequence attributed to the absence of help.

The numerical indices are counts of the number of activities for which an unmet need is present. The ADL and IADL Unmet Needs Indices ranges from 0 to 6 and 0 to 3, respectively. Allen and Mor (1997) reported Cronbach's alpha reliability coefficients of 0.78 for the ADL Unmet Needs Index and 0.79 for the IADL Unmet Needs Index suggesting good internal consistency.

As in Allen and Mor (1997) our subjects were asked about six different ADL activities: bathing, dressing, eating, transferring to and from bed, toileting, and moving about indoors. Our assessment of IADL activities, however, differed slightly from that used by Allen and Mor. In the latter study the IADL domain included four activities: cooking, shopping, transportation, light and heavy housework, while in our study the subjects were asked only three different IADL activities: meal preparation (corresponding to cooking), housekeeping (corresponding to light and heavy housework), and transportation. Shopping was not included as an IADL domain in this study because community services for this IADL activity are generally not available in the Montreal area through CLSCs. In Quebec, CLSCs offers health and social services to the population within its specified territory. These include services of a preventive or curative nature. CLSCs also provide in-home

support services to people, including: nursing and medical care, psycho-social counselling, rehabilitation, family support, personal assistance and domestic aid. CLSCs can provide referrals to people over the age of 65 who require domestic assistance for reduced-rate housekeeping services.

Figure 3-1 illustrates the algorithm (using bathing as an example) used to define the need for assistance of the study subjects. Based on the pattern of responses to the series of questions the subject would be classified as having *no need, met need* or *unmet need* during the month preceding the baseline interview. The same pattern of questions was asked for each of the ADL and IADL activities (APPENDIX D).

The questions used to determine unmet need status were comprised of two components: 1) questions to ascertain the subject's self-perceived need for assistance and 2) questions that dealt with consequences of not having help OR having insufficient help with an ADL or IADL (Allen and Mor 1997). Subjects who responded that they never or seldom needed help (or additional help) in performing an ADL or IADL activity were asked *consequence* questions associated with each of the ADL or IADL activities. The consequence questions were framed to relate a consequence to the lack of sufficient help for that activity (Table 3-1 and Table 3-2) and were selected in consultation with experts in the field of home care (Allen and Mor 1997).

Based on the ADL and IADL indices, unmet needs were dichotomized as being present or absent. A subject was classified as having an unmet ADL or unmet IADL need if he/she had one or more needs for assistance in these measures, respectively. An overall composite unmet need status was also created. Subjects needing assistance in one or more ADLs or IADLs were classified as having *unmet need.* An unmet need, unmet ADL need

or unmet IADL need meant that the subject had at least one unmet needs in each of the ADL or IADL domains. The decision to dichotomize the unmet need variables was based on previous literature which suggests that most community-dwelling seniors have one unmet need with relatively few experiencing two or more unmet needs (Tennstedt et al., 1994). The few subjects with more than one unmet need would likely have provided only limited additional information. In addition, subjects who have multiple unmet needs are likely a subgroup with more pathological problems.

In this thesis the term *unmet need* is used to refer to unmet need for community-based services that address the ADL and IADL needs.

Figure 3-1: Defining Unmet needs: example defining unmet need for assistance with bathing

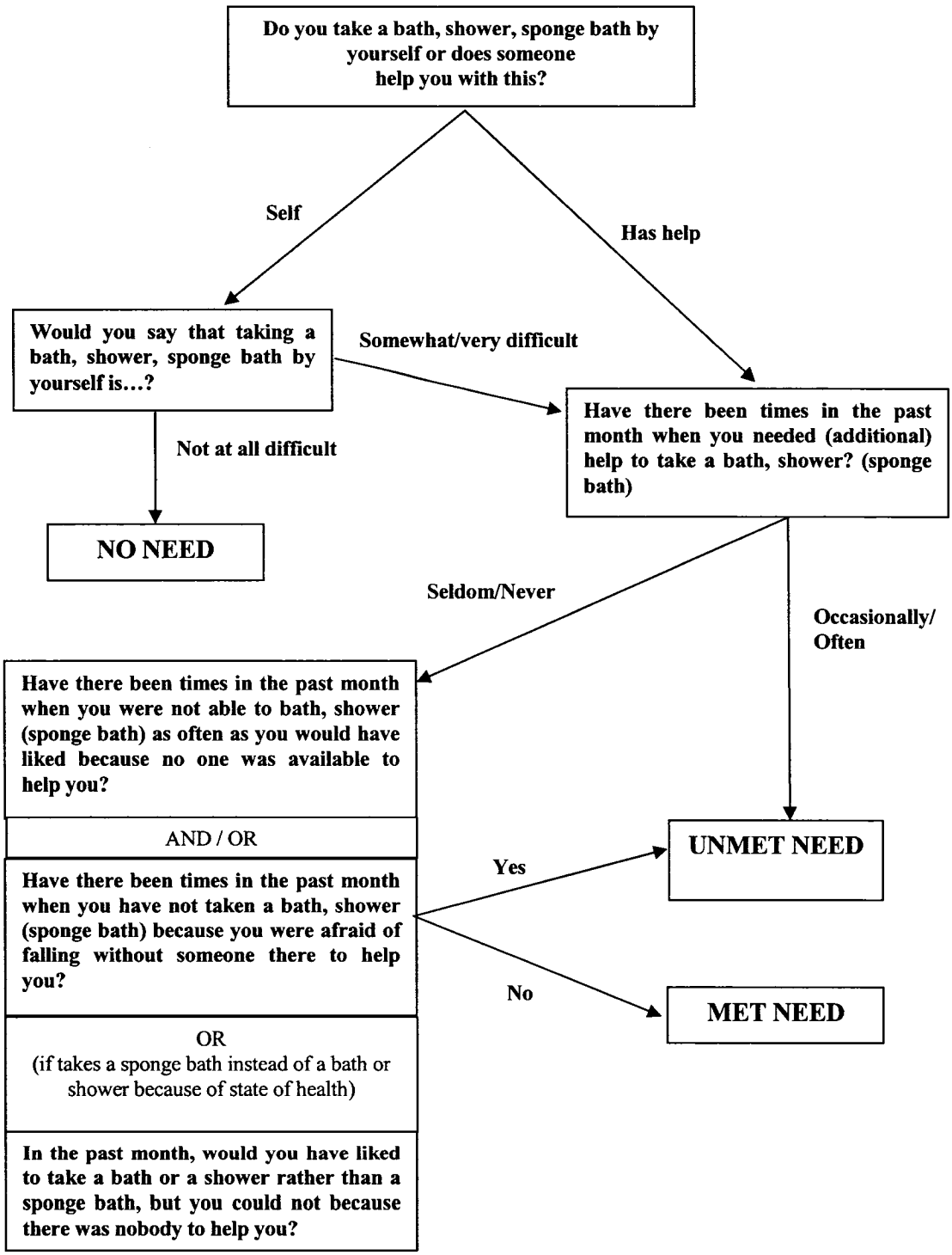


Table 3-1: ADL Activities and Corresponding Consequence Questions

ADL Activity	Consequence Questions
Dressing	During the PAST MONTH, were there times when you were not able to change clothes as often as you would have liked because no one was available to help you?
Bathing, showering or taking a sponge bath	Have there been times in the past month when you were unable to take a bath, shower as often as you would have liked because no one was available to help you? Have there been times in the past month when you have not taken a bath, shower because you were afraid of falling without someone there to help you?
Eating	Have there been times in the PAST MONTH when you were unable to eat when you were hungry because no one was available to help you? Have there been times in the PAST MONTH when you were very thirsty because no one was available to give you something to drink? During the PAST MONTH, have you lost weight even though you were not on a diet?
Transfer from bed to chair	During the PAST MONTH, have your ever fallen while getting in or out of bed or a chair because no one was there to help you?
Toileting	Have there been times in the PAST MONTH when you have experienced physical discomfort because there was no one to help you use the toilet (commode or bedpan) as often as you needed to? During the PAST MONTH did you wet or soil yourself because you did not have help using the toilet (commode or bedpan)?
Moving around inside the house	Would you say that you can not move around inside the house as often as you would like, or have to wait till help is available?

Table 3-2: IADL Activities and Corresponding Consequence Questions.

IADL Activity	Consequence Questions
Preparation of meals	Have there been times in the PAST MONTH when you were unable to follow a special diet because you needed help with food preparation? Have there been times in the PAST MONTH when you were unable to eat when you were hungry because no one was available to prepare the meal?
Housekeeping	Have there been times in the PAST MONTH when you have been bothered because the housework was not getting done because you did not have any help? Have there been times in the PAST MONTH when you had to wear dirty clothes because no one was there to do the laundry?
Transportation	Because you had no transportation, have there been times in the PAST MONTH when you … a) Missed a health-care professional or doctor's appointment? b) Were unable to go places you wanted to for fun or recreation? c) Ran out of food? d) Ran out of medication or other medical supplies? e) Could not attend religious services?

3.10.2 Outcome variables

Health services utilization outcomes in this study were obtained from administrative health databases and from self-reported questionnaire data obtained from the 6-month follow-up questionnaire.

The health services utilization outcomes that were obtained from administrative records included physician visits (i.e. general practitioner, specialist and overall physician visits), emergency department visits, hospitalizations (i.e. number of hospital days, and number of hospital admissions), and medication use over the six months following the baseline interview. These data were obtained from Quebec Ministry of Health and Social Services databases (described in Section 3.7.2).

The self-reported health services utilization outcomes were obtained from the six month follow-up questionnaire.

3.10.2.1 Outcome variables from administrative databases

Emergency Department Visits:

This variable was defined as the total number of times a subject visited an emergency department over the six months following the baseline interview and was created from the RAMQ medical services billing database. An emergency department visit was identified based on physician billings associated with an emergency department visit during the follow-up period. Multiple services billed on the same date were grouped and considered as a single visit.

Hospitalization:

Two hospitalization variables were created.

1. *Hospital days*: Hospitalization was defined as the total number of hospital days (i.e. number of days the patient was hospitalized) during the six month period following the baseline interview. This variable was created using data from the MEDECHO hospital discharge database. Length of stay was computed as the sum of the number of days between the admission and discharge dates for each hospitalization.

2. *Hospital Admissions*: The number of hospital admissions for computed for each subject during the six months follow-up period based on the admission and discharge dates.

The MEDECHO database provided detailed hospitalization records for the study subjects, including the dates of admission and discharge for all hospitalizations during the follow-up period. This enabled the total number of hospital days per subject to be computed. This was thought to be the most appropriate approach for capturing the extent of hospitalization among the subjects since this definition provides the most comprehensive measure of hospitalization. The 6-month questionnaire collected information about the number of hospital admissions experienced by each subject but not the number of days the subjects spent in the hospital during the follow-up period. This posed a problem for the comparison of models using hospitalization outcome variables obtained from administrative (i.e. hospital days) and self-reported hospitalization (i.e. hospital admissions). Therefore, in order to be able to compare these models, the second hospitalization variable (hospital admissions) was created using the MEDECHO hospitalization data.

Physician Visits:

This variable was defined as the total number of times a subject visited a physician (this included the total of all general practitioner and specialist visits) over the six month period following the baseline interview and was created from the RAMQ medical services billing database. All physician visits during the six months following a subject's baseline interview, excluding those associated with hospitalization or visit to an emergency department, were counted.

General Practitioner (GP) Physician Visits:

This variable was defined as the total number of times a subject visited a general practitioner over the six months following the baseline interview. This variable was created from the RAMQ medical services billing database which includes a variable that specifies whether the physician billing for a particular service was a general practitioner or a specialist. All physician visits to a general practitioner during the six months following a subject's baseline interview, excluding those for hospitalization or to an emergency department, were counted.

Specialist Physician Visits:

The specialist outcome variable was defined as the total number of times a patient visited a medical specialist over the six month following the baseline interview. This variable was created from the RAMQ medical services billing database by selecting only services that were billed by medical specialists. All physician visits to a specialist during the six months following a subject's baseline interview, excluding those for hospitalization or to an emergency department, were counted.

Prescribed Medication use:

This variable was defined as the total number of different medications dispensed to the subject over the six month period following the baseline interview. The variable was computed using the American Hospital Formulary Services pharmacologic-therapeutic classification system for coding drugs (AHF). The AHF is a system of classifying drugs which uses 6-digit code numbers arranged in a hierarchical manner. The AHF code identifies each medication class and is included in the RAMQ pharmaceutical database. The first four digits of the AHF code identify the class of the medication and the last two

digits specify drug types within that class (if they exist). For example, the psychotropic drug class has an AHF code of 28:16, and within this class there are two drug types, antidepressants (AHF code 28:16:04) and tranquilizers (AHF code 28:16:08). The number of different medications was determined by counting the total number of different AHF codes per patient during the six months following the baseline interview. This approach was used, rather than counting the number of dispensed prescriptions by date because, on rare occasions, some patients were observed to have been dispensed multiple prescriptions for the same medication on sequential days. This occurs for a few patients who were prescribed cardiotropic or electrolytic-diuretic classes of drugs. By using the AHF codes these occurrences were counted as a single prescription.

3.10.2.2 Self-reported outcome variables

The 6-month telephone questionnaire was used to create self-reported health services utilization outcome variables. The questionnaire provided information on contact utilization and volume (frequency of contact) measures.

Self-Reported Emergency Department Visits:

As part of the 6-month telephone administered questionnaire (APPENDIX E: Section 2, Question 2), subjects were asked if they had visited an emergency department during the previous six months, and if so, how many times. A variable quantifying the number of self-reported emergency department visits was created based on the response to this question.

Self-Reported Physician Visits:

Section 2, Question 5 of the 6-month telephone administered questionnaire (APPENDIX E), asked subjects if they had visited a physician during the previous six months (excluding physician visits during a hospitalization, visits to an emergency

department or in a convalescence centre), and if so, how many times. A variable quantifying the number of physician visits was created based on the response to this question.

Self-Reported Hospital Admissions:

Section 2, Question 3 of the 6-month telephone administered questionnaire (APPENDIX E), asked subjects if they had been hospitalized for at least 24 hours (excluding visits to emergency departments) during the previous six months, and if so, how many times. A variable of the number self-reported hospital admissions was created based on the response to this question.

3.10.3 Independent variables

3.10.3.1 Main independent variables

As described in Chapter 3 section 3.10.1, a subject was classified as having an unmet ADL or unmet IADL need if he/she had one or more needs for assistance in these measures. Subjects needing assistance in one or more ADLs or IADLs were classified as having unmet needs. Unmet need status was dichotomized as present (coded as 1) for subjects classified as having one or more unmet needs or absent (coded as 0) if the subject had no needs or the subject's needs were met. Separate variables were created for unmet ADL needs and unmet IADL needs which were also dichotomized as present or absent (Table 3-3).

Table 3-3: Main independent variables

Variable	Source	Data Type	Coding
Unmet need	Algorithm using responses from Baseline questionnaire Section 3 & 4	dichotomous	0 = no unmet needs 1 = at least one unmet need (ADL or IADL)
ADL unmet need	Algorithm using responses from Baseline questionnaire Section 3	dichotomous	0 = no ADL unmet needs 1 = at least one ADL unmet need
IADL unmet need	Algorithm using responses from Baseline questionnaire Section 4	dichotomous	0 = no IADL unmet needs 1 = at least one IADL unmet need

3.10.3.2 Potential confounding variables

The baseline questionnaire asked about a variety of variables that are known to be associated with health services utilization (Guadagnoli and Mor 1991; Mor et al., 1992; Diehr et al., 1999; Evans et al., 1994; Wolinsky et al., 1983). These variables, which included sex, age, income, education, marital status, and the number of cohabitants, were assessed as potential confounding variables. In addition, size of social network, self-reported health status, whether income satisfies the subject's needs, nutritional score, and Chronic Disease Score were assessed. Variables that were considered as potential confounders are listed in Table 3.4 (including the source, data type and variable coding).

Sex was a dichotomous variable coded as 0 for males and 1 for females; age was calculated based on the date of baseline interview and the subject's date of birth, and was measured as a continuous variable. The date of birth was cross-checked with the RAMQ health insurance number which contains within it the individual's date of birth. Size of

social network was collected as a continuous variable *("How many people can you count on in case of need?")* and was recoded as an ordinal variable with 7 categories ranging from 0 (indicating no social network to 6 (if six or more people were reported). Self-reported health was based on the question: "How would you rate your current state of health?" (With 6 response categories: Excellent; very good; good; fair; poor; very poor). This variable was recoded into 4 categories (very poor/poor; fair; good; very good /excellent). The variable "Marital status" was based on the response to the question concerning the subjects' current marital status (married or living common law; widow/widower; separated or divorced; single [i.e. never married] or other). Marital status was coded as "1" for subjects who were married or living common law at the time of the interview and "0" for single (if the response was affirmative to any of the other categories). The variable "number of cohabitants" was created based on the question "How many people live with you?" that was included in the baseline interview. Education was based on the subject's response to the question "What is your highest level of education?" Eight response categories were listed: 1) None; 2) did not complete elementary school; 3) completed elementary school; 4) did not complete high school; 5) completed high school; 6) technical or trade school; 7) college; 8) university). The question was recoded into 5 categories ("1" if completed elementary school or less; "2" if did not complete high school; "3" if completed high school; "4" if completed technical/trade school or college; and "5" if completed university). Total Family Income was requested from each study subject. Subjects were provided with a list of 14 categories from which to choose (see Table 3.4) and were also asked to indicate if the income reported was before or after income tax. The subject's were also asked the question "how well do you think your income currently

satisfies you basic needs?" (Response categories included: very well; adequately; with some difficulty; not very well; totally inadequately; refuse to answer; do not know). None of the subjects refused to answer this question or reported "do not know". A second income variable, "Income satisfaction", was defined based on this question. The Nutritional status was determined using Payette's Nutritional Screening Score (Payette et al., 1995) which generates a score of "1" if the subject is at low risk, "2" for moderate risk and "3" for high risk of malnutrition.

The Chronic Disease Score (CDS) was based on Von Korff's method for assessing overall health status using administrative pharmaceutical databases (Von Korff et al., 1992). The CDS is computed using AHF codes. Von Korff developed a series of weights based on scoring rules for severity of chronic conditions which are in turn based on the prescription medication use patterns of the subject during a one-year period. The weights are assigned based on the probability of dying in the next year. The CDS was adapted for use with the RAMQ pharmaceutical database by Moride et al. (2002).

3.10.3.3 Prior health services utilization

Using the RAMQ and MEDECHO databases, prescription counts, emergency department visits, number of hospital days, number of hospital admissions, and physician visits (GP, specialist and overall physician visits) were computed for the six-month period prior to the date of the baseline interview. This time frame was selected to coincide with the duration of the follow-up period that was used to compute the outcome variables. The same approaches were used to compute these variables as the corresponding outcome variables.

Table 3-4: Potential confounding variables.

Variable	Source	Data Type	Re-coding (*if applicable*)
Sex	Baseline questionnaire Section 1 Question 1	dichotomous	0 = male 1 = female
Age	Computed using interview date (Baseline questionnaire Cover page) and date of birth (Baseline questionnaire Section 1 Question 3)	continuous	
Size of social network	Baseline questionnaire Section 7A Question 3.1	ordinal	0 = no social network 1 = one person 2 = two people 3 = three people 4 = four people 5 = five people 6 = six or more people
Self-reported health status	Baseline questionnaire Section 2 Question 9	ordinal	1 = very poor / poor 2 = fair 3 = good 4 = very good / excellent
Marital status	Baseline questionnaire Section 1 Question 4	categorical	0 = single 1 = married / common law
Number of cohabitants	Baseline questionnaire Section 1 Question 8	count	
Education	Baseline questionnaire Section 13 Question 6	ordinal	1 = elementary school or less 2 = did not complete high school 3 = completed high school 4 = technical/trade school or college 5 = University

Table 3-4 continued

Income	Baseline questionnaire Section 13 Question 9a *(missing data were imputed)*	ordinal	1 = $ 0 - 9,999 2 = $ 10,000 – 14,999 3 = $ 15,000 – 19,999 4 = $ 20,000 – 24,999 5 = $ 25,000 – 29,999 6 = $ 30,000 – 34,999 7 = $ 3 5, 000 –39,999 8 = $ 40,000 – 44,999 9 = $ 45,000 – 49,999 10 = $50,000 – 59,999 11 = $60,000 – 69,999 12 = $70,000 and more
Income satisfies needs	Baseline questionnaire Section 13 Question 8	ordinal	1 = Very well 2 = Adequately 3 = With some difficulty 4 = Not very well 5 = Totally inadequately
Nutritional Status	Baseline questionnaire Section 10	ordinal	1 = low risk of malnutrition 2 = moderate risk 3 = high risk
Chronic Disease Score (CDS)	Computed using data from the RAMQ prescription database	continuous	

3.11 Statistical Analyses

3.11.1 Modeling Strategies

Health services data are often available in the form of counts (e.g. number of visits or admissions) and are usually not normally distributed (Diehr et al., 1999). Health care utilization variables tend to have a mode at zero and a distribution with a long right tail (McCullagh and Nelder 1989). Various approaches were considered for analysis of the health services data in this study. Logistic regression would involve categorizing the medical services into a binary variable, however, reducing count data to categories wastes information and may reduce statistical power. Moreover, the choice of cut-off in determining the categories can affect the results of the analyses. Alternatively, polytomous logistic regression could be used; however, this would still involve creating arbitrary cut-off points for the categories. In the case of ordinary linear regression models, one of the main assumptions is that the errors are normally distributed. In order to meet this assumption when a continuous dependent variable is skewed (errors are not normally distributed), the variable can be transformed so that the errors are approximately normally distributed. For example, in health services research, a log transformation is often used. However, in many cases variables are categorical or discrete rather that continuous. In such cases, a simple transformation cannot produce normally distributed errors. There are two problems with using ordinary linear regression when the distribution of the dependent variables are counts which are discrete (counts are integers, not continuous) and limited to non-negative values. First, many distributions of count data are positively skewed with many observations having a value of zero. The high number of zero values prevents the logarithmic transformation of a skewed distribution into a normal one since the Log(0) is

infinity. Second, it is likely that the regression models will produce negative predicted values, which are theoretically impossible.

The count data for the health services variables measured during the six month follow-up period in this study were discrete and positively skewed. Moreover, for emergency department visits and hospitalization variables many observations in the dataset had values of zero. Therefore, the regression models based on the Poisson and Negative Binomial distributions were used for the analyses of the health services utilization data.

3.11.2 Poisson Regression

A Poisson regression model is similar to the ordinary linear regression model with the exception that it assumes that 1) the errors follow a Poisson distribution rather than a normal distribution; and 2) rather than modeling the dependent variable as a linear function of the regression coefficients, it models the natural logarithm of the dependent variable as a linear function of the coefficients. The Poisson model is an appropriate regression model for count data where the distribution of the counts is discrete and is limited to non-negative values.

The Poisson distribution has the following probability function:

$$P(Y_i = y_i) = \frac{\exp(-\mu_i)\mu_i^{y_i}}{y_i!}$$

Where $y_i = \{0, 1, 2\ldots\}$ and the variance of the distribution of y is equal to the mean.

$$Var(Y) = E(Y) = \mu$$

It is important to note that one of the rarely met assumptions of a Poisson model is that the mean equals the variance of the errors. Usually, in practice the variance is larger

than the mean since in a skewed distribution the mean is down weighted more than the variance. This is often true of health services utilization data (Jones and O'Donnell 2002).

When the variance is greater than the mean there is more variance than allowed by the Poisson model. This additional variance is referred to as extra-Poisson variance. This results in overdispersion which may lead to incorrect variance estimates. In an overdispersed Poisson model the variance is underestimated and can therefore, lead to misleading inferences. In many studies of discrete outcomes the sampling distribution often results in higher frequency of zero counts than would be expected from a Poisson distribution. Zero-inflated Poisson regression models are possible for such data; however, parameter estimates may be seriously biased if the non-zero counts are overdispersed relative to the Poisson distribution (Ridout et al., 2001). The deviance and Pearson statitistics can be used to measure overdispersion.

Deciding whether the Poisson form is appropriate can be based on several goodness-of-fit statistics: the deviance and the Pearson statistics.

The deviance of a model is:

$$D^m = 2(L^f - L^m)$$

where D^m is the deviance of the model, L^f is the log-likelihood that that would be achieved if the model gave a perfect fit and L^m is the log-likelihood if the model under consideration. If the latter model is correct, the random variable has a distribution that is approximately chi-squared with degrees of freedom equal to the number of observations (n) minus the number of parameters (p). A value of the deviance greatly in excess of n minus p suggests that the model is overdispersed due to missing variables and/or non-Poisson

form. When the deviance divided by degrees of freedom is significantly larger than 1, overdispersion is indicated.

$$\frac{D^m}{n-p}$$

Likewise, the Pearson chi-squared statistic, defined by

$$\chi^2 = \sum_{i=1}^{n} \frac{(y_i - \hat{y}_i)^2}{\hat{y}_i} \quad ,$$

is approximately a chi-squared random variable with mean n - p for a valid Poisson model. If the Pearson chi-squared statistic divided by the degrees of freedom

$$\frac{\chi^2}{n-p}$$

is significantly larger than 1, overdispersion is also indicated.

If a Poisson model does not fit the data and the variance is considerably larger than the mean, then an alternative approach is to fit a model that is more dispersed that the Poisson. A negative binomial is an appropriate alternative.

3.11.3 Negative Binomial Regression

As previously discussed, one the requirements of the Poisson model is that the variance is equal to the mean (μ). Negative binomial regression is in fact a generalization of Poisson regression that accounts for overdispersion by including a quadratic term in the variance to represent the overdispersion. The negative binomial model takes the form:

$$P(Y = y_i) = \frac{\Gamma(y_i + \frac{1}{k})}{y_i!\Gamma(\frac{1}{k})} (\frac{k\mu_i}{1+k\mu_i})^{y_i} (\frac{1}{1+k\mu_i})^{\frac{1}{k}}$$

where k is the overdispersion parameter and the variance is:

$$\text{Var}(y_i) = \mu_i + k\mu_i^2,$$

If k equals 0, the negative binomial reduces to the Poisson model. The larger the value of k the more variability there is in the data over and above that associated with the mean.

$$P(Y=y_i) \sim \text{negbin}(\mu_i, k) \text{ approaches Poisson as } k \rightarrow 0$$

Negative binomial regression allows for extra-Poisson variation due to other variables not included in the model (Dean and Lawless 1989). As pointed out by Gardner et al., 1995, "negative binomial regression can be viewed as a form of Poisson regression that includes a random component explaining the between-subject variability in the model".

Indeed, as health services data often take the form of skewed, discrete data with high frequency of zeros, negative binomial regression is an appropriate modeling strategy.

3.11.4 Approaches to Handling Missing Data

In statistical analysis problems of missing data can often arise. In epidemiologic, and health-related studies in general, missing data can be a consequence of study design (i.e. intentional skip patterns in questionnaires), due to the non-response by the subject (either because the person does not know the answer or refuses to respond to a question) or errors of omission on the part of the researcher (for example, even trained interviewers may overlook a question).

This raises a problem when it comes to the analysis because standard statistical methods presume that every case has data for all the variables to be included in the analysis. Two traditional approaches for dealing with missing data have been to delete the

variable from the analysis or to delete the case from the dataset. The latter is often referred to as case deletion or listwise deletion. These approaches while being simple to implement have a number of disadvantages. From a practical standpoint the variables of interest may be essential for modeling purposes, and therefore, it would not be appropriate to remove them from the analysis. Case deletion is the default solution in statistical packages for analysis of datasets with missing data. However, if there are significant amounts of missing data, dropping subjects from the dataset can results in a loss in precision, can bias parameter estimates, and can also be a tremendous waste of the resources that were used to acquire the other data about the subject.

Another approach which is often used involves "imputing" or making reasonable guesses for the missing values and then proceeding with the analysis as if there were no missing data. The simplest example of this is known as marginal mean imputations, which involves using the mean of the variable based on the subjects with data. This method is known to produce biased estimates of variance and covariance (Allison 2002; Haitovsky 1968) and so, the estimated standard errors for those estimated parameters will be incorrect which affects both the p-values of the hypothesis tests and the width of the confidence intervals. Therefore, this approach should be avoided.

A somewhat better imputation approach is to use information from other variables in a regression model to predict the values for the cases with missing data. However, the same fundamental problem is present for this imputation method. Analyzing imputed data as though it were complete produces standard errors that are underestimated and smaller p-values as these methods do not take into account that the imputation process involves uncertainty about the values that are missing.

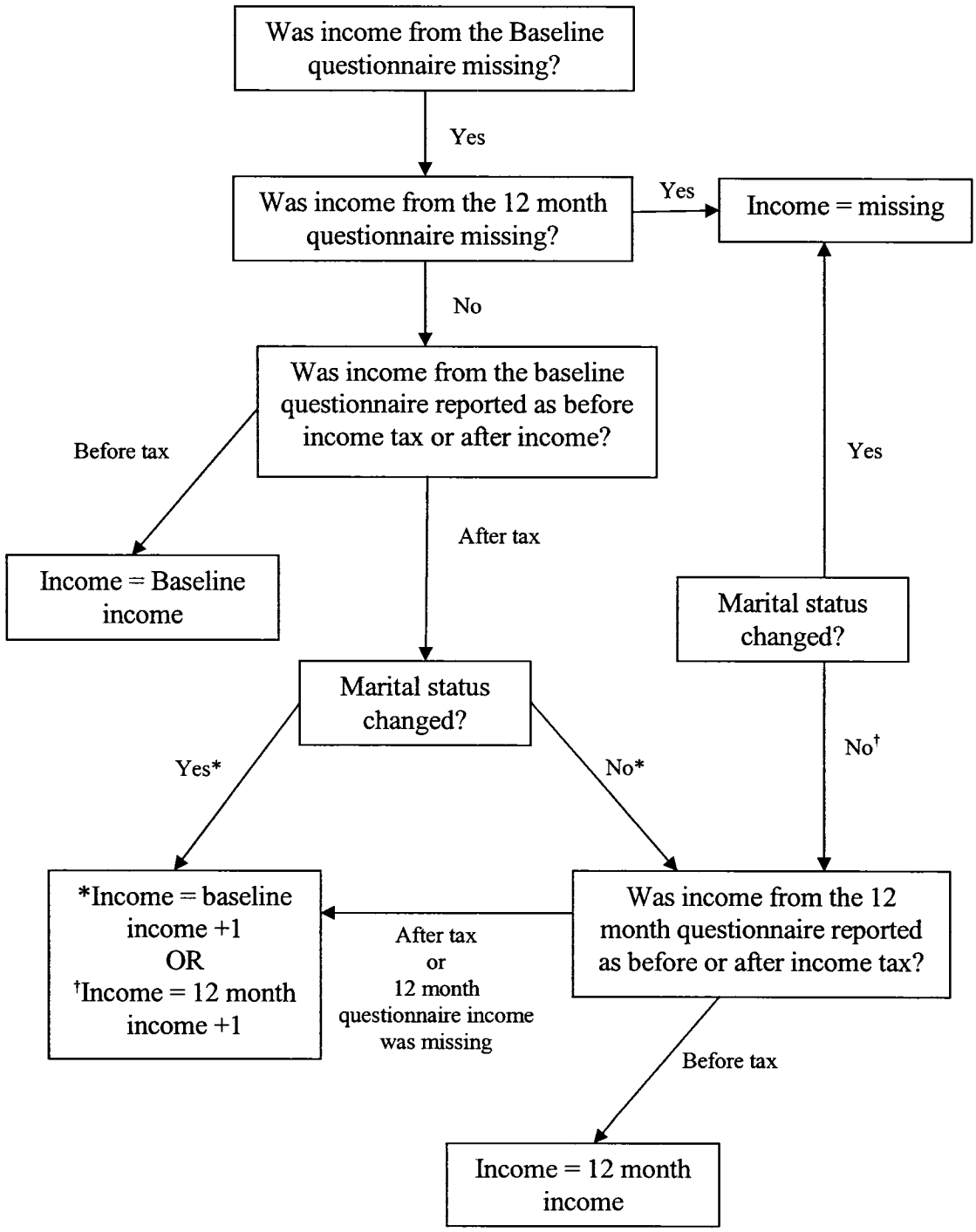
Multiple Imputation is a more sophisticated approach for handling missing data. This approach, first proposed by Rubin (1976), forms "complete" datasets by simulating the missing data from each non-responding subject using the observed data about the subject to impute the missing values for that subject. The multiple datasets that are imputed are analyzed using standard methods. The multiple "complete" datasets are analyzed concurrently and the inherent uncertainty in predicting the missing data for each subject is included in the final inferences. When done correctly this approach produces unbiased estimates of variances and covariances (Schafer and Graham 2002; Allison 2002; Sinharay et al., 2001; Graham and Hofer 2000; Schafer and Olsen 1998).

3.11.5 Missing Income Data

Remarkably, in the data used for this thesis there were no missing data for any of the variables used in the regression analyses with the exception of baseline income. In the income question subjects were asked to provide information on their income within specific income ranges (see Table 3.3). A follow-up question asked whether the income provided was "before" or "after" income taxes. This later question was included so that subjects who could only recall their after-tax income could still provide income information rather than not responding to the question. The majority of subjects that reported their income responded to question as before income tax. Therefore, there were two types of missing "before" income tax data at baseline: 1) subjects who refused to provide their income; 2) subjects who only provided after-tax income. In many cases subjects who refused to provide their income during the baseline questionnaire did, however, provide their income in the 12-month follow-up questionnaire. Similarly, some subjects who reported after-tax income in the baseline questionnaire provided before-tax income in the 12-month questionnaire.

The advantage of multiple imputation is that it provides a better estimate of the variance than would be obtained from a deterministic imputation approach, such as those discussed earlier. In retired elderly populations it is reasonable to assume that income over a 12-month period will remain relatively stable. Because of the availability of the 12-month income data and the reasonable expectation of income stability, rather than using multiple imputations, a deterministic imputation approach was used to estimate the values for missing income. An algorithm (Figure 3-2) was developed that used income provided in the 12-month interview to impute the before tax income of subjects who refused to respond to the income question, did not know their income in the baseline interview or provided "after" tax income at baseline. This approach was a type of data correction in which the 12-month interview income data was used to correct for some of the missing income data in the baseline questionnaire. Moreover, because of the low percentage of missing baseline income data and the stability of income in this population, the problem of underestimating the variance which is normally a concern in deterministic imputation approaches, should not be a large problem in this case, and in fact, multiple imputation would likely overestimate the variance. Therefore, multiple imputation was deemed unnecessary.

Figure 3-2: Algorithm to impute the missing income data



3.11.6 Prevalence

The crude prevalence of unmet needs at baseline was estimated by the proportion of subjects at baseline who had one or more unmet needs. The numerator for the crude prevalence of unmet needs was the total number of subjects classified as having at least one unmet need (either ADL or IADL). The denominator was the total number of subjects who participated in the study at baseline. Separate prevalence estimates were also computed for ADL and IADL unmet need by including only those subjects who were classified as having at least one unmet ADL or IADL need, respectively in the numerator.

$$\text{Prevalence} = \frac{\text{Number of subjects with 1 or more unmet needs}}{\text{Total number of subjects}}$$

3.11.7 Statistical analyses

Possible correlates of health services use and of unmet need status, the latter as defined by a binary variable, were examined individually using Student t tests for continuous variables, and Pearson chi-square tests and Wilcoxon Rank Sum tests for categorical and ordinal variables, respectively.

3.11.8 Multivariable Poisson and Negative Binomial Regressions

Multivariable Poisson and Negative Binomial regression analyses were used to examine the association between unmet need status and health services utilization. SAS Proc GENMOD was used for all Poisson and negative binomial analyses using "log" as the link function and the distribution as "Poisson" or "NB" (negative binomial). Estimated Rate Ratios were derived by exponentiation of the parameter estimates and are reported with 95% confidence intervals (CI).

The possible confounders considered in the models were: sex, age, marital status, number of cohabitants, education, income, Chronic Disease Score, self-rated health, the level of nutritional status, and size of social network. Based on a priori knowledge, plausible interaction terms, involving the main independent variables, were included in the models. In particular, interactions between unmet needs and each of the following covariates: sex, marital status, income, income satisfaction, and size of social network, were examined.

Confounding was assessed using a backwards elimination strategy as recommended by Rothman and Greenland (1998). This approach involved assessing potential confounders for changes in effect size estimate and associated standard errors. First, a full model with all plausible confounding variables and interaction terms was created. To assess whether any of the interaction terms included in the model were statistically significant, the Likelihood Ratio Test was used to compare the full model with a reduced model which included all the covariates except the interaction terms. If the Likelihood Ratio Test was statistically significant ($p < 0.05$), indicating that at least one interaction term was statistically significant, the individual interaction terms were assessed for significance using p-values. If an interaction term was found to be statistically significant then it was retained in the model. Potential confounding was then assessed by removing one covariate at a time from the model and examining the change in the main effect and the associated standard error. If the change in the effect was small, indicating that there was little or no evidence that the covariate confounded the association, then the covariate was removed from the model. However, if the removal of a covariate did not result in a meaningful change in the main effect but did decrease the standard error then the

covariate was retained in the model since the variable increased the precision of the estimate. The change in the estimate criterion was set a priori at 10%. The variable for sex was retained in all the models.

Multivariable analyses involved fitting a Poisson regression model for each of the health services utilization outcomes to assess whether the Poisson regression was an appropriate model. The goodness of fit was assessed using the Pearson chi-square model fit statistic. If this statistic is much larger than 1 overdispersion is indicated. A negative binomial model was then fitted and evaluated for goodness of fit using the Pearson statistic. Crude and adjusted Rate Ratios with 95% confidence intervals are presented for each of the models.

All statistical analyses were conducted using SAS version 8.2.

3.11.9 Comparison of health services utilization obtained from administrative health databases and self-reported health services utilization

Multivariable negative binomial and Poisson regression analyses were also performed using self-reported health services utilization data obtained from the 6-month follow-up questionnaire. In order for the models between self-reported health services utilization and health services utilization based on administrative data to be comparable the same interaction terms and covariates that were included in the previously presented for the models using administrative data for the outcome variables.

3.12 Statistical Power

The sample size of this study was fixed by design. We anticipated recruiting approximately 800 elderly subjects for the Montreal Unmet Needs Study. Based on the assumption that approximately 10% of the subjects would not consent to allow access to their health records contained in the RAMQ and MEDECHO databases the anticipated

sample size for this research project was reduced to 720 subjects. A Poisson regression of health services counts on a binary unmet needs independent variable with a prevalence of 20% using a sample size of 720 subjects achieves 80% power at $\alpha = 0.05$ to detect a rate ratio of at least 1.29 as being statistically significant. Since the prevalence of unmet needs reported in the literatures varies, a sensitivity analysis was conducted to estimate the smallest rate ratios that could be detected with approximately 80% power at $\alpha = 0.05$ for a sample size of 720 over a range of prevalence values of unmet needs (Table 3-5). An unmet needs prevalence of 5% was estimated to result in 80% power to detect a rate ratio of approximately 1.57 at $\alpha = 0.05$; while a prevalence of 25% was estimated to have 81% power to detect a rate ratio of approximately 1.27 at this significance level.

The power calculations were computed using the PASS 2002 software package.

Table 3-5: Statistical Power sensitivity analysis for a sample size of 720

Prevalence of unmet needs	Power (%)	Rate Ratio
0.05	80	1.57
0.10	81	1.40
0.15	81	1.33
0.20	80	1.29
0.25	81	1.27

4 RESULTS

4.1 Study Population

4.1.1 Subject Recruitment

A total of 4,420 seniors were contacted by Léger Marketing recruiters from the 4,775 households that were phoned by Léger Marketing (Figure 4-1). Thirteen hundred subjects met the study eligibility criteria. Of these, 946 informed the Léger Marketing recruiters that they would agree to participate in the study. Our study interviewers subsequently attempted to contact these 946 respondents to arrange for a time for the baseline interview to be conducted and the consent forms to be signed. When contacted by our study interviewers, 69 of the 946 respondents changed their minds and refused to participate in the study. The interviewers were unable to contact 38 of the 946 respondents, for various reasons including: no response to phone calls, no phone service, prolonged illness or death (Figure 4-2). This left a total of the 839 subjects who signed the study consent form and completed the baseline interview. Of these 839 subjects, 783 (93.3%) also signed the separate consent form to allow their health care data contained in the RAMQ and MEDECHO databases to be used in this study.

To assess the effectiveness of Léger Marketing at recruiting study subjects, we calculated the response rates for households that were *phoned* (using as the denominator all calls that were made by the recruiter irrespective of whether there was a response to the phone call) and for individuals that were *contacted* (using as the denominator those calls in which the recruiter was able to make contact with a person in the household). The "recruitment" rate of Léger Marketing, the proportion of subjects that met the eligibility

criteria for the study and verbally agreed to participate, was also calculated. The response rate of subjects phoned[1] and contacted[2] was 72.9% and 78.7%, respectively. Of the 1,300 subjects that met the eligibility criteria, 946 informed Léger Marketing of their willingness to participate in the study, giving a recruitment rate[3] of 72.8%.

The overall study participation rate[4] was 64.5%. These response rates were similar to that of the Canadian Study on Health and Aging which had participation rates of 71.6% in Quebec and ranged from a low of 61.8% in British Columbia to 87.7% in the Atlantic Provinces (Canadian Study of Health and Aging Working Group 1994).

[1] Léger Marketing Response rate (Phoned)=eligible + ineligible/ total phoned=1300+2180 / 4420+355 = 0.729
[2] Léger Marketing Response rate (Contacted) = eligible + ineligible/ total contacted = 1300+2180 / 4420 = 0.787

[3] Léger Marketing Recruitment rate = agreed to participate/eligible = 946 / 1300 = 0.728

[4] Participation rate = agreed to participate/eligible = 839 / 1300 = 0.645

Figure 4-1: Subject Recruitment – Léger Marketing

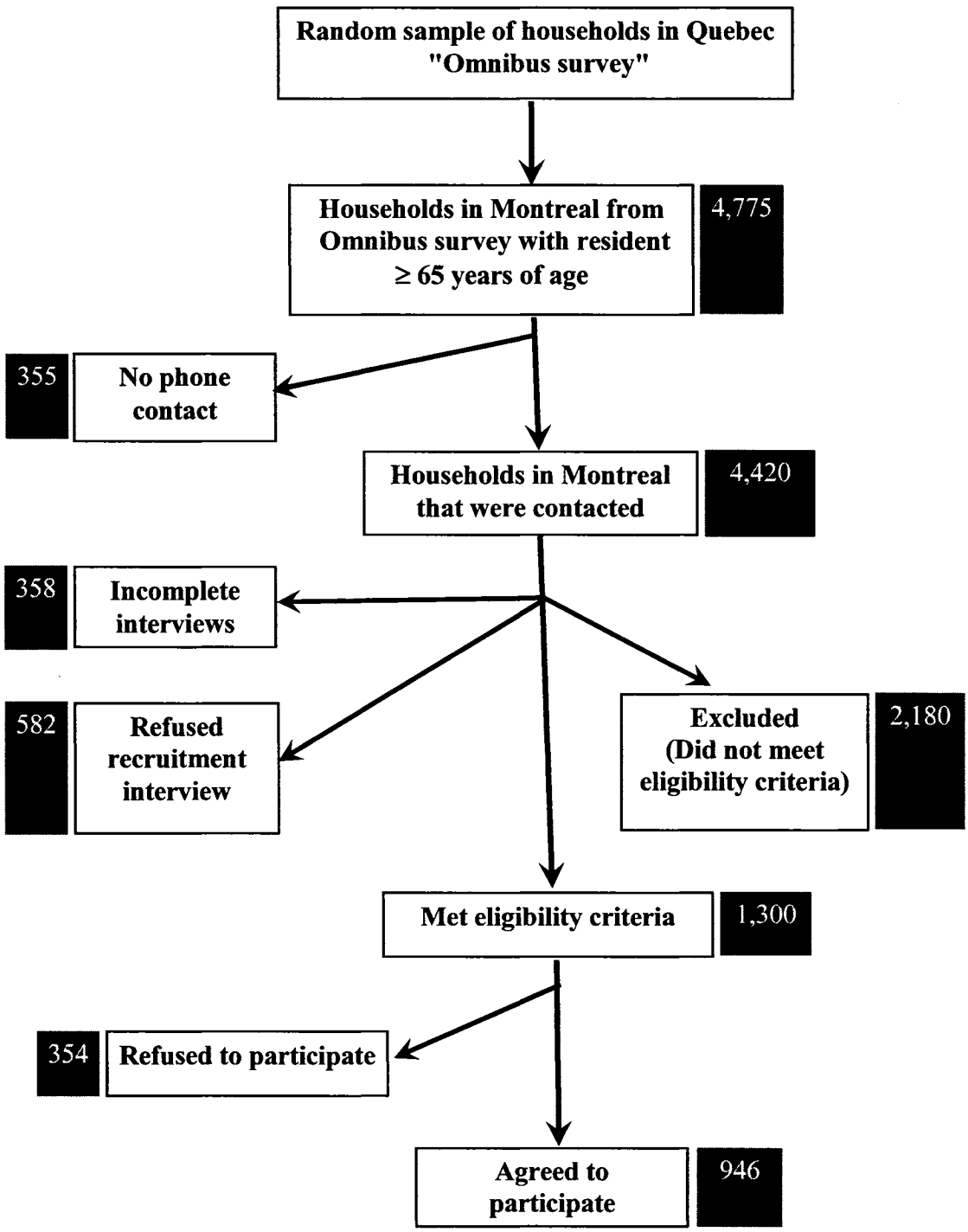
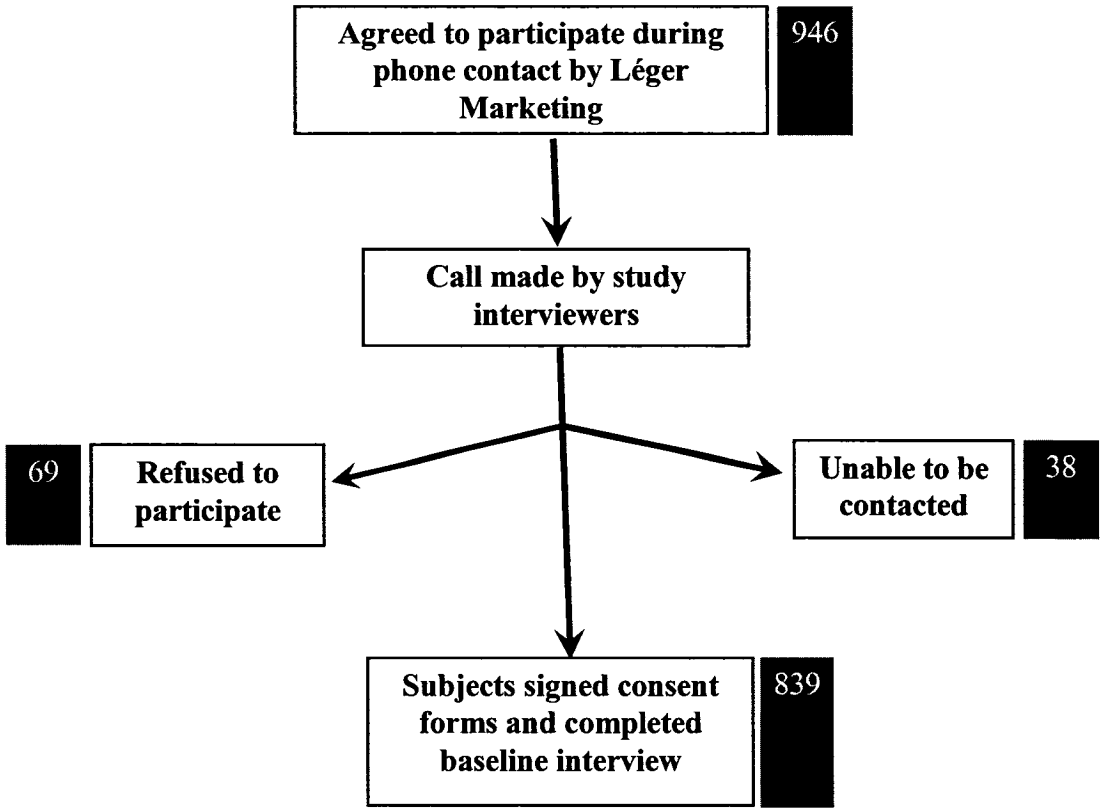


Figure 4-2: Subject recruitment – Participating subjects



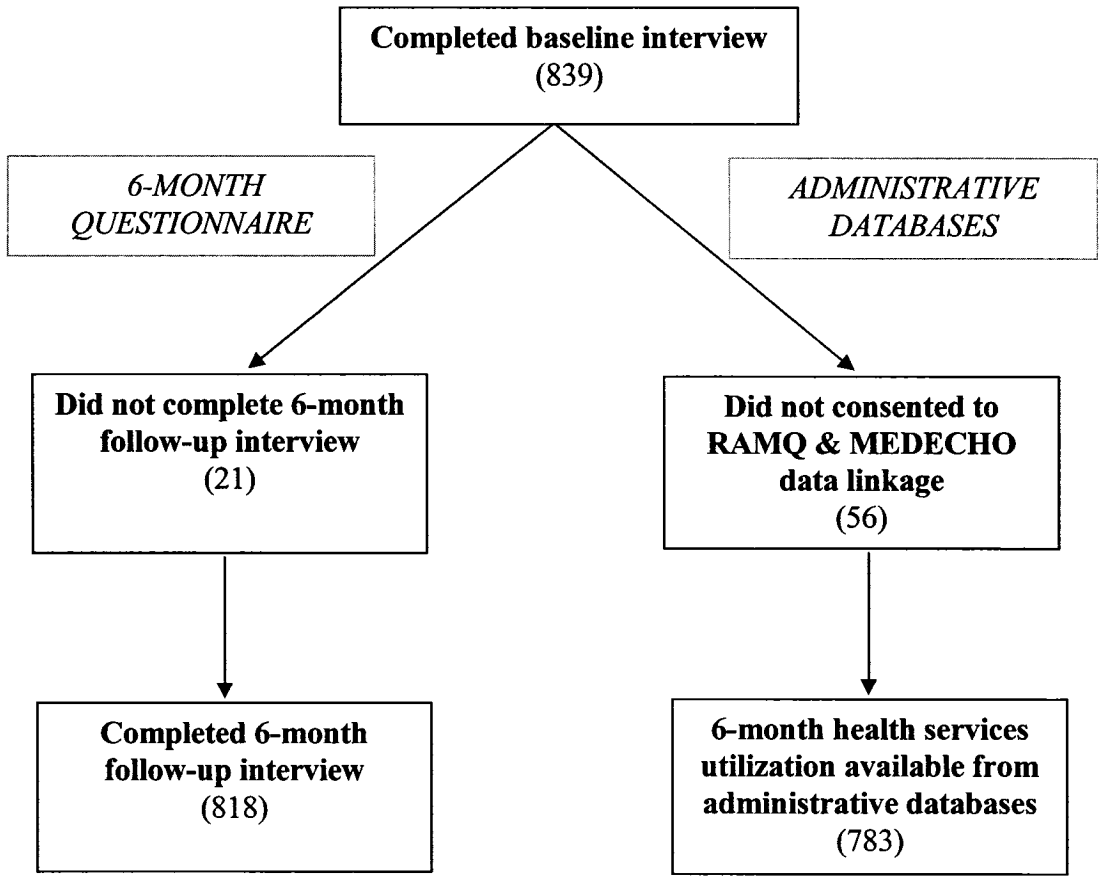
4.1.2 Losses to follow-up

Of the 839 subjects who completed the baseline interview, 818 (97.5%) also completed the 6-month follow-up interview: 12 subjects died, 3 were institutionalized, 1 experienced cognitive decline (reported by a caregiver) and was unable to complete the follow-up interview, 1 could not be contacted, and 4 refused to participate in the 6-month interview (Table 4-1). For the analyses using the RAMQ and MEDECHO health services utilization data, subjects that refused to provide consent for the data linkage were, in effect, lost to follow-up (Figure 4-3). Only 56 (6.7%) of the study subjects refused to consent to the data linkage, and 2 of the subjects (0.2%) refused to consent to allow access to their RAMQ and MEDECHO data *and* did not complete the 6-month follow-up interview (Table 4-1).

Table 4-1: Losses to follow-up at 6 months.

Source	Number (%)
6 month questionnaire:	
Number of subjects that did not complete 6-month follow-up interview	21 (2.5)
Reason for losses to follow-up:	
Died	12
Institutionalized	3
Cognitive decline	1
Could not be contacted	1
Refused	4
RAMQ & MEDECHO data linkage:	
Refused consent for RAMQ and MEDECHO data linkage	56 (6.7)
Refused consent for RAMQ and MEDECHO data linkage AND did not complete 6-month follow-up interview	2 (0.2)

Figure 4-3: Losses to follow-up



4.1.3 Comparison of the characteristics of eligible study subjects who participated with those who refused to participate or were unreachable

There were no data available describing the characteristics of the seniors who were contacted by Léger Marketing but did not meet the eligibility criteria (2180) or refused to participate (354). Limited information (e.g. sex, language of recruitment interview, and ALFI score) was available for the 107 subjects who were eligible and initially verbally informed the Léger Marketing recruiters of their willingness to participate in the study but subsequently refused to participate (69) or were unreachable (38) by our study interviewers. Of these 107 subjects who were eligible, they were more likely to be women (79.4% versus 68.7% among the study subjects; $p < 0.02$), French speaking (88.8% versus 71.8% among the study subjects; $p < 0.003$), and scored lower on the ALFI compared to the study population (Table 4-2). The difference in ALFI score was less than 1 point and, while statistically significant ($p < 0.001$) is not a clinically meaningful difference.

Table 4-2: Comparison of the characteristics of eligible study subjects who participated with those who refused to participate or were unreachable.

(*Frequencies given with column percentages in parentheses; P-values derived using t - or χ^2-tests.*)

	Number (%)		
	Refused to participate or were unreachable* (N=107)	**Study participants** (N=839)	**P-value**
Sex			
Female	85 (79.4)	576 (68.7)	0.02
Male	22 (20.6)	263 (31.3)	
Language of recruitment interview			
French	95 (88.8)	602 (71.8)	0.003
English	12 (11.2)	159 (19.0)	
***Mean* ALFI score** (SD)	19.5 (2.1)	20.4 (1.6)	<0.0001

* Subjects that agreed to participate when contacted by Léger Marketing but changed their minds and refused to participate when contacted by our interviewers or were could not be contacted by the study interviewers.

4.2 Socio-demographic and socio-economic characteristics

In Table 4-3 the socio-demographic characteristics of the study participants at baseline are presented. The majority of the study subjects were women (68.6%). Subjects ranged in age from 75 to 96 with a mean age of 79.6 years. Almost a third of study subjects were married. The remaining subjects were widowed, separated/divorced or never married. Most study subjects were born in Canada (85.8%). The mother tongue of the majority was French (71.8%), followed by English (19%) and 9.3% reported speaking another language. The education levels ranged from no formal education (0.4%) to university level (22.3%). Nearly one fifth of the sample was classified in the income category of less than $15,000 per year, with 23.5% having reported household income in excess of $45,000 per year. The majority of the subjects lived alone (62.2%), while 34.7% lived with 1 cohabitant and just over 3% reported living with 2 to 3 cohabitants. Very few subjects reported that they had no social network (2.4%).

Despite the fact that our sample was selected using random telephone number dialling and was expected to be representative of community-dwelling elderly, there were slight demographic differences between our sample and the Quebec population over the age of 75 (Table 4-4). The study sample had a slightly higher proportion of seniors in the 75-79 age group compared to the Quebec population (56.3% versus 47.9%), and lower proportions in the older age groups (85-89 age group: 11.3% versus 15.5%; 90+ age group: 1.4% versus 7.4%). Nevertheless, comparison of this sample with data from 2001 Census (Statistics Canada 2003) suggests that this sample is fairly representative of the elderly population in Quebec in terms of age and sex.

Table 4-3: Characteristics of study subjects.

(N = 839; frequencies given with sample percentages in parentheses)

Characteristic	Number (%)
Sex	
female	576 (68.7)
male	263 (31.3)
Age (*Mean age: 79.6 SD: 3.92; Min:75 max: 96)*	
75-79	472 (56.3)
80-84	260 (31.0)
85-89	95 (11.3)
90+	12 (1.4)
Mother tongue	
French	602 (71.8)
English	159 (19.0)
Other	75 (9.3)
Country of birth	
Canada	720 (85.8)
Other	119 (14.2)
Education level (highest)	
None	3 (0.4)
Did not complete elementary school	71 (8.5)
Elementary school	66 (7.8)
Did not complete high school	196 (23.4)
High school	181 (21.6)
Technical / trade school	52 (6.2)
College	83 (9.9)
University	187 (22.3)
Marital status	
Married / common-law	257 (30.6)
Widow(er)	426 (50.8)
Separated/ divorced	74 (8.8)
Never married	82 (9.8)
Number of cohabitants	
0 (lives alone)	522 (62.2)
1	291 (34.7)
2	19 (2.3)
3	4 (0.5)
4	3 (0.4)

Table 4-3 continued

Income category ($/year)	
0 - 9,999	11 (1.3)
10,000 - 14,999	147 (17.5)
15,000 - 19,999	80 (9.5)
20,000 - 24,999	109 (13.0)
25,000 - 29,999	78 (9.3)
30,000 - 34,999	92 (11.0)
35,000 - 39,999	48 (5.7)
40,000 - 44,999	57 (6.8)
45,000 - 49,999	34 (4.1)
50,000 - 59,999	62 (7.4)
60,000 - 69,999	33 (3.9)
70,000 and more	67 (8.0)
Refused/missing	21 (2.5)
Size of social network	
0	20 (2.4)
1	69 (8.2)
2	122 (14.5)
3	151 (18.0)
4	146 (17.4)
5	122 (14.5)
6 or more	209 (24.9)

Table 4-4: Comparison of study sample with the Quebec population 75 years of age or older.

(N = 839)

	Percent	
Characteristic	**Study Population**	**Quebec Population***
Age		
75-79	56.3	47.9
80-84	31.0	29.2
85-89	11.3	15.5
90+	1.4	7.4
Sex		
female	68.7	64.5
male	31.3	35.5

* Source: Census 2001, Statistics Canada

4.3 Health status and comorbidities

Characteristics related to health status are presented in Table 4-5. Overall the study sample was in good cognitive health. The median ALFI score of the subjects was 21.0 and ranged between 14 and 22. The study was designed to include subjects with a score of 14 or higher on the ALFI so only subjects who were, at worst, suffering from mild cognitive impairment would be included in the study. The distribution of ALFI scores was skewed with very few subjects with a score between 14 and 17 (6.2%), the cut-off range for individuals suffering from mild cognitive impairment. The majority of subjects scored 18 or higher on the ALFI (93.8%). The Payette Nutritional Score was used to assess the subjects' risk of malnutrition. In this study 12.4% of the sample was found to be at high risk, 47.7% at moderate risk and 39.9% at low risk of malnutrition. The mean number of self-reported comorbid conditions of the subjects was 4 (SD=2.2) and the mean Chronic Disease Score was 5.8 (SD = 4.9). The most common self-reported comorbid conditions were arthritis (64%), high blood pressure (52.3%), and problems of dizziness or balance (40.8). A very small proportion of the subjects reported having suffered a stroke (2.2%). A complete list of the comorbid conditions is presented in Table 4-6. Despite the fact that the subjects reported suffering from numerous comorbid conditions, in response to a question on self-rated health (*How do you rate your current state of health?*), 45% reported that their current state of health was very good or excellent. Only about 3% reported poor or very poor health status (Table 4-5).

We also asked if the subjects had experienced any fractures related to falls. Almost 30% of the subjects reported experiencing a fall during the 12 months before the baseline interview with 3.5% experiencing a fracture related to a fall. The most common fractures

were to the hip or femur (17.4%) and the wrist or forearm (17.2%). Only 6.9% suffered a fracture to an ankle or leg. However, while individually representing small percentages of fractures, taken together, fractures to the nose, pelvis, ribs, fingers, toes, upper arm, foot shoulder or spine accounted 58.6% of the injuries (Table 4-7). Falls resulting in hip fractures are of particular concern since fractures of the proximal femur (hip) are known to be associated with increased risk of hospitalization (Wolinsky et al., 1997; Wolinsky et al., 1992), nursing home placement (Wolinsky et al., 1992), mortality (Baudoin et al., 1996; Meyer et al., 2000; Wolinsky et al., 1997; Katelaris and Cumming 1996; Poor et al., 1994; Wolinsky et al., 1992) and having an impact on the cost of medical care for the elderly (Melton 1993).

Table 4-5: Health related characteristics

(N = 839; frequencies given with sample percentages in parentheses)

CHARACTERISTIC			
Categorical measures		**Number (%)**	
Nutritional Status			
Low risk		335 (39.9)	
Moderate risk		400 (47.7)	
High risk		104 (12.4)	
Health status (self-rated)			
Excellent		88 (10.5)	
very good		283 (33.7)	
Good		273 (32.5)	
Fair		168 (20.0)	
Poor		23 (2.7)	
Very poor		4 (0.5)	
Continuous measures	**Median**	**Range**	**Mean (SD)**
ALFI †	21.0	14 - 22 *	-
Number comorbid conditions§	-	*0 - 16*	4.0 (2.2)
Chronic Disease Score (CDS) §	-	0 - 23	5.8 (4.9)

* The ALFI score ranges from 0 to 22, however, only subjects that score 14 or greater were included in the study.

† ALFI scores had a skewed distribution.

§ Scores were normally distributed.

Table 4-6: Comorbid conditions in the sample.

(N = 839; frequencies given with sample percentages in parentheses)

Self-reported medical condition	Number (%) Overall (N=839)	Male (N=263)	Female N=(576)
High Blood Pressure	439 (52.3)	114 (43.4)	325 (56.4)
Don't know	7 (0.8)	2 (0.8)	5 (0.9)
Cardiac problems	209 (24.9)	70 (26.6)	139 (24.1)
Don't know	9 (1.1)	4 (1.5)	5 (0.9)
Circulatory problems	269 (32.1)	76 (28.9)	193 (33.5)
Don't know	21 (2.5)	8 (3.0)	13 (2.3)
Respiratory problems	168 (20.0)	47 (17.9)	121 (21.0)
Dental problems	284 (33.9)	97 (36.9)	187 (32.5)
Gastrointestinal problems	307 (36.6)	69 (26.2)	238 (41.3)
Bladder, kidney or prostate trouble	224 (26.7)	83 (31.6)	141 (24.5)
Don't know	3 (0.4)	2 (0.8)	1 (0.2)
Problem of dizziness or balance	342 (40.8)	92 (35.0)	250 (43.4)
Problems with feet or ankles	304 (36.2)	78 (29.7)	226 (39.2)
Stroke (thrombosis, CVA)	18 (2.2)	9 (3.4)	9 (1.6)
Don't know	4 (0.5)	-	4 (0.7)
Paralysis due to illness or accident	10 (1.2)	3 (1.1)	7 (1.2)
Parkinson's disease or any other neurological disorder (excluding CVAs)	19 (2.3)	5 (1.9)	14 (2.4)
Don't know	5 (0.6)	3 (1.1)	2 (0.4)
Arthritis, osteoarthritis or rheumatism	537 (64.0)	137 (52.1)	400 (63.4)
Don't know	20 (2.4)	8 (3.0)	12 (2.1)
Tumour or Cancer	46 (5.5)	22 (8.4)	24 (4.2)
Don't know	2 (0.2)	-	2 (0.4)
Diabetes	139 (16.6)	58 (22.1)	81 (14.1)
Don't know	6 (0.7)	1 (0.4)	5 (0.9)
Depression	58 (6.9)	9 (3.42)	49 (8.5)
Don't know	1 (0.1)	-	1 (0.2)

Table 4-7: Falls during the 12 months before the baseline interview.

(N = 839; frequencies given with sample percentages in parentheses)

Characteristic	Number (%)
Experienced a fall	249 (29.7)
Mean number of falls (SD) =2.0 (2.1); range: 1 - 25	
Fractures due to fall	29 (3.5)
Type of fracture:	
Hip or femur	5 (17.4)
Ankle or leg	2 (6.9)
Wrist or forearm	5 (17.2)
Other (nose, pelvis, ribs, fingers, toes, upper arm, foot shoulder, spine)	17 (58.6)

The demographic characteristics of the study sample of elderly Montreal residents were similar to demographic characteristics of the province. The majority of the study subjects were francophone, over two-thirds of the sample were women, less than a third were married or living with a common-law spouse. Despite the fact that most the subjects reported suffering from numerous comorbid conditions, for the most part, they considered themselves to be in fairly good health.

4.4 Self-reported health services utilization

Table 4-8 presents health services utilization as reported by the study subjects themselves in the baseline interview. Most of the subjects reported that they received the services of a family physician (89.5%). Of the 88 subjects that reported not receiving services from a family physician, 55 (62.5%) indicated that they needed this service. Eleven percent of the subjects reported receiving home visits from their family physician,

and 21.6% (161/747) of the subjects that did not, reported that they would like to receive this service.

After family physician services, the next most common reported health service that was used was dental or denturology (46.2%), followed by physiotherapy (11.3%). Almost 8% of the study subjects used the services of a social worker (Table 4-8). Services of psychologists, occupational therapists, speech therapists and psychiatrists were used to lesser extent.

Most of the subjects reported taking one or more prescription medications at the time of the baseline interview (89.6%). Subjects also reported taking vitamin supplements (55.3%), and over-the-counter medications (20.0%). Almost a quarter of the subjects reported using herbal medicines. The vast majority of the subjects reported that they did not require assistance taking their medications. Two-thirds of the subjects had received a flu vaccination in the past year.

Table 4-8: Self-reported health services utilization at baseline.

(N = 839; frequencies given with sample percentages in parentheses)

Characteristic	Number (%)
Family physician services:	
Received services of family physician	751 (89.5)
If did not receive services of family physician, needed the services of a family physician (N=88)	55 (62.5)
Received home visits from family physician	92 (11.0)
If did not receive home visits, needed home visit by family physician (n=747)	161 (21.6)
Used services in past 6 months:	
Dentist / Denturologist	388 (46.2)
Physiotherapist	95 (11.3)
Chiropractor	34 (4.1)
Social worker	66 (7.8)
Dietician or nutritionist	40 (4.8)
Psychologist	18 (2.2)
Occupational therapist	25 (3.0)
Speech therapist	21 (2.5)
Psychiatrist	12 (1.4)
Currently taking:	
Prescription medication	752 (89.6)
Vitamin supplements	464 (55.3)
Herbal medicine	201 (24.0)
Over the counter medications	168 (20.0)
Require assistance taking medication	12 (1.6)
Received flu vaccination in past 12 months	561 (66.9)

4.5 Missing data

As discussed in Chapter 3, there were very little missing data in this study. The only variable used in my analyses with missing data was for household income. Of the 839 subjects who completed the baseline interview 788 (93.9%) reported their baseline income (APPENDIX F: Table 7-1). Most reported *before* tax income (83.4%). The remaining subjects reported *after* tax income (7.6%) or were unsure if the income they reported was *before* or *after* tax (2.9%). Only 6.1% of the income data were missing (i.e. subjects refused to provide this information).

As described in the Methods chapter (Section 3.11.5), income data that were either missing or reported as after tax income in the baseline questionnaire were imputed using an algorithm that used income data from the 12 month questionnaire to estimate the subject's income level at baseline. After imputation, 21 subjects (2.5%) remained missing because they refused to report their income in both baseline and 12 month questionnaires, and therefore, it was not possible to impute values for these subjects. Missing data may introduce bias if a substantial proportion of the sample contains missing values. Even with smaller proportions of missing data bias can still be introduced if a variable with missing data is associated with the outcome of interest.

Comparisons of subjects with missing and those without missing baseline income data after imputation are shown in APPENDIX F: Table 7-2 and Table 7-3. The two groups are similar for most of the characteristics compared, with the exception of education and the size of the social network. In order to examine the possible extent of bias to the estimates resulting from differences in education and size of social network as they relate to unmet need status, these variables were compared in terms of unmet need status between

the subjects with missing and those without missing income. These groups were found to be similar (data not shown). These results suggest that the exclusion of these 21 subjects (case deletion in the regression analyses) is unlikely to result in biased regression coefficients; therefore, multiple imputation was not necessary.

4.6 Prevalence of unmet needs for ADL and IADL activities

In the sample, as shown in Table 4-9, the crude prevalence of subjects with unmet needs for any ADL or IADL (i.e. either directly reported needing help/more help, or as determined based on having reported one or more negative consequences) was 25.4% (95% CI: 22.5%, 28.3%). The proportion of unmet need was highest for IADL activities (21.9%) compared to ADL activities (8.5%). The highest level of IADL unmet need was for housekeeping (14.4%), followed by transportation (11.4%) with only 2.4% needing help with preparation of meals. The proportion of the sample with ADL unmet needs was highest for bathing (5.0%) and indoor mobility (3.0%) followed by dressing (1.3%). The proportion of unmet need for eating and for toileting was very low (0.7% each). Among the subjects that had unmet needs the majority reported experiencing only one unmet need (67.1%), 20.7% reported experiencing two unmet needs, 8.9% experienced 3 to 4 unmet needs, and 3.3% experienced more that 5 unmet needs. The proportions according to ADL and IADL unmet needs are also presented in Table 4-10.

Stratification of unmet need status by age and sex is presented in Table 4-11. The proportion of subjects with unmet needs increased with age and was higher among women.

Table 4-9: Proportion of sample with reported unmet ADL or IADL needs in particular domains.

(N = 839; numbers given with percentages in parentheses)

Domain	Unmet Need N (%)	Met Need N (%)	No Need N (%)
Any ADL or IADL unmet need (one or more ADL or IADL)	**213 (25.4)**	**391 (46.6)**	**235 (28.0)**
Directly reported having unmet need	138 (16.5)	-	-
Experienced negative consequences	161 (19.2)	-	-
Activities of Daily Living:			
Any ADL unmet need (one or more)	**71 (8.5)**	**131 (15.6)**	**637 (75.9)**
Directly reported having unmet need	29 (3.5)	-	-
Experienced negative consequences	58 (6.9)	-	-
Dressing	11 (1.3)	65 (7.8)	763 (90.9)
Directly reported having unmet need	7 (0.8)	-	-
Experienced negative consequences	4 (0.5)	-	-
Bathing	42 (5.0)	76 (9.1)	721 (85.9)
Directly reported having unmet need	7 (0.8)	-	-
Experienced negative consequences	39 (4.7)	-	-
Eating	6 (0.7)	9 (1.1)	824 (98.2)
Directly reported having unmet need	3 (0.4)	-	-
Experienced negative consequences	4 (0.5)	-	-
Toileting	6 (0.7)	26 (3.1)	805 (96.2)
Directly reported having unmet need	4 (0.5)	-	-
Experienced negative consequences	5 (0.6)	-	-
Transfer	11 (1.3)	103 (12.3)	725 (86.4)
Directly reported having unmet need	6 (0.7)	-	-
Experienced negative consequences	6 (0.7)	-	-
Indoor mobility	25 (3.0)	28 (3.3)	786 (93.7)
Directly reported having unmet need	5 (0.6)	-	-
Experienced negative consequences	22 (2.6)	-	-
Instrumental Activities of Daily Living:			
Any IADL unmet need (one or more)	**184 (21.9)**	**403 (48.0)**	**252 (30.0)**
Directly reported having unmet need	121 (14.4)	-	-
Experienced negative consequences	153 (18.2)	-	-
Preparation of meals	20 (2.4)	192 (22.9)	627 (74.7)
Directly reported having unmet need	16 (1.9)	-	-
Experienced negative consequences	6 (0.7)	-	-
Transportation	96 (11.4)	163 (19.4)	580 (69.1)
Directly reported having unmet need	56 (6.7)	-	-
Experienced negative consequences	67 (8.0)	-	-
Housekeeping	121 (14.4)	409 (48.8)	309 (36.8)
Directly reported having unmet need	77 (9.2)	-	-
Experienced negative consequences	85 (10.1)	-	-

Table 4-10: The number of unmet needs experienced by study subjects.

Domain	Number (%) of the study population (N=839)	Percentage among those with unmet needs
Number of unmet ADL needs:		
1	54 (6.4)	76.1
2	10 (1.2)	14.1
3	4 (0.5)	5.6
4	1 (0.1)	1.4
5	1 (0.1)	1.4
6	1 (0.1)	1.4
Number of unmet IADL needs:		
1	142 (16.9)	77.2
2	31 (3.7)	16.9
3	11 (1.3)	6.0
Number of unmet needs (ADL or IADL):		
1	143 (17.0)	67.1
2	44 (5.2)	20.7
3	10 (1.2)	4.7
4	9 (1.1)	4.2
5	4 (0.5)	1.9
6	2 (0.2)	0.9
7	0 (0.0)	0
8	0 (0.0)	0
9	1 (0.1)	0.5

Table 4-11: Proportion of subjects reporting unmet ADL or IADL need, stratified by sex and age.

(Frequencies given with percentage in parentheses)

	Overall		Sex			
			Male		Female	
Age category	**Unmet Need**	**No unmet Need**	**Unmet Need**	**No unmet Need**	**Unmet Need**	**No unmet Need**
75-79	103 (21.8)	369 (78.2)	21 (12.0)	140 (87.0)	82 (26.4)	229 (73.6)
80-84	69 (26.5)	191 (73.5)	10 (13.7)	63 (86.3)	59 (31.6)	128 (68.5)
85-89	36 (37.9)	59 (62.1)	11 (40.7)	16 (59.3)	25 (36.8)	43 (63.2)
≥90	5 (41.7)	7 (58.3)	0 (0.0)	2 (100.0)	5 (50.0)	5 (50.0)
All ages	213 (25.4)	626 (74.6)	42 (16.0)	221 (84.0)	171 (29.7)	405 (70.3)

4.7 Negative consequences related to unmet need

Just over nineteen percent of the total sample population reported a negative consequence with 6.9% and 18.2% reporting consequences related to ADLs and IADLs, respectively (Table 4-12).

The proportions of subjects that reported negative consequences attributed to the absence of help or sufficient help are also presented in Table 4-12. The denominators for calculating these proportions included only subjects who reported needing help with an activity since negative consequences were not relevant if the subject was able to perform the activity alone without difficulty. Overall 26.7% reported experiencing a negative consequence related to absence of help for either ADL or IADL activities. Among subjects that reported an absence of help for ADL or IADL activities 28.7% and 26.1% of subjects reported experiencing a negative consequence, respectively. The proportions of subjects that experienced negative consequences varied depending on the ADL or IADL item (Table 4-12) and ranged from 0.8% (had to wear dirty clothes because no one was there to assist with laundry) to 41.1% (Indoor mobility: inability to move around inside the home). About a third of the subjects, that reported needing help with an activity, experienced a consequence related to bathing, followed by 26.7% for a consequence related to eating. For IADL consequences 25.9% reported experiencing consequences related to transportation, and 16.0% to housekeeping. Fewer experienced consequences related to meal preparation (2.8%).

4.8 Profile of subjects with unmet need

Comparisons of the characteristics of subjects with and without any ADL or IADL unmet need are presented in Table 4-13. Those with reported unmet needs were more

likely to be female, reported more comorbid conditions, higher Chronic Disease Scores, had lower self-reported health, and were more likely to be classified as being at moderate or high nutritional risk for malnutrition (77.9% vs. 54.0%). There were no statistically significant differences with respect to marital status, cohabitant status, mother tongue, cognitive score or size of social network between the two groups. Although there was a statistically significant difference in the mean age of those with versus those without unmet needs, the magnitude of the difference was only just over 1 year, and thus, not likely to represent a meaningful difference.

Table 4-12: Negative consequences attributed to the absence of help among subjects that reported needing help with an activity.

Were there times in the past month when you experience a negative consequence?	Number (Percent) N=839	Percent among those that reported difficulty with the activity*
Consequence related to Activities of Daily Living (ADL)	**58 (6.9)**	**28.7**
Dressing		
Not able to change clothes as often as would like	4 (0.5)	5.3
Bathing		
Unable to take a bath or shower as often as would like	20 (2.4)	17.0
Did not take a bath or shower because of fear of falling	31 (3.7)	26.3
Would have liked to take a bath or a shower rather than having a sponge bath	5 (0.6)	4.2
One or more of the above consequences	39 (4.7)	33.1
Eating		
Unable to eat when hungry	1 (0.1)	6.7
Unable to drink when thirsty	1 (0.1)	6.7
Lost weight even though you were not on a diet	3 (0.4)	20.0
One or more of the above consequences	4 (0.5)	26.7
Toileting		
Experienced physical discomfort	3 (0.4)	8.8
Wet or soiled self	3 (0.4)	8.8
One or more of the above consequences	5 (0.6)	14.7
Transfer		
Fell while getting in and out of bed or a chair	6 (0.7)	5.3
Indoor mobility		
Couldn't move around inside the home	22 (2.6)	41.1

* Denominator: excluded subjects that reported performing an activity alone without difficulty since negative consequences were not relevant if the subject was able to perform the activity alone without difficulty.

Table 4-12 continued

Were there times in the past month when you experience a negative consequence?	Number (Percent) N=839	Percent among those that reported difficulty with the activity*
Consequence related to Instrumental Activities of Daily Living (IADL)	**153 (18.2)**	**26.1**
Preparation of meals		
Unable to follow a special diet	3 (0.4)	1.4
Unable to eat when hungry	4 (0.5)	1.9
One or more of the above consequences	6 (0.7)	2.8
Transportation		
Missed a health care professional or doctor's appointment	14 (1.7)	5.4
Was unable to go places for fun or recreation	46 (5.5)	17.8
Ran out of food	6 (0.7)	2.3
Ran out of medication or other medical supplies	4 (0.5)	1.5
Could not attend religious services	30 (3.6)	11.6
One or more of the above consequences	67 (8.0)	25.9
Housekeeping		
Distressed because housework not done	85 (10.1)	16.0
Had to wear dirty clothes because no one was there to do the laundry	4 (0.5)	0.8
One or more of the above consequences	85 (10.1)	16.0
Any consequence related to ADL or IADL	**161 (19.2)**	**26.7**

* Denominator: excluded subjects that reported performing an activity alone without difficulty since negative consequences were not relevant if the subject was able to perform the activity alone without difficulty.

Table 4-13: Characteristics of subjects with and without unmet needs.

(Unless indicated, frequencies given with column percentages in parentheses; P-values based on t- , Wilcoxon- or χ^2-tests)

Characteristic	Unmet Need (N = 213)	No Unmet Need (N = 626)	P-value
Sex			
Male	42 (19.7)	221 (35.3)	< 0.0001
Female	171 (80.3)	405 (64.7)	
Age			
Mean (SD)	80.46 (4.3)	79.28 (3.7)	0.0004
Median	80	79	
Marital status			
Married	57 (26.7)	200 (32.0)	0.16
No partner	156 (73.2)	426 (68.1)	
Number status			
Lives alone	137 (64.3)	385 (61.5)	0.46
1 or more cohabitants	76 (35.7)	241 (38.5)	
Mother tongue			
French	151 (70.9)	451 (72.0)	0.50
English	38 (17.8)	121 (19.3)	
Other	24 (11.3)	54 (8.6)	
Number of Comorbid conditions			< 0.0001
Mean (SD)	5.42 (2.2)	3.54 (2.0)	
median	5	3	
Chronic Disease Score (CDS)			
Mean (SD)	7.06 (5.2)	5.38 (4.8)	< 0.0001
median	7	5	
Health status (self-rated)			
Mean (SD)	3.41 (1.0)	2.49 (0.9)	< 0.0001
median	3	2	
Social network			
Mean (SD)	11.01 (2.1)	11.11 (2.2)	0.56
median	11	11	
Nutritional score			
Low risk	47 (22.1)	288 (46.0)	< 0.0001
Moderate risk	111 (52.1)	289 (46.2)	
High risk	55 (25.8)	49 (7.8)	
ALFI score			
Mean (SD)	20.28 (1.7)	20.4 (1.6)	0.28
median	21	21	

4.9 Unmet needs and health services utilization

4.9.1 Health services utilization determined using administrative databases

The descriptive statistics for health services utilization as determined from the six-month follow-up period and the six months preceding the baseline interview are presented in Table 4-14. Of the 783 subjects who consented to data linkage with the RAMQ and MEDECHO databases, almost 18% visited an emergency department at least once during the six month follow-up period and 11.7% were hospitalized at least once during this period. The number of hospitalizations ranged from 1 to 4 with 8.7% experiencing one hospitalization, 2.4% experiencing 2 hospitalizations, and only 0.6% experiencing 3 or more hospitalizations. Most of the subjects visited a physician during the follow-up period (92.6%), with 74.0% having visited a general practitioner and 77.5% having visited a medical specialist. Almost 91% of the subjects filled prescriptions for at least one medication. As seen in Table 4-14, the use of health services during the six month period before the baseline interview was very similar to that observed during the six month follow-up period. A comparison of health services utilization confirms that there was no dramatic shift in the pattern of utilization during these two time periods. This suggests that changes in health services utilization do not account for any of the associations between unmet needs and health services utilization that are presented in subsequent sections.

The proportions of prescription medication dispensed according to AHF classes are presented in Table 4-15. Not surprisingly, since cardiovascular conditions were very common in the sample (52.3% reported high blood pressure; 24.9% reported cardiac problems; and 32.1% reported circulatory problems), the most commonly filled prescriptions were for cardiovascular (31.4%) and electrolytic-diuretic (12.0%) classes of

medications. Despite the fact that 64.0% of the subjects reported suffering from arthritis, osteoarthritis or rheumatism only 10.3% of dispensed prescriptions were for analgesics and less than 1% for anti-inflammatory classes of medication. Medications belonging to the Hormones and Substitutes class accounted for almost 8% of the prescriptions; and 5.1% of the filled prescriptions were for anxiety lowering and sedative medications. Benzodiazepines accounted for most of these prescriptions. For other less commonly filled prescriptions refer to Table 4-15.

Table 4-14: Health services utilization determined from administrative databases.

(N=783; *frequencies given with sample percentages in parentheses)*

Health Service	During 6 month follow-up period Number (%)	During 6 month preceding the baseline interview Number (%)
Emergency Department:		
Experienced ED visit (at least one)	140 (17.9)	107 (13.7)
Number of ED visits:		
0	643 (82.1)	676 (86.3)
1	76 (9.7)	57 (7.3)
2	38 (4.9)	26 (3.3)
3	13 (1.7)	14 (1.8)
4 - 10	13 (1.7)	10 (1.3)
Hospitalization:		
Hospitalized (at least once)	92 (11.7)	71 (9.1)
Number of hospitalizations:		
0	691 (88.3)	712 (90.9)
1	68 (8.7)	58 (7.4)
2	19 (2.4)	12 (1.5)
3	4 (0.5)	1 (0.1)
4	1 (0.1)	0 (0.0)
Medication use:		
Filled prescription for at least one medication	711 (90.8)	702 (89.7)
Physician visits *(at least once)*:		
*Physician visit (GP or Specialist)**	725 (92.6)	724 (92.5)
GP visits[†]	579 (74.0)	579 (74.0)
Specialist visits[§]	607 (77.5)	579 (74.0)

** Follow-up ranged from 0 – 82 physician visits; Preceding 6 months ranged from 0 – 78 physician visits*

[†] Follow-up ranged from 0 – 18 GP visits; Preceding 6 months ranged from 0 – 14 GP visits

[§] Follow-up ranged from 0 – 82 specialist visits; Preceding 6 months ranged from 0 – 78 specialist visits

Table 4-15: Proportion of dispensed prescriptions based on AHF codes during the six month follow-up period.

(Total number of prescriptions filled during the 6 month follow-up = 20,037)

AHF Medication Class / Subclass	Percent
Cardiovascular	**31.4**
Anti-hypertensive	12.1
Lipid lowering	11.9
Cardiotropic	5.2
Vasodilators	2.1
Electrolytic-diuretics	**12.0**
Diuretic	6.2
Supplements	4.2
Potassium sparing diuretic	1.6
Analgesics	**10.3**
NSAIDS	8.6
Various	1.6
Hormones & Substitutes	**7.9**
Thyroid	4.5
Estrogen	1.5
Corticosteroids	1.0
Estrogen agonists & antagonists	0.3
Progesterone	0.2
Parathyroid	0.2
Anti-parathyroid	0.2
Anxiety lowering, sedatives	**5.1**
Benzodiazepines	5.0
Various	0.1
Gastrointestinal	**4.9**
Various	4.7
Anti-diarrhea	0.2
Anti-diabetic	**4.3**
Sulfonylurea	1.9
Various	1.9
Insulin	0.5

Table 4-15 continued

Ear, Nose, Throat & Eyes	**3.5**
Other	2.2
Anti-inflammatory	0.9
Carbonic Anhydrase inhibitor	0.4
Psychotropic	**2.5**
Antidepressants	2.2
Tranquilizers	0.3
Autonomic Nervous system	**2.1**
Sympathomimetic	0.7
Anti-spasmodic	0.4
Parasympathetic	0.3
Muscle relaxants	0.2
Antiparkinsons	0.2
Various	0.2
Barbiturates	0.2
Coagulants & Anticoagulants	**1.4**
Anticoagulant	1.4
Anti-spasmodic	**1.7**
Bronchodilator	1.4
Genito-unrinary	0.2
Anti-inflammatory	**0.9**
Other medications *(diagnostic agent, anti-infectious, vitamins, anticonvulsants, anti-neoplastic, Central Nervous System medication)*	**12.0**

4.9.2 Association between unmet need and health services utilization obtained from administrative databases

The association between the unmet need status and health services utilization outcome variables was assessed using Poisson and negative binomial regression analysis. Crude and adjusted rate ratios were estimated. As described in Chapter 3 (Methods), initially Poisson regression models were used to examine the associations between unmet need status and the different health services outcome variables. The Pearson Chi-squared goodness of fit statistic for the hospitalization (defined as hospital days) and physician utilization models indicated the presence of overdispersion (i.e. Pearson Chi-squared statistic was much larger than 1), suggesting that the Poisson regression was not the most appropriate modeling strategy for these data. The Poisson regression models examining the associations between unmet need with the number of dispensed medications, emergency department visits and hospitalization (when defined as the number of hospital admissions) indicated relatively little overdispersion, suggesting that Poisson models could provide reasonably good estimates of variance. Negative binomial regressions were used as the primary method of analysis for all outcome variables, so as to insure that the final 95% confidence intervals for the rate ratios of the separate health services utilization models were more conservative (i.e. wider) than those obtained from Poisson regression analysis. The results of the negative binomial regression analyses are presented in this chapter, while the results of the Poisson regression models are presented in APPENDIX G.

Each of the models was evaluated for potential confounding as discussed in Chapter 3 (Section 3.11.8). Potential confounding variables included: sex, age, size of social network, marital status, the number of cohabitants (living with the subject), education, income, income satisfaction, nutritional status and Chronic Disease Score. Age, number of

cohabitants and income satisfaction were not confounders in any of the models examined. Only those covariates that were found to confound the associations were included in the final regression models.

4.9.2.1 Emergency Department utilization

Three different negative binomial regression models were used to examine the association between unmet need status at baseline and emergency department visits. The outcome variable was defined as the number of emergency department visits during the six month follow-up period and the main independent variable was either 1) unmet need status, 2) ADL unmet need status, or 3) IADL unmet need status. The results of the regression analyses are presented in Table 4-16. In each of these models the Pearson Chi-squared goodness of fit statistics were very close to 1, indicating that there is insufficient evidence to conclude that the model does not fit the data.

4.9.2.1.1 Association between unmet need and emergency department visits

Both the crude and adjusted rate ratios for the association between unmet need status and emergency department visits were estimated (Table 4-16). Individuals with any unmet needs were found to have more than twice the rate of emergency department visits compared to those without unmet need (Crude RR= 2.21; 95% CI: 1.45, 3.35). The final adjusted model included a statistically significant interaction between the size of the subjects' social network and the unmet need status variable. For subjects having no social network the rate ratio was 4.38 (95% CI: 1.60, 12.00) after adjustment for sex, nutritional score, CDS, and self-reported health status (Table 4-16). Table 4-17 shows the effect of the interaction term with increasing social network size. As the size of the subjects' social network increases the rate ratio for emergency department visits decreases.

Analysis using IADL unmet need status at baseline as the independent variable also revealed that subjects with unmet need had more than twice the rate of emergency department visits compared to subjects without unmet need (Crude RR = 2.12; 95% CI: 1.37, 3.29). The final adjusted model using IADL unmet need status as the main independent variable was also found to have a significant interaction between the size of the subjects' social network and IADL unmet need status. Once again, the rate ratio was higher for subjects having no social network (Adjusted RR = 4.57; 95% CI: 1.67, 12.49) after adjusting for sex, nutritional status, and self-reported health (Table 4-16). The effect of the interaction is also presented in Table 4-17. A similar effect was observed in this model as was seen when the main independent variable was unmet need status: As the size of the subjects' social network increased the emergency department visit rate ratio decreased.

Finally, the association between unmet ADL need status and emergency department visits are presented in Table 4-16. The crude rate ratio for this association was 1.81 (95% CI: 0.94, 3.50). As presented in Table 4-16, after adjusting for sex, nutritional status, and self-reported health the rate ratio was 1.06 (95% CI: 0.53, 2.11). As the rate ratio was only slightly above 1 and the 95% confidence intervals include the null value it is not possible to conclude that there is an association between unmet ADL needs and emergency department visits.

Table 4-16: Negative Binomial Regression: Unmet need and number of emergency department visits during the 6 month follow-up period.

		Main Independent Variable								
		Any Unmet need (N=783)			ADL unmet need (N=783)			IADL unmet need (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI for Rate Ratio**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI for Rate Ratio**
Crude	**Main Independent variable**	**0.79 (0.21)**	**2.21**	**1.45, 3.35**	**0.60 (0.33)**	**1.81**	**0.94, 3.50**	**0.75 (0.22)**	**2.12**	**1.37, 3.29**
Adjusted*	**Main Independent variable**	**1.48 (0.51)**	**4.38**	**1.60, 12.00**	**0.06 (0.35)**	**1.06**	**0.53, 2.11**	**1.52 (0.51)**	**4.57**	**1.67, 12.49**
	Sex	-0.49 (0.21)	0.61	0.41, 0.93	-0.47 (0.21)	0.63	0.41, 0.95	-0.48 (0.21)	0.62	0.41, 0.94
	Nutritional score	0.44 (0.16)	1.55	1.12, 2.13	0.48 (0.16)	1.61	1.17, 2.23	0.44 (0.16)	1.55	1.12, 2.13
	CDS	0.04 (0.02)	1.04	1.00, 1.08	-	-	-	-	-	-
	Self-reported health status	-0.10 (0.13)	0.91	0.70, 1.16	-0.25 (0.12)	0.78	0.61, 0.98	-0.17 (0.12)	0.85	0.66, 1.08
	Size of social network	0.15 (0.07)	1.16	1.01, 1.33	-	-	-	0.14 (0.07)	1.15	1.01, 1.31
	(Unmet need) X (size of social network) interaction term	-0.27 (0.12)	0.76	0.60, 0.97	-	-	-	-0.29 (0.13)	0.75	0.58, 0.96

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 1.05
for model with ADL unmet need as main exposure variable Pearson chi-square = 1.08
for model with IADL unmet need as main exposure variable Pearson chi-square = 1.07

Table 4-17: Unmet need and emergency department visits: interaction between unmet need and size of social network; and interaction between IADL unmet need and size of social network.

	Rate Ratio	
Size of social network	**Unmet need**	**IADL unmet need**
0	4.38	4.57
1	3.35	3.42
2	2.56	2.56
3	1.95	1.91
4	1.49	1.43
5	1.14	1.07
6 or more	0.87	0.80

4.9.2.2 Hospitalization

The association between unmet need status and the number of days subjects spent in a hospital (hospital days) was examined using negative binomial regression analysis. Using hospital days during the six month follow-up period as the outcome variable, three different models were examined: As in the previous section, the main independent variables were either 1) unmet need status, 2) ADL unmet need status, or 3) IADL unmet need status.

The association between unmet needs and hospitalization was also examined using the number of hospital admissions experienced by each subject during the six month follow-up period. As above, three separate models were assessed using overall unmet need status, ADL unmet need status or IADL unmet need status as the main independent variables.

The results of the regression analyses are presented in Table 4-18 and Table 4-19. In each of these models the Pearson Chi-squared goodness of fit statistics were very close to 1, indicating that there is insufficient evidence to conclude that the model does not fit the data.

4.9.2.2.1 Association between unmet need and hospitalization

Hospital days:

The crude rate ratio for the association between unmet need status and hospital days was 3.66 (95% CI: 1.58, 8.45). The final model was adjusted for sex, nutritional score, and self-reported health status (Table 4-18). The adjusted rate ratio was 1.57 (95% CI: 0.57, 4.33). While the rate ratio was greater than 1, the 95% confidence interval included the null value. Based on the 95% confidence interval, it is not possible to exclude a negative effect. Nevertheless, the rate ratio is reasonably large and consistent with a clinically important

effect. When this model was examined using Poisson regression (APPENDIX G: Table 7-5) the adjusted rate ratio was found to be 2.30 (95% CI: 1.98, 2.68) with a Pearson goodness of fit statistic (25.93) indicating overdispersion in the model, and that the Poisson regression analysis is not the most appropriate approach for examining this association. Because of overdispersion the width of the 95% confidence interval for the parameter from the Poisson regression is underestimated.

The next model used ADL unmet need as the main independent variable (Table 4-18). The crude rate ratio for the association between hospital days and ADL unmet needs status was 7.06 (95% CI: 1.94, 25.69). The rate ratio in the final model after adjusting for sex, nutritional score, self-reported health status, size of social network, education, income, and CDS (Table 4-18) was 3.53 (95% CI: 0.88, 14.23). As discussed in section 4.5, after imputation income remained missing for 21 subjects. Since these subjects refused to report their income in both the baseline and 12 month questionnaires, it was not possible to impute the income values for these subjects using the algorithm described in Chapter 3 (Figure 3-2). Ten of these 21 subjects did not consent to allow access to their medicare data; therefore, the number of observations in this model was 772 rather than 783. While the rate ratio was substantially greater than 1, the lower 95% confidence limit was to the left of 1 suggesting that it is not possible to exclude the possibility that there is no association between ADL unmet need and hospital days.

The crude rate ratio for the association between IADL unmet need status and hospital days was found to be 3.03 (95% CI: 1.24, 7.38). When the model was adjusted for sex, nutritional score, and self-reported health status (Table 4-18), the adjusted rate ratio

was 1.52 (95% CI: 0.54, 4.28). Once again, as in the previous sections the 95% confidence interval included the null value, suggesting that there is no association.

Hospital admissions:

When hospitalization was defined as the number of hospital admissions during the six month follow-up period (Table 4-19) the crude rate ratio using negative binomial regression was 1.90 (95% CI: 1.20, 3.02), and after adjusting for sex and nutritional score the rate ratio was 1.58 (95% CI: 0.97, 2.87). The Pearson goodness of fit statistic for this model was equal to 1. The adjusted rate ratio is consistent with that obtained when hospitalization was defined as the number of hospital days. In this model the lower limit of the 95% confidence interval was only slightly to the left of 1. It should be noted that the results of this negative binomial regression model are consistent with the results obtained using Poisson regression (APPENDIX G: Table 7-6). The Pearson Chi-squared goodness of fit statistic of 1.37 for the Poisson regression in the adjusted model indicates that there may be some overdispersion. The rate ratio obtained from the Poisson regression was almost identical to that obtained using negative binomial regression and the 95% confidence interval was slightly narrower 1.60 (95% CI: 1.08, 2.36). These results present further evidence to suggest that unmet needs are associated with hospitalization.

As shown in Table 4-19, the crude rate ratio for the association between unmet ADL need and hospital admissions was 2.75 (95% CI: 1.48, 5.12), and after adjusting for sex and nutritional score the rate ratio was 2.17 (95% CI: 1.17, 4.04). The results of these models provide evidence of an association between the number of hospital admissions and ADL unmet needs.

When the association between IADL unmet need and hospitalization was examined using the number of hospital admissions during the six month follow-up period as the measure of hospital utilization (Table 4-19), the crude rate ratio was found to be 1.66 (95% CI: 1.02, 2.70) and after adjusting for sex and nutritional score the rate ratio was 1.37 (95% CI: 0.82, 2.30). Comparison of these negative binomial results with those obtained using Poisson regression (APPENDIX G: Table 7-6) also suggests that there is no association between unmet IADL need and hospital admissions. Even with the narrower 95% confidence intervals obtained from Poisson regression the confidence intervals included the null value (1.40 95% CI: 0.93, 2.11). The Poisson and negative binomial models appear consistent and suggest that there is no association between hospitalization and IADL unmet needs.

Table 4-18: Negative Binomial Regression: Unmet need and the number of hospital days during the 6 month follow-up period.

		Main Independent Variable								
		Unmet need (N=783)			ADL unmet need (N=772)			IADL unmet need (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Independent Variable**	**1.30 (0.43)**	**3.66**	**1.58, 8.45**	**1.95 (0.66)**	**7.06**	**1.94, 25.69**	**1.11 (0.45)**	**3.03**	**1.24, 7.38**
Adjusted*	**Main Independent Variable**	**0.45 (0.52)**	**1.57**	**0.57, 4.33**	**1.26 (0.71)**	**3.53**	**0.88, 14.23**	**0.42 (0.53)**	**1.52**	**0.54, 4.28**
	Sex	-1.73 (0.48)	0.18	0.07, 0.45	-1.61 (0.49)	0.20	0.08, 0.53	-1.75 (0.47)	0.17	0.07, 0.44
	Nutritional score	1.27 (0.40)	3.56	1.63, 7.75	1.15 (0.39)	3.16	1.46, 6.82	1.30 (0.39)	3.67	1.70, 7.92
	Self-reported health status	-0.40 (0.28)	0.67	0.39, 1.15	-0.39 (0.27)	0.68	0.39, 1.16	-0.41 (0.27)	0.66	0.39, 1.13
	Size of social network	-	-	-	0.11 (0.11)	1.12	0.90, 1.39	-	-	-
	Education	-		-	0.01 (0.18)	1.01	0.70, 1.45	-	-	-
	Income	-	-	-	-0.07 (0.07)	0.94	0.82, 1.07	-	-	-
	CDS	-	-	-	0.04 (0.04)	1.04	0.96, 1.12	-	-	-

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 1.04
for model with ADL unmet need as main exposure variable Pearson chi-square = 1.09
for model with IADL unmet need as main exposure variable Pearson chi-square = 1.01

Table 4-19: Negative Binomial Regression: Unmet need and the number of hospital admissions during the 6 month follow-up period.

		Main Independent Variable								
		Unmet need (N=783)			ADL unmet need (N=783)			IADL unmet need (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Independent Variable**	**0.64 (0.23)**	**1.90**	**1.20, 3.02**	**1.01 (0.32)**	**2.75**	**1.48, 5.12**	**0.50 (0.25)**	**1.66**	**1.02, 2.70**
Adjusted*	**Main Independent Variable**	**0.45 (0.25)**	**1.58**	**0.97, 2.57**	**0.77 (0.32)**	**2.17**	**1.17, 4.04**	**0.32 (0.26)**	**1.37**	**0.82, 2.30**
	Sex	-0.64 (0.23)	0.52	0.33, 0.83	-0.61 (0.23)	0.54	0.35, 0.85	-0.63 (0.23)	0.53	0.34, 0.84
	Nutritional score	0.63 (0.17)	1.88	1.34, 2.64	0.64 (0.17)	1.90	1.37, 2.65	0.67 (0.17)	1.96	1.39, 2.75

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 1.01
for model with ADL unmet need as main exposure variable Pearson chi-square = 0.98
for model with IADL unmet need as main exposure variable Pearson chi-square = 1.00

4.9.2.3 Physician utilization

In order to examine if physician utilization differs between seniors with unmet needs and those without a series of multivariable negative binomial regression models were created. In these models physician utilization was defined as 1) the number of physician visits which included the total number of visits to general practitioners and medical specialist, 2) number of visits to general practitioners, and 3) number of visits to medical specialists. As in the previous analyses, the main independent variables that were examined were: 1) unmet needs status, 2) ADL unmet needs status, and 3) IADL unmet need status. In all, nine different models were examined. The results of the regression analyses are presented in Table 4-20, Table 4-21 and Table 4-22. In each of these models the Pearson Chi-squared goodness of fit statistics are close to 1 indicating that there is no overdispersion and that the negative binomial model fits the data better than a Poisson model.

4.9.2.3.1 Association between unmet need and physician visits

The crude rate ratio for the association between unmet needs status and number of physician visits was 1.32 (95% CI: 1.15, 1.51). The crude rate ratios for the association between unmet need status and general practitioners; and unmet need status and specialist visits were 1.21 (95% CI: 1.04, 1.42) and 1.40 (95% CI: 1.16, 1.68), respectively (Table 4-20).

The rate ratio for the model assessing the association between unmet need status and physician visits after adjusting for sex, self-reported health status, and CDS was 1.10 (95% CI: 0.95, 1.27). While the rate ratio was greater than 1, the 95% confidence interval included the null value suggesting that there is no association between unmet need and physician visits. The rate ratio from the model assessing the association between unmet

need status and general practitioners visits after adjusting for sex and self-reported health status was 1.07 (95% CI: 0.90, 1.27). Once again, while the rate ratio was slightly greater than 1, the 95% confidence interval included the null value suggesting that there is no association (Table 4-20). Finally, for the model that used specialist visits as the outcome variable the rate ratio after adjusting for sex and self-reported health status was 1.16 (95% CI: 0.95, 1.42). As in the previous two models, no association was evident between unmet need and specialist visits (Table 4-20).

In order to examine whether the association between unmet need and physician visits differed between unmet ADL and IADL need, six separate models were created using overall physician visits, general practitioners visits and specialist visits as the outcome variable with the main independent variable as either ADL or IADL unmet need.

The crude rate ratios for the association between ADL unmet need status and physician visits, general practitioners visits and specialist visits were 1.74 (95% CI: 1.42, 2.13), 1.28 (95% CI: 1.00, 1.63) and 2.07 (95% CI: 1.57, 2.73), respectively (Table 4-21).

As seen in Table 4-21, no association was evident between ADL unmet need and the number of physician visits, after adjusting for sex, self-reported health status and marital status. However, a significant interaction between marital status and unmet need status was observed. For single subjects (marital status = 0), the adjusted rate ratio was 1.05 (95% CI: 0.82, 1.36). The 95% confidence interval included the null value suggesting that there is no association. In contrast when the subject was married or living common law with a partner (marital status=1) the adjusted rate ratio was 2.23.

A similar association was observed between unmet ADL need and specialist visits after adjusting for sex, self-reported health status and marital status (rate ratio= 1.08, 95%

CI: 0.76, 1.53). For married subjects or those living common law relationships the adjusted rate ratio for specialist visits was 2.86.

The adjusted rate ratio for the model assessing the association between unmet ADL needs and general practitioners visits after adjusting for sex and self-reported health status was 1.09 (95% CI: 0.84, 1.40), suggesting no association. In this model, no interaction was present.

The crude rate ratio for the association between IADL unmet needs status and number of physician visits was 1.13 (95% CI: 0.98, 1.31). When the outcome variable was separated into general practitioners visits and specialist visits, the respective crude rate ratios were 1.12 (95% CI: 0.95, 1.33) and 1.14 (95% CI: 0.93, 1.39). These results are presented in Table 4-22.

After adjusting for confounding by sex and self-reported health status, the rate ratio for the model assessing the association between IADL unmet needs and physician visits was 0.98 (95% CI: 0.85, 1.14). When physician visits were separated into visits to general practitioners and visits to medical specialists the rate ratios, after adjusting for sex and self-reported health status, were 0.98 (95% CI: 0.82, 1.18) and 0.99 (95% CI: 0.80, 1.22), respectively. In each of these models the 95% confidence interval included the null value indicating that there is a lack of evidence for an association between unmet IADL need and physician visits, general practitioners visits or specialist visits.

These results suggest that there was no association between unmet needs and physician utilization among single seniors; while among those with unmet ADL need that were married the rate ratio was 2.8 times higher than among those that did not have unmet

ADL needs. Interestingly, these results suggest that a spouse may be encouraging or assisting a partner with unmet needs in obtaining services from medical specialists.

Table 4-20: Negative Binomial Regression: Unmet need and the number of physician visits during the 6 month follow-up period.

		Outcome Variable								
		Physician visits (N=783)			GP visits (N=783)			Specialist visits (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Unmet need**	**0.28 (0.07)**	**1.32**	**1.15, 1.51**	**0.19 (0.08)**	**1.21**	**1.04, 1.42**	**0.33 (0.09)**	**1.40**	**1.16, 1.68**
Adjusted*	**Unmet need**	**0.10 (0.07)**	**1.10**	**0.95, 1.27**	**0.07 (0.09)**	**1.07**	**0.90, 1.27**	**0.15 (0.10)**	**1.16**	**0.95, 1.42**
	Sex	-0.25 (0.06)	0.78	0.69, 0.87	0.01 (0.08)	1.01	0.87, 1.18	-0.41 (0.09)	0.67	0.56, 0.79
	Self-reported health status	-0.17 (0.04)	0.85	0.79, 0.91	-0.16 (0.04)	0.86	0.79, 0.93	-0.24 (0.05)	0.79	0.71, 0.87
	CDS	0.03 (0.01)	1.04	1.02, 1.05	-	-	-	-	-	-

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: Physician visits model Pearson chi-square = 1.21
GP visits model Pearson chi-square = 0.98
Specialist visits model Pearson chi-square = 1.44

Table 4-21: Negative Binomial Regression: Unmet ADL need and the number of physician visits during the 6 month follow-up period.

		Outcome Variable								
		Physician visits (N=783)			GP visits (N=783)			Specialist visits (N=783)		
Models	Variable(s)	Parameter estimate (SE)	Rate Ratio	95% CI	Parameter estimate (SE)	Rate Ratio	95% CI	Parameter estimate (SE)	Rate Ratio	95% CI
Crude	**Unmet ADL need**	**0.55 (0.10)**	**1.74**	**1.42, 2.13**	**0.25 (0.12)**	**1.28**	**1.00, 1.63**	**0.73 (0.14)**	**2.07**	**1.57, 2.73**
Adjusted*	**Unmet ADL need**	**0.05 (0.13)**	**1.05**	**0.82, 1.36**	**0.08 (0.13)**	**1.09**	**0.84, 1.40**	**0.08 (0.18)**	**1.08**	**0.76, 1.53**
	Sex	-0.22 (0.07)	0.80	0.71, 0.92	0.02 (0.08)	1.02	0.88, 1.18	-0.36 (0.09)	0.70	0.58, 0.83
	Self-reported health status	-0.19 (0.04)	0.83	0.77, 0.89	-0.16 (0.04)	0.85	0.78, 0.93	-0.20 (0.05)	0.82	0.74, 0.90
	Marital status	-0.04 (0.07)	0.96	0.84, 1.10	-	-	-	-0.03 (0.10)	0.97	0.80, 1.18
	(ADL Unmet need) X (Marital status) interaction term	0.75 (0.21)	2.12	1.40, 3.22	-	-	-	0.97 (0.29)	2.64	1.49, 4.67

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: Physician visits model Pearson chi-square = 1.20
GP visits model Pearson chi-square = 1.32
Specialist visits model Pearson chi-square = 1.50

Table 4-22: Negative Binomial Regression: Unmet IADL need and the number of physician visits during the 6 month follow-up period.

		Outcome Variable								
		Physician visits (N=783)			GP visits (N=783)			Specialist visits (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Unmet IADL needs**	**0.12 (0.07)**	**1.13**	**0.98, 1.31**	**0.11 (0.09)**	**1.12**	**0.95, 1.33**	**0.13 (0.10)**	**1.14**	**0.93, 1.39**
Adjusted*	**Unmet IADL needs**	**-0.02 (0.08)**	**0.98**	**0.85, 1.14**	**-0.02 (0.09)**	**0.98**	**0.82, 1.18**	**-0.01 (0.11)**	**0.99**	**0.80, 1.22**
	Sex	-0.23 (0.06)	0.79	0.70, 0.90	0.02 (0.08)	1.02	0.88, 1.19	-0.40 (0.09)	0.67	0.57, 0.80
	Self-reported health status	-0.24 (0.04)	0.79	0.73, 0.85	-0.17 (0.04)	0.84	0.77, 0.92	-0.28 (0.05)	0.76	0.69, 0.84

* Goodness of fit: Physician visits model Pearson chi-square = 1.30
GP visits model Pearson chi-square = 0.98
Specialist visits model Pearson chi-square = 1.50

4.9.2.4 Prescription medication utilization

The association between unmet need and prescription medication use was also examined. Three different negative binomial regression models were used to examine this association: In these models the outcome variable was defined as the number of medications dispensed (as determined by AHF codes) to the subjects during the six month follow-up period and, as in the previous analyses, the main independent variable was either 1) unmet need status, 2) ADL unmet need status, or 3) IADL unmet need status. The results of the regression analyses are presented in Table 4-23. In each of these models the Pearson Chi-squared goodness of fit statistics are very close to 1 indicating that there is insufficient evidence to conclude that the negative binomial model does not fit the data.

4.9.2.4.1 Association between unmet need and prescription medication use

This first model examined the association between unmet need status and the number of dispensed medications. The crude rate ratio for this association was 1.48 (95% CI: 1.32, 1.66), and after adjusting for sex and CDS (Table 4-23) the rate ratio was 1.27 (95% CI: 1.17, 1.39). The rate of medication use is 27% higher among subjects with unmet need compared to those reporting no unmet need.

Similar rate ratios were obtained when the main independent variable in the model was ADL unmet need or IADL unmet need. When the main independent variable was ADL unmet need the crude rate ratio was 1.52 (95% CI: 1.27, 1.81). The rate ratio after adjusting sex and CDS (Table 4-23) was 1.29 (95% CI: 1.13, 1.47). When the association between unmet IADL need and number of dispensed medications was examined the crude rate ratio was 1.39 (95% CI: 1.23, 1.56) and after adjusting sex and CDS (Table 4-23) the rate ratio was 1.23 (95% CI: 1.12, 1.35).

The rate ratios in each of these models were consistent. After adjusting for confounding there does not appear to be a meaningful difference in the association between prescription drugs filled by subjects with ADL versus IADL unmet need. These results provide evidence to support the existence of an association between unmet need and the use of prescription drugs. The only covariates that were found to confound this association were sex and the Chronic Disease Score. As these models were adjusted for CDS, it is unlikely that this association can be attributed to confounding by comorbidity. However, it is possible that the CDS did not completely capture all comorbidities. For example, this association may be a result of a difference in acute medical conditions between subjects with and without unmet need that was not captured by the Chronic Disease Score. Alternatively, this association suggests that physicians may be over-prescribing medications to patients with unmet needs.

Table 4-23: Negative Binomial Regression: Unmet need and the number of filled prescriptions during the 6 month follow-up period.

		Main Independent Variable								
		Unmet need (N=783)			ADL unmet need (N=783)			IADL unmet need (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Independent Variable**	**0.39 (0.06)**	**1.48**	**1.32, 1.66**	**0.42 (0.09)**	**1.52**	**1.27, 1.81**	**0.33 (0.06)**	**1.39**	**1.23, 1.56**
Adjusted*	**Main Independent Variable**	**0.24 (0.04)**	**1.27**	**1.17, 1.39**	**0.25 (0.07)**	**1.29**	**1.13, 1.47**	**0.21 (0.05)**	**1.23**	**1.12, 1.35**
	Sex	0.04 (0.04)	1.04	0.96, 1.14	0.07 (0.04)	1.07	0.98, 1.17	0.04 (0.04)	1.04	0.96, 1.14
	CDS	0.08 (0.00)	1.09	1.08, 1.10	0.09 (0.00)	1.09	1.08, 1.10	0.09 (0.00)	1.09	1.08, 1.10

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 1.08
for model with ADL unmet need as main exposure variable Pearson chi-square = 1.07
for model with IADL unmet need as main exposure variable Pearson chi-square = 1.07

4.9.3 Self-reported health services utilization

Self-reported health services utilization by the study subjects during the six month follow-up period is presented in Table 4-24. Of the 818 subjects who completed the six month follow-up interview, 15.5% reported going to an emergency department. This was slightly less than that obtained from the RAMQ medical services database (17.9%). The subjects underestimated by almost 50% the number of hospitalizations as compared to hospitalization data obtained from the MEDECHO database (6.1% self-reported versus 11.7% from MEDECHO database [see Table 4-14]). This discrepancy may be a consequence of a failure to accurately recall the number of hospitalizations during the follow-up period. Alternatively, subjects that are initially admitted to the emergency department may be unaware of an administrative change in their status from an emergency department admission to a hospital admission, and so may unknowingly be reporting some hospital admissions as emergency department visits. The six month telephone follow-up interview also asked if the subject had visited a physician during the preceding six months: 88.4% reported that they had. This proportion was slightly less than that obtained from the RAMQ medical services database (92.6%). Self-reported health services during the six months prior to the baseline interview are also presented in Table 4-24. Unlike the 6-month follow-up questionnaire which obtained contact and volume utilization measures, the baseline questionnaire only asked the subjects for contact utilization for emergency department visits, hospitalizations and visits to medical specialists. Contact measures for emergency department visits and hospitalization between these two time period were similar (15.5% versus 18.4%; and 6.1% versus 6.1%, respectively). This is consistent with results obtained using administrative data (Table 4-14).

Table 4-24: Self-reported health services utilization.

(Frequencies given with sample percentages in parentheses)

Health service	During the 6 month follow-up period Number (%) *N=818*	During the 6 months preceding the baseline interview Number (%) *N=839*
Emergency Department:		
Experienced ED visit (at least one)	127 (15.5)	154 (18.4)
0	691 (84.5)	-
1	95 (11.6)	-
2	22 (2.7)	-
3	8 (1.0)	-
4	2 (0.2)	-
Hospitalization:		
Hospitalized (at least once)	50 (6.1)	51 (6.1)
Number of Hospitalizations		
0	768 (93.9)	-
1	38 (4.7)	-
2	10 (1.2)	-
3	1 (0.1)	-
4	1 (0.1)	-
Physician visits:		
Physician visit (at least once)	723 (88.4)*	-
Specialist visit (at least once)	-	506 (60.3)

"-" Question was not asked

* *Ranged: 0 – 72 physician visits*

4.9.4 Association between unmet need and self-reported health services utilization

The association between unmet need and health services utilization was also assessed using self-reported health services data obtained from the six month follow-up questionnaire. The subjects were asked if during the past six months they had gone to an emergency department for medical care; were hospitalized for at least 24 hours; and if they had seen a physician (excluding during periods of hospitalization, emergency department visits, or while in a convalescence centre). If the subject answered in the affirmative to any of these questions he or she was also asked to recall the number of times that particular health service was used.

These data allowed for the comparison of health services utilization from administrative records with that of self-reported health services use.

When building the models using self-reported health services utilization data the same covariates that were found to confound the associations between the unmet need variables and the administrative health services outcome variables also confounded the associations when self-reported health services outcome variables were used. However, the interaction terms did differ between models that used administrative versus those that used self-reported outcome variables. Despite obtaining similar parameter estimates for the interaction terms for the models using administrative versus self-reported health services outcome variable, the interaction terms were no longer statistically significant for models using self-reported health services utilization. This is likely due to less precision in the outcome variables obtained using self-reported data. In order for the negative binomial regression models between self-reported health services utilization and health services

utilization based on administrative data to be comparable the same interaction terms and covariates that were included in the previously presented administrative models were included in the regression models for self-reported health services utilization.

4.10 Comparison of health services utilization obtained from administrative health databases and self-reported health services utilization

The negative binomial regression analyses for self-reported health services utilization during the six month follow-up are presented in Table 4-25, Table 4-26 and Table 4-27.

The adjusted rate ratios for the association between unmet need and self-reported emergency department visits; unmet ADL needs and self-reported emergency department visits; and unmet IADL needs and self-reported emergency department visits were 2.94 (95% CI: 1.13, 7.64), 1.19 (95% CI: 0.64, 2.24) and 3.05 (95% CI: 1.19, 7.78), respectively (Table 4-25). The associations between both unmet needs and self-reported emergency department visits; and unmet IADL needs and self-reported emergency department visits were underestimated compared to the rate ratios obtained when emergency department visits were computed from administrative data (rate ratio of 2.94 versus 4.38 when the main independent variable was any unmet need; and 3.05 versus 4.57 for the model with IADL unmet need as the main independent variable). For the models that used unmet ADL needs as the main independent variable, the rate ratios obtained using self-reported emergency department visits and emergency department visits obtained from administrative records were similar (1.19 versus 1.06, respectively). Comparison of the coefficients of the interaction between unmet need and size of social network, and IADL unmet need and size of social network were similar to models using administrative records,

however, the interaction terms were no longer significant, likely a consequence of less precision in models using self-reported visits.

The adjusted rate ratios for the association between unmet need and self-reported hospital admissions; unmet ADL needs and self-reported hospital admissions; and unmet IADL needs and self-reported hospital admissions were 1.43 (95% CI: 0.71, 2.90), 1.75 (95% CI: 0.69, 4.43) and 1.31 (95% CI: 0.62, 2.74), respectively (Table 4-26). Despite the fact that subjects under-reported hospital admissions, the rate ratios were only slightly lower and slightly less precise than those obtained using administrative data (Table 4-19).

Finally, the adjusted rate ratios for the association between unmet need and self-reported physician visits; unmet ADL needs and self-reported physician visits; and unmet IADL needs and self-reported physician visits were 1.18 (95% CI: 1.01, 1.37), 1.13 (95% CI: 0.88, 1.45) and 1.02 (95% CI: 0.87, 1.19), respectively (Table 4-27). The estimates of the rate ratios were similar and confidence intervals were slightly wider than those obtained using administrative data (Table 4-20).

These results suggest that the source of health care data should be carefully considered when assessing the impact of unmet needs on health services utilization by the elderly. While self-reported health care data for hospitalization and physician utilization appear to give similar results as those obtained from administrative health databases, the association between emergency department visits and unmet needs is underestimated when self-reported emergency department utilization is used in analyses.

Table 4-25: Negative Binomial Regression: Unmet need and the number of self-reported emergency department visits during the 6 month follow-up period.

		Main Independent Variable								
		Unmet need (N=818)			ADL unmet need (N=818)			IADL unmet need (N=818)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Independent Variable**	**0.69 (0.20)**	**1.99**	**1.35, 2.92**	**0.40 (0.31)**	**1.48**	**0.81, 2.72**	**0.65 (0.20)**	**1.92**	**1.29, 2.87**
Adjusted*	**Main Independent Variable**	**1.08 (0.49)**	**2.94**	**1.13, 7.64**	**0.18 (0.32)**	**1.19**	**0.64, 2.24**	**1.11 (0.48)**	**3.05**	**1.19, 7.78**
	Sex	-0.51 (0.20)	0.60	0.41, 0.89	-0.48 (0.20)	0.62	0.42, 0.91	-0.52 (0.20)	0.59	0.40, 0.88
	Nutritional score	0.30 (0.15)	1.35	1.00, 1.82	0.40 (0.15)	1.49	1.12, 1.99	0.34 (0.15)	1.40	1.05, 1.87
	CDS	0.04 (0.02)	1.04	1.00, 1.08	-	-	-	-	-	-
	Self-reported health status	-0.04 (0.12)	0.96	0.76, 1.22	-0.13 (0.12)	0.88	0.70, 1.11	-0.06 (0.12)	0.94	0.75, 1.18
	Size of social network	0.09 (0.07)	1.09	0.95, 1.25	-	-	-	0.08 (0.07)	1.09	0.96, 1.23
	(Unmet need) X (size of social network) interaction term	-0.11 (0.12)	0.89	0.71, 1.12	-	-	-	-0.15 (0.12)	0.86	0.68, 1.08

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 1.07
for model with ADL unmet need as main exposure variable Pearson chi-square = 0.99
for model with IADL unmet need as main exposure variable Pearson chi-square = 1.03

Table 4-26: Negative Binomial Regression: Unmet need and the number of self-reported hospital admissions during the 6 month follow-up period.

		Main Exposure								
		Unmet need (N=818)			ADL unmet need (N=818)			IADL unmet need (N=818)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Independent Variable**	**0.57 (0.33)**	**1.76**	**0.92, 3.36**	**0.71 (0.48)**	**2.04**	**0.80, 5.18**	**0.48 (0.35)**	**1.62**	**0.82, 3.20**
Adjusted*	**Main Independent Variable**	**0.36 (0.36)**	**1.43**	**0.71, 2.90**	**0.56 (0.47)**	**1.75**	**0.69, 4.43**	**0.27 (0.38)**	**1.31**	**0.62, 2.74**
	Sex	-0.74 (0.34)	0.48	0.24, 0.93	-0.72 (0.34)	0.49	0.25, 0.94	-0.72 (0.34)	0.49	0.25, 0.95
	Nutritional score	0.74 (0.24)	2.09	1.30, 3.35	0.78 (0.23)	2.18	1.38, 3.43	0.76 (0.24)	2.14	1.34, 3.43

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 0.96
for model with ADL unmet need as main exposure variable Pearson chi-square = 0.96
for model with IADL unmet need as main exposure variable Pearson chi-square = 0.96

Table 4-27: Negative Binomial Regression: Unmet need and the number of self-reported physician visits during the 6 month follow-up period.

		Main Exposure								
		Unmet need (N=818)			ADL unmet need (N=818)			IADL unmet need (N=818)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Independent Variable**	**0.38 (0.07)**	**1.47**	**1.28, 1.68**	**0.62 (0.10)**	**1.86**	**1.52, 2.28**	**0.23 (0.08)**	**1.26**	**1.09, 1.46**
Adjusted*	**Main Independent Variable**	**0.16 (0.08)**	**1.18**	**1.01, 1.37**	**0.12 (0.13)**	**1.13**	**0.88, 1.45**	**0.02 (0.08)**	**1.02**	**0.87, 1.19**
	Sex	-0.09 (0.07)	0.92	0.80, 1.05	-0.05 (0.07)	0.95	0.82, 1.09	-0.08 (0.07)	0.92	0.81, 1.05
	Self-reported health status	-0.25 (0.04)	0.78	0.72, 0.84	-0.27 (0.04)	0.76	0.71, 0.82	-0.32 (0.04)	0.73	0.68, 0.78
	CDS	0.03 (0.01)	1.03	1.01, 1.04	-	-	-	-	-	-
	Marital status	-	-	-	-0.01 (0.08)	0.99	0.85, 1.14	-	-	-
	(ADL Unmet need) X (Marital status) interaction term	-	-	-	0.64 (0.21)	1.90	1.26, 2.88	-	-	-

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 1.46
for model with ADL unmet need as main exposure variable Pearson chi-square = 1.25
for model with IADL unmet need as main exposure variable Pearson chi-square = 1.53

5 DISCUSSION

5.1 Introduction

Using a prospective cohort design that combined a population-based survey with administrative health data, this study provides strong evidence for an association between unmet needs for community services and health services utilization by the elderly. After adjusting for confounding, unmet need was found to be associated with increased rates three types of formal health service use: emergency department visits, hospitalizations, and prescription drug use.

5.2 Study results

The prevalence of unmet need in this sample of community-dwelling seniors was just over 25%, with 8.5% experiencing unmet need for help in one or more activities of daily living and almost 22% experiencing unmet need for help in one or more instrumental activities of daily living. Comparison of these prevalence estimates with those from other studies is difficult due to differences in methodology, definitions of unmet need and study populations. Most other studies estimated the prevalence of unmet need in populations of disabled individuals. One, more recent study conducted in the U.S., used data from the 1994 National Health Interview Survey Supplement on Aging to estimate the prevalence of unmet ADL needs in a population of non-institutionalized seniors 70 years of age and older (Desai et al., 2001). In Desai's study, the overall prevalence of unmet need for Activities of Daily Living was 20.7% and ranged from 10.2% for eating to 20.1% for transferring. In the current study the prevalence estimates for ADL unmet need were substantially lower than those reported by Desai and colleagues. This difference is likely due to a number of factors.

The methodology that was used to assess unmet need in Desai's study was different from that used in the current study. Moreover, differences in provision and accessibility to home care services between the U.S. and Canada may explain the observe difference in the prevalence of unmet need. Finally, Desai's study used 1994 data which may not reflect the current state of the provision of, and accessibility to, home care services.

Assessing unmet need was based on Allen and Mor's (1997) approach, which involved both directly reported self-perceived need for assistance with ADL and IADL activities and indirectly reported unmet need based on the response to questions dealing with negative consequences related to the respective ADL and IADL needs. This approach leads to higher estimates of unmet need than would be obtained without the inclusion of negative consequences. The inclusion of need assessed through the occurrence of negative consequences provides a more realistic picture of unmet needs since seniors with difficulties in performing ADL or IADL activities may be embarrassed to admit having such difficulties, and therefore, unmet need may be underestimated without the inclusion of negative consequence related to ADL and IADL activities.

Using negative binomial regression analyses this study examined the association between unmet needs and four different types of health services utilization: emergency department visits, hospitalizations, physician visits and prescription medication use. These regression models examined the associations between three different main independent variables for each of the health service outcome variables. Specifically, *unmet ADL need status, unmet IADL need status*, and *unmet need status* which were defined based on the subject having any ADL or IADL unmet need. The models were adjusted for confounding.

Subjects were classified as either have unmet need or not having unmet need. The *no unmet needs* category combined two groups of subjects: those who did not have any need, and those whose needs were met and consequently were not experiencing unmet needs at the time. While it may be argued that these two groups may differ with respect to their health service utilization patterns, and thus should be considered separately, we found that the physician visits, medication use, hospitalization admissions and emergency department visits was fairly similar between these groups. Since the objective of this thesis was to address whether unmet needs for community services are associated with increased health services utilization; it was thought appropriate to use a comparison group that included both these groups for the regression analyses.

This is one of only a few studies that have examined the association between unmet needs and health services utilization. Previously, Allen and Mor (1997) examined the association between self-reported health care utilization in a sample of disabled subjects in Springfield, Massachusetts. They found that over the previous year subjects with unmet ADL need experienced significantly more emergency department visits (mean of 1.5 versus 0.7; $p < 0.001$), physician visits (mean of 16.7 versus 10.1; $p < 0.01$) and hospitalizations (mean of 1.1 versus 0.5; $p < 0.001$) compared to those with met ADL need. The study population in that study included subjects 18 years of age and older. The results of this thesis research are not directly comparable to those of Allen and Mor. Firstly, different study populations were examined. Allen and Mor used a random sample of disabled adults, whereas the current study used a representative sample of seniors. Second, Allen and Mor only used self-reported health services utilization data, while in this thesis research both self-reported and administrative sources of health services data were used to estimate

associations between unmet need and health services utilization. Finally, Allen and Mor obtained self-reported health services utilization during the year preceding the interview. In contrast, the current study obtained health services utilization data for the period six months before and six months following the baseline interview.

The results from the current study indicate that unmet need is associated with higher rates of emergency department visits. This association was found to exist for unmet IADL need but not unmet ADL need (Table 4-16). These models were adjusted for confounding by sex, nutritional score, self-reported health status and size of social network. The model examining the association between unmet need status and emergency department visits was also adjusted for confounding by comorbidity (i.e. Chronic Disease Score). Unmet IADL needs are related to inadequate assistance for activities involving meal preparation, housekeeping and transportation. These results suggest that individuals having unmet need for one or more of these activities have more emergency room visits compared to those who do not have need or whose needs are met. These results differ from those of Allen and Mor (1997) who found that respondents with unmet ADL need experienced significantly more emergency department visits that did respondents without unmet ADL need, and that there was no significant difference for unmet IADL need. However, as was previously noted, Allen and Mor's study used a different study population (i.e. adults aged 18 and older), and examined only bivariate associations, and so the results are not directly comparable. The results of the current study also suggest that an important effect modifier between unmet need and emergency department utilization is the *size of the subject's social network* (Table 4-17). Indeed, the rate of emergency department visits was more than four times greater among subjects with unmet needs who had no social network

than those without unmet needs. As the size of social network increased this association was attenuated (i.e. the rate ratio decreased). Individuals with unmet IADL need had higher rates of emergency department visits when the size of the social network was small. These results suggest that seniors with unmet IADL need who also have smaller social networks may be using emergency department resources as a substitute for human contact. Alternatively, subjects with unmet IADL need who lack adequate social support may be experiencing medical problems that can potentially be avoided or prevented if the home services targeted to meet the unmet needs are provided. For example, subjects with unmet need for transportation may have difficulty going to appointments with their primary care physicians and/or specialists, and consequently experience deterioration in their health possibly resulting in an emergency situation. The rate ratios that were obtained using self-reported emergency department visits for the models that used unmet need status and IADL unmet need status were lower than those obtained using administrative data. The interaction term between unmet need and size of social network, and IADL unmet need and size of social network in each respective model was no longer statistically significant when emergency department visits were self-reported. The parameter estimates for the interaction terms were similar between the models using administrative and self-reported emergency department visits. Nevertheless, despite being lower, the rate ratios obtained using self-reported emergency department visits as the outcome variable were consistent with those obtained using administrative data for models using unmet need and IADL unmet need status as the main independent variables.

Two different outcome measures were used to examine the association between unmet need and hospitalization: 1) the number of hospital days, and 2) the number of

hospital admissions. In the former, sex, nutritional score, self-reported health status were found to confound the association. In addition, size of social network, education, income and chronic disease score were also found to be confounding variables but only for association between unmet ADL need and hospital days. In the latter, only sex and nutritional score were found to confound the associations between unmet need status and hospital admissions; unmet ADL need status and hospital admissions; and unmet IADL need status and hospital admissions, respectively. The results of these models suggests that seniors with unmet need have higher rates of hospitalization compared to those without unmet need (adjusted $RR_{\text{hospital days}} = 1.57$; 95% CI: 0.57, 4.33; adjusted $RR_{\text{hospital admissions}} = 1.58$; 95% CI: 0.97, 2.57). When the association was examined in terms of type of unmet need (ADL or IADL unmet need), a major difference in the effect of unmet need on hospitalization was observed. Unmet IADL need was associated with higher rates of hospitalization (1.52 times higher in terms of hospital days; and 1.37 higher in terms of hospital admissions after adjusting for confounding). Whereas, in the case of unmet ADL need, when subjects reported not receiving sufficient assistance for basic tasks, such as dressing, bathing, eating, toileting, transferring and moving around inside the home, the hospitalization rate (hospital days) was 3.53 times higher than those without ADL need. The estimates for the associations between unmet ADL need and hospital days, and unmet IADL need and hospital days suggest positive associations. However, for each of these estimates the 95% confidence intervals include the null value, so it is not possible to conclude that there is an association when hospitalization is defined in terms of hospital days. However, when hospitalization was defined as the number of admissions during the six month follow-up period, there was a positive association between unmet ADL need and

hospitalization. After adjusting for sex and nutritional score the rate ratio for the association between unmet ADL need and hospital admissions was 2.17 (95% CI: 1.17, 4.04). This is not surprising, since individuals with ADL limitations are more likely to have greater disability and more severe health problems than those with only IADL limitations. Allen and Mor (1997) also found that respondents with unmet ADL need had significantly more hospitalizations than those without unmet ADL need. As previously noted, while not directly comparable, the results are consistent with the results of the current study. The rate ratios obtained using the numbers of self-reported hospital admissions were similar to those obtained using administrative data. However, the 95% confidence intervals were wider and included the null value even for the model examining unmet ADL needs.

Using the RAMQ physician billing database the association between unmet needs and physician visits was examined. Only a small association between unmet need and physician visits was observed after adjusting for sex, self-reported health status, and chronic disease score; however, as the 95% confidence intervals for these estimates include the null value it is not possible to infer an association. Similar results were obtained for GP and specialist visits after adjusting for sex and self-reported health status. The rates of physician, GP and specialist visits were found to be almost the same for subjects with unmet ADL needs and subjects with unmet IADL needs compared to those without unmet ADL and IADL needs, respectively. The rate ratios obtained using self-reported physician visits were similar to those obtained using administrative data. However, it is noteworthy that married subjects who reported experiencing ADL unmet need, had rates of visits to medical specialists 2.8 times higher than those who reported no ADL unmet need. A spouse may play a role by encouraging or assisting a partner with unmet needs in obtaining

required services from a medical specialist. Indeed this would also suggest that visits to primary care physicians and specialists may lead in better management of health conditions and, thus, may reduce emergency department utilization and hospitalizations. Addressing transportation needs may improve management of health conditions by enabling seniors visit their physicians.

Finally, the rates of prescribed medication use were 27% higher among subjects with unmet need after adjusting for sex and chronic disease score. Similar rate ratios were observed when this association was examined among the ADL and IADL unmet need subgroups. There are several possible explanations for this observation: Subjects with unmet need may be experiencing negative health consequences that require treatment with prescription medication. Alternatively, physicians may be over-prescribing or unnecessarily prescribing medication to patients with unmet need.

The findings of this study also raise some important issues concerning the use of self-reported health services utilization data and health policy. The source of health services data should be considered when assessing the impact of unmet need on health services utilization by the elderly. The magnitude of the associations between unmet need and hospitalization and unmet needs and physician utilization were similar when obtained from self-reported health care data and administrative health data. Interestingly, the association obtained using the number of hospital admissions was similar for both self-reported data and hospitalization data obtained from administrative databases, despite that fact that there was misclassification of the outcome variable, with subjects underreporting hospitalizations by approximately 50%. However, the association between unmet need and emergency department visits appears to be underestimated when self-reported emergency

department visits are used. This raises concern about drawing conclusions and implementing health policy based on the results of studies utilizing self-reported health services utilization data. The results of the comparison of the associations between unmet need and emergency department visits using administrative data with self-reported emergency department visits, suggest that the use of self-reported emergency department utilization will likely underestimate the magnitude of the association between this service and unmet needs while not substantially impacting on precision.

The health services utilization outcomes examined in this thesis have different implications for patients, physicians and the health care system. Higher rates of emergency department utilization and hospitalizations associated with unmet need suggest that unmet need has a negative impact on the health of patients, and results in greater use of expensive health care services, placing an added burden on the health care system. In contrast, visits to physicians by patients with unmet need may be a positive consequence related to the presence of unmet need, as it may suggest that patients and physicians are trying to better manage their health conditions.

Before addressing the policy implications of these results, I will review the strengths and potential limitations of this study.

5.3 Strengths

The strengths of this study include the use of a representative population-based sample of community-dwelling seniors 75 years of age and older; a longitudinal study design to examine the association between unmet needs and health services utilization; linkage of questionnaire and administrative data; the use of multivariable negative binomial

regression models to examine the association between unmet needs and health services utilization while adjusting for potential confounding, and assessing effect modification.

5.3.1 Representative sample

This study used random telephone number dialling to recruit a representative sample of community-dwelling seniors living in the Greater Montreal Region. A number of studies have examined the prevalence of unmet needs among the elderly; some used representative population samples while others used populations that were restricted to include only disabled individuals. Only two published studies have examined the association between unmet needs and health services utilization; however both of these studies were restricted to include only disabled individuals. Tennstedt and colleagues (1994) used a representative sample of disabled seniors, while Allen and Mor (1997) used a representative sample of disabled adults. This is the first study that used a representative population based sample of community-dwelling seniors to examine the association between unmet needs and health services utilization. The use of this sample ensures greater generalizability of the study results.

5.3.2 Longitudinal study design

Another strength of this study was the use of a longitudinal study design, which enabled us to ascertain the subjects unmet need status at the beginning of the study and then determine their health services utilization over the subsequent 6 months. As noted earlier, one of the limitations of Allen and Mor's 1997 study was the use of a cross-sectional study design which precludes causal inference. While Tennstedt et al. (1994) examined the relationship between unmet needs and nursing home admission using a longitudinal study design; they did not examine the associations between unmet needs and any formal health services utilization, such as emergency department utilization, hospitalizations or use of

physician services. This is the first study to use a longitudinal study design to examine the association between unmet need and health services utilization, providing strong evidence for the association between unmet need and emergency department utilization, hospitalizations and medication use.

5.3.3 Data linkage of questionnaire and administrative data

This is the first study that linked questionnaire and administrative data to examine the association between unmet need and health services utilization. The study questionnaire captured extensive information about patient characteristics. One of the limitations of self-reported health services data is the potential for recall bias. Subjects may not accurately remember their use of health services which may be an even greater problem among elderly subjects. RAMQ administrative databases provide detailed health services utilization data, however, these databases contain only limited information about patient characteristics. Linkage of questionnaire data with administrative data enabled more complete health services utilization and detailed patient characteristics to be used for the analyses in this study.

5.3.4 Confounding and effect modification

Data were collected on a large number of potential confounding variables and effect modifiers, including age, sex, income, education, marital status, number of cohabitants, comorbidities, nutritional score, and self-reported health status. By using multivariable negative binomial regression models, I was able to adjust for potential confounding, and also to assess effect modification in the regression models.

5.4 Limitations

In any epidemiologic study, the evaluation of the validity of the results must consider the potential roles of selection bias, information bias, and confounding. In this

section each of these biases and the possible impact on the results of this study are discussed.

5.4.1 Selection bias

Selection bias is a distortion in the estimate of effect as a result of the manner in which study subjects are selected; and can occur whenever identification of subjects depends on both exposure and outcome. In cohort studies, selection bias can be introduced as a result of non-participation by eligible study subjects, self-selection, or due to losses to follow-up. Each of these potential sources of selection bias will be addressed.

Selecting a cohort of elderly subjects using random telephone dialling provided a representative sample of non-institutionalized seniors living in the Greater Montreal Region. However, the disadvantage of telephone sampling is that seniors without telephones do not have the opportunity to be selected for participation in the study. People without telephones make up a very small proportion (1.76%) of the population in Quebec; and only 1.1% of Canadian seniors 75 years of age or older, living in urban areas (population > 100,000), do not have telephone service (Statistics Canada 2001a; Statistics Canada 2001b). Moreover, for this sampling approach to result in selection bias the lack of a telephone would have to be associated with both unmet need status and the utilization of health services. For example, if subjects with unmet needs were more likely not to have telephone service selection bias could occur. However, because of the low proportion of seniors without telephone service in Canada any bias due to non-participation by subjects who do not have telephones is likely not a major concern in this study.

In all studies only a proportion of the study population that is eligible to participate actually agree to join the study. It has been observed that those who agree to participate in studies differ in a number of important ways from those who do not. For example, non-

participants are more likely to be smokers and have more health problems (Hennekens and Buring 1987). In an elderly population, those with hearing impairment may be less likely to participate, particularly when telephone recruitment is utilized. Therefore, it is possible that non-participation could have had an impact on the validity of the results of this study. While in many studies data about non-participants are not usually available; in this study some information was available. One hundred and seven of the subjects that initially informed the Léger Marketing recruiter that they would be willing to participate in this study subsequently refused to participate or could not be contacted by our study interviewers. These individuals were similar to study participants with respect to cognitive status, as measured by the ALFI score, but differed somewhat in the sex distribution. Almost 80% of non-participants were female compared to 68.7% of the study subjects (Table 4-2). For selection bias to be introduced subjects would have to differ with respect to unmet need status and health services utilization. Health services utilization is typically higher among women during the adult reproductive years, followed by a cross over in later years, with higher use among elderly men than women (Verbrugge and Patrick 1995; Randhawa and Riley 1995; Schappert 1994; Gijsbers van Wijk et al., 1992; Verbrugge 1982). However, we are not able to determine if non-participation bias is present based on a difference in a single demographic characteristic, such as sex. One can hypothesize two possible situations: 1) non-participants did not differ with respect to unmet needs, or 2) non-participants may have been more likely to have unmet needs. In the case of the former, despite the fact that women were less likely to participate, the estimate of the association between unmet needs and health services utilization is unlikely to be affected by bias due to non-response since selection bias would only occur if non-participation was

association with both health services utilization and unmet need status. The latter case could potentially introduce bias. The association between unmet needs and health services utilization may have been underestimated if those individuals who did not participate were more likely to have had unmet needs and been higher health services users, which could have been possible if they were sicker. The best approach for dealing with selection bias from non-participation is to minimize non-participation. One of the concerns during the design phase of this study was that eligible subjects would be reticent to participate in the study that requested access to their medicare records. Therefore, in order to enhance participation we used a two part consent form. The first consent form dealt with participation in the study, and the second allowed access and data linkage with administrative health data. This was done to minimize potential non-participation by individuals who may have been reticent to permit access to their health services utilization data by providing them with the alternative to participate in the study without having to allow access to their Medicare data. Based on the available information is not possible to conclude whether or not selection bias due to non-participation is present.

Volunteer or self-selection bias is potentially a problem if participation by the study subjects varied by unmet need status and health services use. While it is possible that subjects with unmet needs may have been more likely to volunteer to participate in the Montreal Unmet Needs Study, these individuals would have to differentially been either more or less likely to use health services for self-selection bias to be introduced. Since the study subjects were not aware of the outcome variables of interest in this research, volunteer bias is less likely to be a problem.

Losses to follow-up could be a major source of selection bias in a prospective cohort study. Like non-participation bias, selection bias can occur if the probability of loss to follow-up varies by the specific combination of exposure and outcome. However, unlike non-participation, loss to follow-up may be directly related to the outcome of interest, since the loss to follow-up occurs during the study as opposed to before the study as in the case of non-participation. Health services outcome data in this study were obtained from administrative databases and, therefore, follow-up health services utilization data were available for all subjects that consented to allow access to their medicare records. Even if the subjects were lost to the telephone administered follow-up questionnaire portion of the study, since the subjects consented to the data linkage at the time of the baseline interview, the follow-up health services utilization data were available. Moreover, the majority of study subjects consented to allow data linkage with their administrative health records (93.3%), and the mortality rate in the study population was very low (1.4%).

In contrast, the analyses that used self-reported health services utilization could have been affected by bias as a result of loss to follow-up pertaining to the 6-month follow-up telephone interview. However, in this study losses to follow-up were very low. Only 21 of the 839 subjects that did not complete the 6-month questionnaire (12 of which did not have unmet need at baseline, and 9 who had unmet need). Therefore, any selection bias due to losses to follow-up in the analyses of the association between unmet need and self-reported health services utilization data should not be a major concern.

5.4.2 Misclassification bias

Misclassification bias, also known as information bias, results from errors in the ascertainment of information from study subjects once they have entered the study.

The RAMQ pharmaceutical database contains only information on prescribed medications that were dispensed by public pharmacies. Therefore, the actual number of prescriptions issued by physicians may be underestimated since prescriptions filled through hospital pharmacies, while patients are hospitalized, are not captured in the RAMQ pharmaceutical database. Subjects that were actually dispensed prescriptions may have been misclassified as not having received a medication, and consequently, the number of medications that was dispensed to individuals while hospitalized may have been underestimated. If this underestimation varied by unmet need status, it is possible that the association between unmet need status and medication use could be biased. This is potentially a more serious problem if there is differential misclassification, since non-differential misclassification would bias the estimates towards the null. Differential misclassification could occur if 1) subjects with unmet need were more likely to be hospitalized, and therefore, may have been more likely to receive prescriptions from hospital pharmacies. This differential misclassification could result in estimates being biased towards the null or below the null. 2) Alternatively, if subjects without unmet needs were more likely to be hospitalized than those with unmet needs the estimates could be biased away from the null. However, the latter scenario is less likely. In the current study unmet need status appears to be associated with increased hospitalization (Table 4-19). Therefore, the results presented in this thesis would suggest that any differential misclassification would more likely be related to the former scenario. This would suggest that the number of actual dispensed prescriptions among subjects with unmet need could have been underestimated. The resulting bias should be towards the null. In addition, not all prescription issued by physicians are filled by the patient. This could potentially be another

source of misclassification error. Despite the fact that studies have shown that most prescriptions are filled (Mateos and Camacho 1997; Gardner et al., 1996; Beardon et al., 1993), it is not possible to exclude the presence of misclassification bias. If subjects with unmet need were less likely to fill prescriptions this bias would be differential. For example, some subjects with unmet need may have greater difficulty filling prescriptions because of mobility limitations which make it difficult to go to a pharmacy. However, as previously discussed, since most prescriptions are filled and many pharmacies provide home delivery service, any bias should be small. Moreover, the strength of the association would likely have been underestimated since this bias should be towards the null, whether it is differential or non-differential.

In this study the association between unmet need and physician utilization may have been underestimated since the RAMQ medical services database does not include services provided by salaried physicians. Most physicians in Quebec bill on a fee-for-service basis (93.2%). Nevertheless, it is possible that some misclassification error was present since subjects who visited physicians working at CLSCs, and some visits to geriatricians would not have been included in this analysis. Although there is always the possibility of misclassification bias, comparison of the association between unmet needs and physician utilization ascertained from medical services billing database with that obtained from self-reports (in Chapter 4) suggest that the impact of any bias is likely to be small. The rate ratios for physician utilization obtained from self-reports were very similar to those obtained using administrative data. These results suggest that any bias due to misclassification error of physician visits obtained from administrative data is probably not a concern in this study.

The ascertainment of self-reported health services data from the 6-month telephone interview may be subject to misclassification error. Study subjects may have not accurately recalled health services utilization, such as the number of emergency department visits or hospitalizations. Non-differential or random misclassification would bias the estimates towards the null. It is also possible that misclassification could be differential. For example, subjects with unmet needs may have over reported health services utilization or those without unmet needs may have under reported health services utilization Differential misclassification could have resulted in either an exaggeration or underestimation of the effect.

5.4.3 Confounding bias

Confounding is defined as a distortion of the association between an exposure and outcome of interest as a result of an extraneous variable mixing its effect with the exposure of interest. For a variable to introduce confounding it must be associated with the exposure of interest, and must also be a risk factor for the outcome of interest. Moreover, the covariate must not be an intermediate step in the causal pathway.

The selection of potential confounding variables in this study was based on review of the literature. The baseline study questionnaire included questions that captured relevant covariates that could potentially confound the association between unmet need status and health services utilization, including: sex, age, income, education, marital status, number of cohabitants, size of social network, self-reported health status, income satisfaction, nutritional score, and comorbidity (as measured by the Chronic Disease Score). Potential confounders were retained in the regression models based on observed changes in effect size estimates and standard errors according to the methods of Rothman and Greenland (1998). Only those covariates that, when included in the models, resulted in a distortion of

the association between unmet need and health services utilization were retained in the respective final regression models. Nevertheless, it is possible that confounding may still exist due to other variables that were not included in the analyses.

It can be argued that health related covariates, such as the Chronic Disease Score and the nutritional score, should not have been included in the multivariable regression analyses because these covariates may be in the causal pathway. However, this argument assumes that there is only one causal pathway that relates these health covariates to unmet needs and health services utilization. If a covariate is in the causal pathway it should be excluded from the model if it constitutes the only mechanism whereby an exposure is related to an outcome (Szklo and Nieto 2000). This is not always the case; there may be multiple causal pathways that can lead to a particular outcome. For example, unmet needs may cause adverse consequences which lead to comorbidities that result in increased health services utilization; or comorbidities may result in developing need for assistance, some or all of which may be unmet leading to increased health services utilization. Moreover, the objective of this research project was to examine the independent effect of unmet needs on health services utilization, and so, by including health related covariates in the regression models it was possible to determine the effect of unmet needs on health services use independent of the causal pathway of the chronic disease or nutritional status.

Need for assistance with ADLs and IADLs is in the causal pathway of the association between unmet needs and health services utilization. Therefore, the regression models were not adjusted for the number of activities for which assistance is required. Furthermore, unmet need is defined in part by the number of activities for which there is a need for assistance, so unmet need is in fact part of the exposure. Consequently, it was not

necessary to control for severity of impairment as defined by the number of ADL and IADL activities for which there is need for assistance.

5.4.4 Generalizability

This study included only those seniors who were cognitively unimpaired or, at worst, mildly cognitively impaired. Therefore, concerns about generalizability must be considered. Elders that are cognitively impaired are more likely to have need for assistance. Therefore, the prevalence of unmet needs is likely to be greater in the general population than that found in this study. Moreover, cognitively impaired elders use more health care services than the non-cognitively impaired (Tranmer et al., 2003) and so, the associations between unmet need and health services utilization in the general population are likely to be even stronger than those obtained in this thesis.

5.4.5 Power

This study used a moderately sized cohort of elderly subjects. Assuming an unmet needs prevalence of 25% there was 81% power to detect a rate ratio of 1.27 at a significance level of 0.05. With an unmet need prevalence as low as 5% there was 80% power to detect a rate ratio of 1.57 at $\alpha = 0.05$ (Table 3-5). There was reasonable power to examine the effects of unmet need subgroups, specifically, ADL and IADL unmet need. While it would have been interesting to examine the associations between specific domains within ADL and IADL unmet need categories, the study was not designed to have sufficient power for more detailed subgroup analyses.

5.5 Relevance and policy implications

The 1990s was marked by budget cuts in health care in most Canadian provinces. Between 1995 and 1998 the health care budget in Quebec, for example, was cut by more than 10% (Régie régionale de la santé et des services sociaux de Montréal-Centre 2000).

Budgetary cutbacks have placed pressure on the health care system as governments have reduced the number of hospital beds, shut down operating rooms and emergency departments, and reduced available nursing staff and physicians in efforts to reduce costs to the health care system (Direction de la santé publique Montréal-Centre 2001). There are now shortages of both nurses and physicians in Quebec. Over the past few years the effects of these budget cuts have become readily apparent in the form of backlogs in emergency departments and clinics in Quebec. The federal and provincial government recently agreed on a plan that would have the federal government add $41 billion over ten years to what has often been referred to as our chronically under funded health care system. However, money alone is not the solution to these problems in the health care system. Proper and efficient allocation of scarce health care resources should also be considered. For policy makers and planners to make appropriate decisions empirical data and an understanding of factors that influence health care use are required. The relationship between population aging and health care utilization and cost has been the topic of research, government and public discourse over the past few decades. The aging of the population is expected to place even greater demands on health care resources as the baby boomer generation begin to reach retirement age. Moreover, with increasing age comes greater likelihood of suffering from medical conditions that result in disability. In order to continue to live in the community, and avoid or delay institutionalization, elders often require assistance to cope with physical limitations. As discussed in the introduction, few studies have examined the effect of lack of adequate assistance for ADL and IADL needs on formal health care use. There are limitations to previous studies that have examined the association between unmet needs and health service use. In the Springfield study on unmet needs, health service

outcome data were self-reported, the analysis did not adjust for potential confounding or examine effect modification, and the cross-sectional design precluded causal interpretation (Allen and Mor 1997). Tennstedt and colleagues (1994) used a longitudinal design, however, this study was limited by restricting health services utilization to nursing home admissions, and the low number of subjects admitted to nursing homes over the follow up period. These earlier studies were not conducted in Quebec, and therefore, may not be as relevant to the Quebec health care system. The results of this thesis research provide the strongest evidence to date for an association between unmet need status and health services utilization, specifically emergency department utilization, medication use and hospitalization. The longitudinal design provides strong evidence for a temporal sequence: unmet need leading to increased health services utilization. Furthermore, the strength of the associations, after adjusting for confounding support a causal association between unmet need status and emergency department utilization, medication use and hospitalization.

As the results of the current study suggests, unmet need for community services among the elderly may have implications for the use of more expensive acute services. This research provides empirical evidence based on a cohort of seniors, which has expanded current knowledge and provided new insight into the impact of unmet needs for community services on health services utilization among seniors 75 years of age and older within the Canadian context. In addition, this project has addressed the limitations of previous studies by using a longitudinal design, controlling for confounding, and supplementing self-reported health service use with administrative health data.

These results also raise issues for health policy. In Quebec, community services for seniors are often available from local CLSCs, or from public and private service providers.

The prevalence of unmet need for community services in this population was approximately 25% (95% CI: 22.5%, 28.3%), suggesting that there is insufficient assistance to a large proportion of the elderly population. This is likely an underestimate of the magnitude of the problem since our study population was restricted to cognitively unimpaired individuals. A further concern was the poor nutritional state of many of the subjects. About 60% of the subjects were found to be at moderate to high risk of malnutrition as determined by the Payette Nutritional Screening Score (Payette et al, 1995). In addition, 30% experienced falls with fractures resulting in 3.5% of these individuals. Repetitive falls have been found to be associated with increased hospitalization (Wolinsky et al., 1992). The poorer nutritional state and high number of falls suggest that interventions are needed to deal with these problems.

The results presented in this thesis indicate that unmet need status is associated with higher rates of emergency department utilization. This association was found for IADL need but not unmet ADL need. The results also suggest that hospital utilization is higher among seniors with unmet needs. Providing services to reduce or eliminate unmet needs may prevent health complications, and therefore, reduce costs to the health care system in the long-term. Changes in health policy that would result in greater access to community services to address ADL and IADL needs can potentially reduce the cost to the health care system and allow for better allocation of health care resources. Finally, the higher rate of the prescription of drugs use among seniors with unmet needs is also of concern, both from a health perspective and from a health economic perspective. The cost of prescription drugs is the most rapidly increasing cost to the Canadian health care system. Reducing unmet needs among the elderly can potentially decrease these drug related costs.

In developing programs to address unmet needs in the elderly population, researchers and policy makers need to take into account the different effects of ADL and IADL unmet needs on health services utilization.

5.6 Future Directions

The results of this research suggest other important issues that should be addressed in future research. First, it would be useful to explore the reasons for increased prescription medication use by the elderly with unmet needs. Specifically to determine whether the higher rate of medication dispensed to seniors with unmet need is the result of physicians over-prescribing medication to patients with unmet need, or due to negative consequences related to unmet needs. Second, while the results of this study strongly suggest that there is an association between unmet needs and hospitalization; further research could more definitively address this question. One of the limitations of this study was that the follow-up period for hospital utilization data may have been too short to observe a sufficiently large number of hospital admissions. In 2005, we will be receiving additional data from the MEDECHO database which will enable the follow-up period to be extended to 12 months. It should be possible to address this weakness with these additional data. Third, in order to implement strategies to decrease the level of unmet need in the elderly population, and consequently reduce health services utilization, it is important to better understand the factors that contribute to unmet needs. The Montreal Unmet Needs Study also included a section on the use of community services and barriers to services. Analyses of these data will provide valuable insight into these issues and assist health services planners in implementing changes to the current system of community services so as to decrease the level of unmet needs in the elderly population. Finally, while the results of this research

indicate that health services utilization is associated with unmet need in daily living activities, it is not known whether reducing unmet needs will result in reduced health care costs. Future research is needed to address the effect that responding to unmet needs may have on health care costs, and to address the cost effectiveness of an extended program designed to reduce unmet needs.

6 References

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7 APPENDICES

APPENDIX A: CONSENT

CONSENT FORM

Consent to participate in a study of the needs for community services of people aged 75 and older

I, the undersigned, _____ hereby consent to participate in this research project under the conditions described below.

PROJECT TITLE

Needs for community services of people aged 75 and older.

RESEARCHERS RESPONSIBLE FOR THE PROJECT

Louise Lévesque, Institut universitaire de gériatrie de Montréal, Université de Montréal

Christina Wolfson, Institut universitaire de gériatrie de Montréal and McGill University

Lysette Trahan, Ministère de la Santé et des Services sociaux, Direction de la recherche et de l'évaluation

Howard Bergman, McGill University

François Béland, Université de Montréal

Anne Perreault, Institut universitaire de gériatrie de Montréal

IMPORTANCE OF THE STUDY

The elderly population is growing rapidly and among this group, some are likely to need community services. The goal of this study is to find out from elderly people

themselves about their needs for community services and the difficulties that they experience when they want to use these services. This study will provide the information required to determine the needs for community services among the elderly. The data will be used by community service planners to improve services and access to services for elderly people who are not served or are inadequately served by community services.

NATURE OF MY PARTICIPATION

My participation in this study will consist of my cooperation in:

- two interviews at home, each lasting one and a half hours. These two interviews will take place one to two weeks apart, at my convenience.

- a 20 to 30 minutes telephone interview, six months after the first interview.

- a brief telephone contact 12 months after the first home interview at home.

During the two interviews at home, an interviewer will ask me questions about my needs for community services and about the difficulties that I may have experienced in obtaining these services. Other questions will deal with my state of health and difficulties that I may have in carrying out activities of daily living such as bathing, preparing meals or going to the grocery store.

During the telephone interview six months after the first interview, an interviewer will ask me if there have been any changes in my use of community services and in my state of health.

The purpose of the telephone contact one year after the first interview is to find out if I would like to continue to collaborate in this project in the event that this study will be continued.

PERSONAL ADVANTAGES THAT COULD RESULT FROM MY PARTICIPATION

My participation in this study can provide me with information about the community services that exist in my neighbourhood. In fact, I will get the address and phone number of the CLSC and the community-based services available in my neighbourhood.

DISADVANTAGES

I am aware of the disadvantages that this study may pose; including the fact that the interview might prove tiring and that it takes some time to complete the questionnaires.

RISK

Certain questions might elicit emotional reactions in some people. Should this happen, you will be able to discuss the matter with the interviewer or you may choose not to answer the question.

INFORMATION CONCERNING THE PROJECT

We will answer any questions that you have about this study. You will be able to reach the coordinator of the study, Ms. Josette Dupuis, by phoning 514-340-8222 extension 3442 (in the Montreal region).

WITHDRAWAL OF MY PARTICIPATION

If I choose to withdraw from the study, the written documents concerning me will be destroyed upon my request. My withdrawal from the study will in no way affect the services or care that I am currently receiving.

CONFIDENTIALITY

We assure you that the information collected during this study will remain confidential and that the rules of confidentiality will be respected. An identification number, *and not your name*, will appear on the questionnaires where your responses to the questions posed by the interviewer will be recorded. The data that identifies you (your name and address) will be kept in a locked cabinet and only the two main researchers responsible for the project and the coordinator will have access to this information. This information will be destroyed no

later than five years after the end of the study. You will not be personally identified in any manner in the results since your name will not appear on any document.

DATABANK

At the end of the study, all of the data will be preserved in an anonymous databank. This databank will not contain any information that could identify you, such as your name and address. This data bank will serve for the statistical analyses required by the study and will be used only by the researchers responsible for the study and those authorized by these researchers to do so. The people who will carry out the analyses will not know your identity. None of the results will be reported in any manner that would allow you to be personally identified.

I declare that I have read and/or understood the content of this form.

_____

Signature of the participant

_____

Signature of the interviewer (witness)

Signed in _____, on _____, 2001.

I, the undersigned, _____certify that a) I explained the content of this form to the participant; b) that I answered the questions that he/she asked me about it, and c) I clearly indicated to the participant that he/she is free to withdraw his/her participation in the study presented above at any time.

_____

Interviewer's signature

CONSENT FOR ACCESS TO INFORMATION ON THE USE OF MEDICAL SERVICES, PRESCRIPTION MEDICATIONS, AND HOSPITALIZATION

One aspect of our study consists of describing the number of visits to a doctor, hospitalizations and prescriptions filled by a pharmacist in the elderly population. This information is routinely gathered every time that you use your health insurance card. If you give your consent, we will be able to use your medicare number to gain access to information on your visits to a doctor, your hospitalizations and your prescriptions for medication. We plan to collect this information a four-year period of time, that is for two years preceding this interview and two years following it.

For visits to a doctor, we would like to gather data on the date and location of each visit, as well as the specialty and the type of institution where the physician who provided each service practices.

For hospitalizations, the data will focus on the hospitals where you were admitted, the dates of admission and discharge, the final diagnosis, the interventions that were performed, the costs and whether you were discharged home or to another care facility.

For prescription medications, we would like to gather data on the medications prescribed and on the specialty and type of institution where the doctor who signed the prescriptions practices.

CONFIDENTIALITY DURING THE STUDY

Rest assured that the information gathered using your medicare number will remain strictly confidential. Your medicare number will be filed in a locked office, and only the two main researchers responsible for the project and the coordinator will have access to it. This information will not be communicated to anyone, other than the Régie d'assurance maladie du Québec authorities. The data on the health insurance numbers will be destroyed no later than five years after the end of the study.

At any time, you can instruct us to discontinue using your medicare number by phoning the coordinator of the study, Ms Josette Dupuis, toll free at (514) 340-8222 extension 3442 (in the Montreal region). You will also be able to ask us to destroy the data already gathered.

DATABANK

At the end of the study, the information on medical and hospital services and prescription medication will be preserved in an anonymous databank. This databank will not contain any information that could identify you personally (i.e. your name, address, medicare number). This data bank will be use for the statistical analyses required by the study and only by the researchers responsible for the study and those authorized by these researchers to do so. The people who will carry out the analyses will not know your identity. None of the results will be reported in any manner that would allow you to be personally identified.

I authorize the research team to use my health insurance number to gain access to data concerning my hospitalizations, my doctors' visits, and my prescription medications for the period beginning 2 years prior to this interview and continuing until 2 years after it.

MEDICARE NUMBER: _____

NAME : _____
(Please print)

SIGNATURE _____ /2001
Date

Interviewer : _____

(witness) Name (Please print)

SIGNATURE _____ /2001
Date

APPENDIX B: ETHICAL APPROVAL

The request for ethics approval for this thesis project was submitted to the McGill Institutional Review Board (IRB). Since this thesis research took place within the framework of a larger study called "Unmet needs for community-based services for the elderly aged 75 years and over", the request for ethics approval was sought and approved for this larger project which included my thesis research (The certificate of ethical acceptability from the McGill IRB included on the next page). The McGill IRB received copies of both the protocol for the larger study as well as a separate protocol for my thesis project.

Ethics approval for the study "Unmet needs for community-based services for the elderly aged 75 years and over" was also received from the Ethics Committees of the Jewish General Hospital, and the l'Institut Universitaire de Gériatrie de Montréal.

APPENDIX C: QUEBEC ACCESS TO INFORMATION COMMISSION

Nous comprenons que cette communication sera en lien avec les 839 sujets ayant choisi de s'associer a cette recherche en signant un formulaire de consentement et en acceptant de vous transmettre leur numéro d'assurance sociale de manière a faciliter l'extraction des données les concernant.

Enfin, nous prenons acte que l'information sur 1'utilisation des services médicaux et de médicaments, antérieurement a l' entrevue initiale, sera extraite des bases de données de MED-ECHO et de la RAMQ pour une période allant jusqu'a 24 mois avant l' entrevue initiale. II sera ainsi possible d'ajuster les données en fonction des habitudes d'utilisation de services et de médicaments du sujet.

Cette autorisation est cependant assortie des conditions suivantes que vous devez respecter:

- vous devez assurer la confidentialité des renseignements nominatifs que vous recevrez;

- vous devez faire signer un engagement a la confidentialité aux membres de l'équipe de recherche qui n' ont pas signe le formulaire de demande d'autorisation et a toute autre personne qui s' ajoutera, par la suite, a cette équipe;

- vous devez utiliser les renseignements reçus uniquement pour cette recherche particulière;

- dans vos rapports, vous ne devez pas publier un renseignement permettant d'identifier un individu;

- vous ne devez pas communiquer un renseignement reçu à d'autres personnes que celles qui sont autorisées à le recevoir dans le cadre de cette recherche;

- vous devez détruire les renseignements concernant les personnes qui refuseront de participer a votre recherche, et ce, des leur refus;

- vous devez détruire tous les renseignements reçus, préalablement énumères pour lesquels l'autorisation de la Commission vous est accordée, au plus tard le 1er novembre 2007.

APPENDIX D: BASELINE QUESTIONNAIRE

Subject identification : N• ☐☐☐☐

English 2

Study on unmet needs for community-based services for the elderly aged 75 years and over: Questionnaire

	Questionnaire completed	1- ☐ Yes	2- ☐ No
	Signed consents forms :		
a)	Study participation	1- ☐ Yes	2- ☐ No
b)	RAMQ number utilization	1- ☐ Yes	2- ☐ No
	Interviewer identification	N• ☐	

♠ *Please, do not write in this box*

ADM 1	Questionnaire verified	1- ☐ Yes	
ADM 2	Identification of verifier	N• ☐	
ADM 3	Questionnaire coded	1- ☐ Yes	
ADM 4	Identification of the coder	N• ☐	
ADM 5	Date of interview - Time I Year Month Day ☐☐☐☐☐	ADM 6	Total length of interview Hr Mn ☐☐☐☐
ADM 7	Postal code ☐☐☐☐☐☐	ADM 8	ALFI score ☐
ADM 9	CLSC's name ☐		
ADM 10	Interview: 1 (Baseline)		

Residence: ☐

Version 2001 May 1st

PREAMBLE

The interview started at : Hour :	Minutes :

First, I would like to thank you for having agreed to meet with me and to participate in our study.

The purpose of this study is to find out the views of elderly people concerning their needs for community services, that is, services that help them to remain at home. Your participation is important since this study will provide information for planning services that meet the needs of the elderly. I will explain briefly how our meeting will proceed.

The questions that I will be asking you do not have any right or wrong answers. It is your opinion that is important here.

I also want to assure you that your answers will remain completely confidential. I will not write your name on the questionnaire, only a number.

The questionnaire includes questions that I will read to you. I will give you cards indicating the choice of answers. You can answer by giving me the number corresponding to the answer or you may read the answer to me.

♠ *SHOW THE PERSON A CARD TO EXPLAIN IT TO HIM/HER*

If there are any questions that you do not understand or that you find difficult to answer, please tell me. We can take a break whenever you wish.

♠ *CONSENT*

Present and read the consent to participate in the study with the subject. If the subject agrees to sign right away, have him/her sign it. If the subject hesitates or prefers to wait, tell him/her that it can be signed at the end of the interview.
Have the subject sign two copies of the consent form (one for you and one for the subject).

♠ *If the person asks questions that are not related to understanding the questionnaire during the interview, gently ask the subject if he/she can wait until the interview is over and tell him/her that at that time you will be glad to take all the time that is needed to answer his/her questions.*

Before we begin, do you have any questions concerning the interview?
Are you comfortable?
We will begin now.

Section 1- DEMOGRAPHIC INFORMATION

Identification of the subject: N° ☐☐☐☐

We will start the interview with a few general questions.

1. Sex 1- ☐ Male 2- ☐ Female

2. How old are you?_____

3. What is your date of birth?_____ ☐☐ ☐☐ ☐☐
Month Day Year

4. Are you?
1- ☐ Married or living common law
2- ☐ Widow/Widower
3- ☐ Separated or divorced
4- ☐ Single (never married)
5- ☐ Other, *(Please specify)* :_____

5. What is your mother tongue? _____

6. What country were you born in? _____ ☐☐☐
♠ If the subject was born in Canada ⇨ GO to Q. 8

7. How long have you lived in Canada?_____ ☐☐☐

8. How many people live with you? _____ ☐☐☐
♠ If the subject lives alone ⇨ GO to Section 2.

9. How are you related to these people?
♠ Write the FIRST NAME and the RELATIONSHIP

PERSON 1_____ a) ☐
PERSON 2_____ b) ☐
PERSON 3_____ c) ☐
PERSON 4_____ d) ☐
PERSON 5_____ e) ☐

END OF SECTION 1

Section 2 – USE OF MEDICAL SERVICES AND HEALTH SERVICES

The following questions are concerned with any hospitalizations or medical visits that you may have had recently.

CARDS 1 and 2

1.	In the PAST SIX MONTHS, did you go to the Emergency Room of a hospital to obtain medical care?	1- ☐ Yes 2- ☐ No
2.	In the PAST SIX MONTHS, were you hospitalized for at least 24 hours without counting a stay at the emergency room?	1- ☐ Yes 2- ☐ No → GO to Q. 6
3.	The last time that you were hospitalized in the PAST SIX MONTHS, where did you go following your discharge from the hospital?	1- ☐ Home 2- ☐ A relative's/friend's home 3- ☐ A rehabilitation/convalescent centre → GO to Q. 6
4.	When you went home (a relative's/friend's home) from hospital, did you receive home care services?	1- ☐ Yes, which ones : → GO to Q. 6 2- ☐ No
5.	Would you have needed home care services?	1- ☐ Yes, which ones: 2- ☐ No
6.	Is there a specific place where you usually go for general medical care (routine examinations, treatment of a cold or the flu that does not require specialized care)?	1- ☐ Yes → GO to Q. 8 2- ☐ No

7.	What is the main reason that you do not have a place that you usually go to for general medical care?	Record verbatim:
8.	In the PAST SIX MONTHS, have you seen a specialist, excluding doctor's visits when you were in the hospital or in a convalescent centre?	1- ☐ Yes 2- ☐ No
9.	How would you rate your current state of health? **CARD 1**	1- ☐ Excellent 2- ☐ Very good 3- ☐ Good 4- ☐ Fair 5- ☐ Poor 6- ☐ Very poor
10.	Compared to ONE YEAR AGO, how would you rate your current state of health? **CARD 2**	1- ☐ Much better 2- ☐ Better 3- ☐ The same 4- ☐ A little worse 5- ☐ Much worse
11.	**During the past two weeks,** how many days did you stay in your bed at home almost all day or the whole day because of a health problem?	_____Number of days

END OF SECTION 2

Section 3 – HELP WITH PERSONAL CARE

Allen, S. M. et al. (1997), Medical Care, 35, 1132-1148

Now I have some questions about how you are CURRENTLY managing your personal care. I am going to ask you if you carry out your personal care by yourself or with someone's help. Help from another person includes the presence of someone who is available when needed.

♠ If the subject needs someone's help for only part of a personal care activity, consider it as if he does the activity «with help». Ex.: the respondent cannot take the clothes out of a dresser, but can put them on.

CARD 3

1)	**Dressing yourself; take the clothes out of a dresser or closet ; put them on or take them off.** ♠ *Includes the upper and lower body.*	
1.1	Currently, do you dress yourself or does someone help you with this?	1- ☐ Self 2- ☐ *With help* ➪ GO to Q.1.3
1.2	Would you say that dressing yourself is …	1- ☐ Not at all difficult ➪ GO to activity # 2 2- ☐ Somewhat difficult 3- ☐ Very difficult
1.3	Have there been times in the PAST MONTH when you needed (*additional*) help with dressing? CARD 3	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
1.4	During the PAST MONTH, were there times when you were not able to change clothes as often as you would have liked because no one was available to help you?	1- ☐ Yes 2- ☐ No

2)	**Bathing, showering, or taking a sponge bath.**	
2.1	Usually, when you wash your whole body, do you take a bath, a shower or a sponge bath?	1- ☐ Bath ➪ GO to Q. 2.3 2- ☐ Shower ➪ GO to Q. 2.3 3- ☐ Sponge bath
2.2	Do you take a sponge bath because your health makes it difficult to take a bath or a shower or because you have always done so?	1- ☐ State of health 2- ☐ Always did it (personal preference)

2.3	Do you take a bath, shower (Do you take a sponge bath) by yourself or does someone help you with this?	1- ☐ Self 2- ☐ *With help* → GO to Q. 2.5
2.4	Would you say that taking a bath, a shower (that taking a sponge bath) by yourself is ...	1- ☐ Not at all difficult → GO to activity # 3 2- ☐ Somewhat difficult 3- ☐ Very difficult
2.5	Have there been times in the PAST MONTH when you needed (*additional*) help to take a bath, shower or (take a sponge bath)? **CARD 3**	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
2.6	Have there been times in the PAST MONTH when you were unable to take a bath, shower (when you were unable to take a sponge bath) as often as you would have liked because no one was available to help you?	1- ☐ Yes 2- ☐ No
2.7	Have there been times in the PAST MONTH when you have not taken a bath, shower (when you have not taken a sponge bath) because you were afraid of falling without someone there to help you?	1- ☐ Yes 2- ☐ No
2.8	♠ *If the subject takes a sponge bath because of his/her state of health* In the PAST MONTH, would you have liked to take a bath or a shower rather than having a sponge bath, but you could not because there was no one to help you?	1- ☐ Yes 2- ☐ No

3)	**Eating, cutting up food and getting food from the plate or bowl to the mouth.** ♠ *Hygiene and table manners should not be taken into account in the rating.*	
3.1	Do you feed yourself or does someone help you with this?	1- ☐ Self 2- ☐ *With help* → GO to Q. 3.3
3.2	Would you say that feeding yourself without any help is ...	1- ☐ Not at all difficult → GO to activity # 4 2- ☐ Somewhat difficult 3- ☐ Very difficult

3.3	Have there been times in the PAST MONTH when you needed (*additional*) help with eating? **CARD 3**	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
3.4	Have there been times in the PAST MONTH when you were unable to eat when you were hungry because no one was available to help you?	1- ☐ Yes 2- ☐ No
3.5	Have there been times in the PAST MONTH when you were very thirsty because no one was available to give you something to drink?	1- ☐ Yes 2- ☐ No
3.6	During the PAST MONTH, have you lost weight even though you were not on a diet?	1- ☐ Yes 2- ☐ No 3- ☐ Do not know

4)	**Transfers.**	
4.1	Do you get in and out of bed and chairs by yourself or does someone help you with this?	1- ☐ Self 2- ☐ *With help* ⇒ GO to Q. 4.3
4.2	Would you say that these activities are...	1- ☐ Not at all difficult ⇒ GO to activity # 5 2- ☐ Somewhat difficult 3- ☐ Very difficult
4.3	Have there been times in the PAST MONTH when you needed (*additional*) help to get in or out of bed or a chair? **CARD 3**	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
4.4	During the PAST MONTH, have your ever fallen while getting in or out of bed or a chair because no one was there to help you?	1- ☐ Yes 2- ☐ No

5)	**Toileting, getting on and off the toilet, wiping him/herself or putting clothes back on.**	
5.1	Do you use the toilet, bedpan or commode by yourself or does someone help you with this?	1- ☐ Self 2- ☐ *With help* ➡ GO to Q. 5.3
5.2	Would you say that using the toilet (commode or bedpan) by yourself is …	1- ☐ Not at all difficult ➡ GO to activity # 6 2- ☐ Somewhat difficult 3- ☐ Very difficult
5.3	Have there been times in the PAST MONTH when you needed (*additional*) help to use the toilet (commode or bedpan) by yourself? **CARD 3**	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
5.4	Have there been times in the PAST MONTH when you have experienced physical discomfort because there was no one to help you use the toilet (commode or bedpan) as often as you needed to?	1- ☐ Yes 2- ☐ No
5.5	During the PAST MONTH did you wet or soil yourself because you did not have help using the toilet (commode or bedpan)?	1- ☐ Yes 2- ☐ No

6)	**Moving around inside your house on the same floor, for example, getting to the bathroom or kitchen.**	
6.1	Do you move around inside the house by yourself or does someone help you with this?	1- ☐ Self 2- ☐ *With help* ➡ GO to Q. 6.3
6.2	Would you say that moving around inside your house by yourself is …	1- ☐ Not at all difficult ➡ GO to Q. 7 2- ☐ Somewhat difficult 3- ☐ Very difficult
6.3	Have there been times in the PAST MONTH when you needed (*additional*) help moving around inside? **CARD 3**	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
6.4	Would you say that you move around inside the house…	1- ☐ Whenever you want to 2- ☐ Not as often as you would like 3- ☐ Have to wait till help is available

7) SUMMARY

7.1	I would like to summarize what you have told me about personal care. Would you say that… *(Personal care : for dressing, bathing, eating, transfers, toileting and mobility.)*	1- ☐ You have some difficulty performing some personal care activities or you receive assistance from someone. or 2- ☐ You are able to perform all of these tasks on your own and it is not at all difficult for you ➡ GO to section 4

8) GENERAL QUESTIONS

8.1	Have there been times in the PAST MONTH when you have been dissatisfied with the way these personal care needs have been met? Would you say this happened… CARD 3	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
8.2	Would you say that you need more help with your personal care activities now than you did ONE YEAR AGO?	1- ☐ Yes, slightly more 2- ☐ Yes, much more 3- ☐ No

9) HELP FROM FAMILY/CIRCLE OF FRIENDS

9.1	Have there been times in the PAST MONTH when you needed help with the personal care activities that we have just spoken about, but you did not want to bother your relatives or friends? CARD 3	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
9.2	Among the members of your family (or your circle of friends) who helps you the most with your personal care activities? ♦ *Write in this person's first name and his/her relationship to you.*	1- ☐ First name and relationship :_____ _____ 2- ☐ Does not receive help from family/circle of friends ➡ GO to section 4
9.3	Does this person live with you?	1- ☐ Lives with the subject 2- ☐ Does not live with the subject
9.4	How often does this person help you?	1- ☐ Every day 2- ☐ At least once a week 3- ☐ At least once a month 4- ☐ Less than once a month

END OF SECTION 3

Section 4 – NEEDS FOR HELP WITH HOUSEHOLD ACTIVITIES

Allen, SM, et al.(1997). Medical Care, 35, 1132-1148.

I will continue now, considering routine household activities. Please answer if you are CURRENTLY doing these activities by yourself or with someone's help. Help from another person includes the presence of someone who is available when needed.

♠ ***If the subject needs someone's help for just part of an activity, consider that he does the activity «with help». Ex., the respondent can prepare cold meals by himself but he cannot prepare hot meals.***

♠ ***Formal network : CLSC, care provider from a community-based organization, a volunteer, a private agency or a self-employed worker paid by the respondent (ex., a cleaning lady).***

CARD 3

1)	**Preparation of meals, i.e. preparing hot or cold meals, including getting dishes in and out of the oven and handling hot dishes.**

1.1	Do you prepare meals by yourself or does someone help you with this? ♠ *If the activity is done together = capable of doing it by himself / herself.*	1- ☐ Self ⇒ GO to Q. 1.3 2- ☐ *With help* ⇒ GO to Q. 1.4 3- ☐ Goes to **dining room** in his/her residence
1.2	Do you go to the **dining room** in your residence because your state of health makes meal preparation difficult for you or are there other reasons?	1- ☐ Health-related reason 2- ☐ Other, *(Please specify)* : ⇒ GO to Q. 1.8
1.3	Would you say that preparing meals by yourself is ...	1- ☐ Not at all difficult ⇒ GO to activity # 2 2- ☐ Somewhat difficult ⇒ GO to Q. 1.8 3- ☐ Very difficult ⇒ Go to Q. 1.8
1.4	Who provides **the most** help with preparing meals?	Record verbatim:

1.5	Does (the *person named above*) help you because your state of health makes it difficult for you, because (*the person named above*) has always done it, or for some other reason?	1- ☐ Other has always done it 1.5 B) If this person who is a member of your family or your circle of friends becomes incapable of preparing meals, would you be able to manage on your own ? ☐ Yes, his/her state of health enables him/her to do it ➪ GO to Q. 1.8 2- ☐ Health-related reason 3- ☐ Other reason, (*Please specify*) : ♠ If the person mentioned comes from the **public or private network** ➪ GO to Q. 1.8
1.6	What is this person's relationship to you and does he/she live with you?	Relationship :_____ 1- ☐ Lives with the subject 2- ☐ Does not live with the subject
1.7	How often does this person help you?	1- ☐ Every day 2- ☐ At least once a week 3- ☐ At least once a month 4- ☐ Less than once a month
1.8	Have there been times in the PAST MONTH when you needed (*additional*) help in preparing meals? CARD 3	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
1.9	Have there been times in the PAST MONTH when you were unable to follow a <u>special diet</u> because you needed help with food preparation?	1- ☐ Yes 2- ☐ No
1.10	Have there been times in the PAST MONTH when you were unable to eat when you were hungry because no one was available to prepare the meal?	1- ☐ Yes 2- ☐ No

♠ Continued p. 3

2)	**Transportation, that is using a means of public transit (metro, bus, train) or driving a car.**	
2.1	Do you drive a car yourself for your transportation needs?	1- ☐ Yes ➞ GO to activity # 3 2- ☐ No
2.2	**Most of the time,** do you take the bus/metro by yourself or does someone help you?	1- ☐ Self 2- ☐ *With help* ➞ GO to Q. 2.4 3- ☐ Does not take the bus/metro ➞ GO to Q. 2.4
2.3	Would you say that taking a bus/metro by yourself is…	1- ☐ Not at all difficult ➞ GO to activity # 3 2- ☐ Somewhat difficult ➞ GO to Q. 2.8 3- ☐ Very difficult ➞ GO to Q. 2.8
2.4	Who provides <u>the most</u> help with transportation?	Record verbatim:
2.5	Does (the *person named above*) help you because your state of health makes it difficult for you, because (*the person named above*) has always done it, or for some other reason?	1- ☐ Other has always done it 2.5 B) If this person who is a member of your family or your circle of friends becomes incapable of doing it, would you be able to manage on your own ? ☐ Yes, his/her state of health enables him/her to do it ➞ GO to Q. 2.8 2- ☐ Health-related reason 3- ☐ Other reason, (*Please specify*) : ♠ If the person mentioned comes from the **public or private network** ➞ GO to Q. 2.8
2.6	What is this person's relationship to you and does he/she live with you?	Relationship :_____ 1- ☐ Lives with the subject 2- ☐ Does not live with the subject
2.7	How often does this person help you?	1- ☐ Every day 2- ☐ At least once a week 3- ☐ At least once a month 4- ☐ Less than once a month

2.8	Have there been times in the PAST MONTH when you needed (*additional*) help with transportation? **CARD 3**	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
2.9	Because you had no transportation, have there been times in the PAST MONTH when you … a) Missed a health-care professional or doctor's appointment? b) Were unable to go places you wanted to for fun or recreation? Because you had no transportation, have there been times in the PAST MONTH when you … c) Ran out of food? d) Ran out of medication or other medical supplies? e) Could not attend religious services?	 1- ☐ Yes 2- ☐ No 1- ☐ Yes 2- ☐ No 1- ☐ Yes 2- ☐ No 1- ☐ Yes 2- ☐ No 1- ☐ Yes 2- ☐ No

3)	**Housekeeping, meaning doing the laundry and dishes, vacuuming, cleaning the bathroom, changing the sheets, dusting.**

3.1	Do you do the housekeeping tasks by yourself or does someone help you with this? ♠ *If the activity is done together = capable of doing it by himself / herself.*	1- ☐ Self 2- ☐ *With help* ➪ GO to Q. 3.3
3.2	Would you say that doing the housekeeping by yourself is...	1- ☐ Not at all difficult ➪ GO to Q. 4 2- ☐ Somewhat difficult ➪ GO to Q. 3.7 3- ☐ Very difficult ➪ GO to Q. 3.7
3.3	Who provides <u>the most</u> help with the housekeeping?	Record verbatim:

3.4	Does (the *person named above*) help you because your state of health makes it difficult for you, because (*the person named above*) has always done it, or for some other reason?	1- ☐ Other has always done it 3.4 B) If this person who is a member of your family or your circle of friends becomes incapable of doing it, could you do your own housekeeping ? ☐ Yes, his/her state of health enables him/her to do it → GO to Q. 3.7 2- ☐ Health-related reason 3- ☐ Other reason, (*Please specify*) : ♠ If the person mentioned comes from the **public or private network** → GO to Q. 3.7
3.5	What is this person's relationship to you and does he/she live with you?	Relationship :_____ 1- ☐ Lives with the subject 2- ☐ Does not live with the subject
3.6	How often does this person help you?	1- ☐ Every day 2- ☐ At least once a week 3- ☐ At least once a month 4- ☐ Less than once a month
3.7	Have there been times in the PAST MONTH when you needed (*additional*) help with the housekeeping? **CARD 3**	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
3.8	Have there been times in the PAST MONTH when you have been bothered because the housework was not getting done because you did not have any help?	1- ☐ Yes 2- ☐ No
3.9	Have there been times in the PAST MONTH when you had to wear dirty clothes because no one was there to do the laundry?	1- ☐ Yes 2- ☐ No

♠ Continued p.6

4) SUMMARY

4.1	I would like to summarize what you have told me about the household activities that we have just talked about. Would you say that... *(Household activities : preparation of meal, transportation and housekeeping.)*	1- ☐ You have some difficulty performing some activities or you receive assistance from someone. or 2- ☐ You perform all of these activities on your own and it is not at all difficult for you ⇒ GO to Section 5

5) GENERAL QUESTIONS

5.1	Have there been times in the PAST MONTH when you have been dissatisfied with the way your needs for these routine household activites have been met? Would you say this happened... CARD 3	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
5.2	Have there been times in the PAST MONTH when you needed help with these activities, but you did not want to bother your relatives or friends? CARD 3	1- ☐ Never 2- ☐ Seldom 3- ☐ Occasionally 4- ☐ Often
5.3	Would you say that you need more help with these activites now than you did ONE YEAR AGO?	1- ☐ Yes, slightly more 2- ☐ Yes, much more 3- ☐ No

END OF SECTION 4

⇒ GO TO SECTION 5
(COMMUNITY SERVICES)

Section 6A PSYCHOLOGICAL WELL-BEING

Échelle de détresse psychologique de Santé Québec, Ihlfeld et al.

The following questions deal with various aspects of your well-being. I would like to know how you felt during the past week. I just remind you that your responses are confidential. You have four choices of answers.

During the past week:

CARD 5

1.	Did you feel lonely ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
2.	Did you have your mind go blank ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
3.	Did you feel tense or under pressure ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
4.	Did you lose your temper ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
5.	Did you feel bored or have little interest in things ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
6.	Did you feel fearful or afraid ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
7.	Did you have trouble remembering things ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often

During the past week…

8.	Did you cry easily or feel like crying ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
9.	Did you feel nervous or shaky inside ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
10.	Did you feel critical of others ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
11.	Did you feel downhearted or blue?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
12.	Did you feel easily annoyed or irritated ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
13.	Did you get angry over things that are not too important ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often
14.	Did you feel hopeless about the future ?	1-☐ Never 2-☐ Occasionally 3-☐ Fairly often 4-☐ Very often

END OF SECTION 6 A

Section 6 B – CONTROL

Aneshensel, C.S.et al. (1995). Profiles in Caregiving. Academic Press : New York.

I will ask you other questions but the choice of answers is different (♦ *show card 6*). CURRENTLY...

1.	Do you think that you have control over what happens to you? **CARD 6**	1- ☐ Not at all 2- ☐ To a small extent 3- ☐ To some extent 4- ☐ To a large extent
2.	Do you think that what will happen to you in the future depends on you?	1- ☐ Not at all 2- ☐ To a small extent 3- ☐ To some extent 4- ☐ To a large extent
3.	Do you think that you can solve some of the problems that you have?	1- ☐ Not at all 2- ☐ To a small extent 3- ☐ To some extent 4- ☐ To a large extent
4.	Do you feel helpless when faced with problems in your life?	1- ☐ Not at all 2- ☐ To a small extent 3- ☐ To some extent 4- ☐ To a large extent
5.	Do you think that you can change many of the important things in your life?	1- ☐ Not at all 2- ☐ To a small extent 3- ☐ To some extent 4- ☐ To a large extent
6.	Do you think that you can do just about everything that you decide to do?	1- ☐ Not at all 2- ☐ To a small extent 3- ☐ To some extent 4- ☐ To a large extent
7.	Do you feel that you are being pushed around in life?	1- ☐ Not at all 2- ☐ To a small extent 3- ☐ To some extent 4- ☐ To a large extent
8.	Would you like to have more control over what happens to you?	1- ☐ Not at all 2- ☐ To a small extent 3- ☐ To some extent 4- ☐ To a large extent

END OF SECTION 6 B

Section 7 A, SOCIAL NETWORK
Krause N.(1995)., J. of Gerontology, 50B, P59-P73

CARDS 7, 8 and 9

1.1 **Now, I will ask you a few questions about the members of your family (who are living).**

1- How many children do you have?_____
2- How many brothers and sisters do you have?_____
3- How many grandchildren do you have?_____

Could you indicate the frequency of your contact with your family and friends? You have four choices of answers.

2.1	**During the past month**, how often were you visited by or did you visit members of your family? **CARTE 7**	1- ☐ Every day 2- ☐ At least once a week 3- ☐ At least once a month 4- ☐ Less than once a month 5- ☐ Has no family ⇨ GO to Q. 2.3
2.2	**During the past month**, how often were you in touch with members of your family by telephone or by mail? **CARTE 7**	1- ☐ Every day 2- ☐ At least once a week 3- ☐ At least once a month 4- ☐ Less than once a month
2.3	**During the past month**, how often were you visited by or did you visit your friends? **CARTE 7**	1- ☐ Every day 2- ☐ At least once a week 3- ☐ At least once a month 4- ☐ Less than once a month 5- ☐ Has no friends ⇨ GO to Q. 2.5
2.4	**During the past month**, how often were you in touch with your friends by telephone or by mail? **CARTE 7**	1- ☐ Every day 2- ☐ At least once a week 3- ☐ At least once a month 4- ☐ Less than once a month
2.5	**Given what happened during the PAST MONTH**, to what extent are you satisfied with the number of times that you were in contact with your family, your friends or your neighbours, not counting those living with you? **CARD 8**	1- ☐ Very satisfied 2- ☐ Satisfied 3- ☐ Dissatisfied 4- ☐ Very dissatisfied

3.1 How many people can you count on (ex.: children, relatives, friends, neighbours) in case of need? Number of people mentioned.

_____ | | | |

END OF SECTION 7 A

SECTION 7 B, SOCIAL SUPPORT
Krause N.(1995)., J. of Gerontology, 50B, P59-P73

Now I will ask you some questions about the support that you receive from your family, your friends or your neighbours. I will ask you to tell me how frequently each question applies to your situation. You have four choices of responses (☗ *show card 9*) and you should consider what has occurred in the PAST SIX MONTHS.

CARD 9

1.	**Over the PAST SIX MONTHS (*indicate the month when the period began*), how many times have your family, your friends or your neighbours...**	Never	Once in a while	Fairly often	Very often
1.1	Comforted you by showing you physical affection?	1- ☐	2- ☐	3- ☐	4- ☐
1.2	Expressed interest and concern in your well-being?	1- ☐	2- ☐	3- ☐	4- ☐
1.3	Been right there with you (physically) in a stressful situation? 777- Not applicable ☐	1- ☐	2- ☐	3- ☐	4- ☐
1.4	Listened to you talk about your private feelings?	1- ☐	2- ☐	3- ☐	4- ☐

2.	**As you think back over the PAST SIX MONTHS, would you say that you received enough of this type of support or that you would have liked to have obtained it more often or less often?** 1- ☐ Less often 2- ☐ Satisfied 3- ☐ More often

3.	**The contact that we have with others is not always pleasant. As you think back over the PAST SIX MONTHS (*indicate the month when the period began*), how many times have you felt that your family, your friends or your neighbours...**	Never	Once in a while	Fairly often	Very often
3.1	Were being too demanding of you?	1- ☐	2- ☐	3- ☐	4- ☐
3.2	Were criticizing you or what you were doing?	1- ☐	2- ☐	3- ☐	4- ☐
3.3	Were trying to meddle in your affairs?	1- ☐	2- ☐	3- ☐	4- ☐
3.4	Were taking advantage of you?	1- ☐	2- ☐	3- ☐	4- ☐

END OF SECTION 7 B

Section 8 – PSYCHOSOCIAL NEEDS

People sometimes need to talk about difficult events with someone from outside of their family. For example: a professional care provider, a volunteer or a friend. The following questions are designed to determine your needs to be in contact with a person outside of your family to discuss certain topics.

1.1	Does a volunteer come to your home to visit you or to give you a change of pace?	1 ☐ *Yes* 2- ☐ No
1.2	Would you like to have this type of visit *(more visits)?*	1- ☐ Yes 2- ☐ No
2.1	Do you currently participate in a self-help or support group? (Meetings where people who are experiencing similar types of difficult situations discuss their concerns, for example, groups for people with declining autonomy, who are in mourning or who are caring for a relative.)	1- ☐ Yes 2- ☐ No → GO to Q. 2.3
2.2	Who offers this group ? ♠ *Check the answer(s).*	1- ☐ Someone from the CLSC 2- ☐ Someone from a community organization, a volunteer 3- ☐ Private resource 4- ☐ Other, *(Please specify)* : 5- ☐ Do not know → GO to Q. 3.1
2.3	Would you like to participate in such a group ?	1- ☐ Yes 2- ☐ No
3.1	Do you discuss worries that you have about the future, such as the possibility of moving or drawing up a will with a person outside of your family?	1- ☐ *Yes* 2- ☐ No → GO to Q. 3.3
3.2	Who is this person? Is it... ♠ *Check the answer(s).*	1- ☐ Someone from the CLSC 2- ☐ Someone from a community organization, a volunteer 3- ☐ Private resource 4- ☐ Friends/Neighbours 5- ☐ Other, *(Please specify)* : 6- ☐ Do not know

3.3	Do you feel the need to have help *(more help)* from a person outside of your family to deal with these issues ?	1- ☐ Yes 2- ☐ No
4.1	Do you speak **with a person <u>outside of your family</u>** about trying events such as losing someone close to you, having to face health problems?	1- ☐ *Yes* 2- ☐ No ⇒ GO to Q. 4.3
4.2	Who is this person? Is it... ♠ *Check the answer(s).*	1- ☐ Someone from the CLSC 2- ☐ Someone from a community organization, a volunteer 3- ☐ Private resource 4- ☐ Friends/Neighbours 5- ☐ Other, (*Please specify*) : 6- ☐ Do not know
4.3	Do you feel the need to have help *(more help)* from a person outside of your family to deal with these issues?	1- ☐ Yes 2- ☐ No
5.1	Do you speak **with a person <u>outside of your family</u>** about the manner in which certain people treat you, for instance, people who do not respect your rights, your desires, or who force you to do things that you do not want to?	1- ☐ *Yes* 2- ☐ No ⇒ GO to Q. 5.3
5.2	Who is this person? Is it... ♠ *Check the answer(s).*	1- ☐ Someone from the CLSC 2- ☐ Someone from a community organization, a volunteer 3- ☐ Private resource 4- ☐ Friends/Neighbours 5- ☐ Other, (*Please specify*) : 6- ☐ Do not know
5.3	Do you feel the need to have help *(more help)* from a person outside of your family to deal with these issues?	1- ☐ Yes 2- ☐ No

6.1	If someone from your circle of friends or family needed to be protected from neglect or abuse by certain people, would you know who to contact (ex.: community based-organizations, protection service or associations)?	1- ☐ Yes, *(Please specify)* : 2- ☐ No
7.1	Some people who are depressed, sad or stressed discuss these emotions with a **professional care provider** such as a nurse, a social worker, a psychologist. Do you have a professional care provider with whom you discuss these emotions?	1- ☐ *Yes* 2- ☐ No ⇒ GO to Q. 7.5
7.2	Who is this person? Is it… ♠ *Check the answer(s).*	1- ☐ Someone from the CLSC 2- ☐ Private resource 3- ☐ Other, *(Please specify)* : 4- ☐ Do not know
7.3	Do you or your family have to pay for this service?	1- ☐ Yes 2- ☐ No ⇒ GO to Q. 7.5 3- ☐ Do not know ⇒ GO to Q. 7.5
7.4	Are these fees within your means (affordable)?	1- ☐ Yes 2- ☐ No
7.5	Would you like to receive help *(more help)* from a professional care provider?	1- ☐ Yes 2- ☐ No
8.1	Are there other trying events that you would like to discuss with a person outside of your family?	1- ☐ Yes, *(Please specify)* : 2- ☐ No

9.1	**During the past month,** have you participated in organized leisure activities in a group?	1- ☐ Never 2- ☐ From time to time 3- ☐ Often
9.2	Would you have liked to participate in them...	1- ☐ Much more often 2- ☐ A little more often 3- ☐ It's fine the way it is
10.1	**During the past month,** did you attend or participate in religious activities?	1- ☐ Never 2- ☐ From time to time 3- ☐ Often
10.2	Would you have liked to participate in them...	1- ☐ Much more often 2- ☐ A little more often 3- ☐ It's fine the way it is
11.1	**During the past month, did you have a chance to do one of your favourite hobbies** (ex.: sewing, gardening, reading, do-it-yourself projects)?	1- ☐ Never 2- ☐ From time to time 3- ☐ Often
11.2	Would you have liked to do your favourite pastime...	1- ☐ Much more often 2- ☐ A little more often 3- ☐ It's fine the way it is

END OF SECTION 8

Section 9 A - ATTITUDES TOWARDS COMMUNITY SERVICES

Noelker et al. (1998). Research on Aging, 20, 317-338.

♠ This section **9 A** *is intended for* respondents who **receive at least one community service** ⇒ otherwise GO to section 9 B.

♠ *For some questions, the expression « circle of friends » in parentheses is used when the respondent has no family. Indicate if the subject is responding for the family* ☐ or *for the circle of friends* ☐

I would like to know your views about asking for community services in the public network. As mentioned earlier, this refers to services from the CLSCs, community-based organizations, or other government-sponsored organizations. They are free or they are offered at a lower cost than what private agencies or companies charge for them.

Please tell me whether you agree or disagree with the following statements:

CARD 10

1. I prefer to call upon community services rather than on my family (my circle of friends).	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
2. I believe that the government should pay for services to help families take care of their elderly parents or relatives that live at home.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
3. Elderly people should be proud to be able to manage with little help from community services.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
4. Families should take care of their elderly parents or relatives themselves and should not ask for any outside help.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
5. I prefer to wait until the situation becomes impossible for my family (my circle of friends) before I seek help from community services.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree

6. I am afraid when people from community services come into my home to care for me.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
7. People think less of me since I have been using community services.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
8. I think that I should take care of myself without help from community services.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
9. I have little confidence in the quality of community services.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
10. People from community services can care for me as well as my family (my circle of friends) can.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree

END OF SECTION 9 A

Section 9 B – ATTITUDES TOWARDS COMMUNITY SERVICES

Noelker et al. (1998), Research on Aging, 20, 317-338.

♠ This section 9 B is intended for respondents who do not receive any community services.

♠ *For some questions, the expression « circle of friends » in parentheses is used when the respondent has no family. Indicate if the subject is responding for the family* ☐ or *for the circle of friends* ☐

I would like to know your views about asking for community services in the public network, in the case where you would need them. As mentioned earlier, this refers to services from the CLSCs, community-based organizations, or other government-sponsored organizations. They are free or they are offered at a lower cost than what private agencies or companies charge for them.

Please tell me whether you agree or disagree with the following statements:

CARD 10

1. I would prefer to call upon community services rather than my family (my circle of friends).	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
2. I believe that the government should pay to establish services to help families take care of their elderly parents or relatives that live at home.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
3. Elderly people should be proud to be able to manage with little help from the community.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
4. Families should care for their elderly parents or relatives themselves and should not ask for any outside help.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
5. I would prefer to wait for the situation to become impossible for my family (my circle of friends) before seeking help from community services.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree

6. I would be afraid if people from community services would come into my home to care for me.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
7. People would think less of me if I used community services.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
8. I think that I should take care of myself without help from community services.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
9. I would have little confidence in the quality of community services.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree
10. People from community services could care for me as well as my family (my circle of friends) could.	1- ☐ Strongly agree 2- ☐ Agree 3- ☐ Disagree 4- ☐ Strongly disagree

END OF SECTION 9 B

BEGINNING OF TELEPHONE INTERVIEW

Section 10 - NUTRITIONAL SCREENING

Payette et al. Am. J. Public Health 1995;85 :677-683

The following questions deal with your diet.

Current weight:	_____	1- ☐ kg 2- ☐ pds
Adult height:	_____	1- ☐ m 2- ☐ ft,in

♠ *Do not measure the person's height and weight. Just ask him/her for his current weight and his height when he reached adulthood.*

1.	The person is very thin. (♠ *In the interviewer's opinion*)	1- ☐ Yes 2- ☐ No	2 0	
2.	Have you lost weight in the past year? (♠ *Any weight loss is noted YES*)	1- ☐ Yes 2- ☐ No	1 0	
3.	Do you suffer from arthritis to the point where it interferes with your daily activities?	1- ☐ Yes 2- ☐ No	1 0	
4.	Is your vision, even with glasses,...?	1- ☐ Good 2- ☐ Medium 3- ☐ Poor	0 1 2	
5.	Do you have a good appetite?	1- ☐ Good 2- ☐ Medium 3- ☐ Poor	0 1 2	
6.	Have you recently suffered a stressful life event (e.g., personal illness/death of a loved one)?	1- ☐ Yes 2- ☐ No	1 0	
7.	Cancelled question.	1- Yes 2- No	0 4	

USUALLY, for your breakfast, do you eat...

♠ *Here we are looking for a routine breakfast and not that on any particular day.*

8.	Fruit or fruit juice	1- ☐ Yes 2- ☐ No	0 1	
9.	Eggs or cheese or peanut butter	1- ☐ Yes 2- ☐ No	0 1	
10.	Bread or cereal	1- ☐ Yes 2- ☐ No	0 1	
11.	Milk (1 cup or more than 1/4 cup in coffee)	1- ☐ Yes 2- ☐ No	0 1	

END OF SECTION 10

Section 11 – HEALTH NEEDS

Now I will ask you some questions about various health needs that you may have AT THE PRESENT TIME.

1.1	At the present time, is someone helping you to supervise your meals because you are following a special diet?	1- ☐ *Yes* 2- ☐ No ➞ GO to Q. 1.5 3- ☐ Do not have a special diet ➞ GO to Q. 2.1
1.2	Who is helping you with this? ♠ *Do not list the answers. Check the answer(s).*	1- ☐ The CLSC (or a private agency sent by the CLSC) 2- ☐ Someone from a community organization, a volunteer 3- ☐ Private resource 4- ☐ Friend/Neighbour ➞ Go to Q. 1.5 5- ☐ Family ➞ Go to Q. 1.5 6- ☐ Other, (*Please specify*) : 7- ☐ Do not know
1.3	Do you or your family have to pay for this service?	1- ☐ Yes 2- ☐ No ➞ GO to Q. 1.5 3- ☐ Do not know ➞ GO to Q. 1.5 4- ☐ Included in the residence's fees ➞ GO to Q. 1.5
1.4	Are these fees within your means (affordable)?	1- ☐ Yes 2- ☐ No
1.5	Do you need help (*more help*) to manage your diet?	1- ☐ Yes 2- ☐ No
2.1	Do you receive help to care for your feet or your toenails?	1- ☐ *Yes* 2- ☐ No ➞ GO to Q. 2.5
2.2	Who provides this help for you? ♠ *Do not list the answers. Check the answer(s).*	1- ☐ The CLSC (or a private agency sent by the CLSC) 2- ☐ Someone from a community organization, a volunteer 3- ☐ Private resource 4- ☐ Friend/Neighbour ➞ Go to Q. 2.5 5- ☐ Family ➞ Go to Q. 2.5 6- ☐ Other, (*Please specify*) : 7- ☐ Do not know

2.3	Do you or your family have to pay for this service?	1- ☐ Yes 2- ☐ No ➞ GO to Q. 2.5 3- ☐ Do not know ➞ GO to Q. 2.5 4- ☐ Included in the residence's fees ➞ GO to Q. 2.5
2.4	Are these fees within your means (affordable)?	1- ☐ Yes 2- ☐ No
2.5	Do you need help (*more help*) to care for your feet or your toenails?	1- ☐ Yes 2- ☐ No
3.1	Does someone <u>regularly check</u> on you because of your state of health (for example, does someone phone you regularly)?	1- ☐ *Yes* 2- ☐ No ➞ GO to Q. 3.5
3.2	Who provides this help for you? ♣ *Do not list the answers. Check the answer(s).*	1- ☐ The CLSC (or a private agency sent by the CLSC) 2- ☐ Someone from a community organization, a volunteer 3- ☐ Private resource 4- ☐ Friend/Neighbour ➞ Go to Q. 3.5 5- ☐ Family ➞ Go to Q. 3.5 6- ☐ Other, (*Please specify*) : 7- ☐ Do not know
3.3	Do you or your family have to pay for this service?	1- ☐ Yes 2- ☐ No ➞ GO to Q. 3.5 3- ☐ Do not know ➞ GO to Q. 3.5 4- ☐ Included in the residence's fees ➞ GO to Q. 3.5
3.4	Are these fees within your means (affordable)?	1- ☐ Yes 2- ☐ No
3.5	Do you need this type of help (*more of this type of help*)?	1- ☐ Yes 2- ☐ No

4.1	Do you currently receive help to improve your balance or the mobility in your legs, your arms or your hands (ex.: physio. or occupational therapy)?	1- ☐ *Yes* 2- ☐ No ⇒ GO to Q. 4.5
4.2	Who provides this help for you? ♦ *Do not list the answers. Check the answer(s).*	1- ☐ The CLSC (or a private agency sent by the CLSC) 2- ☐ Someone from a community organization, a volunteer 3- ☐ Private resource 4- ☐ Friend/Neighbour ⇒ Go to Q. 4.5 5- ☐ Family ⇒ Go to Q. 4.5 6- ☐ Other, (*Please specify*) : 7- ☐ Do not know
4.3	Do you or your family have to pay for this service?	1- ☐ Yes 2- ☐ No ⇒ GO to Q. 4.5 3- ☐ Do not know ⇒ GO to Q. 4.5 4- ☐ Included in the residence's fees ⇒ GO to Q. 4.5
4.4	Are these fees within your means (affordable)?	1- ☐ Yes 2- ☐ No
4.5	Do you need help *(more help)* to improve your balance or your mobility?	1- ☐ Yes 2- ☐ No
5.1	Do you receive information on health and social services that could help you at this time?	1- ☐ *Yes* 2- ☐ No ⇒ GO to Q. 5.3
5.2	Who gives this information to you? ♦ *Do not list the answers. Check the answer(s).*	1- ☐ The CLSC (or a private agency sent by the CLSC) 2- ☐ Someone from a community organization, a volunteer 3- ☐ Private resource 4- ☐ Friend/Neighbour 5- ☐ Family 6- ☐ Other, (*Please specify*) : 7- ☐ Do not know
5.3	Do you need to receive such information (*or more information*) ?	1- ☐ Yes 2- ☐ No

6.1	Is there one person who is responsible for organizing all of the health and social services that you need and to whom you can refer your questions?	1- ☐ Yes 2- ☐ No ➪ GO to Q. 6.3
6.2	Who provides this help for you? ♦ *Do not list the answers. Check the answer(s).*	1- ☐ The CLSC (or a private agency sent by the CLSC) 2- ☐ Someone from a community organization, a volunteer 3- ☐ Private resource 4- ☐ Friend/Neighbour 5- ☐ Family 6- ☐ Other, (*Please specify*) : 7- ☐ Do not know ➪ GO to Q. 7.1
6.3	Do you need such a person?	1- ☐ Yes 2- ☐ No
7.1	Do you have other needs related to your state of health for which you are not receiving help?	1- ☐ Yes, (*Please specify*) : 2- ☐ No
8.1	Do you need special equipment to take a bath, a shower or to go to the toilet (ex. : grab bar, anti-skid bathmat, raised toilet seat) that you do not have at this time?	1- ☐ Yes, (*Please specify*) : 2- ☐ No
8.2	For greater safety in your home, do you need an emergency or call system in case of need (ex. : intercom, emergency call bell, emergency necklace or bracelet)?	1- ☐ Yes, (*Please specify*) : 2- ☐ No

9.1	**During the past six months,** have you had any of the devices or equipment that you use to see, hear or move about examined or repaired (ex., eye glasses, dentures)?	1- ☐ Yes 2- ☐ No ➡ GO to Q. 9.5
9.2	Which device or equipment did you need to have examined or repaired? ♦ *Do not list the answers. Check the answer(s).*	1- ☐ Eye glasses 2- ☐ Hearing aid 3- ☐ Dentures 4- ☐ Orthotics 5- ☐ Wheel chair 6- ☐ Walker 7- ☐ Other, *(Please specify)* :
9.3	Do you or your family have to pay for this service?	1- ☐ Yes 2- ☐ No ➡ GO to Q. 9.5 3- ☐ Do no know ➡ GO to Q. 9.5 4- ☐ Included in the residence's fees ➡ GO to Q. 9.5
9.4	Are these fees within your means (affordable)?	1- ☐ Yes 2- ☐ No
9.5	**At the present time,** do you need to have any device or equipment that you use to see, hear or move about examined or repaired?	1- ☐ Yes, *(Please specify)* : 2- ☐ No
10.1	Do you need to make any modifications in your home in order to make your daily living activities easier to accomplish?	1- ☐ *Yes, (Please specify)* : 2- ☐ No

END OF SECTION 11

Section 12 - PHYSICAL HEALTH AND MOBILITY

Now I would like to know if you have had any health problems during the PAST YEAR. For these questions, I will ask you just to answer Yes or No.

	DURING THE PAST YEAR, have you had ....?	YES	NO	DO NOT KNOW
1.	Problems with hypertension or high blood pressure (controlled or not by medication)	1- ☐	2- ☐	3- ☐
2.	Cardiac problems (heart disease)	1- ☐	2- ☐	3- ☐
3.	Circulatory problems (in the arms or legs)	1- ☐	2- ☐	3- ☐
4.	Lung trouble (asthma, pneumonia, tuberculosis, emphysema, bronchitis, respiratory trouble)	1- ☐	2- ☐	3- ☐
5.	Dental problems (teeth needing care, poorly fitting dentures)	1- ☐	2- ☐	3- ☐
6.	Stomachaches, digestive or intestinal problems	1- ☐	2- ☐	3- ☐
7.	Bladder, kidney or prostate trouble	1- ☐	2- ☐	3- ☐
8.	Problems of dizziness or balance	1- ☐	2- ☐	3- ☐
9.	Problems with your feet or ankles	1- ☐	2- ☐	3- ☐

	DURING THE PAST YEAR, have you had ....?	YES	NO	DO NOT KNOW
10.	A stroke (thrombosis, a CVA (cerebro-vascular accident), a clot in the brain)	1- ☐	2- ☐	3- ☐
11.	Paralysis due to an illness or an accident	1- ☐	2- ☐	3- ☐
12.	Parkinson's disease or any other neurological disorder (do not include CVAs)	1- ☐	2- ☐	3- ☐
13.	Arthritis, osteoarthritis or rheumatism	1- ☐	2- ☐	3- ☐
14.	Tumor or cancer	1- ☐	2- ☐	3- ☐
15.	Diabetes or sugar in the blood or urine	1- ☐	2- ☐	3- ☐
16.	Depression	1- ☐	2- ☐ ⇨ GO to Q. 17	3- ☐ ⇨ GO to Q. 17
16a	♦ *If yes to Q. 16, ask:* Are you being seen regularly by a health professional or were you followed during the past year?	1- ☐	2- ☐	3- ☐
17.	Have you fallen during the past year?	1- ☐	2- ☐ ⇨ GO to Q. 20	3- ☐ ⇨ GO to Q. 20

17a	How many times did you fall during the past year?	Number of times : _____
18.	Did you fracture any bones?	1- ☐ Yes 2- ☐ No ⇒ GO to Q. 20
19.	What did you fracture? ♠ *Check the answer(s).*	1- ☐ Hip or femur 2- ☐ Ankle or leg 3- ☐ Wrist or forearm 4- ☐ Other, (*Please specify*) :
20.	Do you sometimes wet yourself? (do you ever urinate without meaning to)	1- ☐ Yes 2- ☐ No
21.	Do you sometimes soil yourself? (do you ever move your bowels without meaning to)	1- ☐ Yes 2- ☐ No
22.	In the PAST SIX MONTHS have you used the services of...	
	a) a dentist?	a) 1- ☐ Yes 2- ☐ No
	b) a denturologist?	b) 1- ☐ Yes 2- ☐ No
	c) a physiotherapist?	c) 1- ☐ Yes 2- ☐ No
	d) a chiropractor?	d) 1- ☐ Yes 2- ☐ No
	e) a social worker?	e) 1- ☐ Yes 2- ☐ No
	f) a dietitian or nutritionist?	f) 1- ☐ Yes 2- ☐ No
	g) a psychologist?	g) 1- ☐ Yes 2- ☐ No
	h) an occupational therapist?	h) 1- ☐ Yes 2- ☐ No
	i) a speech therapist?	i) 1- ☐ Yes 2- ☐ No
	j) a psychiatrist?	j) 1- ☐ Yes 2- ☐ No
23.	Do you receive services from a family physician?	1- ☐ Yes ⇒ GO to Q 25 2- ☐ No
24.	Do you need the services of a family physician?	1- ☐ Yes 2- ☐ No
25.	Do you receive services from a family physician who comes to your home?	1- ☐ Yes ⇒ GO to Q. 27 2- ☐ No
26.	Do you need the services of a family physician who comes to your home?	1- ☐ Yes 2- ☐ No

Medication

27.	Are you currently taking any prescription medications?	1- ☐ Yes 2- ☐ No
28.	Do you regularly take vitamin supplements?	1- ☐ Yes 2- ☐ No
29.	Do you regularly take herbal medication?	1- ☐ Yes 2- ☐ No
30.	Are you currently taking other medications on a regular basis that you purchase without a prescription (that is over the counter)?	1- ☐ Yes 2- ☐ No
31.	Do you take your medication yourself or with help from someone else (ex., to follow the instructions, time of day, dose, take the pills out of the box, swallow them)?	1- ☐ Self 2- ☐ With help 3- ☐ Do not take any medication regularly
32.	In the PAST TWELVE MONTHS, have you had a flu shot?	1- ☐ Yes 2- ☐ No
33.	Do you have trouble hearing even with a hearing aid, if you wear one?	1- ☐ No trouble 2- ☐ Some trouble 3- ☐ A lot of trouble
34.	When you speak, do you have trouble making yourself understood (difficulty expressing yourself or answering)?	1- ☐ No trouble 2- ☐ Some trouble 3- ☐ A lot of trouble
35.	In summer, are you able to walk a block (150 feet or 50 metres) by yourself or does someone have to help you?	1- ☐ Self without difficulty 2- ☐ Self but with difficulty 3- ☐ With the help of someone 4- ☐ Unable to walk

36.		To move around, do you use ... ?		Do you use it ... ?		
		Yes	No	Indoors only	Outdoors only	Indoors and outdoors
36.1	Cane	1- ☐	2- ☐	1- ☐	2- ☐	3- ☐
36.2	Walker	1- ☐	2- ☐	1- ☐	2- ☐	3- ☐
36.3	Mechanical wheelchair	1- ☐	2- ☐	1- ☐	2- ☐	3- ☐
36.4	Electric wheelchair	1- ☐	2- ☐	1- ☐	2- ☐	3- ☐
36.5	Other, *(Please specify)* :	1- ☐	2- ☐	1- ☐	2- ☐	3- ☐
37.	When you go to public places, what physical obstacles do you encounter (ex.: no access ramps)? Record verbatim : ☐ None					
38.	As you are entering or leaving your home, what physical obstacles do you encounter (ex.: difficulty going up and down stairs, dangerous stairways, no access ramps, no elevator)? Record verbatim : ☐ None					

END OF SECTION 12

END OF TELEPHONE INTERVIEW

♠ *Tell the respondant that his/her cooperation has been greatly appreciated*
that he/she will receive CLSC brochure by mail
and that you will phone him/her in six months

Complete section 15, (interviewer's notes), interview 2 page 3

Section 13 – SOCIO-ECONOMIC INFORMATION

Before ending this interview, I would like to ask you a few questions about your home and your socio-economic situation. Rest assured that your responses will remain strictly confidential.

CARD 11 and 12

1. Do you own your home or rent (apartment) or do you live with someone without paying rent?

1- ☐ Owner
2- ☐ Tenant
3- ☐ Live with someone without paying rent

2. ♠ ***Note, without asking the question or request additional details if necessary: the respondent lives in a…***

1- ☐ House (single family dwelling)
2- ☐ Room
3- ☐ Apartment (includes duplex, condo)
4- ☐ Senior's residence
5- ☐ HLM (Subsidized housing), HBNL (Non-profit housing), or non-profit cooperative
6- ☐ HLM (Subsidized housing for senior's)
7- ☐ Other, (*Please specify*) :_____

♠ ***Ask only if the subject lives in a seniors' residence, subsidized housing or Coop (# 4,5,6), otherwise ➡ GO to Q. 4***

3. What services are available on site ? _____

_____

_____

4. How long have your lived here? _____ month or _____years

5. How long have you lived in this neighbourhood? _____ month or _____years

6. What is your highest level of education?

1- ☐ None
2- ☐ Did not complete elementary school
3- ☐ Completed elementary school
4- ☐ Did not complete high school
5- ☐ Completed high school
6- ☐ Technical or trade school
7- ☐ College
8- ☐ University

7. **Cancelled question.**

8. **How well do you think that your income currently satisfies your basic needs?**
♠ ***Circle the number correspondent to the answer.*** **CARD 11**

Very well	Adequately	With some difficulty	Not very well	Totally inadequately	Refuse to answer	Do not know
1	2	3	4	5	6	7

9. **Here is a list that corresponds to different income levels.**
♠*If the subject lives alone, ask:* **a) Which category corresponds to your personal income?**
or
♠*If there is more than one person in this home, ask:* **a) Which category corresponds to the total income of all those living in your home?**

CARD 12

1. ☐ less than 9 999 $
2. ☐ 10 000 $ - 14 999 $
3. ☐ 15 000 $ - 19 999 $
4. ☐ 20 000 $ - 24 999 $
5. ☐ 25 000 $ - 29 999 $
6. ☐ 30 000 $ - 34 999 $
7. ☐ 35 000 $ - 39 999 $
8. ☐ 40 000 $ - 44 999 $
9. ☐ 45 000 $ - 49 999 $
10. ☐ 50 000 $ - 59 999 $
11. ☐ 60 000 $ - 69 999 $
12. ☐ 70 000 $ and more
13. ☐ Refuse to answer
14. ☐ Do not know

b) Is this before or after taxes?

1- ☐ Before taxes 2- ☐ After taxes 3- ☐ Do not know

10. **Did you know that you may be able to receive tax credits for the home care services that you have to pay for?**
♠ *Tax credit: tax-deductible fees paid for home care services. Any amount spent for housekeeping with a receipt may be eligible for a tax credit.*

1- ☐ Yes
2- ☐ No

END OF SECTION 13

Section 14 - CONCLUSION OF INTERVIEW DONE AT HOME

Identification of the subject N° ☐☐☐☐

1- Could you give me the name and address of a person who is close to you, a relative, friend or neighbour who we could contact if we have trouble reaching you six months from now?

♦ *It would be best if the contact person were a member of your family other than your spouse.*

First name _____ Last name : _____

Relationship to the respondent ? _____
Address
(including the city and postal code): _____

_____

Telephone number : (____) - _____

PLEASE GO TO THE NEXT PAGE

♠♠♠ HAVE THE SUBJECT SIGN TWO COPIES OF THE CONSENT FORM FOR THE RAMQ ♠♠♠

We have now completed the interview. I want you to know that your cooperation is greatly appreciated. I know that you have a lot to do and that I have taken your time.

1- Do you have any questions or comments ?

_____

_____

♠ ***When there is a need for a second interview in the respondent's home, remind him/her that we will save the questions to be discussed for the end of the second interview. Write these questions down.***

♠ ***If the questionnaire has not been completed, ask :***
2- Can we set up an appointment for a **second interview** *(over the telephone or face-to-face, as needed)* ?

1. ☐ Yes Date : _____, the_____ Time :_____
(Day of the week) (Date) (Month) (Year)

2. ☐ No, *(Please specify)* :_____

_____

♠ ***If a second face-to-face interview is anticipated, tell the respondent*** **: If it is all right with you, I will phone you the day before our next meeting to confirm.**

♠ **Check to see if the ID number of the respondent is written in the upper right corner of the booklet.**

Time of end of interview: Hour : **Minutes :**

END OF INTERVIEW

Section 15 – INTERVIEWER'S NOTES

Interviewer's name : _____

15.1 Interview 1 :

1. Date of interview: Date : _____ (Day of the week), the _____ (Date) (Month) (Year) Time : _____

2. Length of interview : _____

3. Location of interview :

1- ☐ Subject's home
2- ☐ Elsewhere, *(Please specify)* : _____

4. Was another person present during the interview?

1- ☐ Yes, but he/she did not provide information
2- ☐ Yes, and he/she influenced the respondent's answers to several questions
3- ☐ No
4- ☐ Other, *(Please specify)* : _____

5. Sections of the questionnaire remaining to be completed : _____

6. Hearing problems

1- ☐ Yes
2- ☐ No

7. Vision problems

1- ☐ Yes
2- ☐ No

8. Did the respondent spontaneouly ask to see the results of the research when they are available?

1- ☐ Yes
2- ☐ No

9. OBSERVATIONS DURING THE INTERVIEW AT THE RESPONDENT'S HOME

INSIDE APPEARANCE OF THE HOME

a)	CLEAN	1-☐	2-☐	3-☐	4-☐	5-☐	DIRTY
b)	NEAT	1-☐	2-☐	3-☐	4-☐	5-☐	MESSY
c)	NO REPAIRS NEEDED	1-☐	2-☐	3-☐	4-☐	5-☐	NEEDS REPAIRS

OUTSIDE APPEARANCE OF THE HOME

a)	CLEAN	1-☐	2-☐	3-☐	4-☐	5-☐	DIRTY
b)	NEAT	1-☐	2-☐	3-☐	4-☐	5-☐	MESSY
c)	NO REPAIRS NEEDED	1-☐	2-☐	3-☐	4-☐	5-☐	NEEDS REPAIRS

REACTIONS OF THE SUBJECT

a)	FRIENDLY	1-☐	2-☐	3-☐	4-☐	5-☐	UNFRIENDLY
b)	CALM	1-☐	2-☐	3-☐	4-☐	5-☐	ANXIOUS
c)	INTERESTED	1-☐	2-☐	3-☐	4-☐	5-☐	INDIFFERENT

HOW DID THE SUBJECT TOLERATE THE INTERVIEW ?

VERY WELL 1-☐ 2-☐ 3-☐ 4-☐ 5-☐ POORLY

DID THE SUBJECT FIND THE INTERVIEW TOO LONG ?

DEFINITELY NO 1-☐ 2-☐ 3-☐ 4-☐ 5-☐ DEFINITELY YES

PLEASE RATE THE LANGUAGE ABILITY OF THE SUBJECT (in the language of the interview)

COMPLETELY FLUENT 1-☐ 2-☐ 3-☐ 4-☐ 5-☐ MAJOR DIFFICULTY

COMPREHENSION OF QUESTIONS

VERY GOOD 1-☐ 2-☐ 3-☐ 4-☐ 5-☐ VERY POOR

♠ ***Indicate the questions or sections that you felt were difficult for the respondent to understand.***

_____

_____

RELIABILITY OF RESPONSES

VERY GOOD 1-☐ 2-☐ 3-☐ 4-☐ 5-☐ VERY POOR

♠ ***Indicate the responses or the sections that you feel are not very reliable.***

_____

_____

10. ♠ ***Please write your comments concerning the interview :*** _____

_____

_____

♠ ***Re-read the questionnaire and phone the coordinator for any points that require clarification.***
Questions discussed with the coordinator : _____

_____

_____

♠ ***If all the questionnaire has been completed during the in-home interview*** ⇨ **GO to Q. 15.3**

15.2 Interview 2 :

1. Date of interview: Date : _____ (Day of the week), the _____ (Date) (Month) (Year) Time : _____

2. Length of interview : _____

3. Was this interview conducted over the telephone or in person?
   1-☐ In person
   2-☐ Over the telephone ⇨ GO to Q. 6

4. Location of interview :
   1-☐ Subject's home
   2-☐ Elsewhere, (*Please specify*) : _____

5. Was another person present during the interview?
   1-☐ Yes, but he/she did not provide information
   2-☐ Yes, and he/she influenced the respondent's answers to several questions
   3-☐ No
   4-☐ Other, (*Please specify*) : _____

6. Have all the sections of the questionnaire been completed?

1- ☐ Yes

2- ☐ No, when will the questionnaire be completed, would it be during an in-home interview or by telephone?

_____

_____

7. **Please write other comments if relevant:** _____

_____

_____

8. OBSERVATION DURING THE SECOND INTERVIEW

COMPREHENSION OF QUESTIONS

VERY GOOD 1- ☐ 2- ☐ 3- ☐ 4- ☐ 5- ☐ VERY POOR

♠ ***Indicate the questions or sections that you felt were difficult for the respondent to understand.***

_____

_____

RELIABILITY OF RESPONSES

VERY GOOD 1- ☐ 2- ☐ 3- ☐ 4- ☐ 5- ☐ VERY POOR

♠ ***Indicate the responses or the sections that you feel are not very reliable.***

_____

_____

♠ ***Re-read the questionnaire and phone the coordinator for any points that require clarification.***

Questions discussed with the coordinator : _____

_____

_____

♠ Continued p. 5

15.3 HELP TO THE RESPONDENT (FACE-TO-FACE OR BY TELEPHONE)

1. Did the respondent ask for help (ex., need for a specific service) ?

1- ☐ Yes
2- ☐ No ⇨ Go to Q. 4

2. What type of help did he ask for? _____

3. What did you do for this respondent?

1- ☐ Give him references to organizations, which ones: _____

2- ☐ Advise him to speak to : _____

3- ☐ Other, *(Please specify) :* _____

_____

4. Did the subject say anything (or were there other indications) that seemed important to you during the interview and that made you think that the subject is experiencing major physical or psychological difficulties (ex. : he told you or hinted at committing suicide, that he was feeling very depressed or that he need to be protected from abuse)?

1- ☐ Yes ⇨ Complete Appendix 1
2- ☐ No

_____

END OF SECTION 15

APPENDIX 1

1- Describe what made you think there might be a major problem and what type of problem you were thinking about (ex., describe what type of problem you were thinking about)_____

2. Do you know a professional, such as a doctor, a nurse, a social worker or any other person who you could speak to about this problem ?

☐ Yes, (*Specify*) :_____

⇨ GO to Q. 4

☐ No

3. Would you like me to give you the name and telephone number of your CLSC ?

☐ Yes

☐ No ⇨ GO to Q. 5

4. Do you plan to contact this professional or this person or the CLSC to talk about the difficulties that you are experiencing?

☐ Yes, When do you plan on doing this (*write the date*) :_____

☐ No

5. Would you like me to speak about it (*the person's problem*) with the nurse who is responsible for the project, so that either she or I will contact (*the professional or the person that the respondent knows or the CLSC in his/her region*)?

☐ Yes

☐ No

The nurse responsible (L. Lévesque) has been advised of the problem, write the date :_____

Intervention of the interviewer or the coordinator :_____

Interviewer's signature :

Date :

Signature of person responsible for the project :

Date :

END OF APPENDIX 1

APPENDIX E: 6-MONTH QUESTIONNAIRE

Subject identification # | | | | |

Study on unmet needs for community-based services for the elderly aged 75 years and over: 6-Month Questionnaire

♠ ***Do not write in the shaded areas***

Questionnaire completed	1- ☐ Yes	2- ☐ No
Interviewer Name		
Interviewer identification	N°	

ADM 1	Questionnaire verified	1- ☐ Yes
ADM 2	Identification of verifier	N°
ADM 3	Questionnaire coded	1- ☐ Yes
ADM 4	Identification of the coder	N°

ADM 5 Date of interview - Time I I
Month | Day | Year

ADM 6 Total length of interview
Hr | Min

Introduction:

Interviewer: *Hello, Mr., Ms...I am X from McGill University. Six months ago you participated in a research study on the needs for community services among people 75 years of age and older. As mention during the first interview, the second part of this study involves a brief telephone interview. I am calling you 6 months after our first interview to ask you some questions concerning your health and your utilization of community services. These questions should not take more than 10 minutes of your time. Do you have time to answer these questions right now?*

Before beginning, I would like to thank you for your collaboration. Your participation in this study is very important since it will provide information about the needs for community services among elderly people and the difficulties that they experience when they want to use these services. Even if you are not receiving services at this time, your participation is valuable since it will allow us to learn about your opinions and your expectations with respect to these different services. In addition, this will allow us to get an overall picture of the needs of people 75 years of age and older. I will now begin the questionnaire.

Date of interview :						
		mm		dd		yyyy

Time interview started :		
	hr	min

Section 1 – DEMOGRAPHIC INFORMATION

1.	In the PAST SIX MONTHS, have you moved? ♠♠ *Even if the subject has not moved, it is very important to re-verify his/her address because we will be sending an information letter about the second in-home interview in several months.*	1- ☐ Yes New Address : _____ _____ 2- ☐ No ⟶ Go to Q. 3
2.	What type of residence is this?	1- ☐ House/apartment/ condominium 2- ☐ Seniors residence 3- ☐ Institution ♠ ***If institutionalized end the interview***
3.	How many people live with you?	

Section 2 - USE OF MEDICAL AND HEALTH SERVICES

1.	How would you rate your current state of health?	1- ☐ Excellent 2- ☐ Very good 3- ☐ Good 4- ☐ Fair 5- ☐ Poor 6- ☐ Very poor
2.	In the PAST SIX MONTHS, did you go to the Emergency Room of a hospital to obtain medical care?	1- ☐ Yes a) How many times?_____ 2- ☐ No
3.	In the PAST SIX MONTHS, were you hospitalized for at least 24 hours without counting a stay at the emergency room?	1- ☐ Yes a) How many times?_____ 2- ☐ No ⟶ Go to Q. 5
4.	When you went home (a relative's/friend's home) from hospital, did you receive home care services?	1- ☐ Yes, a) Which ones : 2- ☐ No
5.	In the PAST SIX MONTHS, have you seen a doctor, excluding doctor's visits when you were in the hospital, Emergency room or in a convalescent centre? ♠ ***Including going to see a doctor and home-visits by a doctor***	1- ☐ Yes a) How many times?_____ 2- ☐ No

Section 3 – PERSONAL CARE ACTIVITIES

☐ **Did not receive help at baseline interview** ⟶ ***Go to Q. 2***

1.	In our previous interview you said that you received help for the following personal care activities: ***(♠ Interviewer – list the activities that you checked off below)***

♠ ***Help from another person includes the presence of someone who is available when needed.***

♠ ***<u>Help can be obtained from all sources, including: family/circle of friend, or from the public or private network</u>.***

♠ ***<< Interviewer should check the box in the first column to indicate which activities were received by the subject according to the baseline interview >>***

	a		b
	At the present time, do you **still** receive help with…..		Have there been times in the PAST MONTH when you needed (*<u>more</u>*) help with this activity?
1-☐	**Dressing?**	1-☐ *<u>Yes</u>* 2-☐ No	1-☐ Yes 2-☐ No
2-☐	**Bathing, showering or taking a sponge bath?**	1-☐ *<u>Yes</u>* 2-☐ No	1-☐ Yes 2-☐ No
3-☐	**Eating?**	1-☐ *<u>Yes</u>* 2-☐ No	1-☐ Yes 2-☐ No
4-☐	**Transfers?**	1-☐ *<u>Yes</u>* 2-☐ No	1-☐ Yes 2-☐ No
5-☐	**Toileting?**	1-☐ *<u>Yes</u>* 2-☐ No	1-☐ Yes 2-☐ No
6-☐	**Moving around inside the house?**	1-☐ *<u>Yes</u>* 2-☐ No	1-☐ Yes 2-☐ No

♠ ***If the subject received help for all the above*** ⟶ ***Go to section 4***

2.	In our previous interview you said that you did **NOT** receive help with the following personal care activities : ***(♠ Interviewer – list the activities that you checked off below)***

♠ ***Help can be obtained from all sources, including: family/circle of friend, or from the public or private network.***

♠ ***<< Interviewer should check the box in the first column to indicate which activities were NOT received by the subject according to the baseline interview >>***

	a		b	c
	Because of your state of health, do you **now** need help with…..	**If yes**	Are you receiving help with…..	Have there been times in the PAST MONTH when you needed (*more*) help with this activity?
1-☐	**Dressing?**	1-☐ Yes 2-☐ No	1-☐ *Yes* 2-☐ No	1-☐ Yes 2-☐ No
2-☐	**Bathing, showering or taking a sponge bath?**	1-☐ Yes 2-☐ No	1-☐ *Yes* 2-☐ No	1-☐ Yes 2-☐ No
3-☐	**Eating?**	1-☐ Yes 2-☐ No	1-☐ *Yes* 2-☐ No	1-☐ Yes 2-☐ No
4-☐	**Transfers?**	1-☐ Yes 2-☐ No	1-☐ *Yes* 2-☐ No	1-☐ Yes 2-☐ No
5-☐	**Toileting?**	1-☐ Yes 2-☐ No	1-☐ *Yes* 2-☐ No	1-☐ Yes 2-☐ No
6-☐	**Moving around inside the house?**	1-☐ Yes 2-☐ No	1-☐ *Yes* 2-☐ No	1-☐ Yes 2-☐ No

Section 4 – HOUSEHOLD ACTIVITIES

☐ **Did not receive help at baseline interview** ⟶ ***Go to Q. 2***

1.	In our previous interview you said that you received help with the following household activities: ***(♠ Interviewer – list the activities that you checked off below)***

♠ ***Help can be obtained from all sources, including: family/circle of friend, or from the public or private network.***

♠ ***<< Interviewer should check the box in the first column to indicate which household activities were received by the subject according to the baseline interview >>***

	a		b
	At the present time, do you **still** receive help with…..		**Because of your state of health,** have there been times in the PAST MONTH when you needed (*more*) help with this activity?
1-☐	**Preparation of meals?**	1- ☐ *Yes* 2- ☐ No	1- ☐ Yes, because of my health 2- ☐ No
2-☐	**Transportation?**	1- ☐ *Yes* 2- ☐ No	1- ☐ Yes, because of my health 2- ☐ No
3-☐	**Housekeeping?**	1- ☐ *Yes* 2- ☐ No	1- ☐ Yes, because of my health 2- ☐ No

♠ ***If the subject received help for all the above*** ⟶ ***Go to section 5***

2.	In our previous interview you said that you did NOT received help with the following household activities: ***(♠ Interviewer – list the activities that you checked off below)***

♠ **POINT TO REMEMBER FROM BASELINE INTERVIEW:**
If the activity is done together = capable of doing it by himself or herself

♠ ***Help can be obtained from all sources, including : family/circle of friend, or from the public or private network.***

♠ ***<< Interviewer should check the box in the first column to indicate which household activities were NOT received by the subject according to the baseline interview >>***

	a		b	c
	Because of your state of health, do you **now** need help with….. **yes** **If**		Are you receiving help with…..	Have there been times in the PAST MONTH when you needed (*more*) help with this activity?
1-☐	**Preparation of meals?**	1-☐ Yes 2-☐ No	1-☐ *Yes* 2-☐ No	1-☐ Yes 2-☐ No
2-☐	**Transportation?**	1-☐ Yes 2-☐ No	1-☐ *Yes* 2-☐ No	1-☐ Yes 2-☐ No
3-☐	**Housekeeping?**	1-☐ Yes 2-☐ No	1-☐ *Yes* 2-☐ No	1-☐ Yes 2-☐ No

Section 5 – USE OF SERVICES

☐ **Did not receive any home services at baseline interview** ⟶ ***Go to Q. 2***

Now I would like to speak to you briefly about four different home care services. During the first interview, you told us that you receive home service(s) for: (♠ ***Interviewer – list the activities that are checked below.*****)**

♠ *<< Interviewer should check the box in the first column to indicate which services were received by the subject according to the baseline interview summary >>*

	a		b	c
1.	Are you still receiving ….?	**If yes**	Who is the provider of this service? (*Specify*:)	♠ *Do not write in this column*
1-☐	Home services for **Personal care?**	1-☐ Yes 2-☐ No		1-☐ Private 2-☐ Public
2-☐	Home services for **Housekeeping?**	1-☐ Yes 2-☐ No		1-☐ Private 2-☐ Public
3-☐	Home services for Assistance with **Meals?**	1-☐ Yes 2-☐ No		1-☐ Private 2-☐ Public
4-☐	Home **Nursing Care** services?	1-☐ Yes 2-☐ No		1-☐ Private 2-☐ Public

♠ ***If the subject received services for all the above*** ⟶ ***Go to section 6***

In our last interview you said that you were NOT receiving the following home care service(s): (♠ *Interviewer – list the activities that are checked below.*)

♠ *<< Interviewer should check the box in the first column to indicate which services were NOT received by the subject according to the baseline interview summary >>*

	a		b	c
2.	Over the past 6-months, have you started receiving	**If yes** →	Who is the provider of this service? (*Specify*:)	♠ *Do not write in this column*
1-☐	Home services for **Personal care?**	1- ☐ Yes 2- ☐ No		1- ☐ Private 2- ☐ Public
2-☐	Home services for **Housekeeping?**	1- ☐ Yes 2- ☐ No		1- ☐ Private 2- ☐ Public
3-☐	Home services for Assistance with **Meals?**	1- ☐ Yes 2- ☐ No		1- ☐ Private 2- ☐ Public
4-☐	Home **Nursing Care** services?	1- ☐ Yes 2- ☐ No		1- ☐ Private 2- ☐ Public

☐ **If No to all of the above services** ⟶ ***Go to section 6***

3.	Did you request any of these services because you became aware of them through your participation in this study?	1- ☐ Yes 2- ☐ No

Section 6 – LIFE EVENTS

1.	In the last six months have you experienced any major life events that were a source of happiness?

1- ☐ Yes, *Specify:* ***(♠ If the subject is hesitant, list examples below)***

2- ☐ No

1. Birth
2. Vacation
3. Marriage

2	In the last six months have you experienced any major life events that were particularly sad or difficult?

1- ☐ Yes, *Specify:* ***(♠ If the subject is hesitant, list examples below)***

2- ☐ No

1. Death of spouse
2. Divorce
3. Marital Separation
4. Death of a close family member
5. Personal injury
6. Illness
7. Death of a close friend
8. Change in residence

Section 7 – CONTACT INFORMATION UPDATE

Contact information

In the last interview you gave us the name of _____ ♠*<<Print name from baseline interview summary>>* as the person to contact if we are unable to reach you. Is this still the person you would like us to use as a contact or would you prefer to give us the name of another person?	1- ☐ Yes 2- ☐ No, (*Specify new contact name*) : Name :_____ Tel :_____

This is the end of the interview. Do you have any questions for me?

Thank you very much for your time. In the first phase of this study the participation rate has been very good and we received additional funding to continue the project for a second year. I just want to let you know that we will be calling you in approximately 6 months to request your participation in a second home interview.

Will it be easy to reach you at this number in 6 months?	1- ☐ Yes 2- ☐ No (Specify alternate phone number) : _____

Time interview ended		
	hr	min

INTERVIEWER OBSERVATIONS / COMMENTS

What is your impression of the subject's reaction to being called in 6-months to request his/her participation in another home interview?	1- ☐ Would accept 2- ☐ Is hesitant 3- ☐ Would probably refuse 4- ☐ Other *(Specify :)* _____ _____
Comments :	

APPENDIX F: MISSING INCOME DATA

Table 7-1: Baseline income as reported in the questionnaire.

Characteristic (N=839)	**Number (%)**
Reported Income:	**788 (93.9)**
Reported before tax income	700 (83.4)
Reported after tax income	64 (7.6)
Did not know if income was before or after tax income	24 (2.9)
Missing income:	**51 (6.1)**
Refused	43 (5.1)
Did not know	7 (0.8)
Missing	1 (0.1)

Table 7-2: Characteristics of subjects with and without missing income data.

(Unless indicated, frequencies given with column percentages in parentheses)

Characteristic	Income Not missing (N = 818)	Income Missing (N = 21)
Sex		
Male	258 (31.5)	5 (23.8)
Female	560 (68.5)	16 (76.2)
Age		
Mean (SD)	79.6 (3.9)	80.2 (3.7)
Marital status		
Married	252 (30.8)	5 (23.8)
No partner	566 (69.2)	16 (76.2)
Number cohabitants		
Lives alone	507 (62.0)	15 (71.4)
1 or more cohabitants	332 (38.0)	6 (28.6)
Mother tongue		
French	587 (71.8)	15 (71.4)
English	156 (19.1)	3 (14.3)
Other	75 (9.2)	3 (14.3)
Number of Comorbid conditions		
Mean (SD)	4.0 (2.2)	3.8 (2.1)
Chronic Disease Score (CDS)		
Mean (SD)	5.8 (4.9)	7.6 (5.9)
Health status (self-rated)		
Excellent	86 (10.5)	2 (9.5)
Very good	276 (33.7)	7 (33.3)
Good	266 (32.5)	7 (33.3)
Fair	164 (20.1)	4 (19.1)
Poor	22 (2.7)	1 (4.8)
Very poor	4 (0.5)	0 (0.0)
Education		
Elementary school or less	138 (16.9)	2 (9.5)
Did not complete high school	191 (23.4)	5 (23.8)
Completed high school	172 (21.0)	9 (42.9)
Technical/trade school/college	132 (16.1)	3 (14.3)
University	185 (22.6)	2 (9.5)

Table 7-2 continued

Social network		
0	507 (62.0)	0
1	285 (34.8)	1 (4.8)
2	19 (2.3)	3 (14.3)
3	4 (0.5)	1 (4.8)
4	3 (0.4)	4 (19.1)
5	0 (0.0)	10 (47.6)
6 or more	0 (0.0)	2 (9.5)
Nutritional screening		
Low risk	327 (40.0)	8 (38.1)
Moderate risk	390 (47.7)	10 (47.6)
High risk	101 (12.4)	3 (14.3)
ALFI score		
Mean (SD)	20.4 (1.6)	20.2 (1.8)
median	21.0	21.0
Unmet needs		
no	611 (74.7)	15 (71.4)
yes	207 (25.3)	6 (28.6)
Unmet ADL needs		
no	750 (91.7)	18 (85.7)
yes	68 (8.3)	3 (14.3)
Unmet IADL needs		
no	638 (78.0)	17 (81.0)
yes	180 (22.0)	4 (19.0)

Table 7-3: Comparison of health services utilization during the 6-month follow-up period for subjects with and without missing baseline income.

(Unless indicated, frequencies given with column percentages in parentheses)

Characteristic*	Income Not missing (N = 772)	Income Missing (N = 11)
Visited an ED		
yes	138 (17.9)	2 (18.2)
no	634 (82.1)	9 (81.8)
Number of ED visits		
Mean (SD)	0.33 (0.92)	0.27 (0.65)
median	0.0	0.0
Hospitalized		
yes	681 (88.2)	10 (90.9)
no	91 (11.8)	1 (9.1)
Number of hospital days		
Mean (SD)	1.1 (6.7)	0.1 (0.3)
median	0.0	0.0
Taking medication		
yes	701 (90.8)	10 (90.9)
no	71 (9.12)	1 (9.1)
Number of medications		
Mean (SD)	5.3 (3.6)	7.0 (4.2)
median	5.0	6.0
Visited a physician		
yes	714 (92.5)	11 (100)
no	58 (7.5)	0 (0.0)
Number of Physician visits		
Mean (SD)	5.3 (5.4)	5.8 (2.8)
median	5.3	5.8

* Health services utilization data obtained from the RAMQ and MEDECHO databases

APPENDIX G: POISSON REGRESSION ANALYSES

Table 7-4: Poisson Regression: Unmet need and the number of emergency department visits during the 6 month follow-up period.

		Main Exposure								
		Unmet need (N=783)			ADL unmet need (N=783)			IADL unmet need (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Exposure**	**0.79 (0.13)**	**2.21**	**1.72, 2.82**	**0.60 (0.18)**	**1.81**	**1.28, 2.58**	**0.75 (0.13)**	**2.12**	**1.65, 2.73**
Adjusted*	**Main Exposure**	**1.62 (0.31)**	**5.05**	**2.73, 9.33**	**0.13 (0.19)**	**1.14**	**0.79, 1.67**	**1.57 (0.31)**	**4.79**	**2.63, 8.71**
	Sex	-0.38 (0.13)	0.68	0.53, 0.88	-0.34 (0.13)	0.71	0.55, 0.92	-0.37 (0.13)	0.69	0.53, 0.89
	Nutritional score	0.39 (0.10)	1.47	1.21, 1.80	0.43 (0.10)	1.54	1.27, 1.87	0.36 (0.10)	1.44	1.18, 1.75
	CDS	0.04 (0.01)	1.04	1.01, 1.07	-	-	-	-	-	-
	Self-reported health status	-0.15 (0.08)	0.86	0.74, 1.01	-0.28 (0.08)	0.76	0.65, 0.88	-0.22 (0.08)	0.80	0.69, 0.94
	Size of social network	0.16 (0.05)	1.18	1.06, 1.30	-	-	-	0.15 (0.05)	1.16	1.05, 1.27
	(Unmet need) X (size of social network) interaction term	-0.31 (0.08)	0.73	0.63, 0.85	-	-	-	-0.31 (0.08)	0.73	0.63, 0.86

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 2.18
for model with ADL unmet need as main exposure variable Pearson chi-square = 2.40
for model with IADL unmet need as main exposure variable Pearson chi-square = 2.27

Table 7-5: Poisson Regression: Unmet need and the number of hospital days during the 6 month follow-up period.

		Main Exposure								
		Unmet need (N=783)			ADL unmet need (N=772)			IADL unmet need (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Exposure**	**1.30 (0.07)**	**3.66**	**3.20, 4.17**	**1.95 (0.07)**	**7.06**	**6.16, 8.08**	**1.11 (0.07)**	**3.03**	**2.65, 3.45**
Adjusted*	**Main Exposure**	**0.83 (0.08)**	**2.30**	**1.98, 2.68**	**1.52 (0.08)**	**4.57**	**3.92, 5.32**	**0.62 (0.08)**	**1.86**	**1.60, 2.16**
	Sex	-0.51 (0.07)	0.60	0.52, 0.69	-0.51 (0.08)	0.60	0.52, 0.70	-0.49 (0.07)	0.61	0.53, 0.71
	Nutritional score	0.69 (0.05)	2.00	1.80, 2.23	0.73 (0.06)	2.08	1.86, 2.32	0.72 (0.05)	2.05	1.85, 2.29
	Self-reported health status	-0.27 (0.04)	0.76	0.70, 0.83	-0.23 (0.04)	0.79	0.73, 0.86	-0.32 (0.04)	0.72	0.67, 0.78
	Size of social network	-	-	-	0.10 (0.02)	1.11	1.06, 1.15	-	-	-
	Education	-	-	-	-0.05 (0.03)	0.95	0.90, 1.00	-	-	-
	Income	-	-	-	-0.04 (0.01)	0.96	0.94, 0.98	-	-	-
	CDS	-	-	-	-0.02 (0.01)	0.98	0.97, 1.00	-	-	-

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 25.93
for model with ADL unmet need as main exposure variable Pearson chi-square = 23.97
for model with IADL unmet need as main exposure variable Pearson chi-square = 25.85

Table 7-6: Poisson Regression: Unmet need and the number of hospital admissions during the 6 month follow-up period.

		Main Exposure								
		Unmet need (N=783)			ADL unmet need (N=783)			IADL unmet need (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Exposure**	**0.64 (0.19)**	**1.90**	**1.32, 2.74**	**1.01 (0.23)**	**2.75**	**1.76, 4.30**	**0.50 (0.20)**	**1.66**	**1.13, 2.43**
Adjusted*	**Main Exposure**	**0.47 (0.20)**	**1.60**	**1.08, 2.36**	**0.76 (0.24)**	**2.13**	**1.34, 3.39**	**0.34 (0.21)**	**1.40**	**0.93, 2.11**
	Sex	-0.60 (0.19)	0.55	0.38, 0.79	-0.56 (0.19)	0.57	0.40, 0.82	-0.58 (0.19)	0.56	0.39, 0.81
	Nutritional score	0.60 (0.14)	1.81	1.39, 2.37	0.60 (0.14)	1.83	1.40, 2.38	0.63 (0.14)	1.88	1.44, 2.45

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 1.37
for model with ADL unmet need as main exposure variable Pearson chi-square = 1.32
for model with IADL unmet need as main exposure variable Pearson chi-square = 1.37

Table 7-7: Poisson Regression: Unmet need and the number of physician visits during the 6 month follow-up period.

		Outcome Variable								
		Physician visits (N=783)			GP visits (N=783)			Specialist visits (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Unmet needs**	**0.28 (0.03)**	**1.32**	**1.24, 1.41**	**0.19 (0.05)**	**1.21**	**1.09, 1.35**	**0.33 (0.04)**	**1.40**	**1.28, 1.52**
Adjusted*	**Unmet needs**	**0.12 (0.04)**	**1.13**	**1.05, 1.22**	**0.07 (0.06)**	**1.07**	**0.95, 1.20**	**0.20 (0.05)**	**1.22**	**1.11, 1.34**
	Sex	-0.28 (0.03)	0.76	0.71, 0.81	0.01 (0.05)	1.01	0.91, 1.12	-0.44 (0.04)	0.64	0.59, 0.70
	Self-reported health status	-0.17 (0.02)	0.85	0.81, 0.88	-0.15 (0.03)	0.86	0.81, 0.91	-0.25 (0.02)	0.78	0.74, 0.82
	CDS	0.03 (0.00)	1.03	1.03, 1.04	-	-	-	-	-	-

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: Physician visits model Pearson chi-square = 4.28
GP visits model Pearson chi-square = 2.03
Specialist visits model Pearson chi-square = 5.71

Table 7-8: Poisson Regression: Unmet ADL need and the number of physician visits during the 6 month follow-up period.

		Outcome Variable								
		Physician visits (N=783)			GP visits (N=783)			Specialist visits (N=783)		
Models	Variable(s)	Parameter estimate (SE)	Rate Ratio	95% CI	Parameter estimate (SE)	Rate Ratio	95% CI	Parameter estimate (SE)	Rate Ratio	95% CI
Crude	**Unmet ADL need**	**0.55 (0.05)**	**1.74**	**1.59, 1.90**	**0.25 (0.08)**	**1.28**	**1.09, 1.50**	**0.73 (0.06)**	**2.07**	**1.86, 2.31**
Adjusted*	**Unmet ADL need**	**0.04 (0.07)**	**1.04**	**0.91, 1.18**	**0.08 (0.09)**	**1.09**	**0.92, 1.28**	**0.07 (0.09)**	**1.07**	**0.90, 1.27**
	Sex	-0.24 (0.03)	0.79	0.74, 0.84	0.02 (0.05)	1.02	0.92, 1.13	-0.39 (0.04)	0.68	0.62, 0.74
	Self-reported health status	-0.19 (0.02)	0.83	0.80, 0.86	-0.16 (0.03)	0.86	0.81, 0.91	-0.21 (0.02)	0.81	0.77, 0.85
	Marital status	-0.04 (0.04)	0.96	0.89, 1.03	-	-	-	-0.02 (0.05)	0.98	0.89, 1.09
	(ADL Unmet need) X (Marital status) interaction term	0.81 (0.09)	2.24	1.87, 2.68	-	-	-	1.02 (0.11)	2.78	2.22, 3.47

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: Physician visits model Pearson chi-square = 4.14
GP visits model Pearson chi-square = 2.03
Specialist visits model Pearson chi-square = 4.91

Table 7-9: Poisson Regression: Unmet IADL need and the number of physician visits during the 6 month follow-up period.

		Outcome Variable								
		Physician visits (N=783)			GP visits (N=783)			Specialist visits (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Unmet IADL needs**	**0.12 (0.04)**	**1.13**	**1.05, 1.21**	**0.11 (0.06)**	**1.12**	**1.00, 1.25**	**0.13 (0.05)**	**1.14**	**1.04, 1.25**
Adjusted*	**Unmet IADL needs**	**-0.02 (0.04)**	**0.98**	**0.91, 1.06**	**-0.02 (0.06)**	**0.98**	**0.87, 1.11**	**-0.02 (0.05)**	**0.98**	**0.88, 1.08**
	Sex	-0.24 (0.03)	0.78	0.73, 0.84	0.02 (0.05)	1.02	0.92, 1.13	-0.42 (0.04)	0.66	0.61, 0.72
	Self-reported health status	-0.24 (0.02)	0.78	0.76, 0.81	-0.17 (0.03)	0.84	0.80, 0.89	-0.29 (0.02)	0.75	0.71, 0.78

* Goodness of fit: Physician visits model Pearson chi-square = 4.69
GP visits model Pearson chi-square = 2.04
Specialist visits model Pearson chi-square = 5.82

Table 7-10: Poisson Regression: Unmet need and the number of prescribed medications during the 6 month follow-up period.

		Main Exposure								
		Unmet need (N=783)			ADL unmet need (N=783)			IADL unmet need (N=783)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Exposure**	**0.39 (0.03)**	**1.48**	**1.39, 1.58**	**0.42 (0.05)**	**1.52**	**1.38, 1.67**	**0.33 (0.03)**	**1.39**	**1.30, 1.49**
Adjusted*	**Main Exposure**	**0.24 (0.03)**	**1.28**	**1.19, 1.36**	**0.25 (0.05)**	**1.29**	**1.17, 1.42**	**0.20 (0.04)**	**1.22**	**1.14, 1.31**
	Sex	0.03 (0.03)	1.03	0.97, 1.11	0.06 (0.03)	1.06	0.99, 1.13	0.03 (0.03)	1.03	0.97, 1.11
	CDS	0.08 (0.00)	1.08	1.08, 1.09	0.08 (0.00)	1.08	1.08, 1.09	0.08 (0.00)	1.08	1.08, 1.09

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 1.08
for model with ADL unmet need as main exposure variable Pearson chi-square = 1.09
for model with IADL unmet need as main exposure variable Pearson chi-square = 1.07

Table 7-11: Poisson Regression: Unmet need and the number of self-reported emergency department visits during the 6 month follow-up period.

		Main Exposure								
		Unmet need (N=818)			ADL unmet need (N=818)			IADL unmet need (N=818)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Exposure**	**0.69 (0.16)**	**1.99**	**1.46, 2.70**	**0.40 (0.24)**	**1.48**	**0.93, 2.37**	**0.65 (0.16)**	**1.92**	**1.40, 2.63**
Adjusted*	**Main Exposure**	**1.20 (0.40)**	**3.31**	**1.52, 7.21**	**0.14 (0.25)**	**1.15**	**0.71, 1.89**	**1.19 (0.38)**	**3.29**	**1.57, 6.92**
	Sex	-0.50 (0.17)	0.61	0.44, 0.84	-0.44 (0.16)	0.64	0.47, 0.88	-0.50 (0.16)	0.60	0.44, 0.83
	Nutritional score	0.32 (0.13)	1.37	1.07, 1.76	0.40 (0.12)	1.49	1.18, 1.89	0.35 (0.12)	1.41	1.11, 1.80
	CDS	0.04 (0.02)	1.04	1.01, 1.07	-	-	-	-	-	-
	Self-reported health status	-0.03 (0.10)	0.97	0.79, 1.18	-0.13 (0.10)	0.88	0.73, 1.06	-0.06 (0.10)	0.94	0.78, 1.14
	Size of social network	0.10 (0.06)	1.11	0.98, 1.25	-	-	-	0.09 (0.06)	1.10	0.98, 1.23
	(Unmet need) X (size of social network) interaction term	-0.14 (0.10)	0.87	0.72, 1.04	-	-	-	-0.17 (0.09)	0.84	0.70, 1.01

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 1.43
for model with ADL unmet need as main exposure variable Pearson chi-square = 1.41
for model with IADL unmet need as main exposure variable Pearson chi-square = 1.41

Table 7-12: Poisson Regression: Unmet need and the number of self-reported hospital admissions during the 6 month follow-up period.

		Main Exposure								
		Unmet need (N=783)			ADL unmet need (N=772)			IADL unmet need (N=772)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Exposure**	**0.57 (0.26)**	**1.76**	**1.06, 2.92**	**0.71 (0.34)**	**2.04**	**1.04, 4.00**	**0.48 (0.27)**	**1.62**	**0.96, 2.75**
Adjusted model†	**Main Exposure**	**0.38 (0.27)**	**1.46**	**0.85, 2.49**	**0.46 (0.35)**	**1.58**	**0.79, 3.14**	**0.30 (0.28)**	**1.35**	**0.77, 2.36**
	Sex	-0.60 (0.26)	0.55	0.33, 0.92	-0.56 (0.26)	0.57	0.35, 0.95	-0.58 (0.26)	0.56	0.33, 0.93
	Nutritional score	0.70 (0.19)	2.02	1.40, 2.92	0.73 (0.18)	2.08	1.45, 2.98	0.72 (0.19)	2.06	1.43, 2.97

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 1.37
for model with ADL unmet need as main exposure variable Pearson chi-square = 1.37
for model with IADL unmet need as main exposure variable Pearson chi-square = 1.37

Table 7-13: Poisson Regression: Unmet need and the number of self-reported physician visits during the 6 month follow-up period.

		Main Exposure								
		Unmet need (N=818)			ADL unmet need (N=818)			IADL unmet need (N=818)		
Models	**Variable(s)**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**	**Parameter estimate (SE)**	**Rate Ratio**	**95% CI**
Crude	**Main Exposure**	**0.38 (0.04)**	**1.47**	**1.35, 1.60**	**0.62 (0.06)**	**1.86**	**1.65, 2.09**	**0.23 (0.05)**	**1.26**	**1.15, 1.38**
Adjusted*	**Main Exposure**	**0.18 (0.05)**	**1.20**	**1.09, 1.33**	**0.09 (0.08)**	**1.09**	**0.93, 1.28**	**0.01 (0.05)**	**1.01**	**0.91, 1.11**
	Sex	-0.10 (0.05)	0.91	0.83, 0.99	-0.08 (0.05)	0.93	0.84, 1.02	-0.08 (0.05)	0.93	0.85, 1.01
	Self-reported health status	-0.25 (0.03)	0.78	0.74, 0.82	-0.28 (0.02)	0.76	0.72, 0.80	-0.32 (0.02)	0.72	0.69, 0.76
	CDS	0.02 (0.00)	1.02	1.01, 1.03	-	-	-	-	-	-
	Marital status	-	-	-	-0.04 (0.05)	0.96	0.87, 1.06	-	-	-
	(ADL Unmet need) X (Marital status) interaction term	-	-	-	0.72 (0.12)	2.05	1.62, 2.60	-	-	-

" - " indicates that the covariate was not a confounding variable and was, therefore, removed from the model

* Goodness of fit: for model with unmet need as main exposure variable Pearson chi-square = 3.43
for model with ADL unmet need as main exposure variable Pearson chi-square = 2.93
for model with IADL unmet need as main exposure variable Pearson chi-square = 3.60