University of Alberta

The Impact of Socioeconomic Status on Health Related Quality of Life

Regarding with Post-AMI Patients

by

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Abstract

AMI continues to be the leading cause of mortality and morbidity in Canada. The purpose of this study is to explore the role of SES in long-term HRQOL after AMI. Linear regression models were applied to analyze the association between SES and quality-of-life changes after AMI. The results reveal that household income, diabetes mellitus, current smoking, baseline SF-36 PCS, prior CABG surgery, and total risk score (age, gender, nitrates usage, worst Killip-class, and ST depression) account for 27.0% of changes in one-year SF-36 PCS score. Household income, current smoking, baseline SF-MCS, baseline depression, and total risk score account for 24.5% of changes in one-year SF-36 MCS score. The findings indicate household income as a SES measurement independently associated with changes in one-year HRQOL outcomes for post-AMI patients. In order to improve post AMI-patients' HRQOL, more attentions of managing the factor have been identified in this study.

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CHAPTER ONE:

INTRODUCTION

Problem Statement

Cardiovascular disease (CVD) remains the second leading cause of death and a major cause of morbidity and mortality in Canada (Statistics Canada, 2000). Acute Myocardial infarction (AMI) is a potentially life-threatening event, which occurs suddenly as a result of coronary artery thrombosis, that is, a blood clot within a coronary artery. Among all forms of CVD, AMI continues to be the leading cause of death and disability, especially among elderly individuals (Statistical Canada, 2000). 40% - 75% of all AMI victims die before reaching the hospital (WHO, 2002).

WHO (2004) reported that lower Socioeconomic Status (SES) is associated with increased risk of CVD. Generally, people from SES groups have a higher incidence of disease and higher mortality (WHO, 2004). Particularly, the rate of CVD has been increasing greatly in low-income and middle-income population (Yusuf, et al. 2004). A report released recently by the Australian Institute of Health and Welfare (AIHW) reveals that SES inequalities in CVD in Australia: low income, low educational attainment and unemployment) had significantly higher mortality from CVD, and coronary heart disease (CHD) than adults from the least disadvantaged areas-between 1.6 and 1.9 times as high (AIHW, 2006).

Even if the initial event is survived, a significant proportion of AMI patients continue to face life-threatening and disruptive problems, including recurrent AMI and

Congestive Heart Failure (CHF). In Canada, among AMI survivors, 12.5% are readmitted within one year for angina, 7.7% for a second AMI and 7.5% for CHF (Heart and Stroke Foundation of Canada, 2006). Moreover, the impact of AMI extends far beyond the purely physical. 1 year after AMI, only 31% of Canadian AMI survivors think their health better than 1 month before AMI (Heart and Stroke Foundation of Canada, 2006a).

AMI leads not only to sudden physical impairments, but also to long-term psychosocial consequences. Residual quality of life problems are common after acute myocardial infarction (AMI). For example, depression is very common among post-AMI (Frasure-Smith, Lesperance, & Talajic, 1993; Frasure-Smith, Lesperance, & Talajic, 1995), which is an independent risk factor for increased mortality among post-AMI patients.

Brown et al (1999) found lower Short form-36 scores on health related quality of life (HRQOL) 4 years after AMI, compared with the community normative score. Short term study shows the similar result. At 5 months after AMI, both physical and mental components were lower than the normative scores (Brink, Karlson, & Hallberg, 2002).

Focus of the Thesis

In particular, this thesis will examine the relationship between SES and quality of life after AMI. SES is a general term used to describe individuals' economic and social status such as occupation, income, and education (Alter, et al. 2006b). It is now recognized as being important for researchers and health policy makers to consider SES when conducting health studies (Aalto, et al. 2006). Some have also suggested incorporating SES into patient's cardiovascular risk factor calculations (Tunstall-Pedoe & Woodward, 2006).

SES is associated with access to AMI treatments and mortality rate (Hetemaa, et al. 2004; Salomaa, et al. 2000; Alter, Naylor, Austin, & Tu, 1999; Alter, Chong, Austin, Mustard, & SESAMIN Study Group, 2006). Low SES is linked to an increased risk of AMI mortality and decreased treatment access (Rao, Schulman, Curtis, Gersh, & Jollis, 2004; Salomaa, Niemela, Miettinen, Ketonen, Immonen-Raiha, Koskinen, et al.2000). Importantly, these differences are not accounted for by biology, clinical presentation or treatment (Barakat, Stevenson, Wilkinson, Suliman, Ranjadayalan, K., & Timmis, 2001). However, little research has been undertaken examining the association between SES and long-term health related quality of life (HRQOL) changes among AMI survivors. Therefore, this study will focus particularly on the influence of SES on health after an AMI, particularly in relation to quality of life.

Consistent associations internationally have been detected between SES and access to AMI treatments and mortality rates (Alter et al., 1999, 2006; Alter, Venkatesh, et al., 2006; Hetemaa et al., 2004; Salomaa et al., 2000). Low SES is linked to an increased risk of AMI mortality and decreased treatment access (Rao, Schulman, Curtis, Gersh, & Jollis, 2004; Salomaa et al., 2000). It is important to note that these differences are not accounted for by clinical presentation or treatment (Barakat et al., 2001); further, they are likely to have a significant impact on quality of life. However, little research has been undertaken to examine the association between SES and long-term HRQOL change. Therefore, this study will focus particularly on the influence of SES on health after an MI, particularly in relation to quality of life.

Research Questions

1. What are the changes in HRQOL among one year post-AMI patients?

2. To what degree does SES influence HRQOL after one year in post - AMI patients?

Conceptual Framework

A considerable amount has been written about the conceptualization and measurement of both SES and HRQOL. Traditional conceptualization considers SES as control variables in clinical and public health studies (Braveman, et al. 2005).Braveman (et al. 2005) illustrated that analyzing SES variables of main interest could affect research findings and conclusions. The conceptual framework of this study includes:

(1). Considering SES variables as much as possible;

(2). SES variables to be as main interest;

(3). Specifically analyzing SES after controlling clinical factors.

Significance of the Study

This study will further clarify the role of SES in long-term HRQOL after AMI. An exploration of the association between SES and HRQOL will help decision makers and health professionals to understand the implications of SES on AMI outcomes.

CHAPTER TWO:

LITERATURE REVIEW

This chapter describes the concepts and findings related to SES and AMI patients and their HRQOL. The purpose of this chapter is to (a) outline the definitions, epidemic, treatments, and consequences of AMI; (b) review the research on HRQOL regarding post-AMI patients; (c) discuss the concepts and findings of SES disparities related to AMI outcomes; and (d) identify the study hypothesis.

Though this is not purported to be a *systematic* review, the rationale for this literature review is the concept of an *integrative research review*, which means that previous research will be summarized by drawing overall conclusions from separate studies that address the topic area with the aim of not only describing the current state of knowledge, but also discussing important issues that previous studies have left unsolved (Cooper, 1989).

Studies were identified by searching health science database literature indexed in MEDLINE, Web of Science, CINAHL, and Pub Med from 1970 to November 2005. Search terms include *acute myocardial infarction*, *health-related quality of life*, *psychosocial factors*, and *socioeconomic status*. As well, related studies in key publications were equally valuable sources of literature.

The conceptions of SES

SES is defined as the economic, social and physical environments in which individuals live and work, as well as demographic and genetic characteristics (Roos, et al. 1995). In another word, SES is a person's position or standing in a society because of

income, education level, occupation, and social status in the community (such as contacts within the community, group associations, and the community's perception). It is commonly measured by education, income, occupation (Mueller, Patil, & Boilesen, 1998; Williams & Collins, 1995).

Numerous studies have documented the relationship between SES and health. Kosteniuk and Dickinson (2003) analyzed the Canadian National Population Health (NPH) data for 1994-1995 and found that household income is a direct socioeconomic indicator. Wilkinson and Marmot (2003) comprehensively explored the social and economic factors that affect population health in European societies. They found that lifestyles, living conditions, and work environment strongly influence people's health.

However, Wilkinson and Marmot's study (Wilkinson & Marmot, 2003) is based on UK data and might not apply to Canadian society. For instance, Canada's and the UK's social gradients and the health service system are quite different. In 2004, Raphael published an overview of how socioeconomic factors affect the health of Canadians and identified 11 critical areas that significantly affect the health of Canadians: Aboriginal status, gender, early life, education, employment and working conditions, food security, health care services, housing, income and its distribution, social safety net, social exclusion, and unemployment and employment security (Raphael, 2004).

Introduction of AMI

AMI Definition

AMI (or heart attack) is a sudden blockage of the coronary arteries that causes ischaemia, which leads to necrosis and lasting damage to the heart muscle (Rubin & Farber, 1995). AMI is a diagnosis at the end of the spectrum of myocardial ischemia or

acute coronary syndromes (Rubin & Farber, 1995; Cotran, Kumar, & Robbins, 1994).

Hardening and narrowing of the coronary arteries that feed the heart are usually caused

by atherosclerosis. In some cases, a blood clot blocks blood flow; in others, the

narrowing is caused by atherosclerosis alone or spasm of the coronary arteries.

AMI Epidemic

AMI remains a very common health problem in the developed world. About

260,000 AMIs occur annually in the UK (147,000 in men and 121,000 in women in

2002). The average of the incidence rate for men aged 30 to 69 is about 600 per 100,000

and for women is about 200 per 100,000 (British Heart Foundation, 2005). In about 30%

of cases, patients die before researching hospital (Petersen, Peto, Scarborough, & Rayner,

2005).

In Canada it is estimated that there are over 70,000 heart attacks annually. Figure

1 shows that 9.5% of deaths in 1999 were due to AMI in Canada. However, 19,000

Canadians died from heart attacks in 2001 (Heart and Stroke Foundation of Canada,

2003).

In the US the latest estimation of prevalence for MI in 2006 is 7,200,000, which is

an increase of 100,000 from 2005 (Thom et al., 2006). Approximately 1.1 million persons

have AMI per year in the US (American Heart Association [AHA], 2000). 25% of men

and 38% of women will die within one year after having an initial AMI. The estimated

incidence of AMI is 565,000 and 300,000 re-infarction annually in the US (National

Heart, Lung, and Blood Institute [NHLBI], 2004).
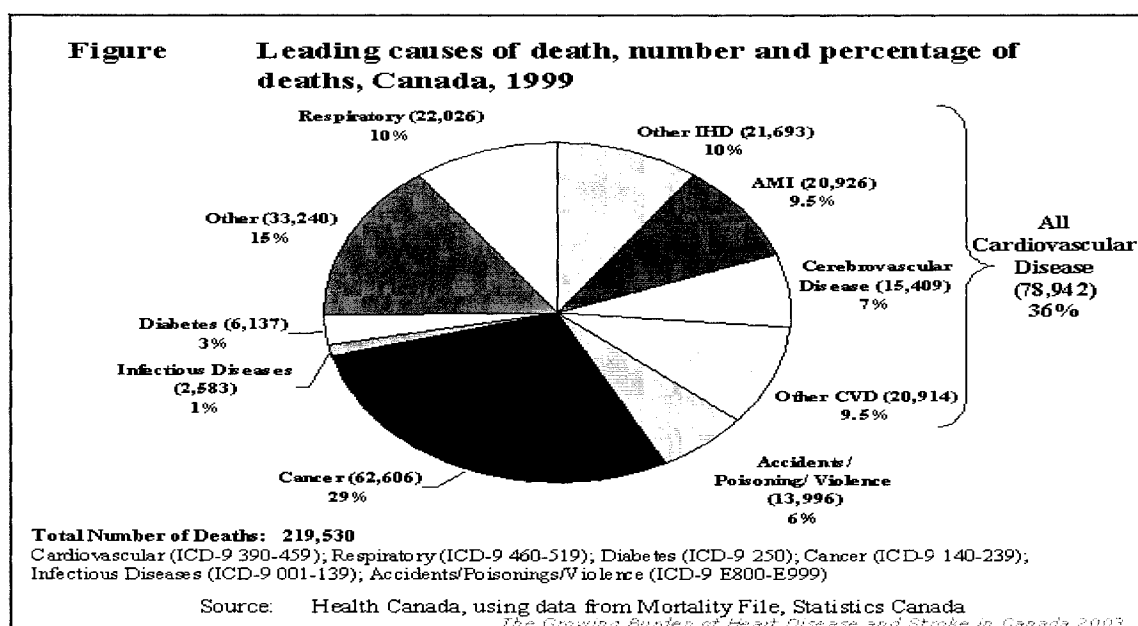
Figure 1. Deaths by cause, Canada (Heart and Stroke Foundation of Canada, 2003).

AMI Treatments

Under the American College of Cardiology/AHA guidelines for the management

of patients with AMI, AMI treatments include such as anti-platelet therapy,

Supplemental oxygen, percutaneous revascularization, fibrinolytic therapy, percutaneous

transluminal coronary angioplasty (PTCA), and Coronary artery bypass graft (CABG)

surgery (Brener et al., 1998; Ryan et al., 1999). Patients who experience an AMI are

typically hospitalized for 7-10 days, and recovery can last up to six weeks or longer,

including participation in a cardiac rehabilitation program (Ell & Dunkel-Schetter, 1994).

Post-AMI issues

During the post-AMI period, the priority care focuses on how to help patients

comply with the prescribed therapy, adopt the positive lifestyle changes, and cope with

the physical and/or mental health decline. Cardiac rehabilitation is provides post-AMI

patients with continued education, reinforcement of lifestyle modification, and adherence

with a comprehensive prescription of therapies for recovery (Brener et al., 1998; Ryan et al., 1999).

However, many eligible patients fail or refuse to attend cardiac rehabilitation programs (Cooper, Jackson, Weinman, & Horne, 2002). Cooper et al. found that non-attendees were more likely to be older and to have lower income, employment status, and gender and health awareness, which indirectly affect attendance behavior.

Many researchers have observed psychological problems such as depression, anxiety, stress, anger, and other negative affectivity among post-AMI patients (Ell & Dunkel-Schetter, 1994; Frasure-Smith et al., 1995). Furthermore, Ell and Dunkel-Schetter reported that feelings of loss can contribute to patients' negative emotional reactions following an AMI, which can interfere with recovery and motivation to participate in rehabilitation. AMI leads to HRQOL changes that usually stem from physical impairments as well as the disparities of individuals' SES. To fully understand patients' psychosocial adjustment to AMI, it is important to understand HRQOL changes by considering the impact of SES.

AMI: Patterns by Gender, Age, and Ethnicity

The prevalence and mortality rate of AMI varies by gender. AHA (2005) data indicate that men have a greater risk of AMI than women do and that they have attacks earlier. The latest literature has also shown that after one year AMI mortality rates are higher in women than in men (AHA, 2005; WHO, 2006). Women are also more likely to die within the short term, and 25% of men and 38% of women will die within one year after having an initial recognized AMI (AHA, 2005).

In general, the risk of AMI also rises with age (AHA, 2005; WHO, 2006). Figure 2 shows that Americans' annual AMI occurrence is increasing by age for both genders. The average age of a person with a first AMI is 65.8 for men and 70.4 for women in the US (NHLBI, 2004). Older age is the main cause of higher AMI mortality in women than in men (AHA, 2005).

AMI prevalence rates are also different among different racial and ethnic populations (AHA, 2006; WHO, 2006). Older patients, ethnic groups, and women all represent groups who are particularly vulnerable to AMI and its implications. The age-specific AMI mortality rate increases by age in both men and women in Canada (Heart and Stroke Foundation of Canada, 2000). Among American adults aged 20 and older, the estimated age-adjusted prevalence of AMI for non-Hispanic Whites is 5.1% for men and 2.4% for women; for non-Hispanic Blacks, 4.5% for men and 2.7% for women; and for Mexican-Americans, 3.4% for men and 1.6% for women (NHIS, 2002).

SES impacts on AMI patients.

Research on SES and health can be divided into three categories (Kaplan, 2006): (a) studies that examine the association between SES and health; (b) studies that search for an appropriate explanation for the association; for example, some research considers psychological factors in explaining the association between SES and health (Bruner & Marmot, 2005; Lynch, Smith, Kaplan, & House, 2000); and (c) studies that focus on interventions to reduce SES-related disparities in health outcomes.

SES has both a direct and an indirect influence on the trends and changes in AMI morbidity and mortality. Marmot and Mustard (1994) identified the high strength of this link effectively: "Socioeconomic differences within countries have come to assume such

major importance that continued exploration of underlying connections between social position and CHD is likely to be fruitful"

The association between SES and CVD risk factors has been well documented. During the past few decades a considerable number of researchers tested the relation between SES and CVD mortality in geographically diverse populations (Kaplan & Keil, 1993). In the literature, education, occupation, and income are considered the principal measures of SES. Particularly education has been the most frequent measure because education as a single SES factor has a stronger association with CVD mortality rate than other SES factors do (Davey et al., 1998).

On the other hand, the results of previous studies indicate that gender hinders access to treatments for coronary heart disease ([CHD] Manderbacka, 2005; Svennevig, 2004). Manderbacka interviewed 30 Finnish-speaking persons diagnosed with or suspected to have CHD. Women and persons from lower socioeconomic groups were more likely to have difficulties in accessing services and to lack a permanent contact in primary care. Haglund et al. (2004) found that men were 1.5 times more likely to undergo revascularization treatment than women were.

The existing data from the literature also show that patients from lower socioeconomic groups have more severe cardiac disease and are more likely to have difficulties in accessing health services and lack continuity of care (Manderbacka, 2005; Svennevig, 2004). In particular, SES has been observed as an important determinant of the use of invasive procedures in AMI patients (Philbin, McCullough, DiSalvo, Jenkins, & Weaver, 2000).

In New York State, AMI patients in the highest income quintile were 22% more likely to undergo catheterization, 74% more likely to have PTCA, 48% more likely to get CABG, and 76% more likely to receive any revascularization procedure than were patients in the lowest quintile (Philbin, McCullough, DiSalvo, Jenkins, & Weaver, 2000).

Generally, low levels of SES are associated with low levels of education (Davey et al., 1998). Low levels of education tend to correspond with poor health-related behavior in terms of diet and exercise and with a raised risk of overweight and obesity in terms of self-esteem (Davey et al., 1998; Wilkinson & Marmot, 2003). Furthermore, factors that lead to poor health, such as smoking and obesity, and poor health status (hypertension, diabetes, and hypercholesterolemia) are highly related to AMI. Research results continue to confirm the relationship between lower SES and HRQOL (Evans & Stoddart, 1990). For example, for two years Alter & Chong et al. (2006) studied a cohort of almost 5,000 Canadian patients who were hospitalized after AMII. They found that poorer patients (<$30,000 CAD) have a greater incidence of preexisting CVD and cardiac risk factors (diabetes, hypertension, hypercholesterolemia, smoking, and family history of CVD). The association between household income and mortality rate becomes substantially weaker after the differences of preexisting CVD and cardiac risk factors are adjusted. Past CVD events and baseline cardiac risk factors accounted for the highest SES-AMI mortality association after AMI (Alter, & Venkatesh, et al., 2006).

Independently, education as a very important indicator of SES is strongly related to health outcomes. Jaglal and Goel (1994) and Williams and Collins (1995) demonstrated the relationship between lower education levels and worse health care outcomes.

Trends in health associated with SES are not only associated with patients but also are linked to health services. SES level can affect medical treatment and post-AMI rehabilitation. Figure 2 shows the relationships among SES, HRQOL, and AMI. Patients with upper-income or better-education are usually able to access the most advanced medical treatments and services (Raphael, 2004; Wilkinson & Marmot, 2003).
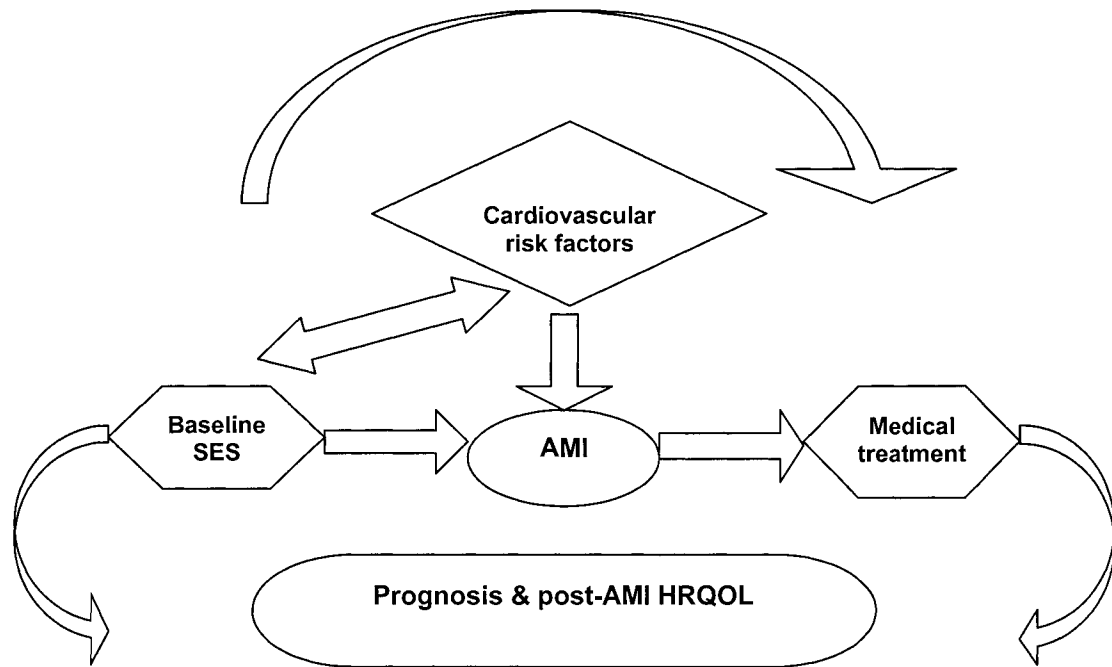
Figure 2. Relationship model: SES, HRQOL, and AMI.

These trends persist even in health systems with free access to health care. For example, the Canadian health care system covers all medically necessary services that hospitals and physicians provide without any user fees and based on the principle of access according to need rather than income (Naylor, 1992). However, despite the lack of direct financial barriers to treatment, studies from Winnipeg and Manitoba report a 43% relative increase in the standardized mortality rate from ischemic heart disease among the lowest income quintile compared with the highest (Ross & Mustard, 1997).

Alter, Iron, Austin, Naylor, and SESAMI Study Group (2004a) reported that upper-income and better-educated Canadians receive more specialty cardiac services than do those in lower socioeconomic groups. On the other hand, patients in the lower and middle groups of income and education receive fewer specialty services (Alter et al., 2004). Income and education are independently associated with preexisting cardiovascular disease and the prevalence of AMI patients younger than 65 years of age (Alter et al., 2004a).

Shen, Wan, and Perlin (2001) conducted another study in the US on the relationship between SES and AMI outcomes. A total of 95,971 AMI discharges in 11 states were involved. The risk factors included demographic and clinical characteristics; ethnic differences did not seem to be a significant factor after adjustment for other SES attributes. Patients with poor SES had a much higher mortality risk, more comorbidities, a longer length of stay, and higher total hospital charges and underwent fewer AMI specialized procedures than patients with good SES did.

Some studies searched for an appropriate explanation for the association. Beyond the evidence discussed showing the effects of treatment and its access, why then does this relationship persist between SES and health? Pollitt, Rose, and Kaufman (2005) systematically reviewed 49 observational studies in the biomedical literature that examined the association between life-course SES, the prevalence of traditional CVD risk factors, and CVD outcomes. They identified four hypotheses to account for links between SES and outcomes: latent effects, pathway, accumulation to influence adult mobility, and cumulative life-course models (Pollitt, Rose, & Kaufman, 2005).

The latent effects model hypothesizes that earlier-life SES affects biologic resources and directly influences adult health (Kuh & Ben-Shlomo, 1997). For example, after adjusting for biological and behavioral risk factors in adulthood, the association between them did not change in CVD death, CHD death, and acute coronary events (Kauhanen, Lakka, Lynch, & Kauhanen. 2006).

The pathway model proposes that interactions in different environments and experiences throughout life can affect adult risk of CVD. Alter and Venkatesh et al. (2006) hypothesized that cardiovascular risk factors remain the central intermediate pathway between SES and increased AMI mortality rate. Furthermore, they suggested that the association between SES and increased AMI mortality rate can be explained by traditional risk factors and variation in service use (Alter and Venkatesh et al. 2006). Age and conventional risk factors are determinants of AMI mortality rate in different populations and health care systems. The traditional cardiovascular risk factors may be the intermediates between income and mortality rate after AMI.

The cumulative model hypothesizes that both psychosocial and physiological experiences affect the increased disease risk. It describes an individual's biological resources accumulated over the life course (Ben-Shlomo,& Kuh, 2002). The accumulation of risk model emphasizes that the impacts of different life-course events accumulate but do not interact (Ben-Shlomo, & Kuh, 2002; Smith, Ben-Shlomo, & Lynch, 2002).

Szreter and Woolcock (2004) contributed further understanding to the conditions that influence population health. They categorized three conceptions of social capital in publish health:

(1) A 'social support' perspective argues that informal networks are central to objective and subjective welfare; (2) an 'inequality' thesis posits that widening economic disparities have eroded citizens' sense of social justice and inclusion; (3) a 'political economy' approach sees the primary determinant of poor health outcomes as the socially and politically mediated exclusion from material resources. (p. 1)

Szreter and Woolcock (2004) emphasized bonding, bridging, and linking social capital in population health issues. The social network structure and social relations influence the health outcome. As the evidence detailed previously, lower SES population has a higher incidence of disease and higher mortality worldwide (WHO, 2004). Specifically, lower SES is related with increased risk of CVD (WHO, 2004; Yusuf, et al. 2004). The absence of social network, such as lack of social support, is one of the risk factors for AMI (Carlos et al., 2005).

Review of the Research on HRQOL for Post-AMI Patients

Conceptions of HRQOL

The dependent (or outcome) variable in this study is HRQOL, which is measured by SF-36. HRQOL provides information to evaluate the impact of the disease and/or treatment on the patient's life (McBurney et al., 2002; Armstrong, D., Ogden, J., Lilford, R., & Wessely, S., 2005). The concept of HRQOL emerged between the 1970s and 1980s (Bergner et al., 1976), and in the last 30 years HRQOL has been a widely accepted and frequently applied outcome measure in health research (Bradley & Tamburini, 2003; Greenfield & Nelson, 1992; Lam, 1997; Wilson & Cleary, 1995). HRQOL measurement tools usually contain measurements of general health, physical and mental health, and social functioning. Generally, there are two types of HRQOL models: (a) the biomedical model focuses on mortality rate and biomedical outcomes of diseases. For example, health professionals evaluate survival rate or physiological recovery to determine

treatment outcome. However, the biomedical model neglects the impact of illness on behavioral functioning and psychosocial HRQOL; and (b) Alternative model (Squier, & Kaplan, 1996; Kaplan, 1995). Kaplan indicates that behaviors are very important indicators of health and wellness. The Kaplan model considers physiological states predictors or mediators of behavioral outcomes. These two types of HRQOL models represent a shift from traditional medical outcome measures to a comprehensive physical and psychosocial measure.

To assess the impact of disease and the response to interventions, over 800 HRQOL instruments have been developed since the 1980s (Anderson & Meyers, 2000; Cella, Dineen, et al., 1996; Davis & Pathak, 2001; Lankhorst et al., 1996; Ritvo et al., 1997; Vickrey, et al., 1995; Wu et al., 1991). Many valid and standardized self-assessment tools have been developed to measure HRQOL. Both physical and psychological aspects of a patient's HRQOL status can be measured using these numerical scales (Hemingway & Marmot, 1999; Holcik & Koupilova, 1999). Although qualitative dimensions of HRQOL clearly exist, quantitative expression presents a chance to evaluate the changes of HRQOL in larger samples at the population level.

Two categorized HRQOL instruments are currently well recognized by researchers: generic and disease-specific questionnaires (Dempster & Donnelly, 2000; Holcik & Koupilova, 1999). Generic questionnaires are applicable across a wide variety of health care conditions. Disease-specific assessment instruments target symptoms, outcomes, and experiences associated with particular diagnoses.

Ware and Sherbourne (1992) developed the short-form (SF-36) questionnaire, which includes 36 items in long-form measures developed for the medical outcomes

study (Ware, Snow, Kosinski, & Gandek, 1994). The SF-36 includes eight health concepts: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, general mental health, social functioning, energy/fatigue, and general health perceptions. In addition, a single item is included in SF-36 that indicates a perceived change in health. Muller-Nordhorn, Roll, and Willich (2004) reported that the SF-12 appears to be an efficient alternative to the SF-36 for the assessment of HRQOL of patients with CHD. Hays, Sherbourne, and Mazel (1993) distributed the RAND-36 Health Survey, which includes the same items as those in the SF-36 and differs only in its simplified scoring method. RAND-36 takes into account the potential interactions between mental and physical health. However, the SF-36 considers mental health and physical health as two systems. Therefore, the physical and mental health composite scores are different for the RAND-36 and the SF-36.

Currently, disease-specific questionnaires are applicable to such chronic diseases as arthritis, CHD, depression, and neurological impairment: the Core Questionnaire 30 (Fayrers & Bottomley, 2002), the MacNew Heart Disease Questionnaire (Lim et al., 1993), and the Seattle Angina Questionnaire (computer-based versions). Hillers et al. (1994) developed the quality of life after MI (QLMI) instrument and administered a cross-sectional survey to 63 post-AMI patients. Nowels, McGloin, Westfall, and Holcomb (2005) compared the EQ-5D, SF-36, QLMI, and the Canadian Cardiovascular Society Angina Classification (CCSG) scores in 99 post-MI patients.

The prognosis of diseases is very different, as is the severity, and measuring the HRQOL is a vital part of assessing the effect of medical treatment. For a complete,

accurate, and responsive assessment of the HRQOL that is both generic and disease specific, quality-of-life instruments should be applied together in evaluating patients.

Importance of HRQOL in Post-AMI Patients

With advances in medical technology, rates of AMI survival have increased (Heart and Stroke Foundation, 2003), which has led to increased concerns about poor HRQOL in post-AMI patients (AHA, 2000; Heart and Stroke Foundation of Canada, 2003). To further justify the importance of examining HRQOL, a review of the research that has been conducted on the HRQOL measure of post-AMI patients in the last 25 years is presented.

At the beginning of the 1980s few studies examined the changes of HRQOL status among patients with AMI. It was evident, however, that AMI had broad and marked impacts on individuals' holistic well-being and adversely affected sexual and work readjustment, social status, and values clarification (Herlitz, Bengtson, Wiklund, & Hjalmarson, 1988; Waltz, 1986; Saito, Fuseno, Honda, Haze, & Hiramori, 1983;) In the late 1980s the term *quality of life measure* emerged in the literature to describe these impacts in broad terms. Follick et al. (1988) conducted a prospective cohort study with 238 post-AMI patients. They defined quality of life in terms of psychological status, return to work, and social functioning. There was a growing concern about psychological symptoms, and they reported that depression inversely affects post-MI patients' perceptions of their ability to manage a recurrence of cardiac symptoms. Self-evaluated health is an important aspect of Quality-of-Life after Myocardial Infarction (QLMI) and that psychological distress clearly influences HRQOL (Maeland & Havik, 1988).

During this early stage, studies focused more on the impact of medical treatments than on social factors and used HRQOL as a secondary outcome for the evaluation of different medical treatments. For instance, in Herlitz et al.'s (1988) five-year longitudinal study, 1,395 patients participated in a clinical trial with metoprolol. The results show that morbidity and quality of life were not significantly affected five years after early intervention with metoprolol in patients with suspected AMI.

During the 1990s more and more researchers have applied the HRQOL concept to their studies (Laerum et al., 1991; Lim et al., 1993; Oldridge et al., 1991; Wiklund et al., 1991). They developed and tested self-evaluation questionnaires in the research. For instance, Lim et al. modified and tested the QLMI questionnaire that Oldridge et al. created. Lim et al.'s results indicate that that the QLMI questionnaire is a valid instrument for assessing quality of life in post-AMI patients.

Researchers in the 1990s also explored the impact of psychosocial factors on HRQOL in post-AMI patients. For example, in a qualitative study Drory, Kravetz, and Florian (1999) interviewed 290 male patients with a documented first AMI to ascertain their psychosocial adjustment after AMI. Depression, a sense of medical coherence, and social support predict psychosocial adjustment in most life domains three to six months after AMI (Drory et al., 1999). Furthermore, Drory et al. (1999) identified some important psychosocial variables as predictors of a poor medical outcome: the lack of a stable partnership, a high workload, poor general well-being with multiple chronic nonspecific health complaints, and failure to identify disease-promoting factors within the patients' own surroundings or lifestyle (Hoffmann et al., 1995).

Since 2000 researchers have examined in more detail how social factors and psychological issues affect HRQOL after AMI. Some used HRQOL instruments to predict the prognosis of AMI or the events after AMI (Fogel et al., 2004). Others specifically investigated how SES affects HRQOL among post-AMI patients. For example, the absence of social support and untreated depression are risk factors for AMI that have been proven in the literature (Carlos et al., 2005; Frasure-Smith & Lesperance, 2003; Strik, Lousberg, Cheriex, & Honig, 2004; Strine, Chapman, Kobau, & Balluz, 2005).

In the latest research a team from Johns Hopkins University School of Medicine examined the relationship between baseline depression and HRQOL in a cohort of patients after hospitalization due to AMI (N = 196). After adjusting for pre-infarction quality of life, in-hospital anxiety, and SES variables, they found that depression is prospectively and independently associated with reduced general health at four months as well as reduced overall mental health—including vitality, psychological health, and social function—and increased role interference from psychological problems (Fauerbach et al., 2005). In another longitudinal study, Kristofferzon (2005) compared coping, social support, and quality of life for women and men after AMI.

Overview the last 25 years researchers have found that different medical treatment and rehabilitation programs affect patients' physical functions. Psychosocial factors are significantly related to quality of life. However, little research has linked AMI, HRQOL, and SES.

Studies for Assessing HRQOL in Post-AMI Patients:

An extensive body of evidence has shown that HRQOL after AMI significantly influences long-term mortality after AMI. Those with self-perceived poor health have a greater mortality risk than those with self-perceived good health do (Idler & Benyamini, 1997). Idler and Benyamini analyzed 27 longitudinal studies of survey respondents' global self-ratings of health as predictors of mortality, and 23 confirmed that self-rating of health predicts survival/mortality, even when adjusting for known health risk factors.

Specifically, Westin, Nilstun, Carlsson, & Erhardt (2005) studied the self-ratings of health as predictors of CVD mortality. The findings of self-administered quality of life questionnaires completed one year after AMI (n = 296), CABG (n = 99), or percutaneous coronary intervention ([PCI] n = 18) suggest that post-AMI patients' own experience of their quality of life has prognostic importance for long-term mortality after a cardiac event.

The Impact of Psychosocial Factors

There is clear and convincing evidence that psychosocial factors contribute significantly to the pathogenesis and prognosis of AMI. Ryan et al. (1999) reported that psychosocial factors affect the development and course of CAD (Rozanski, Blumenthal, & Kaplan, 1999). Smith and Ruiz (2002) systematically reviewed 326 human and animal studies and found psychophysiological mechanisms that influence CAD and its progression to CHD. Their findings suggest that psychosocial characteristics may predict the development and course of CHD and that depression and anxiety may be especially important following AMI.

Psychosocial problems are very common post-AMI (Frasure-Smith et al., 1993, 1995). Research has provided clear and convincing evidence that psychosocial factors

contribute significantly to AMI short-term outcome and long-term recovery (Bucher, 1994; Frasure-Smith et al., 1993, 1995; Lillie-Blanton, Parsons, Gayle, & Dievler, 1996; Lauzon et al., 2003). For instance, Frasure-Smith et al. (1995) followed 218 post-MI patients for 18 months. Post-MI patients completed the Beck Depression Inventory (BDI), which measures depressive symptoms, and the result show that elevated BDI scores have a significant long-term prognostic impact independent of traditional post-MI risk factors (odds ratio, 7.82; 95% CI, 2.42 to 25.26; P = .002).

Hemingway and Marmot (1999) defined psychosocial factors as an HRQOL measurement that potentially relates psychological phenomena to the social environment. Furthermore, they confirmed a link between SES, social support, depression and work stress, and CVD. Hemingway and Marmot's longitudinal studies have shown that the role of psychosocial factors in CVD is strongest for social isolation, depression and anxiety, and low control at work. Previous studies also indicate that psychosocial issues may predict increased CVD risk (Berkman, Leo-Summers, & Horwitz, 1992; Knox et al., 1998; Krumholz et al., 1998; Musselman, Evans, & Nemeroff, 1998).

The evidence from the literature shows that depression is the most frequently investigated factor in post-AMI outcome studies (Frasure-Smith et al., 1993, 1995). Psychosocial variables have proven to be powerful predictors of physical health and quality of life in both observational studies and clinical trials in longitudinal studies of patients with MI patients (Bucher, 1994). It has been recognized that depression is a significant predictor of post-AMI mortality for women as well as for men, and its impact is largely independent of other post-AMI risks (Frasure-Smith et al., 1999). Lesperance, Frasure-Smith, Talajic, and Bourassa (2002) revealed that depressive symptoms increase

the risk for cardiac events during the first year post-AMI and predict mortality five years post-MI. In the latest study, Grace et al. (2005) recruited 750 patients with AMI and reported that depression during hospitalization is significantly predictive of five-year mortality after AMI.

Although there is a growing body of research that focuses on SES, AMI, and HRQOL, there is no enough information based on the Canadian AMI population. This fact increases the importance of this study because the results are expected to be valuable for Canadian health and social support systems.

Studies have focused on HRQOL as an outcome of specific pharmacological, technological, and program-evaluation perspectives. Researchers have addressed rehabilitation programs and medical treatment evaluations and reviewed factors such as gender, age, and ethnic perspectives. As well, previous studies have considered specific psychological issues related to low income, lack of social support, and poor education. However, little research has linked AMI, HRQOL, and SES.

In the literature, SES variables are usually analyzed as confounding variables and less frequently as the variable(s) of primary interest (Benzeval, Judge, & Shouls, 2001; Braveman et al., 2005; Kunst, Groenhof, Mackenbach, & Health, 1998; Lannin et al., 1998; Marmot, Bosma, Hemingway, Brunner, & Stansfeld, 1997). Braveman et al. cautioned that ignoring the role of SES could affect research findings and conclusions and have implications for practice and policy. It is therefore important to explore changes in the pathways and mechanisms between SES and HRQOL for AMI patients.

Although the mechanisms through which SES affects HRQOL are still incompletely delineated, traditional cardiovascular risk factors and health service

intensity are potentially modifiable among the poor and those with less education. Therefore, this study focuses on delineating the extent to which changes in long-term HRQOL after AMI can be explained by SES differences.

Summary of Literature Review

Studies of SES, AMI, and HRQOL have been reviewed. In previous studies researchers have suggested that for a population with equal access to medical care, comprehensive consideration of social, personal, and medical factors could explain gender and age disparities in prognosis after AMI. The existing data show that ethnic differentials in health outcome are minimized when data are stratified or adjusted for social class (Lillie-Blanton et al., 1996). The relationship between AMI outcome and SES has not been well explained, and further investigation is necessary (Shen et al., 2001).

CHAPTER THREE:

METHOD

This chapter presents a description of and justification for the study design and a discussion of the sample size, the data collection, the main measured variables, the data analysis, and ethical considerations.

Study Design

Because the research questions were designed to determine the influence of factors on each other, a quantitative approach was most appropriate. Given the time and financial constraints of this study, an existing dataset from Pilote et al.'s (2002) previous historical-perspective longitudinal study of quality of life after AMI was used. The purpose of this prior study was to compare the differences between the quality of life and functional status of patients with AMI who were treated at five sites in Quebec and those of patients without angiography at five sites. The full dataset contains fields related to demographic characteristics, SES, quality of life and functional status that were collected by questionnaire at baseline, 30 days, 6 months, and 1 year after AMI.

The purpose of conducting a secondary analysis was to maximize the use of the existing database. Because the issues of instrument development, validity, and reliability were addressed in the original study, a multiple-statistics method was used in the secondary analysis with confidence.

Sample and Setting

The study population included patients who confirmed diagnosis of AMI (Q or non-Q wave) according to WHO criteria (Ryan et al., 1999). Data were collected from

patients who resided in the Coronary Care Units of 10 sites in Quebec at 30 days,

6 months, and 1 year after AMI. Between January 1997 and November 1998, patients

were recruited from five sites (n = 253) with the availability of angiography and five sites

(n = 334) without the availability of angiography. Patients provided baseline data 30 days

after the diagnosis of AMI. During the one-year follow-up, at six months and one year

after AMI, information was obtained through a mail-in survey (see the appendix of the

original source for further details). The inclusion criteria for all 10 sites were

(a) admission through the emergency department, (b) the ability to read and understand

either English or French, (c) a physician confirmation of Q or non-Q wave AMI, and

(d) survival up to 24 hours after hospital admission. The two exclusion criteria were

(a) transfer from another floor in the hospital and (b) incapability of responding to a

questionnaire because of the level of physical health.

Measurement of SES Variables

SES is usually determined by measuring one or more indicators of the following:

education, income, occupation, or factors related to these dimensions such as ethnicity,

age, and gender. Such measures have been used in many studies (Alter et al., 1999, Alter

etal., 2005; Alter, Chong, et al., 2006; Canto et al., 2000; Clarke, Gray, Keating, &

Hampton, 1994; Gan et al., 2000; Gatsonis, Epstein, Newhouse, Normand, & McNeil,

1995; Hannan, & Kumar, 1997; Hanratty et al., 2000; Krumholz, Douglas, Lauer, &

Pasternak, 1992; Maynard, Every, Martin, & Weaver, 1997; Raine, Crayford, Chan, &

Chambers, 1999; Wilkinson, Laji, Ranjadayalan, Parsons, & Timmis, 1994). Alter and

Chong et al. (2006) examined the variation of CVD risk factors according to SES

variables (income and education) among 1,636 AMI patients in Ontario. Income and education were used as SES measurement (Alter and Chong, et al. 2006).

Researchers examined the independent contribution of education, income, and occupation to a set of traditional CVD risk factors (cigarette smoking, systolic and diastolic blood pressure, and total and high-density lipoprotein cholesterol; Winkleby, Jatulis, Frank, & Fortmann. 1992). The relationship between these SES measures and risk factors was the strongest and most consistent for education: a higher risk associated with lower levels of education. Both income and education can influence health outcomes. Occupation is the primary basis for SES measures, and researchers have observed a significant relationship between occupation and health indicators after controlling other SES variables (Benzeval et al., 2001; Mackenbach, Kunst, Cavelaars, Groenhof, & Geurts, 1997). Thus, education and occupation should be considered independently as SES factors other than the proxy of income. Although previous studies found that SES variables (such as education, income, and occupation) are the main risk factors for CVD, it is unknown whether SES can predict the mortality of CVD or AMI (Alter, Chong, et al., 2006; Benzeval et al., 2001; Mackenbach, Kunst, Cavelaars, Groenhof, & Geurts, 1997).

In the original study (Pilote et al., 2002), self-reported total household income from all sources (including earnings, pensions, investments, etc.) before taxes was measured according to six categories of variables ranging from <$10,000 to >$60,001 CAD. Also, the major income earners in patients' households during the last year were analyzed according to five categories of variables: myself, my spouse or spouse equivalent, my parents or in-laws, my children, or other individual(s). The self-

reported highest educational attainment was determined by five categories of variables ranging from no school to university or professional.

Information on support was collected through three categories of variables: social support, someone around to help if needed, and the number of people living with the patient. Social support was measured as a binary variable (fair amount of support and assistance vs. little or no support and assistance). "Someone around to help if needed" as a variable was categorized in five levels from "Yes, quite bit" to "No, not at all." Also the self-reported number of people living in the patient's house (excluding the patient) was originally measured as a numeric variable.

Information on patients' occupation was collected through the following four categories of variables: (a) "Working status before hospitalization," (b) "Planning to return to work," (c) "Which statement best describes how you are (or were) paid?" and (d) "How many hours per week did you work?" (Pilote et al., 2002)

Pilote, et al. (2002) considered the ways in which race/ethnicity and SES relate to each other and combine to affect racial variations in health status. The authors reviewed a number of methodological issues concerning the assessment of race in the US that importantly affect the quality of the available data on racial differences in health (Williams, 1996).

Ethnic variations in CVD risk factors have been found in many studies (Cowie, Harris, Silverman, Johnson, & Rust, 1993; Gidding et al., 1996; Johnson, Heineman, Heiss, Hames, & Tyroler, 1986; Kuczmarski, Flegal, Campbell, & Johnson, 1994; Shea et al., 1991; Sprafka, Folsom, Burke, & Edlavitch, 1988). For example, Winkleby, Kraemer, Ahn, and Varady (1998) showed that CVD risk factors among Black and

Mexican-American women are higher than those among White women of comparable

SES . Furthermore, Williams (1996) reported ways in which ethnicity and SES relate to

each other and combine to affect ethnic variations in health status. However, Lillie-

Blanton et al. (1996) indicated that ethnic differentials in health outcome are minimized

when data are stratified or adjusted for social class.

Information on ethnicity was also obtained through self-report in the original

study (Pilote et al. 2002). In this secondary study, because 95.6% of the patients are

Caucasian, it is not appropriate to examine ethnic differences, and ethnicity will not be

considered as a part of the SES measure.

<div align="center">

Total Risk Score

</div>

To aid in the analysis, rather than using various biological factors, Boersma

et al.'s (2000) summative measurement score was used to determine cardiovascular

health. They examined the factors that affect the occurrence of adverse events after acute

coronary syndromes. After analyzing an international trial of 9,461 patients, the authors

identified age, worst CCS-class (Canadian Cardiovascular Society) in the previous six

weeks, signs of heart failure, and ST-depression ECG as the predictors of AMI mortality

or re-infarction. The identification of these risk factors provides a useful tool for the

assessment of long-term cardiac risk in a contemporary population of patients with stable

coronary disease. The total score is the baseline health stratification in AMI patients. The

risk score was calculated based on age, gender, nitrate usage, Killip-class, and ST

depression (Table 1). The summary points (total score) provide a risk score for post-AMI

mortality and re-infarction. Killip-class is a classification system used in individuals with

AMI. Individuals with a low Killip-class are less likely to die within the first 30 days

after their AMI than individuals with a high killip-class (Killip & Kimball, 1967). Killip-class II means rales in the lungs, an S3 gallop, and elevated jugular venous pressure (Drazner,). Killip-class III indicates frank pulmonary edema (Drazner, et al. 2001). Killp-class IV is cardiogenic shock (Killip & Kimball, 1967).

Table 1

Total Risk Score

Factor	Score (Mortality or infarction)
Age (year)	
≤ 50	11
51-60	12
61-70	13
≥ 71	14
Gender	
Male	1
Female	0
Nitrate used in hospital	
Yes	2
No	0
Killip-class II, III, or IV	
Yes	2
No	0
ST-depression	
Yes	1
No	0
Total score	

Instruments

The questionnaires are constituted from a baseline chart review, the SF-36, the BDI, the Europol measure, and a follow-up chart review. The baseline chart review provides the following information: patient registration, history and physical health, medications, procedures, catheterization and angioplasties, complications and arrhythmias, in-hospital clinical events, other tests, transfer/discharge, comments, name, and signature. The follow-up chart review includes the same contents except history and physical health. Trained nurses collected the data between January 1997 and November 1998 (Pilote et al., 2002).

The SF-36 as a general health status survey consists of 36 multiple-choice questions sorted into eight categories: physical functioning, mental health, bodily pain, role- physical, role- emotional, vitality, social functioning, and general health. These eight categories are divided into two overall categories of scores: physical component summary (PCS) and mental component summary ([MCS] Ware et al., 1994). SF-36 consists of eight specific dimensions of health related quality of life which include physical functioning, role physical, bodily pain, general health, vitality, social functioning, role-emotional, and mental health. Physical functioning, role physical, bodily pain, and general health are grouped into PCS. Vitality, social functioning, role-emotional, and mental health are grouped into MCS.

The PCS and MCS provide the opportunity to reduce the number of statistical comparisons during the hypothesis testing on health outcomes (Ware et al., 1995). Ware et al. tested the usefulness of both the PCS and the MCS in the Medical Outcomes Study,

in which has 1,440 patients participated. The PCS and MCS may be useful in most studies.

The SF-36 summary scales were valid, reliable, and equivalent in different populations and different diseases (Dorman, Slattery, Farrell, Dennis, & Sandercock, 1998; Failde & Ramos, 2000; Pickard et al., 1999). In particular, Failde and Ramos tested the validity and reliability of the SF-36 among 185 patients hospitalized with suspected AMI, unstable angina, nonischemic cardiologies, and/or the absence of cardiologies. Their results demonstrate that the SF-36 is a useful instrument for the differentiated clinical forms of acute ischemic heart disease.

The BDI is a self-administered 21-item self-report scale that measures supposed manifestations of depression, including characteristic attitudes toward and symptoms of depression (Beck et al., 1961). The literature reported that it has been tested and widely used. The BDI scale ranges from 0 to 63, with a higher score representing a higher level of depression; for instance, a score of 10 indicates mild to moderate depression. In the QOLAMI Investigators database, the BDI measured patients' depression symptoms.

The EuroQol is a generic instrument for measuring HRQOL that provides a simple descriptive profile of well-being in the following four dimensions: mobility, self-care, social pain, and psychological. In the QOLAMI Investigators database, the EuroQol visual analog scale measured post-AMI patients' perceptions of their overall HRQOL. The continuous scale from 0 to 100 represents the health state: 0 is equal to death; 100 is equal to excellent health.

The validity of SF-36 and EuroQol has been tested for different diseases and different populations. For example, EuroQol has been tested and provides evidence of the

validity in ankylosing spondylitis (Haywood, Garratt, Dziedzic, & Dawes, 2000).

Haywood et al. examined the reliability of the EuroQol and SF-36 among a total of 2,253

stroke patients in the international stroke trial. Both showed acceptable and qualitatively

similar test-retest reliability. Therefore, either instrument might function effectively as a

discriminatory measure in assessing health-related quality-of-life. The BDI has been

evaluated as a valid, reliable, and potential responsive instrument to assess the severity of

depression in Parkinson's disease, multiple sclerosis, and adolescent psychiatric

inpatients (Moran & Mohr, 2005; Osman, Kopper, Barrios, Gutierrez, & Bagge, 2004;

Visser, Leentjens, Marinus, Stiggelbout, & Hilten, 2006).

Data Analysis

The data from this study are a group of values of one or more variables. Values

can be either numbers or names. For example, household income is a numeric variable

(values are numbers), and gender is nominal (values are names). The rationale for

quantitative data analysis is to summarize data: variables, simple statistics, effect

statistics and statistical models, complex models, and generalization from sample to

population: precision of estimate, confidence limits, statistical significance, p value, and

errors. Furthermore, the literature revealed that most researchers have used the

quantitative method to identify the relationship between SES and HRQOL outcome.

Therefore, quantitative data analysis was suited for this study.

According to the literature, many studies have used education, household income,

occupation, clinical characteristics, and so on as indicators of SES; SF-36 has been

widely used as measure of HRQOL for various diseases (Dorman et al., 1998; Failde &

Ramos, 2000; Pickard et al., 1999). PCS and MCS have been demonstrated as useful

summary scores (Ware et al., 1995). Therefore, a single dependent variable ([DV] either PCS or MCS) and several independent variables ([IVs] education, household income, occupation, total risk score, marital status, EuroQol score, and BDI score) are involved.

In the above situation, multiple regression is an appropriate approach to the analysis of the data (Kleinbaum & Muller, 1988). PCS and MCS (at one year) are the DVs, and all of the IVs came from the baseline because the purpose of the study was to use baseline factors to predict the one-year HRQOL outcome. Finally, two multiple regression models explain the association between SES and quality-of-life changes after AMI.

SPSS 14.0 for Windows was used for the data analysis. Frequencies and percentages were applied to analyze the data on each of the SES and the HRQOL variables, and tables and graphs helped to interpret the results as appropriate. As well, univariate analysis (Chi-square test) was conducted to determine the relationship of HRQOL changes to other variables of interest. An alpha level of <.05 was considered acceptable to establish statistical significance.

Ethical Considerations

Panel B of the Health Research Ethics Board, a joint committee of Capital Health and the University of Alberta, approved this study. Because it is a secondary data analysis, no recruitment of a study sample was necessary. Therefore, issues pertaining to informed consent and confidentiality were addressed at the time that the data were collected (Pilote et al., 2002).

CHAPTER FOUR:

RESULTS

This chapter presents the results of an investigation of the impact of baseline SES on the one-year HRQOL outcome (SF-36 physical health summary and mental health summary scores) of the AMI patient population in Quebec. First, a description of the sample is presented, followed by a summary of descriptive statistics for all variables. Following this section, the relationship between each SES variables and HRQOL outcome variables (SF-36 PCS and SF-36 MCS) is analyzed by using linear regression models.

Overall Description of the Sample

Description of Baseline SES Variables

Table 2 is a summary of scores for the primary measures across demographic groups for the selected baseline sample (N = 441). The mean age of the sample was 60.0 years, with a standard deviation of 11.8 years (median age of 59.4 years). Four-fifths of the study sample were male (79.6%).

The majority of the sample were Caucasian (95.5%), with 1.4% Asian, 0.2% Hispanic, 0.5% Black, and 2.3% other races. The study sample has a very similar ethnic distribution compared to Quebec population. In the Quebec population there were 97.6% Caucasian, 0.4% Asian, 0.3% Hispanic, and 0.4% Black (Statistics Canada, 2005). However, Quebec population has quite different ethnic distribution compared with Canadian population (Statistics Canada, 2005).

Table 2

Characteristics of Baseline SES Variables

Characteristics	Total N = 441 (%)
Gender:	
Men	351 (79.6%)
Women	90 (20.4%)
Mean of Age	60.0 (±11.8)
Race:	
Caucasian	421 (95.5%)
Asian	2 (0.5%)
Hispanic	1 (0.2%)
Black	2 (0.5%)
Asian Indian	4 (0.9%)
Other	10 (2.3%)
Marital status:	
Married	317 (71.9%)
Divorced	35 (7.9%)
Separated	14 (3.2%)
Widowed	40 (9.1%)
Never married	32 (7.3%)
Missing	3 (0.7%)
Work status:	
Full-time	166 (37.6%)
Part-time	39 (8.8%)
Sick leave	10 (2.3%)
Retired	163 (37.0%)
Unemployed	12 (2.7%)
Homemaker	27 (6.1%)
Disabled	12 (2.7%)
Not answered	9 (2.0%)
Household income/year:	
≤ 10, 000	21 (4.8%)
10,001 – 20, 000	66 (15.0%)
20,001 – 30,000	64 (14.5%)
30,001 – 45, 000	64 (14.5%
45, 001- 60,000	47 (10.7%)
60,001 or greater	60 (13.6%)
Refused/don't know	119 (27.0%)
Below poverty threshold:	
<20,000/year	87 (19.7%)
≥ 20,000/year	345 (78.2%)
Not answered	9 (2.0%)

Characteristics	Total N = 441 (%)
Highest grade in school:	
Elementary school	127 (28.8%)
High school	187 (42.4%)
College or technical	50 (11.3%)
University or professional	71 (16.1%)
Not answered	6 (1.4%)
Somebody around to help:	
As much as wanted	242 (54.9%)
Quite a bit	59 (13.4%)
A fair amount	59 (13.4%)
A little bit	43 (9.8%)
Not at all	38 (8.6%)
Social support received:	
Fair amount	391 (88.7%)
Little or no support	49 (11.1%)
Not answered	1 (0.2%)

Of the sample, 71.9% were married at baseline, and 28.1% (124) were single, widowed, or divorced. Specifically, 7.9% were divorced, 3.2% separated, 9.1% widowed, and 7.3% never married; and 0.7% did not answer. Compared to the entire Canadian population (4.8% widowed), the percentage of the study sample that was widowed was almost two times higher.

More than half of the patients indicated that someone was around to help as much as the patients desired (54.9%), and 13.4% were frequently able to get someone to help. Similarly, another 13.4% received some help from someone. On the other hand, 9.8% of the patients were to get only a little help from someone, and 8.6% had no one at all. The majority of the sample (88.7%) reported receiving a fair amount of social support, 11.1% had little or no support or assistance, and 0.2% did not answer.

The percentage of full-time working patients (37.6%) was almost equal to the percentage of retired patients (37.0%). In addition, 8.8% of the patients worked part time,

2.3% were on sick leave, 6.1% were homemakers, 2.7% were disabled, 2.7% were unemployed, 0.7% had been temporarily laid off, and 2.0% did not answer.

The major income earners in the household consisted of 56.5% of the patients, 21.5% reported that both they and their spouse were the major earners in their household, 8.8% indicated that their spouse or spouse equivalent was the major income earner in the household, 19.7% were living below the poverty threshold (<$20,000 per year), 78.2% earned ≥ $20,000 per year, and 2.0% of the sample did not answer.

Furthermore, 4.8% of the sample's annual household income was below $10,000, 15.0% had a household income of between $10,001 and $20,000, 14.5% between $20,001 and $30,000, 14.5% between $30,001 and $45,000, 10.7% between $45,001 and $60,000, and 13.6% ≥ $60,001 per year. Unfortunately, 27.0% of the patients refused to discuss their household income.

This study sample has a different household income distribution to Quebec population. 27.7% of Quebeckers have a gross household income of less than $20,000, as compared with 13.4% of respondents who indicated their income; only 20.4% of Quebeckers have an income of more than $60,000 (Statistics Canada, 2005).

The patients reported their highest education level as elementary school (28.8%), high school (42.4%), college or technical (11.3%), and university or professional (16.1%); 1.4% of the patients did not indicate their highest education level. Compared to Canada's population, the study sample had a higher percentage in each education category. For example, only 23.0% Canadians have a high school education and 15.0%

college level (Statistics Canada, 2004); whereas in the study sample the percentage was higher at the high school level and lower at the college level.

Baseline Clinical Characteristics of AMI

The clinical characteristics of AMI are displayed in Table 3. A majority of the patients had a prior history of CVD-related disease or risk factor, including prior MI (19.0%), prior angina (24.5%), hypertension (36.1%), diabetes mellitus (14.7%), current smoking (39.7%), a smoking history (73.2%), hypercholesterolemia (38.8%), and family history of CHD (51.9%). A small proportion of the study sample had had prior coronary procedures. For example, 5.7% had prior CABG, and 6.3% had prior PCI.

The mean total risk score of the sample was 15.3, with a standard deviation of 1.5 (median 15.0). The majority of the total risk scores (72%) were between 14 and 16. The minimum total risk score was 11 (0.2%), and the maximum was 20 (0.2%).

Table 3

Baseline Clinical Characteristics

IVs	Total N = 441 (%)
Hypertension	159 (36.1%)
Diabetes mellitus	65(14.7%)
Current smokers	175(39.7%)
Smoking history	323(73.2%)
Hypercholesterolemia	171(38.8%)
CHD family history	229(51.9%)
Prior MI	84 (19.0%)
Prior angina	108(24.5%)
Prior coronary procedures:	25(5.7%)

CABG	28(6.3%)
PCI	
Mean of total risk score	15.3 (±1.5)

Note. CHF: congestive heart failure; CVD: cardiovascular disease; PCI:

percutaneous coronary intervention; Total risk score: age, gender, nitrate

usage, worst Killip-class, and ST- depression

Characteristics of Baseline General Health

Table 4 shows that the mean score of the baseline SF-36 PCS was 65.9, with a

standard deviation of 23.0 (median 72.3). The mean for the baseline SF-36 MCS was

66.3, with a standard deviation of 22.6 (median 70.6). These indicate the negative skewed

distributions (Figure. 3 & 4). Negative skewed distributions means a small number of

post-AMI patients had small values of baseline SF-36 PCS & MCS scores. Higher PCS

and MCS scores represent better health perceptions (Ware et al., 1994).

Of the patients, 31.9% (136) reported depression at baseline. The BDI showed

that the majority of the sample had no or minimal depression at baseline, 20.2% mild to

moderate depression, 9.1% moderate to severe depression, and 2.3% severe depression.

Table 4

Characteristics of Baseline General Health

Characteristics	Total (N = 441)%
Mean of baseline SF-36 PCS	65.9 (±23.0)
Mean of baseline SF-36 MCS	66.3 (±22.6)
Depression at baseline	136 (31.9%)
BDI at baseline	
No or minimal depression	294 (66.7%)

Mild-to moderate depression	89 (20.2%)
Moderate-to-sever depression	40 (9.1%)
Severe depression	10 (2.3%)
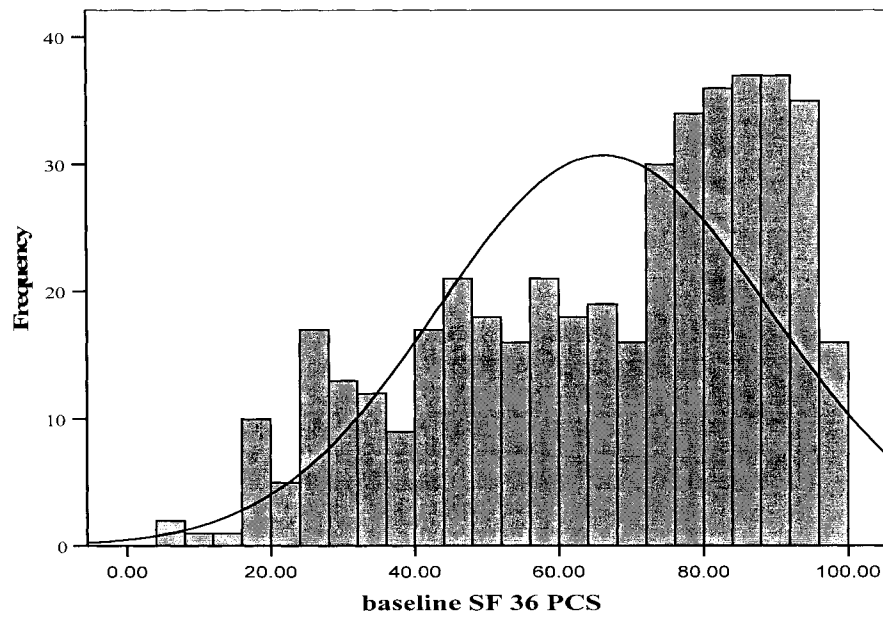
Figure 3. Distribution of Baseline SF-36 PCS

(Mean = 65.9; Std. Dev. = 23.0; Median = 72.3)
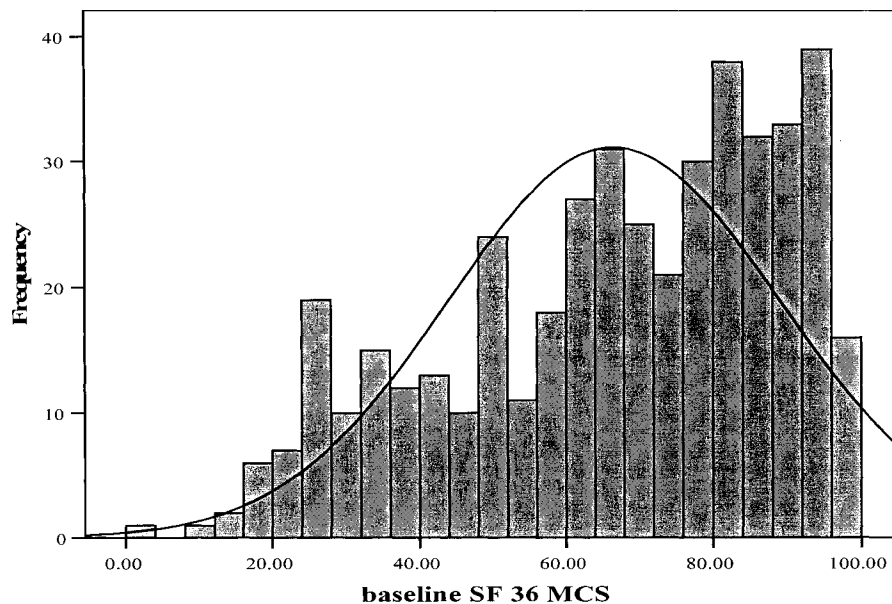
Figure 4. Distribution of Baseline SF-36 PCS

(Mean = 66.3; Std. Dev. = 22.6; Median = 70.6)

Construction of SF-36 PCS and MCS Prediction Models

Linear regression models were used to identify predictors of one-year SF-36 PCS

and MCS in post-AMI patients. SF-36 PCS and MCS after AMI are affected by a wide

range of factors. Not only patients' physical and psychological characteristics, but also

their SES prior to AMI contributes to the HRQOL after an AMI. Which factors are

accurate in predicting HRQOL after an AMI, and which should be included in the

regression models to predict AMI? The following deals with the models that evaluate the

significance of predictors, especially SES, on one-year HRQOL outcome after AMI.

The linear regression assumptions include normality, homogeneity, and

independence (Tabachnick & Fidell, 2007). DVs and IVs must be linear in the

population, all of the observations must be independent for each IV value, DVs must be

normal distributed, and there must be equal DV variance for all IV values (Tabachnick &

Fidell, 2007). Statistically, data can be assumed in normal distribution if the sample size more than 30. Some IVs (e.g. baseline SF-36 PCS & SF-6 MCS) are slightly skewed distribution. However, there is a large sample size in this study (N= 441). Therefore, linear regression approach is plausible.

The results of the descriptive analysis show no missing data in 2 DVs (one-year SF-36 PCS and MCS) and only a small percentage of missing data in some categories of IVs. The missing data are defined as a group under each IV. All of the DVs and IVs were tested for normality. Although baseline SF-36 PCS & MCS are slightly negative skewed distributed, the sample size is considered large.

All the observations in this study were independent.

Stage I models. Linear regression was performed between the DVs (SF-36 PCS or PCS) and IVs by using "Enter" in SPSS regression. The IVs were divided into 2 blocks: (a) block 1: physical and psychological variables: hypertension, diabetes mellitus, current smoking, smoking history, hypercholesterolemia, CHD family history, previous MI, previous angina, previous CABG, previous PCI, total risk score (age, gender, nitrate usage, worst Killip-class, and ST depression), baseline SF-36 PCS, baseline SF-36 MCS, and baseline depression; and (b) block 2: SES variables: household income, highest grade in school, work status, marital status, and social support. Tables 5 and 6 indicate that the SES variables contribute significantly to the prediction of one-year SF-36 PCS and one-year SF-36 MCS.

Table 5

Changes in Variances in Adding SES to the One-Year SF-36 PCS Model[a]

Model	R square	Sum of squares	df	F	P value

	Model	R square	Sum of squares	df	F	P value
1	Regression		55970.620	14		
	Residual	.285	140366.6	426	12.133	.001[b]
	Total		196337.2	440		
2	Regression		64449.991	19		
	Residual	.328	140366.6	421	10.828	.001[c]
	Total		196337.2	440		

Note. [a]Dependent Variable; one-year SF-36 Physical Summary Score. [b]Predictors: Block 1 Physical and psychological variables. [c]Predictors: Block 1 Physical and psychological variables & Block 2 SES variables

Table 6

Change in Adding SES to One-Year SF-36 MCS Model[a]

	Model	R square	Sum of squares	df	F	P value
1	Regression		54752.131	14		
	Residual		175318.9	426		
	Total	.238	230071.1	440	9.503	.001[b]
2	Regression		63446.349	19		
	Residual		166624.7	421		
	Total	.276	230071.1	440	8.437	.001[c]

Note. [a]Dependent Variable; one--year SF-36 Mental Summary Score. [b]Predictors: Block 1 Physical and psychological variables. [c]Predictors: Block 1 Physical and psychological variables & Block 2 SES variables.

Table 7 shows the association between one-year SF-36 PCS (IVs) and 19 DVs

(hypertension, diabetes mellitus, current smoking, smoking history,

hypercholesterolemia, family history, prior MI, prior angina, prior CABG, prior PCI,

baseline depression, baseline SF-36 PCS and MCS, total risk score (age, gender, nitrate usage, worst Killip-class, and ST depression), work status, marital status, and social support). Ten IVs have a p value <0.20 in the regression analysis: diabetes mellitus, current smoking, hypercholesterolemia, prior CABG, baseline depression, baseline SF-36 PCS, baseline SF-36 MCS, total risk score, household income, and highest grade in school.

Diabetes mellitus, current smoking, hypercholesterolemia, prior CABG, baseline SF-36 PCS and MCS, household income, and highest grade in school have a positive relationship with the DVs (one–year SF-36 PCS). The size of the effect of the IVs on the DVs (one-year SF-36 PCS) is diabetes mellitus (-6.079), current smoking (-5.832), hypercholesterolemia(-2.589), prior CABG (-7.011), baseline SF-36 PCS (.268), baseline SF-36 MCS (.097), household income (1.588), and highest grade in school (1.190).

On the other hand, baseline depression and total risk score have a negative relationship with one-year SF-36 PCS. The coefficient of total risk score is -1.818. The total risk score is a summary of age, sex, nitrate usage, worst Killip-class, and ST depression (Boersma et al., 2000). The coefficient of baseline depression has a negative effect on the one-year SF-36 PCS of -3.197.

Table 7

Linear Regression of All IVs and One-Year Outcomes of SF-36 PCS

IVs	ß		P value
	Unstandardized coefficients	Standardized coefficients	
Hypertension	-.465	.011	.789
Diabetes mellitus	-6.079	.102	.017
Current smoker	-5.832	2.705	.007
Smoking history	-1.271	-.027	.555

Hypercholesterolemia	-2.589	.071	.088
CHD family history	-.407	.014	.729
Prior MI	-.852	-.016	.724
Prior angina	-.242	-.006	.895
Prior CABG	-7.011	.079	.070
Prior PCI	-4.142	.051	.232
Baseline depression	-3.197	-.078	.095
Baseline SF 36 PCS	.268	.291	.001
Baseline SF 36 MCS	.097	.104	.106
Total risk score	-1.818	-.128	.007
Work Status	-.320	-.056	.234
Marital status	.408	.026	.538
Baseline social support	2.267	.035	.390
Household income	1.588	.159	.001
Highest grade in school	1.190	.060	.193

Note. DV is one-year SF-36 PCS.

In Table 7, 19 IVs-hypertension, diabetes mellitus, current smoking, smoking history, hypercholesterolemia, family history, prior MI, prior angina, prior CABG, prior PCI, baseline depression, baseline SF-36 PCS, baseline SF-36 MCS, total risk score (age, gender, nitrate usage, worst Killip-class, and ST depression), household income, highest grade in school, work status, marital status, and social support—were included.

The 8 IVs with a p value of <.20 are highlighted in Table 8: diabetes mellitus, current smoking, hypercholesterolemia, prior CABG, baseline depression, baseline SF-36 MCS, total risk score, household income, and highest grade in school. Except for baseline depression and the total risk score, all other IVs have a positive relationship with the one-year SF-36 MCS. The coefficients of the IVs are diabetes mellitus (-4.602), current smoking (-5.613), hypercholesterolemia(-3.261), prior CABG (-6.854), household income (1.462), highest grade in school (1.723), baseline depression (-5.525), and total risk score (-1.347).

The coefficients explain the effect of a one unit change in IV on change in DV.

For example, household income increasing $10,000 would attribute 1.462 increasing in

one-year SF-36 MCS score. Taking into all these IVs coefficients into account, one-year

SF-36 MCS change would be significant (Table 7 & 8). Previously, in literature review

chapter, household income has independently and significantly associated with health.

Lower income group trends to have higher diabetes rate, smoking rate, and worse general

health status. Therefore, household income directly and indirectly has significantly

influence on one year SF-36 PCS & MCS scores.

Table 8

Linear Regression of All IVs and One-Year Outcomes of SF-36 MCS

IVs	ß		P value
	Unstandardized coefficients	Standardized coefficients	
Hypertension	-1.314	-.030	.500
Diabetes mellitus	-4.602	.071	.109
Current smoker	-5.613	.023	.021
Smoking history	-1.136	.120	.639
Hypercholesterolemia	-3.261	.082	.056
CHD family history	-.747	.024	.571
Prior MI	-2.443	-.042	.369
Prior angina	-1.060	.023	.609
Prior CABG	-6.854	.071	.115
Prior PCI	-4.744	.054	.223
Baseline depression	-5.525	-.124	.010
Baseline SF 36 PCS	-.022	-.022	.735
Baseline SF 36 MCS	.365	.361	.001

IVs	ß		P value
	Unstandardized coefficients	Standardized coefficients	
Total risk score	-1.347	-.088	.074
Work status	-.328	-.053	.276
Marital status	.392	.023	.599
Baseline social support	-1.445	-.021	.626
Household income	1.462	.136	.007
Highest grade in school	1.723	.080	.094

Note. DV is one-year SF-36 MCS.

Except for the baseline SF-36 PCS, the same 9 IVs have an effect on both the one-year SF-36 PCS and the one-year SF-36 MCS. Baseline depression and total risk score have negative relationships with the one-year SF-36 PCS and MCS. Except for cardiovascular-related IVs (diabetes mellitus, current smoking, hypercholesterolemia, prior CABG) and baseline depression, which have the largest effect on the one-year SF-36 PCS and MCS, the SES variables of household income and highest grade in school contribute to the changes in one-year SF-36 PCS and MCS. Household income and baseline SF-36 PCS have the most significant relationship with the one-year SF-36 PCS (P household income = .001, P baseline SF-36 PCS = .001). Baseline depression and household income have the smallest p value of all IVs when the one-year SF-36 MCS is the DV (P baseline depression = .010; P household income = .007). However, work status, marital status, and baseline social support have little effect on one-year SF-36 PCS and MCS.

Stage II models. Backward elimination was applied. This method enters all IVs at one time and then removes variables one at a time based on a preset significance value to

remove. In order to include the variables with clinical significance, the default value to

remove a variable is set at $p \geq 0.20$. When there are no more variables that meet the

requirement for removal, the process ceases.

Table 9

One Year SF-36 PCS Linear Regression Model (Backward)

IVs	ß	P value
	Unstandardized coefficients	
Diabetes mellitus	- 6.313	.011
Current smoker	- 5.289	.005
Hypercholesterolemia	- 2.765	.062
Prior CABG surgery	-7.810	.030
Baseline depression	-3.012	.109
Baseline SF-36 PCS	.275	.001
Baseline SF-36 MCS	.099	.094
Total risk score	-2.022	.002
Household income	1.660	.001
Highest grade in school	1.366	.126

Note. DV is one-year SF-36 PCS.

Table 9 lists all of the remaining IVs (P value ≤ 0.20) when the one-year SF-36 PCS

is the DV. 10 IVs are included in the one-year SF-36 PCS model; they are the same IVs

as in the stage I model of the one-year SF-36 PCS (diabetes mellitus, current smoking,

hypercholesterolemia, prior CABG surgery, baseline depression, baseline SF-36 PCS,

baseline SF-36 MCS, total risk score, household income, and highest grade in school).

Table 10

One Year SF-36 MCS Linear Regression Model (Backward)

IVs	Unstandardized coefficients	P value
	ß	
Diabetes mellitu	- 4.137	.128
Current smoker	- 6.314	.003
Hypercholesterolemia	- 3.118	.061

Previous CABG surgery	- 7.248	.072
Baseline depression	- 5.624	.008
Baseline SF-36 MCS	.355	.001
Total risk score	- 1.435	.043
Household income	1.425	.005
Highest grade in school	1.896	.058

Note. DV is one-year SF-36 MCS.

Table 9 shows that nine IVs remain in the one-year SF-36 MCS model; they are also the same IVs as in the stage I model of the one-year SF-36 MCS (diabetes mellitus, current smoking, hypercholesterolemia, prior CABG surgery, baseline depression, baseline SF-36 MCS, total risk score, household income, and highest grade in school).

Stage III models. The General Linear Model (GLM) univariate procedure was used to model the outcome of the one-year SF-36 PCS or MCS based on its relationship to household income and controlling for hypertension, diabetes mellitus, current smoking, smoking history, hypercholesterolemia, family history, prior MI, prior angina, prior CABG, prior PCI, baseline depression, baseline SF-36 PCS and MCS, total risk score (age, gender, nitrate usage, worst Killip-class, and ST depression).

Diabetes mellitus, current smoking, hypercholesterolemia, prior CABG surgery, baseline depression, baseline SF-36 PCS, baseline SF-36 MCS, total risk score, and household income meet the selection criterion, which is a p value of <0.20 (Table 10). Five IVs have a significant effect on the outcome of the one-year SF-36 PCS: diabetes mellitus (p = 0.024), current smoking (p = 0.009), baseline SF-36 PCS (p = 0.001), total risk score (p = 0.006), and household income (p = 0.023). The significance value for the IV is <0.05, which indicates that it has a significant effect on the one-year SF-36 partial eta squared. Table 10 shows that the larger values of the partial eta squared indicate a

greater change accounted for by the IVs. Household income and the baseline SF-36 PCS

have significant influence on the change of one-year SF-36 PCS.

Table 11

One-Year SF-36 PCS (GLM)

IVs	P value	Partial eta squared
Diabetes mellitus	.024	.012
Current smoker	.009	.016
Hypercholesterolemia	.078	.007
Prior CABG surgery	.092	.007
Baseline depression	.157	.005
Baseline SF-36 PCS	.001	.049
Baseline SF-36 MCS	.131	.005
Total risk score	.006	.018
Household income	.023	.034

Note. DV is one-year SF-36 PCS scores

Tables 11 and 12 show that the household income level is still significant

associated with the one-year SF-36 PCS after controlling for hypertension, diabetes

mellitus, current smoking, smoking history, hypercholesterolemia, family history, prior

MI, prior angina, prior CABG, prior PCI, baseline depression, baseline SF-36 PCS and

MCS, total risk score (age, gender, nitrate usage, worst Killip-class, and ST depression),

work status, marital status, social support, and highest grade in school.

Table 12

One-Year SF-36 PCS (Univariate)

	Sum of squares	Df	Mean square	F	P value	Partial eta squared
Contrast	4650.716	6	775.119	2.469	.023	.034
Error	130608.7	416	313.963			

Table 13

Dependent Variable: One-Year SF-36 PCS

Household income	Mean of one-year SF-36 PCS	Std. error	95% CI		N (%)
			Lower bound	Upper bound	
Missing/unknown/ refused	55.277	1.722	51.892	58.661	119 (27.0%)
≤10,000	48.779	4.098	40.724	56.834	21 (4.8%)
10,001-20,000	57.323	2.300	52.801	61.845	66 (15.0%)
20,001-30,000	57.394	2.233	53.006	61.783	64 (14.5%)
30,001-45,000	60.345	2.276	55.871	64.818	64 (14.5%)
45,001-60,000	63.375	2.692	58.084	68.667	47(10.7%)
≥ 60,001	64.562	2.675	59.304	69.820	(13.6%)

Note. Covariates appearing in the model are evaluated at the following values: hypertension,

diabetes

mellitus, current smoking, smoking history, hypercholesterolemia, family history, prior MI, prior

angina, prior CABG, prior PCI, baseline depression, baseline SF-36 PCS and MCS, total risk score

(age, gender, nitrate usage, worst Killip-class, and ST depression), work status, marital status, and

social support.

    The mean for the one-year SF-36 PCS ascends from the low level of household

income to the high level of household income except for the missing/ unknown/ refused

group. The higher the level of household income, the higher one- year SF-36 PCS score.

The higher SF-36 PCS score indicates the better physical functioning.

The household income of the <$10,000 group has the lowest mean for the one-year SF-36 PCS (48.779, 95% CI, 40.724-56.834). The lower SF-36 PCS suggests a lower physical functioning status. Twenty-one patients (4.8%) have a household income of <$10,000. Those with a household income of $10,001-$20,000 have a similar mean for the one-year SF-36 PCS to that of the $20,001-$30,000 group (Mean$_{10,001-20,000}$ = 57.323, 95% CI, 52.801-61.845; Mean$_{20,001-30,000}$ = 57.394, 95% CI, 53.006-61.783).

The group with a household income of >$60,001 has the highest mean for the one-year SF-36 PCS (64.562, 95% CI 59.304-69.820). The missing/ unknown/refused group has the second lowest mean for the one-year SF-36 PCS (Mean = 55.277, 95% CI, 51.892- 58.661).

There were 119 patients (27.0%) in the missing/unknown/refused group. Figure 4 shows the ascending trend of the PCS and MCS means from the lower household income group to the higher household income group, except for the missing/unknown/refused group. The missing group has similar mean of SF-36 scores as 20,001 – 30,000 group. It was more possible that missing group were at low or middle income level than at high income level.
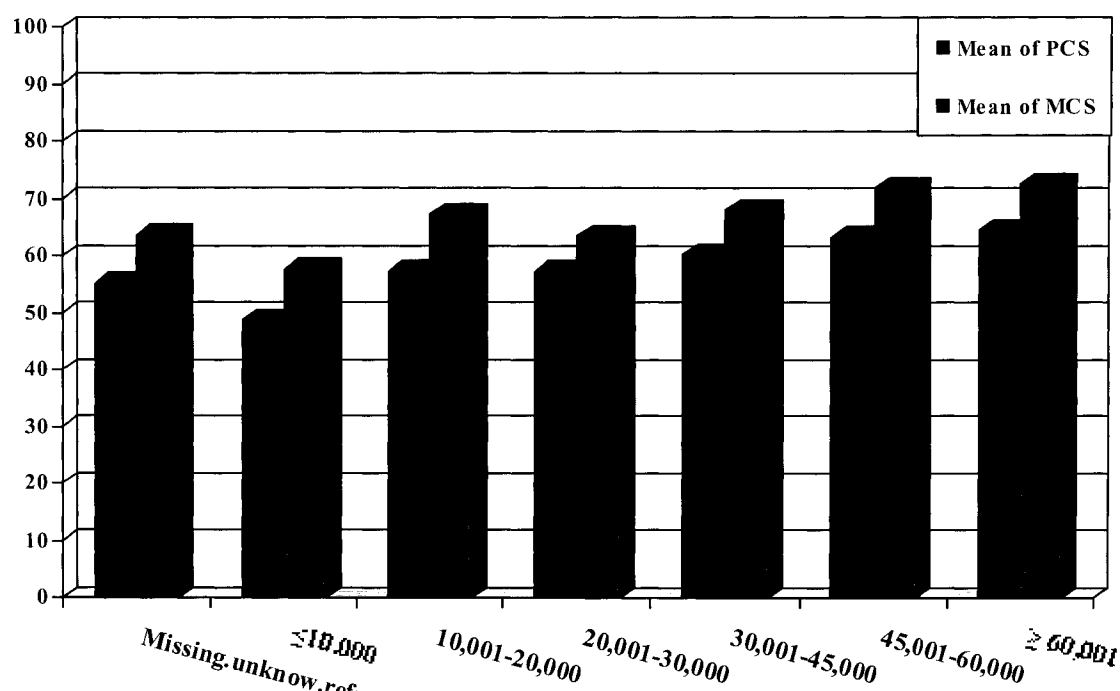
Figure 4. Household income with one-year SF-36 PCS & MCS scores.

Table 13 indicates the mean difference for the one-year SF-36 PCS between the household income groups after controlling for hypertension, diabetes mellitus, current smoking, smoking history, hypercholesterolemia, family history, prior MI, prior angina, prior CABG, prior PCI, baseline depression, baseline SF-36 PCS and MCS, total risk score (age, gender, nitrate usage, worst Killip-class, and ST depression), work status, marital status, social support, and highest grade in school. A p value <0.05 is considered statistically significant. The mean household income for the missing/ unknown/ refused group is 8.099 (95% CI, -14.574 ~ -1.624); for the <$45,001-$60,000 group, the p value is 0.014. Similarly, the mean for the missing/unknown/refused group is significantly less at 9.286 than for the $60,001 group (p = .006, 95% CI, -15.922 ~ -2.649).

Table 14

Test between Subjects Effects With DV One-Year SF-36 PCS

(I) Household income	(J) Household income	(I-J) Mean difference	Std. error	P value	95% CI	
					Lower	Upper
Missing/ unknown/ refused	≤10,000	6.498	4.407	.141	-2.166	15.161
	10,001-20,000	-2.046	2.777	.462	-7.505	3.413
	20,001-30,000	-2.118	2.800	.450	-7.622	3.387
	30,001-45,000	-5.068	2.910	.082	-10.789	.652
	45,001-60,000	-8.099	3.294	.014	-14.574	-1.624
	≥ 60,001	-9.286	3.376	.006	-15.922	-2.649
≤10,000	Missing/unknown/ refused	-6.498	4.407	.141	-15.161	2.166
	10,001-20,000	-8.544	4.622	.065	-17.630	.542
	20,001-30,000	-8.615	4.647	.064	-17.750	.519
	30,001-45,000	-11.566	4.704	.014	-20.813	-2.319
	45,001-60,000	-14.596	4.986	.004	-24.396	-4.796
	≥ 60,001	-15.783	5.107	.002	-25.822	-5.745

(I) Household income	(J) Household income	(I-J) Mean difference	Std. error	P value	95% CI Lower	95% CI Upper
10,001-20,000	Missing/ unknown/refused	2.046	2.777	.462	-3.413	7.505
	≤10,000	8.544	4.622	.065	-.542	17.630
	20,001-30,000	-0.071	3.178	.982	-6.318	6.175
	30,001-45,000	-3.022	3.298	.360	-9.505	3.461
	45,001-60,000	-6.052	3.650	.098	-13.227	1.123
	≥ 60,001	-7.239	3.755	.055	-14.620	.141
20,001-30,000	Missing/unknown/r efused	2.118	2.800	.450	-3.387	7.622
	≤10,000	8.615	4.647	.064	-.519	17.750
	10,001-20,000	.071	3.178	.982	-6.175	6.318
	30,001-45,000	-2.951	3.190	.355	-9.221	3.320
	45,001-60,000	-5.981	3.526	.091	-12.913	.951
	≥ 60,001	-7.168	3.551	.044	-14.147	-.189
30,001-45,000	Missing/unknown/r efused	5.068	2.910	.082	-.652	10.789
	≤10,000	11.566	4.704	.014	2.319	20.813
	10,001-20,000	3.022	3.298	.360	-3.461	9.505
	20,001-30,000	2.951	3.190	.355	-3.320	9.221
	45,001-60,000	-3.030	3.505	.388	-9.919	3.858
	≥ 60,001	-4.217	3.445	.222	-10.990	2.555
45,001-60,000	Missing/unknown/r efused	8.099	3.294	.014	1.624	14.574
	≤10,000	14.596	4.986	.004	4.796	24.396
	10,001-20,000	6.052	3.650	.098	-1.123	13.227
	20,001-30,000	5.981	3.526	.091	-.951	12.913
	30,001-45,000	3.030	3.505	.388	-3.858	9.919
	≥ 60,001	-1.187	3.578	.740	-8.220	5.847
≥ 60,001	Missing/unknown/r efused	9.286	3.376	.006	2.649	15.922
	≤10,000	15.783	5.107	.002	5.745	25.822
	10,001-20,000	7.239	3.755	.055	-.141	14.620
	20,001-30,000	7.168	3.551	.044	.189	14.147
	30,001-45,000	4.217	3.445	.222	-2.555	10.990
	45,001-60,000	1.187	3.578	.740	-5.847	8.220

The mean for the one-year SF-36 PCS for the ≤$10,000 group is significantly less than the means for the household incomes of $30,001-$45.000, $45,001-$60,000, and ≥$60,001 groups. The mean for the $20,001-$30,000 group is significantly smaller than the mean for the $60,001 group (Mean difference = -7.168, p = 0.044, 95%

CI, -14.147 ~ -0.189). However, the mean for the $10,001-420,000 group is not

significantly different from the means for all other groups.

Similarly, the one-year SF-36 MCS, household income has a significant effect

(p = 0.029) on the value of the one-year SF-36 MCS after controlling for hypertension,

diabetes mellitus, current smoking, smoking history, hypercholesterolemia, family

history, prior MI, prior angina, prior CABG, prior PCI, baseline depression, baseline

SF-36 PCS and MCS, total risk score (age, gender, nitrate usage, worst Killip-class, and

ST depression), work status, marital status, social support, and highest grade in school

(Table 14 & Table 15). The partial eta-squared value varies from 0 to 1. Larger values for

the partial eta squared suggest a greater amount of changes accounted for by the IVs

(P = 0.757).

Table 15

Univariate Test with DV One-Year SF-36 MCS

	Sum of squares	df	Mean square	F	P value	Partial eta squared
Contrast	4999.616	6	833.269	2.107	.029	.757
Error	164486.2	416	395.399			

Except for the highest grade in school, the same IVs are selected for the model,

with $P \leq 0.20$: diabetes mellitus (p = 0.124), current smoking (p = 0.022),

hypercholesterolemia(p = 0.050), prior CABG surgery (p = 0.149), baseline depression

(p = 0.016), baseline SF-36 MCS (p = 0.001), total risk score (p = 0.058), and household

income (p = 0.051). In addition, prior PCI is also selected with a p value of 0.182

(Table 15).

Table 16

One-Year SF-36 MCS (GLM)

IVs	N	P value	Partial eta squared
Diabetes mellitus	441	.124	.006
Current smoker		.022	.012
Hypercholesterolemia		.050	.009
Prior CABG surgery		.149	.005
Prior PCI		.182	.004
Baseline depression		.016	.014
Baseline SF-36 MCS		.001	.062
Total risk score		.058	.009
Household income		.051	.029

Note. DV is one-year SF-36 MCS scores.

Contrasting with the GLM (univariate)of the one-year SF-36 PCS, there is no clear trend in the mean difference for the one-year SF-36 MCS when the data are divided into household income categories. Table 16 shows that the group with a household income of $20,000-$30,000 has the lowest mean for the one-year SF-36 MCS (Mean = 63.468, 95% CI, 58.543 ~ 68.393). There are 64 (14.5%) patients in the $20,001-$30,000 group. The second lowest mean for the one-year SF-36 MCS is in the missing /unknown /refused group. The group with a household income >$60,001 has the highest mean for the one-year SF-MCS value. A higher mean indicates better mental health condition.

Table 17

Dependent Variable: One-Year SF-36 MCS

Household income	Mean of one-year SF-36 MCS	Std. error	95% CI		N (%)
			Lower bound	Upper bound	
Missing/unknown/ refused	63.740	1.932	59.941	67.538	119 (27.0%)
≤10,000	57.679	4.599	48.639	66.719	21 (4.8%)

10,001-20,000	67.336	2.582	62.261	72.410	66 (15.0%)
20,001-30,000	63.468	2.505	58.543	68.393	64 (14.5%)
30,001-45,000	68.027	2.554	63.007	73.047	64 (14.5%)
45,001-60,000	71.897	3.021	65.959	77.835	47(10.7%)
≥ 60,001	72.650	3.002	66.749	78.551	60(13.6%)

Note. Covariates appearing in the model are evaluated at the following values: hypertension, diabetes mellitus, current smoking, smoking history, hypercholesterolemia, family history, prior MI, prior angina, prior CABG, prior PCI, baseline depression, baseline SF-36 PCS & MCS, total risk score (age, gender, nitrate usage, worst Killip-class, and ST depression), work status, marital status, and social support.

Table 17 shows that the missing/unknown/refused group has a significantly lower mean for the one-year SF-36 MCS than do the $45,001-$60,000 and the ≥$60,001 groups. Similarly, the ≤$10,000 group also has a significantly lower mean for the one-year SF-36 MCS than do the $45,001-$60,000 and the ≥$60,001 groups.

The mean for the one-year SF-36 MCS for the $20,001-$30,000 group is also significantly lower than the mean for the high household income groups ($45,001-$60,000 and ≥$60,001). On the other hand, the MCS mean for the $10,001-for the $20,000 and $30,001-and $45,000 groups is not significantly different from that for any other household income subgroups.

Table 18

Test of Subjects' Effects with DVs One-Year SF-36 MCS

(I) Household income	(J) Household income	(I-J) Mean difference	Std. error	P value	95% CI	
					Lower	Upper
Missing/ unknown/ refused	≤10,000	6.061	4.946	.221	-3.662	15.783
	10,001-20,000	-3.596	3.116	.249	-9.722	2.530
	20,001-30,000	.272	3.142	.931	-5.905	6.449
	30,001-45,000	-4.288	3.266	.190	-10.707	2.132
	45,001-60,000	-8.157	3.697	.028	-15.424	-.891
	≥ 60,001	-8.910	3.789	.019	-16.358	-1.463

(I) Household income	(J) Household income	(I-J) Mean difference	Std. error	P value	95% CI	
					Lower	Upper
≤10,000	Missing/unknown/ refused	-6.061	4.946	.221	-15.783	3.660
	10,001-20,000	-9.657	5.187	.063	-19.853	.540
	20,001-30,000	-5.789	5.215	.268	-16.040	4.462
	30,001-45,000	-10.349	5.279	.051	-20.725	.028
	45,001-60,000	-14.218	5.595	.011	-25.216	-3.220
	≥ 60,001	-14.971	5.731	.009	-26.237	-3.706
10,001-20,000	Missing/unknown/ refused	3.596	3.116	.249	-2.530	9.722
	≤10,000	9.657	5.187	.063	-.540	19.853
	20,001-30,000	3.868	3.566	.279	-3.143	10.878
	30,001-45,000	-.692	3.701	.852	-7.967	6.584
	45,001-60,000	-4.561	4.096	.266	-12.613	3.491
	≥ 60,001	-5.314	4.214	.208	-13.597	2.968
20,001-30,000	Missing/unknown/ refused	-.272	3.142	.931	-6.449	5.905
	≤10,000	5.789	5.215	.268	-4.462	16.040
	10,001-20,000	-3.868	3.566	.279	-10.878	3.143
	30,001-45,000	-4.559	3.580	.203	-11.596	2.477
	45,001-60,000	-8.429	3.958	.034	-16.208	-.650
	≥ 60,001	-9.182	3.985	.022	-17.015	-1.350
30,001-45,000	Missing/unknown/ refused	4.288	3.266	.190	-2.132	10.707
	≤10,000	10.349	5.279	.051	-.028	20.725
	10,001-20,000	.692	3.701	.852	-6.584	7.967
	20,001-30,000	4.559	3.580	.203	-2.477	11.596
	45,001-60,000	-3.870	3.933	.326	-11.600	3.861
	≥ 60,001	-4.623	3.866	.233	-12.223	2.978
45,001-60,000	Missing/unknown/ refused	8.157	3.697	.028	.891	15.424
	≤10,000	14.218	5.595	.011	3.220	25.216
	10,001-20,000	4.561	4.096	.266	-3.491	12.613
	20,001-30,000	8.429	3.958	.034	.650	16.208
	30,001-45,000	3.870	3.933	.326	-3.861	11.600
	≥ 60,001	-.753	4.015	.851	-8.646	7.140
≥ 60,001	Missing/unknown/ refused	8.910	3.789	.028	1.463	16.358
	≤10,000	14.971	5.731	.011	3.706	26.237
	10,001-20,000	5.314	4.214	.266	-2.968	13.597
	20,001-30,000	9.182	3.985	.034	1.350	17.015
	30,001-45,000	4.623	3.866	.326	-2.978	12.223
	45,001-60,000	.753	4.015	.851	-7.140	8.646

Final models. Based on the results from the stage I, II, III models, all of the IVs

with $p \leq 0.20$ were selected to build up the one-year SF-36 PCS model. There were 10

IVs: diabetes mellitus, current smoking, hypercholesterolemia, prior CABG, baseline

depression, baseline SF-36 PCS, baseline SF-36 MCS, total risk score, household

income, and highest grade in school (Table 18).

Table 19 indicates that diabetes mellitus, current smoking, prior CABG, baseline

SF-36 PCS, total risk score, and household income have a significant effect on the value

of the one-year SF-36 PCS (p < 0.05).

Table 19

One year SF-36 PCS model Coefficients Summary I

IVs	ß		P value
	Unstandardized coefficients	Std.Error	
Diabetes mellitus	- 6.313	2.470	.011
Current smoker	- 5.289	1.856	.005
Hypercholesterolemia	- 2.765	1.479	.062
Prior CABG	- 7.810	3.591	.030
Baseline depression	- 3.012	1.878	.109
Baseline SF-36 PCS	.275	.055	.001
Baseline SF-36 MCS	.099	.059	.094
Total risk score	-2.022	.637	.002
Household income	1.660	.455	.001
Highest grade in school	1.366	.891	.126

Note. DV is One-year SF-36 PCS

Table 20

One year SF-36 PCS model Conefficients Summary II

IVs	ß		P value
	Unstandardized coefficients	Std.Error	

IVs	ß		P value
	Unstandardized coefficients	Std.Error	
Diabetes mellitus	- 8.773	2.493	.001
Current smoker	- 5.143	1.913	.007
Prior CABG	- 9.777	3.681	.008
Baseline SF-36 PCS	.333	.039	.001
Total risk score	-2.519	.649	.001
Household income	2.241	.418	.001

Note. DV is One-year SF-36 PCS

Table 20 reveals 27.0% the changes of one-year SF-36 PCS scores can be

explained by diabetes mellitus, current smoking, prior CABG, baseline SF-36 PCS, total

risk score, and household income.

Table 21

One year SF-36 PCS model summary

R	R Square	df	Adjusted R Square	R Square Change	F Change	Sig. F Change
.519[a]	.270	6 434	.260	2.107	26.724	.001

Note. [a]Predictors include (Constant), Total risk score, CABG surgery, baseline SF-36 MCS,

Household income, Diabetes mellitus, current smoker. [b]DV is one-year SF-36 PCS.

The same procedure was used to build up the final regression model for the one-

year SF-36 MCS. The final model includes five IVs (current smoking, baseline

depression, baseline SF-36 MCS, total risk score, and household income); the changes of

one year SF-36 MCS could be explained by these five IVs (Tables 21-23). Five baseline

variables included current smoking, baseline depression, baseline SF-36 MCS, total risk

score, and household income.

Table 22

One year SF-36 MCS model Coefficients Summary I

IVs	Unstandardized coefficients		P value
	ß	Std.Error	
Diabetes mellitus	- 4.137	2.716	.128
Current smoker	- 6.314	2.084	.003
Hypercholesterolemia	- 3.118	1.660	.061
Prior CABG	- 7.248	4.014	.030
Baseline depression	- 5.624	2.107	.008
Baseline SF-36 MCS	.355	.048	.001
Total risk score	-1.435	.707	.043
Household income	1.425	.506	.005
Highest grade in school	1.896	.999	.058

Note. DV is One-year SF-36 MCS

Table 23

One year SF-36 MCS model Coefficients Summary II

IVs	ß		P value
	Unstandardized coefficients	Std.Error	
Current smoker	- 6.187	2.103	.003
Baseline depression	- 4.477	2.098	.033
Baseline SF-36 MCS	.386	.048	.001
Total risk score	- 1.717	.703	.015
Household income	1.674	.458	.001

Note. DV is One-year SF-36 MCS

Table 24

One year SF-36 MCS model Summary

R	R Square	df	Adjusted R Square	R Square Change	F Change	Sig. F Change
.495[a]	.245	5 435	.236	.245	28.183	.001

Note. [a]Predictors include (Constant), total risk score, depression at baseline, household income, current smoker, baseline SF-36 MCS. [b]DV was One-year SF-36 MCS.

CHAPTER FIVE:

DISCUSSION

The purpose of this chapter is to present a discussion that focuses on the study findings by comparing them to those of previous studies in the literature. At the same time, the implications and significance of the findings are also explored. After discussing the influence of SES on the outcome variables, this last chapter elaborates on the implications of this for nursing practice and policy development. The limitations of the

study and recommendations for future research are also discussed. The thesis ends with concluding remarks.

Highlights of the Study Findings

The study sample has a similar age and gender characteristics compared to the Alter, Venkatesh, Chong, and SESAMI Study Group (2006). The mean age of this study was 60.0 years, 79.6% of the sample were men. In Alter's study, the mean age of the cohort was 63.8 years (SD 13.1), and 30.5% were women. The data of Alter's study (Alter, Venkatesh, Chong, &SESAMI Study Group, 2006) was from SESAMI database which consists of a prospective, longitudinal, observational cohort of patients hospitalized with AMI throughout Ontario.

Household income and current smoking are strongly associated with the changes of both the one-year SF-36 PCS and MCS scores. Patients with lower household income and/or who smoke will have lower SF-36 PCS and MCS scores one year after AMI. Lower scores indicate a lower quality of life among post-AMI patients.

Specifically, patients' baseline characteristics (diabetes mellitus, current smoking, prior CABG, baseline SF-36 PCS, total risk score, and household income) significantly contribute to the changes of one-year SF-36 PCS scores. Approximately a 27.0% of changes of one-year SF-36 PCS scores can be explained by diabetes mellitus, current smoking, prior CABG, baseline SF-36 PCS, total risk score, and household income. Similarly, five baseline variables (current smoking, baseline depression, baseline SF-36 MCS, total risk score, and household income) can explain 24.5% of changes in one-year SF-36 MCS. Compared to Aalto et al's study, IVs in this study are attributed to a relative large percentage of changes in quality of life. In Aalto et al (2006) study (n = 3130 at

baseline, n =2745 at follow-up, aged 45-74 years), IVs (CHD history and severity) only explained 13% of changes in global health status and 8% in global QOL ratings at the baseline.

Influence of Household Income

Several researchers have suggested that SES is an important determinant of the heterogeneity in outcomes for patients hospitalized with AMI (Alter et al., 1999; Alter, Venkatesh, et al., 2006; Kaplan, & Keil, 1993). Most of the studies (Alter et al., 1999; Davey et al., 1998; Kaplan, 2006; Kaplan & Keil, 1993; Manderbacka, 2005; Marmot & Mustard, 1994; Svennevig, 2004) have examined the association between SES and survival mortality and morbidity after AMI. Few studies have focused on the association between SES and HRQOL after AMI (Aalto et al., 2006; Alter, Chong, et al., 2006).

This study examined SES variables (household income, education, and work status) in relation to the one-year HRQOL outcomes among post-AMI patients after adjusting for baseline sociodemographics (age, gender, marital status, and social support) and illness-related factors (hypertension, diabetes mellitus, current smoking, smoking history, hypercholesterolemia, CHD family history, prior MI, prior angina, prior CABG, prior PCI, baseline depression, baseline SF-36 PCS, baseline SF-36 MCS, nitrate usage, worst Killip-class, and ST depression). The results indicate that the household income level is strongly related to both the SF-36 physical summary score and the SF-36 mental component summary. Age and gender are significantly associated with changes in one-year SF-36 PCS and MCS. Baseline illness-related factors (diabetes mellitus, current smoking, hypercholesterolemia, prior CABG, baseline SF-36 PCS, nitrate usage, worst Killip-class, and ST depression) partially explain changes in the SF-36 PCS. Baseline

illness-related factors (current smoking, hypercholesterolemia, baseline SF-36 MCS, baseline depression, nitrate usage, worst Killip-class, and ST depression) significantly affect changes in the SF-36 MCS.

In this study post-AMI patients with different levels of household income had an overall different SF-36 PCS and MCS after controlling for all clinical characteristics (hypertension, diabetes mellitus, current smoking, smoking history, hypercholesterolemia, family history, prior MI, prior angina, prior CABG, prior PCI, nitrates usage, worst Killip-class, ST depression, baseline depression, and baseline SF-36 PCS and MCS) and other sociodemographic factors (age, gender, marital status, education, work status, and social support).

The results from this study show that the gradients of household income significantly affect the one-year SF-36 PCS and MCS among post-AMI patients. After adjusting for the baseline factors of education, work status, marital status, social support, cardiac risk factors, and total risk score, post-AMI patients with higher household incomes were significantly more likely to have higher physical functioning. Post-AMI patients from the lower level of household income have lower values of the one-year SF-36 PCM. The highest mean for the SF-36 PCS is from the highest household income group. A large body of research has explained that people with low household income live shorter, less healthy lives (Evans, 1994; Wilkinson & Marmot, 2003). SES has been observed as an important determinant of the use of invasive procedures in AMI patients (Philbin et al., 2000). Shen et al. (2001) reported that persons living in low-income areas tend to have worse overall health status because they are more likely by definition to be poor and by circumstance to have limited access to primary and continuous care.

Another possible explanation may be lifestyle. Inadequate income is a strong drawback to maintaining a healthy lifestyle by ensuring appropriate diet and exercise. AMI risk factors such as obesity and smoking are related to an unhealthy lifestyle, and obesity and smoking are significantly related to hypertension, diabetes mellitus, hyperchelecimia, and CHD. Persons with a low SES or who live in lower socioecologic areas are more likely to have AMI. AMI is more severe in a low SES population, and this population also tends to have higher AMI mortality than does a high SES population (American Heart Association, 2000).

Although Canada's universal health insurance programs have promoted greater equity in access to health care services (Schoen, Davis, DesRoches, Donelan, & Blendon, 2000; Standing Committee on Social Affairs, Science, and Technology, 2002), several studies have shown continuing income-related differences in the rates of use of specific services (Alter et al., 2004a; Alter et al., 1999; Dirnfeld, 1996; Naylor, 1999; Zitner, 2002). Alter et al. (1999) reported pronounced effects of SES on access to specialized cardiac services in Ontario's universal health care system, as well as on mortality one year after AMI. In Ontario, persons with low income have both reduced access to invasive procedures and worse outcomes (Alter et al., 1999). Later, Alter et al. (2004a) reported that upper-middle-class Canadians gain preferential access over people with lower incomes or less education to services within the publicly funded health care system. Social conditions affect health through multiple mechanisms, and offering a universal health care system solves only part of the puzzle. In addition, access to care and the quality of that care may not necessarily be equal even in the presence of universal access (Diez Roux, 2005).

An interesting finding in this study is that the $20,001-30,000 household income group have lower average one-year SF-36 MCS scores (N = 64, 14.5%; Mean = 63.468, 95% CI, 58.543-68.393) than do the $10,001-20,000 group (N = 66, 15.0%; Mean = 67.336, 95% CI, 62.261-72.410). These two groups have baseline similarities except education level. The $20,001-$30,000 household income group has significantly higher education levels than the $10,001-do the $20,000 group (P value = 0. 017).

There is little evidence of household gradients in the prevalence of low SF-36 MCS scores, but research has demonstrated substantial changes in mental health at the household level (Chandola, Bartley, Wiggins, & Schofield, 2003; Chandola, Clarke, Wiggins, Bartley, 2005; Weich, Holt, Twigg, Jones, & Lewis, 2003). However, only a small number of studies have considered the household level. A plausible interpretation may be that higher education may be related to the prevalence of psychological distress.

Education, Work Status, Marital Status, and Social Support

Researchers considered education, work status, and income the principal measures of SES. Particularly education has been the most frequently used measure because education as a single SES factor has a stronger association with CVD mortality rates than other SES factors do (Davey et al., 1998; Alter et al. 2004a & b) reported that upper-income and better-educated Canadians receive more specialty cardiac services than do those in lower socioeconomic groups. The relationship between lower education levels and worse health care outcomes has also been demonstrated (Jaglal & Goel, 1994; Williams & Collins, 1995). However, the findings from this study do not indicate either education or work status is significantly related to changes in one-year SF-36 PCS and

MCS scores. This may be explained by the atypical distribution of education in the study sample: This study sample was more educated than the general Canadian population.

Marital status and social support are also not significantly related to changes in one-year SF-36 PCS and MCS scores in this study. Previous evidence indicated a positive relationship between social support and AMI survival (Mookadam & Arthur, 2004). However, social support did not show a strong relationship with survivors' physical and mental functions.

Smoking

Previous studies have indicated that smoking is widely acknowledged as one of the most important causes of illness and death (Stephens & Siroonian, 1998). In this sample, 39.7% were smokers. Canada's national smoking rate is 21.8%, and Quebec's is 24.4% (1,577,000 smokers; Statistics Canada, 2006). This indicates a higher smoking rate exists among people with AMI. Johansen, Nair, and Taylor (1998) affirmed that changes in smoking, exercise, diet, and other lifestyle behaviors will likely affect the re hospitalization rate within one year. The findings from this study reveal that smoking is independently and significantly related to the one-year SF-36 PCS and MCS scores.

Diabetes

Diabetes is currently the seventh leading cause of death in Canada; 5% (1,300,000) of the population have been diagnosed with diabetes (Statistics Canada, 2006). In Quebec the diabetes rate is 5.2% (332,800; Statistics Canada, 2006). In this study sample, 17.4% had diabetes mellitus, which significantly affected the one-year SF-36 PCS scores after adjusting for all other baseline factors. Diabetes mellitus tends to be more pronounced in the AMI population than in the normal population.

Depression

This study sample has a significant high depression rate (31.9%). Depression rates among elderly Canadian population (aged 65 and older) are more than 11%. According to Health Canada and Statistics Canada, approximately 5% of adult Canadians experience depression annually (Statistics Canada, 2002). Depression has been found as a significant predictor of 1-year cardiac mortality (Frasure-Smith, et al. 1999). The result from this study reveals that depression largely impacts the 1-year quality of life after AMI.

Significance of the Study Findings

Research focused on heart disease in aging population becomes more and more important. It is due to the increasing number of aging population in Canada in recent years. Quebecers 65 years of age or over accounted for roughly 12 % of the population. This proportion is expected to climb to 20 % by the year 2031, ranking Québec among the oldest populations (Quebec Portal, 2006). Furthermore, as a result of this increased aging population, there has been an increase in the mortality of heart diseases (Heart and Stroke Foundation of Canada, 2006c). This trend is estimated to continue for the next fifteen years. The mean age in this study was 60.0 years. Therefore, the findings from this study would provide valuable information about aging people in Quebec.

AMI has long term impact on an individual's quality of life, such as chronic pain or discomfort, activity restriction, disability, and unemployment. Although there are many advanced treatments, and AMI hospitalized mortality rate has been decrease; long term survival rate and quality of life have not improved. This study draws people's attention to post-AMI survivor- life. This study identified the factors that should be taken

account into changes in HRQOL among post-AMI. They are including diabetes mellitus, current smoking, baseline physical and mental health status, and household income level.

The findings from this study do not support the literature that lower education is related to changes in one-year HRQOL among post-AMI patients. Education is one of the most widely used measurements of SES in quality of life among AMI patients (Kaplan & Keil, 1993). However, the social, behavioral, and psychological characteristics of a given level of education may vary depending on other factors such as age, gender, religious background, household income, and marital status (Kaplan & Keil, 1993). This study sample comes from Quebec, and Quebec's population is older than the Canadian average. Aging influences the various age groups at the provincial level as much as it does nationally. For example, people in different age groups may choose different lifestyles, cardiac rehabilitation programs, and diets even though they have the same education level.

This study has also shown that diabetes mellitus, smoking, and hypercholesterolemia are strongly related to HRQOL among post-AMI patients. It is significantly meaningful to identify these factors because 30% of survivors will be re-hospitalized within one year (Johansen et al., 1998). In addition, 40%-75% of all AMI victims die before reaching hospital (WHO, 2002). Even though the 30-day mortality rate of hospitalized AMI patients in Canada dropped from 13.4% in 1999-2000 to 11.1% in 2004-2005, this still means that 40%-75% of victims cannot be saved. Therefore, self-management strategies such as monitoring diabetes mellitus, controlling smoking and blood cholesterol/blood pressure levels, exercising, consuming a low-fat diet, and decreasing stress are the first interventions to prevent AMI reoccurrence.

Limitations

This study has several limitations. First, it was underpowered to further detect differences in the household incomes of subgroups (e.g., why does the $20,001-$30,000 group have a lower SF-36 MCS score than the $10,001-the $20,000 group does? What is the household income level for the missing/unknown/refused group?).

Second, baseline depression and baseline physical and mental health status were ascertained through self-report. However, this does not affect the fact that changes in HRQOL was already explicable by the gradients of household income, age, gender, and traditional risk factors (diabetes mellitus, smoking, and hypercholecimia).

Finally, missing data of household income and single quality of life questionnaire (SF-36) also limited the study. 29.1% of patients did not give information on household income. Although SF-36 is well designed and utilized questionnaire for quality of life measurement, a heart disease specific questionnaire may provide more detailed and accurate information.

Conclusions

In conclusion, the results of this study demonstrate changes in one-year HRQOL outcomes for post-AMI patients are independently associated with unequal household income. The findings are consistent with those in the literature that indicate the importance of income in HRQOL among post-AMI patients (Alter et al., 2004a; Alter et al., 1999; Dirnfeld, 1996; Naylor, 1999; Tonne et al., 2005; Zitner, 2002).

In the two final models, household income, diabetes mellitus, current smoking, baseline SF-36 PCS, prior CABG surgery, and total risk score (age, gender, nitrates usage, worst Killip-class, and ST depression) account for 27.0% of changes in one-year SF-36 PCS score. Household income, current smoking, baseline SF-MCS, baseline depression, and total risk score account for 24.5% of changes in one-year SF-36 MCS score.

A greater effort is needed to decrease smoking rate in Quebec elderly population. More attention to the promotion of healthy life style is necessary in order to prevent re-infarction. Healthy life style means such as nutrition, exercises, and appropriate behaviors. Health service providers need to provide a wide range of services that will enhance the quality of life of individuals living with AMI.

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