Predictors of Self-Rated Health in a Manitoba First Nation Community

by

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ABSTRACT

Self-rated health (SRH) is a commonly used measure in surveys. The associations of SRH in Canadian First Nations populations have not previously been fully studied. Univariate, bivariate, and multivariate analyses were conducted to determine how participants rated their health and what factors associated with SRH in a Manitoba First Nation.

Respondents rated their health substantially worse than the general Canadian population. Men rated their health worse than women, and older adults rated their health worse than younger adults. In multivariate analyses, sex, hypertension, arthritis, the metabolic syndrome, number of chronic conditions, vision and mobility difficulties, perceived stress, perceived control over health and life, and community conditions were independently associated with SRH.

These results suggest that asymptomatic conditions may be incorporated into the SRH of community members and suggest a complex interaction of health-related factors, stressors, and psychosocial factors that contribute to community members' SRH.

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CHAPTER ONE

INTRODUCTION

1.1 Summary

The prevalence of chronic disease in Canadian First Nations (FN) peoples is consistently higher than among non-FN Canadians (Young et al., 1998; RHS 2007), in spite of the relatively recent emergence of chronic disease as a source of major concern in these populations. Numerous social, behavioural, genetic, and biological risk factors have been proposed and identified among FN populations (Young, 1994; Shah et al., 2004), but despite an increasing acknowledgment of this issue, rates of conditions such as diabetes continue to escalate and disparities increase.

Self-rated health (SRH) is a commonly used measure in surveys as a substitute for a clinical measure of biomedical status or as a measure of health-related quality of life. As SRH has independently been shown to predict mortality (Mossey and Shapiro, 1982; Idler and Benyamini, 1997; Benyamini and Idler, 1999), researchers have attempted to identify the referents that individuals incorporate into their self-evaluations that produce such consistent results. Thus, the determinants of SRH and its associations with other outcomes, including cardiovascular and metabolic disease, and clinical biomarkers and risk factors that may be indicative of subclinical disease states, have become an increasingly explored area of interest. One factor whose relationship to SRH has been investigated in some populations is ethnicity. Differences have been detected in how ethnic minorities rate their health and culturally-specific determinants of SRH have been identified, but only limited research has been conducted in Canadian FN communities

regarding SRH. The present study will address this deficiency in researchers' knowledge by examining the distribution of SRH in a Canadian FN community and its associations with cardiometabolic risk factors and population-specific variables including chronic disease, perceived stress, and sociodemographic factors. This will also contribute to researchers' awareness of FN people's self-rated and objective health status, and add to the burgeoning body of literature concerning SRH and chronic disease indicators and risk factors.

1.2 Rationale

Qualitative and quantitative research has emphasized the inclusivity of SRH, and its predictive association with morbidity and mortality suggest that SRH can serve as a risk indicator for these conditions and as a particularly valid and comprehensive measure of general health status or health-related quality of life. As such, it is often included in surveys as a simple to administer, concise, and cost-effective measure to assess these variables in populations. However, studies in various ethnic minorities have indicated that there may be differences in how ethnic groups approach rating their health that might affect the validity of the measure or, at least, de-emphasize the culturally-specific factors that influence people's perceptions and experiences of their health. If legitimate descriptions of the distribution of SRH within minority populations and comparisons are to be made within and between populations, a greater understanding of the culturally-relevant determinants of SRH is essential.

SRH has not been thoroughly investigated within Canadian FN populations. While SRH is used as a measure in national surveys to evaluate the health of FN peoples

and to compare against other Canadians, there is insufficient knowledge of the perhaps unique components of FN lives that may contribute to their self-assessments of health. This inadequacy is particularly evident given the diverse array of determinants identified in previous studies addressing ethnicity and SRH. Given the high prevalence of chronic health and risk conditions among the Manitoba FN community in which this research is being conducted, it is expected that SRH would be poorer in this community than among a comparative general Canadian population. To address the poorer health and quality of life in Canadian FN communities, more attention must be paid to what factors affect the dimensions of health most pertinent to individuals themselves. To that end, this study incorporates ethnographically-derived, population-specific variables and evaluates which of these factors most impacts SRH and should therefore be viewed as priorities in prevention efforts. An enhanced awareness of the distribution and interaction of risk factors, chronic disease, and SRH within this community will allow for the design of more effective prevention programs that can focus on what community members themselves consider the most important factors influencing their health and quality of life. Improving individuals' self-perceived health may encourage healthier lifestyle choices and adherence to prevention or treatment regimes (Idler and Benyamini, 1997). This study has the potential to aid in the establishment of more meaningful and suitable local interventions and may inform future policy on a larger scale.

1.3 Purpose

The purpose of this study is to explore how members of a Manitoba FN population rate their health, how these ratings are distributed within the community, and the sociodemographic and biomedical factors that associate with these assessments.

1.4 Objectives

1. To determine how study participants rate their own health;
2. To examine how self-rated health differs by sociodemographic variables (e.g., age, sex, educational level), presence of chronic disease risk factors, perceived stress, and chronic health conditions; and
3. To determine what factors are associated with self-rated health via multivariable analyses.

1.5 Ethical Considerations

This project is one component of a larger community-based participatory research study regarding the relationship between diabetes and stress that was developed by the FN community and my advisor. A community-based Advisory Group was established as part of the larger study. Together my advisor and the Advisory Group developed a governance structure for the research that adheres to CIHR Ethical Guidelines for Research with Aboriginal Peoples. The governance structure remains in place and I will adhere to the agreements made between the research partners. The primary purpose for the larger stress and diabetes study and the establishment of this research relationship has

always been to benefit the FN community. As such, the FN community has been involved in the development of the study since its design phases and will continue to be involved in this study throughout all stages including dissemination. I will present on the findings to community members and any manuscripts developed will be reviewed by the community. The larger project and the current project have obtained approval from the FN community and the University of Manitoba's Health Research Ethics Board. All efforts have been made to ensure the confidentiality of the study participants. The data used for this study have been anonymized and are kept in locked filing cabinets in a secure area on the University of Manitoba's Bannatyne campus.

CHAPTER TWO:

Review of the Literature

2.1. Health of First Nations People

In seeking to redress Canadian health disparities, perhaps the most relevant and conspicuous concern is the substantially poorer health of Canadian FN people compared to non-FN Canadians. Canadian FN people have been rendered more susceptible to disease by a colonial history involving forced relocation to reserves and attendance at frequently unsanitary, deculturizing, and sometimes abusive residential schools. Modern policy has continued to compound these vulnerabilities through discrimination, legal disputes regarding health coverage, and social and economic marginalization (Waldram et al. 2006). These issues ultimately manifest in poor housing conditions, crowded living areas, low levels of education and employment, and higher levels of substance abuse and smoking. These factors, in addition to transitioning to a modern lifestyle and commercialized diet, promote ill-health in FN communities (Shah, 2004).

Chronic disease has recently replaced accidents and infectious disease in FN communities as the greatest source of morbidity and mortality (Waldram et al., 2006). The 1997 First Nations and Inuit Regional Health Survey (FNIRHS) found that in all sex and age subsets, FN people were more afflicted than non-FN individuals by diabetes, heart disease, hypertension, cancer, and arthritis/rheumatism (Young et al., 1998). Follow-up work in 2002-2003 revealed that the five chronic health conditions that most affect FN people are arthritis/rheumatism, chronic back pain, allergies, diabetes, and

hypertension (RHS, 2007). As chronic conditions tend to co-occur, having one condition may predispose an individual to developing another and lead to high rates of comorbidity among FN individuals.

The prevalence of type 2 diabetes mellitus in Canadian FN populations has reached epidemic status, despite having only emerged as a source of alarm in the population in the past 50 years, concurrent with an increase in the prevalence of obesity (Young et al., 2000; Waldram et al., 2006). The disparity between FN and non-FN people in prevalence of diabetes has increased over time (RHS, 2007). Although there are regional differences in the prevalence of diabetes in Canadian FN groups, high rates have been found in geographically disparate groups including British Columbia (Patenaude et al., 2005), Ontario (Harris et al., 1997), Quebec (Chateau-Degat, 2009), and Manitoba (Martens et al., 2002; Bruce and Young, 2008). The metabolic syndrome, a conflagration of metabolic risk factors that has been found to predict type 2 diabetes mellitus in Canadian FN peoples (Ley et al., 2009), has also been detected at alarmingly high rates among Canadian FN individuals (Pollex et al., 2006), and its association to lifestyle variables in these populations has been established (Liu et al., 2006). The high prevalence and increasing incidence of diabetes in Canadian FN communities is of particular concern given the high levels of diabetes complications that affect vision, nerves, kidneys, the cardiovascular system, and increased susceptibility to infectious disease (Dyck and Tan, 1994, 1998; Young et al., 1998, 2000; Hanley et al., 2005; Bruce and Young, 2008). These conditions impact quality of life, and contribute to disability and mortality.

While some genetic, environmental, and lifestyle risk factors for the development of chronic disease and its pre-cursor states have been identified in FN populations

(Young, 2004; Liu et al., 2006), the multi-factorial etiology of chronic disease requires further investigation. A greater knowledge of how these risk factors interact, contribute to both objective health outcomes and perceived general health, and how this perception may influence health-related behaviour in Canadian FN communities is required for the development of effective prevention programs.

2.2 Self-Rated Health

Global self-rated health (SRH), also referred to as self-assessed health, self-evaluated health, self-perceived health, and general health perceptions (Bjorner et al., 2005), is a simple, easy to administer measure of general health that was initially used as a replacement for clinical assessment in survey oriented research (Strawbridge and Wallhagen, 1999). SRH is typically measured on a single-item asking respondents to choose a response that best describes their general health. The most common wording of the question is that included in the Medical Outcomes Study Short-Form-36 Health Survey (MOS SF-36) (Ware and Sherbourne, 1992; Bjorner et al., 2005) as follows: 'In general, would you say your health is' with the response items 'excellent', 'very good', good', 'fair', or 'poor'. Initially, the response item most frequently used was a four-point scale without the 'very good' response, but its inclusion in the MOS SF-36 has made this response scale the most popular choice (Strawbridge and Wallhagen, 1999). Other variations on the measure include asking respondents: to rate themselves compared to age peers; to rate their present health or health over a particular time span; or to rate themselves on a visual analogue scale. Comparisons of the different questions or scales used in measuring SRH have found that the different wordings reflect comparable

subjective evaluations of health, and any differences produced by the use of different scales are marginal (Eriksson et al., 2001). SRH is recommended for inclusion in health surveys by, amongst other organizations, the World Health Organization (WHO, 1996) and is often included in national and international surveys, including the Canadian Community Health Survey, the American National Health and Nutrition Examination Survey, and the Survey of Health, Ageing and Retirement in Europe (Jylhä, 2009; Veenstra, 2009).

Early studies conducted using SRH involved assessing the relationship between SRH with numerous sociodemographic, physical health, and psychosocial variables (e.g. Maddox, 1962; Garrity et al., 1978), or, as described by Ware and colleagues (1978), investigating relationships between health constructs, clarifying measurement issues, attempting to explain health and illness behaviour, or describing populations' health. SRH was found to be associated with physicians' assessments of health, to at least a moderate degree (Suchman et al., 1958; Maddox, 1962; Heyman and Jeffers, 1963; LaRue et al., 1979; Ware et al., 1978; Idler et al., 1999). Since these early studies, research on SRH as a measure has expanded considerably. The appeal of this measure is multifaceted and is summarized by Bjorner and colleagues (2005). SRH provides respondents with the opportunity to prioritize different aspects of their health and evaluate the factors they consider to be most relevant, maximizing the sensitivity to respondent views of health. Given its somewhat abstract nature, SRH also affords researchers the opportunity to examine the cognitive processes involved in evaluating self-health. SRH has proven to be a strong indicator of mortality, morbidity, and a variety of health outcomes, and as it is simple, easy to administer, and included in numerous

surveys, it has provided researchers with a wealth of data for secondary analyses. Due to its strengths as a measure and source of research, a body of literature concerning SRH, its determinants, and its outcomes has accumulated from studies conducted throughout the world concerning a variety of diverse populations and variables.

2.3 Self-Rated Health and Mortality

While SRH has been used in surveys and studies for decades, it was not until Mossey and Shapiro (1982) determined that SRH served as an independent predictor of mortality in the elderly Canadian participants of the Manitoba Longitudinal Study on Aging that a substantial body of literature accumulated on the measure itself. Although Heyman and Jeffers (1963) first identified a predictive relationship between SRH and mortality, Mossey and Shapiro were able to demonstrate that SRH predicted mortality independently of a variety of sociodemographic, health, and psychosocial factors. Initially, researchers sought to confirm Mossey and Shapiro's findings, broaden the scope of populations wherein SRH and its association to mortality was examined, and introduce new covariates into the analyses. A significant, independent effect of SRH on mortality after controlling for covariates was subsequently replicated in at least a population subset in numerous studies (Kaplan and Camacho, 1983; Idler and Angel, 1990; Idler and Kasl, 1991; Idler et al, 1990; Pijls et al., 1993; Rakowski et al., 1993; Appels et al., 1996; Fried et al., 1998; Jylhä et al., 1998; Benyamini et al, 1999; McGee et al., 1999; Strawbridge and Wallhagen, 1999; Mackenbach et al., 2002 Ferraro and Kelley-Moore, 2001; Jylhä et al., 2006). The association has also been found among individuals with particular disease conditions, including Americans with diabetes (Dasbach et al., 1994;

McEwen et al., 2009), American adults aware of a circulatory disorder (Idler et al., 2004), Israeli patients recovering from myocardial infarction (Gerber et al., 2009), Australian cancer patients (Shadbolt et al., 2002), and American coronary artery disease patients (Bosworth et al., 1999).

In summary, most studies examining the relationship between SRH and mortality have found that poorer SRH is associated with an increased relative risk of mortality. The association remains even after controlling for numerous potential confounders including subjective and objective medical health measures, and the effect is not only short-term but can remain over a protracted period of time (Bjorner et al., 2005). Reviews and meta-analyses of the American and international literature underscore the consistency of these findings, although some studies suggest it may be stronger in women than in men (Idler and Benyamini, 1997; Benyamini and Idler, 1999; Kawada, 2003; DeSalvo et al., 2006).

While the strength of the relationship between SRH and mortality is often somewhat diminished by the various covariates researchers have included in analyses, a number of studies have identified variables that, when controlled for, render the relationship between SRH and mortality non-significant. Han and colleagues (2005) found that adjustment for baseline characteristics including functional limitations, cognitive function, sociodemographic factors, depression, and health risk behaviours in a sample of elderly disabled American women diminished the association between SRH and mortality. Similarly, self-reported health conditions or chronic disease among adult Finns (Jylhä et al., 1998; Lyyra et al., 2006), physical health status in Americans with younger onset diabetes (Dasbach et al., 1994), major illnesses, comorbidities, disability, depression, and social support in elderly Australians (McCalhan et al., 1994), and

sociodemographic characteristics, health risk behaviours, and medical diagnoses in American adults, apart from middle-aged men (Idler and Angel, 1990), were all found to account for a significant proportion of the relationship between SRH and mortality. This wide spectrum of variables shown to substantially attenuate the relationship between SRH and mortality in some populations is suggestive of the broad array of factors individuals incorporate in their self-assessments. Whether SRH independently predicts mortality in every population or every subcomponent of a population, it clearly incorporates valid, but not yet fully understood, perceptions on a variety of variables relevant to the determination of health status outcomes.

2.4. Self-Rated Health and Chronic Disease

Following the recognition of the association between SRH and mortality, researchers began to concentrate on the influence of SRH on outcomes other than all-cause mortality. The role of SRH as a predictor of cause-specific mortality and cardiovascular or cerebral events served as the focus of some studies (Appels et al., 1996; Simons and McCallum, 1996; Bosworth et al., 1999; Emmelin et al., 2003; Benjamins et al., 2004; Idler et al., 2004; Gidron et al., 2006; Kuper et al., 2006, 2007; Kamphuis et al., 2009; McEwen et al., 2009). While other health outcomes including chronic disease incidence (Piljis et al., 1993), diabetes complications (Hayes et al., 2008), physical and cognitive functional limitations (Idler et al., 2000; Whitfield et al., 2004), and health service use (Fylkesnes, 1993) have also been examined.

Attempting to understand the effect of chronic disease on how individuals rate their health and what variables contribute to these ratings has served as the impetus of

other morbidity-focused analyses. In general, people with diabetes rate their health worse than those without diabetes (Klein et al., 1998; Jonsson et al., 2001; Pan et al., 2006; RHS, 2007; Eller et al., 2008; Jiménez-Garcia et al, 2008) This poorer SRH among people with diabetes is associated with numerous factors including presence of complications and duration of diabetes, use of insulin, comorbidities, obesity, clinical biomarkers, Hispanic ethnicity, level of education, socioeconomic and employment status, health behaviours, social network measures, cognitive limitations (Dasbach et al., 1994; Klein et al., 1998; Jonsson et al., 2001; Pan et al., 2006; McCollum et al., 2007; Eller et al., 2008; Jiménez-Garcia et al, 2008), and typically, female gender and increasing age, although exceptions exist (e.g. McCollum et al., 2007). Apart from diabetes, the determinants of SRH in other disease groups have been studied. For example, Gerber and colleagues (2009) demonstrated that in Israeli patients recovering from myocardial infarction, poor SRH was associated with psychosocial determinants, baseline SRH, being of Asian or African origin, low education and income, comorbidity, hyperlipidemia, obesity, impaired ejection fraction, myocardial infarction complications, diabetes, and physical inactivity.

Recently, investigators have begun to explore the association between SRH and clinical biomarkers that may indicate subclinical disease states. Studies have been conducted involving the metabolic syndrome and cardiometabolic risk factors such as glucose, cholesterol, and blood pressure (Froom et al., 2004; Goldman et al., 2004; Näslindh-Ylispangar, et al., 2005, Jylhä et al., 2006; Tomten and Høstmark, 2007; Giltay et al., 2008; Balasubramanyam et al., 2008; Delpierre et al., 2009; Haseli-Mashhadi et al., 2009), hypertension (Shankar et al., 2008), cytokine levels (Lekander et al., 2004), and

allostatic load (Hasson et al., 2009). Some of these new avenues of investigation will be further explored in the present study.

2.5. Determinants of Self-Rated Health

To better understand the consistent predictive power of SRH, attempts have been made to establish what components of their health and life individuals use in making these assessments. Analyses have been conducted in a variety of populations including American adolescents, adults, and elderly adults (Krause and Jay, 1994; Borawski et al., 1996), Australian women (Shadbolt, 1997), elderly African Americans (Manderbacka et al., 1998), middle-aged Finns (Idler et al., 1999), and Israeli adults (Kaplan and Baron-Epel, 2003). These researchers have focused on what referents individuals use in assessing their health and how this may affect their assessments' relationship to their objective health status. Benyamini and colleagues (1999) asked a sample of older adults to rank a number of determinants in importance of assessing SRH. The highest ranked determinants were ability to perform necessary and desired activities, amount they exercise, and typical level of energy. Kaplan and Baron-Epel (2003) identified 3 models in their respondents' referents, the biomedical or disease model, the functional model, and the emotional or general feeling model, while Borawski and colleagues (1996) identified 5 main categories of responses they labelled health-focused, health-transcendent, behavioural/attitudinal, externally-focused, and nonreflective. Ultimately, the researchers suggest that respondents' perceptions of their health incorporate both their biomedical health status and any resultant functional limitations, in addition to lifestyle

and behavioural factors (Krause and Jay, 1994; Shadbolt, 1997; Manderbacka et al., 1998).

Some differences are evident in the referents employed by certain components of the population in how rate their health. Younger age groups and those with less education were found to be more likely to consider health behaviours, lifestyle, and feeling fit in assessing their health, whereas older age groups focused more on psychological and physical health problems, (Krause and Jay, 1994; Shadbolt, 1997). Borawski and colleagues (1996), however, found that among the oldest of the elderly, health behaviours and attitudes were of greater concern in appraising self-health than medical and functioning criteria.

Individuals who rate their health favourably appear to use different referents when evaluating their health than individuals who rate their health more poorly. The majority of respondents report rating their health by internally comparing themselves to self-selected reference groups even when not asked to make this comparison (Kaplan and Baron-Epel, 2003). The reference groups applied appear to be chosen to provide the most positive self-evaluations. Kaplan and Baron-Epel (2003) found that better self-rated health in younger adults was associated with using age peers as a reference group, but in older adults, self-rated sub-optimal health was associated with using age peers as a reference group when evaluating self-health. Those individuals who did not compare themselves to age peers typically compared themselves to most of their friends and acquaintances, irrespective of their ages. These findings suggest that in order to maintain a more positive perception of their own health, individuals do not compare themselves to reference groups that are likely to be healthier (Kaplan and Baron-Epel, 2003). Idler and

colleagues (1999) demonstrated that those individuals who rated their health better than their medical history would suggest often relied on a more inclusive referent that incorporated psychosocial, spiritual, or emotional components rather than merely biomedical criteria, and Borawski and colleagues (1996) found that those who over-estimated their health based their assessments on their transcendence of objective health problems. On the other hand, those with poor health who evaluated their health realistically were more likely to focus on medical conditions and functional ability (Borawski et al., 1996). Krause and Jay (1994), however, found that while poor or fair SRH was selected by 53% of respondents who referred to health problems when rating their health, 45% of respondents who indicated they were thinking about a health problem when rating their health still rated their health as good.

Researchers have conducted studies designed to further elucidate the components involved in evaluating self-health by identifying factors that associate with SRH. Sociodemographic factors, socioeconomic status, health risk behaviours, biomedical health status, and often psychosocial and functional ability measures have become standard and are typically included as covariates in studies. In Bjorner and colleagues' (1996) systematic review on explanatory variables for SRH, medical diagnoses, physical symptoms, physical function, mental health symptoms, and longer education demonstrated consistent and strong associations with SRH. Weak positive associations were found with being Caucasian and being employed. The youngest and oldest age groups reported the best SRH, but gender, marital status, and social networks did not remain significantly associated with SRH, after controlling for other health measures.

Some studies have begun exploring novel explanatory variables for SRH. In addition to the increased concentration on chronic disease incidence, risk factors, and clinical biomarkers, newly investigated biological factors include hypertension labelling (Barger and Muldoon, 2006) and co-morbid psychological disorders (Pirkola et al., 2009). Recently explored social factors include racism (Franzini and Fernandez-Esquer, 2004; Moody-Ayers et al., 2005; Paradies, 2006), acculturation stress (Finch and Vega, 2003), trust (Franzini and Fernandez-Esquer, 2004; Franzini, 2008), neighbourhood characteristics (Patel et al., 2003; Harris et al., 2006; Oshio and Kobayashi, 2009), and relative income and subjective social status (Demakakos et al., 2008; Pham-Kanter, 2009; Subramanyam et al., 2009). All of these factors are relevant in contextualizing SRH in a Canadian FN community.

2.6 Self-Rated Health by Ethnic Group

One factor that has been found to influence SRH is ethnicity, and a substantial body of international research has developed on differences in how ethnic groups rate their health and the determinants that influence these ratings. Typically, ethnic minorities rate their health worse than Whites in British and American samples (Ren and Amick, 1996; Shetterly et al., 1996; Ferraro et al., 1997; McGee et al., 1999; Chandola and Jenkinson, 2000; Zahran et al., 2005), although there is evidence that Asians or Pacific Islanders may be less likely to rate their health poorly compared to other Americans (Zahran et al., 2005). While non-White Canadians reported better health than non-White Americans, and there were greater discrepancies between White and non-White Americans than between White and non-White Canadians (Siddiqi and Nguyen, 2010),

differences in SRH between ethnic groups in Canada have been identified. Among Canadians, Veenstra (2009) found that those respondents who self-identified as Aboriginal or both Aboriginal and White or Chinese were more likely to rate their health poorer than respondents who identified themselves as Whites. Menec and colleagues (2007) found that older Manitobans identifying as being of Eastern European ethnic background were significantly more likely to rate their health as fair, poor, or bad compared to older Manitobans who self-identified as British or Canadian. Besides Canadians who self-identified as Aboriginal, Wu and Schimmele (2005) determined that East and Southeast Asian Canadians had lower than average SRH, and English, French, and Black Canadians had better than average SRH. In New Zealand, Māori respondents were significantly more likely to report poor health than New Zealanders of European ancestry, until adjustments were made for all of sex, age, racial discrimination, and deprivation (Harris et al., 2006). In Sweden, disparities in SRH were evident between native Swedes and immigrants, seemingly mainly attributable to psychosocial and economic forces (Lindström et al., 2001).

A variety of determinants of SRH in specific ethnic minorities have been identified. Among Mexican and Hispanic Americans, SRH has been found to be negatively associated with depressive affect, lower income, greater financial strain, cognitive impairment, lower self esteem, lack of acculturation, discrimination, stroke, diabetes, neighbourhood socioeconomic status, neighbourhood economic, demographic, and geographic characteristics, and the female gender. In these populations, SRH was positively associated with social support, religiosity, education, better physical and mental health, and trust (Angel and Guarnaccia, 1989; Shetterley et al., 1996; Angel et al,

2003; Finch and Vega, 2003; Otiniano et al., 2003; Patel et al., 2003; Franzini and Fernandez-Esquer, 2004; Franzini, 2008).

The determinants of SRH in other ethnic minorities, apart from Hispanic Americans, have also been assessed. Moody-Ayers and colleagues (2005) found that passive coping with racism but not exposure to racism was negatively associated with SRH in African American respondents with diabetes. Among Asian Indian immigrants in the United States, Jonnalagadda and Diwan (2005) determined that SRH was negatively associated with age, female gender, BMI, and number of chronic disease conditions, and positively associated with satisfaction with social support. Among Australian Aborigines, poor or fair SRH was associated with increasing age (apart from the eldest age groups), presence and number of health conditions, recent health actions, employment status, disability, and primary language spoken not being English (Sibthorpe et al., 2001). The association of poor or fair health with individuals who do not primarily speak English is inconsistent with morbidity and mortality data and may call into question the use of SRH in this population with non-English speakers.

Limited research has been conducted in ethnic minority groups in which SRH has served as an independent variable. Whitfield and colleagues (2004) found that SRH and number of chronic illnesses were significant predictors of cognitive functioning after age, gender, and education were controlled for in elderly African Americans. In Asian Indian Americans, Balasubramanyam and colleagues (2008) determined that SRH significantly predicted the metabolic syndrome after controlling for all covariates.

2.7 Validity of Self-Rated Health and Ethnicity

According to Last (2001, p 184), validity is defined as an expression of the degree to which a measurement measures what it purports to measure. The SRH measure has demonstrated validity in multiple ethnic groups (e.g. Chandola and Jenkinson, 2001). The validity of SRH was examined as early as 1958 by Suchman and colleagues, and the evidence available regarding the validity of SRH was reviewed by Ware and colleagues in 1978. Early studies assessed whether SRH correlated with objective health assessments (Suchman et al., 1958; Maddox, 1962; Heyman and Jeffers, 1963; LaRue et al., 1979; Ware et al., 1978; Idler et al., 1999), and typically at least a moderate association was found between self-rated and objective health measures.

Evaluations of the relationship between objective health measures and SRH have also been conducted within ethnic minority populations and discrepancies between the measures have been found. In phone interviews, self-identified overweight Hispanic and African American respondents over-rated their health compared to their degree of obesity, self-reported morbidity status, and probable objective morbidity status based on national prevalence data. The African American respondents rated their health better than Hispanics, despite having higher rates of obesity and self-reported comorbidities (Burroughs et al., 2008). Angel and Guarnaccia (1989) found Hispanic Americans frequently underestimated their health compared to a physician's assessment, and this discrepancy was particularly pronounced among those taking the survey in Spanish. This suggests that this pattern is either an artifact of the language used or there were differences in how the less acculturated Hispanics viewed their health compared to those who were more acculturated. The importance of language in SRH was also emphasized in

analyses conducted in Australia, wherein the self-assessments of health in Australian Aborigines were not congruent with morbidity data (Wiseman, 1999), particularly in individuals who did not primarily speak English (Sibthorpe et al., 2001).

In one of the few studies focusing on SRH within a North American Indian population, Garroutte and colleagues examined the degree of association between physician assessments and older American Indian patients' SRH (Garroutte et al., 2006). The patients and physicians, 4 out of 7 of whom were also American Indians, agreed on 60% of the patients' assessments of health. Similarly to Angel and Guarnaccia's (1989) findings among Hispanic Americans, in the majority of disagreements the discrepancy occurred when physicians chose a higher rating than the patients did. These differences were greater for those individuals who weakly associated with White American cultural identity, but individuals' affiliation with American Indian culture (measured separately from White American cultural affiliation) did not significantly affect the discrepancy between ratings. As all physicians were strongly affiliated with White American culture, these findings may suggest that having a similar cultural identity to one's provider may facilitate congruent health assessments more so than only sharing ethnic heritage.

Cross-cultural comparisons that compare the degree of correlation between SRH and objective health measures between ethnic groups have been conducted. Chandola and Jenkinson (2000) found that the association between SRH and objective health measures did not differ between British ethnic groups, suggesting that all ethnicities incorporated similar referents in their self-assessments. Some differences in the relation between objective health and SRH has, however, been reported between White and African Americans. While self-reported morbidity was the stronger predictor in both groups,

African Americans' health assessments were found to only be associated with self-reported morbidity and not with physician-evaluated morbidity, while White Americans' SRH was associated with both kinds of measures (Ferraro and Farmer, 1999).

Other cross-cultural analyses have produced findings suggestive of ethnic differences in determinants and referents of SRH. In their qualitative study, Krause and Jay (1994) found that non-White Americans focused more on health problems in rating their health than White Americans who focused more on general physical functioning. Ren and Amick (1996) determined that while higher income, but not higher education, among Black Americans attenuated the disparities in SRH between Black and White Americans, no such effect was found between Hispanic and White Americans for either education or income. Huh and colleagues (2008) ascertained that foreign-born Hispanic, and particularly Asian, immigrants were as likely or more likely to rate their health poorly as Hispanics and Asians born in the United States, despite reporting fewer health problems.

2.8 Self-Rated Health in Indigenous Populations

Little research has been conducted specifically on SRH within North American indigenous populations, although they may form one ethnic sub-grouping of national American (McGee et al., 1999; Zahran et al., 2005) or Canadian data (Wu and Schimmele, 2005; Veenstra, 2009). These Canadian data do not include individuals on reserves. Both the Canadian and American studies found that the Aboriginal groups have poorer SRH than most other ethnic groups studied, and Veenstra (2009) found that

socioeconomic status was only a relevant determinant of SRH among Aboriginals and respondents identifying as both Aboriginal and White.

Some SRH information for on reserve FN communities is available from the 1991 Aboriginal Peoples Survey and the 1997 and the 2002-2003 First Nations and Inuit Regional Health Survey (RHS). Newbold (1997), based on data from the 1991 Aboriginal Peoples Survey and the 1991 General Social Survey, determined that while Aboriginal Canadians, including those both on and off reserve, appeared to rate their health similarly to the general Canadian population, this similarity disappeared when the data were age and sex standardized. Aboriginal respondents were then found to be more likely to rate their health as fair or poor, particularly those living on reserve. Despite any similarities in SRH, Aboriginal respondents suffered more from diagnosed medical conditions. Poorer SRH among all participants, regardless of ethnicity, was found to predict number of family physician visits in a dose-dependent manner. Aboriginal Canadians with excellent health, however, were less likely to visit a physician than were Canadians in general with self-rated excellent health, even when income was controlled. These results are suggestive of cultural differences impacting assessments of SRH and subsequent decisions regarding health care.

The 2002-2003 RHS confirmed that a greater percentage of FN and Inuit individuals rated their health as poor and a lower percentage rated it as excellent or very good compared to non-FN Canadians in all age groups, although these differences were not tested for statistical significance (RHS, 2007). These results remained consistent when analyzed by income and disability status. The survey focused predominantly on how disability affected SRH among FN and Inuit individuals. Disabled FN and Inuit

adults were more likely to rate their health as fair or poor compared to non-disabled FN and Inuit adults and non-FN adults with or without disabilities, although the differences between FN and Inuit and other Canadians were not tested for statistical significance. Older disabled FN and Inuit individuals were more likely to report poor health compared to younger individuals, but there were minimal differences between the sexes. Generally, higher income was associated with better SRH and those individuals who reported excellent or very good health ascribed their health status to good social supports and sleep. Similar to earlier findings that FN and Inuit individuals suffering from chronic disease were more likely to rate their health as poor and less likely to rate their health as excellent compared to healthy individuals (Young et al., 1998), those with diabetes were more likely to rate their health as poor, fair, or good relative to those without diabetes but were less likely to rate their health as excellent.

Some studies have been conducted using SRH in adolescent North American Indians and Alaska Natives. Approximately 20% of the respondents rated their health as poor or fair, which is substantially higher than other North American adolescents (Blum et al., 1992; Parker, 2004). American Indian and Alaska Native adolescents were also less likely to rate their health as excellent compared to their non-Native American peers (Blum et al., 1992). SRH was negatively associated with suicide attempts, physical or sexual abuse, drug use, poor school performance, poor body image and preoccupation with weight, and being a female from a poorer income family (Grossman et al., 1991; Blum et al., 1992; Parker, 2004). Having a recent physical examination, social competence, and school achievement were positively associated with SRH among adolescent American Indians and Alaska Natives (Blum et al., 1992; Parker, 2004), and

not smoking tobacco was associated with excellent self-rated health among Canadian Aboriginal adolescents and young adults (Ritchie and Reading, 2004).

SRH among elderly Native North Americans has been investigated in a number of studies. Older disabled American Indians and Alaska Natives were more likely to report poor or fair health than White or Asian Americans (Okoro et al., 2007). Poorer SRH predicted specialist use in a sample of older rural dwelling individuals with type 2 diabetes of which a quarter of the sample comprised Native Americans (Bell et al., 2005). Being younger, having a higher income, having more education, and exercising predicted better SRH among elderly Native Americans. Tobacco use, greater nutritional risk, and longer time since using alcohol predicted poorer SRH. Barriers to health care predicted worse SRH only when these health risk behaviours were not considered (Ruthig et al., 2009). While these studies provide some information concerning SRH in North American indigenous populations, there remains a deficiency in research specific to Canadian FN reserve communities and SRH and how SRH is impacted by the highly prevalent rates of chronic disease, chronic disease risk factors, and psychosocial stress present in these communities.

CHAPTER THREE:

METHODS

3.1 Study Design

This study is a secondary analysis of data derived from a cross-sectional community-based survey. The study sample is composed of 175 adult members (18 years of age and older) of a Manitoba FN community located approximately 200 kilometres from Winnipeg. Participants of the study were volunteers who had previously participated in a larger screening study for diabetes and diabetes complications.

The survey instrument is the "First Nations Community-Based Stress and Coping Survey"©, a 119-item questionnaire based on ethnography completed by my supervisor, Dr. Sharon Bruce. The scales used as templates for the design of the instrument include the Perceived Stress Scale (Cohen et al., 1983), the Inventory of College Students' Recent Life Experiences (ICSRLE) (Kohn et al., 1990), and the Canadian Community Health Survey (CCHS), Cycle 2.1. A pilot study on a smaller sample was conducted to validate the instrument in this population.

3.2 Measures

Variables included in the analysis comprise the following categories: sociodemographic, self-rated health, chronic health conditions, mobility and functioning, living conditions, and perceived stress and control. Sociodemographic variables include sex (male, female); age (derived from date of birth); educational level (possible responses included highest grade completed in grade school, college, university, or other); current

marital status (possible responses included never married, married/common-law, separated/divorced, or widow/widower); and paid employment status (yes/no). A category of younger and older adults for each sex was constructed based on sex-specific median age. *Self-rated health* was based on responses to the question: 'Compared with other people your age, how would you describe your health?' Possible responses included 'excellent', 'very good', 'good', 'fair', and 'poor'.

Chronic health conditions were determined by measurement and self-report. Diabetes and high blood pressure were measured as part of an earlier Screening Study for Diabetes and Diabetes Complications (2003). Individuals who were classified as having either diabetes or high blood pressure at the time of the Screening Study were considered to have diabetes or high blood pressure for this study. Individuals who did not have diabetes or high blood pressure at the time of the Screening Study were asked if they had been diagnosed in the interim. With permission, diagnoses were confirmed with the chronic disease nurse at the Health Centre. Conditions derived by self-report included: arthritis and heart problems. Diabetes complications were determined by examination and self-report. Previous amputation, neuropathy, and microalbuminuria were determined by examination and measurement at the Screening Study. Respondents with diabetes were additionally asked whether they had any of the following diabetes-related complications: diabetes-related amputation, foot problems, kidney problems, and vision problems.

Venous blood samples were drawn from participants as part of the Screening Study for Diabetes and Diabetes Complications after an overnight, 12-hour fast. *Diabetes* was defined as a glucose $\geq$ 7.0mmol/L or a previous diagnosis. Blood pressure was measured by a registered nurse as part of the Screening Study for Diabetes and Diabetes

Complications. *Hypertension* was defined as a systolic pressure > 140mmHg or a diastolic pressure > 90 mmHg, or a previous diagnosis. *Microalbuminuria* (early kidney dysfunction) was defined as an albumin/creatinine ratio > 2.0mg/mmol for males and > 2.8 mg/mmol for females. *Neuropathy* was defined as the presence of numbness, tingling, pain, and/or loss of protective sensation determined through application of the 10-g Semmes-Weinstein monofilament wire system. Foot examinations and applications of the monofilament were completed by a registered nurse as part of the Screening Study for Diabetes and Diabetes Complications. Anthropometric measures conducted during the Screening Study for Diabetes and Diabetes Complications included waist circumference and BMI. *Obesity* was defined as BMI $\geq$ 30 kg/m^2, and *abdominal obesity* was defined as a waist circumference > 102 cm. for males and > 88 cm. for females.

Measures derived from the Screening Study for Diabetes and Diabetes Complications and respondents' survey responses were used to construct composite chronic condition and risk factor variables. *Metabolic syndrome* was defined based on the presence of at least 3 of the following variables: large waist, elevated triglycerides, elevated blood pressure, elevated glucose, and elevated HDL-cholesterol according to ATP III criteria (NCEP, 2001). *Cardiometabolic risk or hypertriglyceridemic waist* was determined based on the presence of elevated triglycerides and waist circumference, and *dyslipidemia* was assessed based on elevated HDL-cholesterol and triglyceride levels. *Presence of at least one condition* was determined by a respondent having diabetes, arthritis, hypertension, obesity, or dyslipidemia. The *number of chronic conditions* variable was based on how many of the following conditions a respondent had: diabetes, hypertension, obesity, arthritis, and dyslipidemia.

The mobility and functioning category is comprised of questions related to difficulty with mobility and difficulty with vision. *Difficulty with mobility* was determined by asking respondents if they had any difficulty: walking 350 metres/ 400 yards (about a quarter of a kilometre); moving from one room to another on a single floor; or standing for more than 20 minutes. *Difficulty with vision* was based on asking respondents whether they had difficulty seeing the print on the page, or the face of someone across a room (4 metres or 12 feet) even while wearing glasses or contact lenses, if these were usually worn. For all mobility and functioning questions, possible responses were 'yes, have difficulty' or 'no difficulty'. Individuals who responded affirmatively to at least one of the three mobility questions or at least one of the two vision questions were considered to have a mobility or vision difficulty, respectively.

The *living conditions* category assessed household crowding and maintenance, road conditions, and water safety in the community. Respondents were asked the number of rooms, people, and children in their home, and whether they had now, in the past, now and in the past, or never experienced overcrowding in their home. The condition of houses and roads in the community was assessed by asking respondents whether they agreed, disagreed, neither agreed nor disagreed, or did not know if houses or roads in the community were in good condition. Water safety was determined by asking respondents if they agreed, disagreed, neither agreed nor disagreed, or did not know if water in the community was safe for drinking. *Community conditions* combined responses to the questions regarding water safety, housing maintenance, and overcrowding in the home into a single variable.

To determine *levels of perceived stress*, respondents were asked how often in the past month: they felt unable to control the important things in their life; they felt nervous and "stressed"; and they felt difficulties were piling up so high that they could not overcome them. Respondents assessed the frequency of these incidents on a response scale including the responses: 'never', 'almost never', 'sometimes', 'fairly often', and 'very often'. *Levels of perceived control* were assessed by asking how much personal influence respondents felt they had over what happens in terms of their physical health, how they feel (their emotions or sense of well-being), and their life in general. Response categories for control variables included: 'none', 'a little bit', 'quite a bit', and 'a lot'.

Table 3.1: Measures Used in Analysis

Variable	Definition	Code
Sex	Sex of Participant	0=Male 1=Female
Age	Age (in yrs) of participant	Number of years
Age Group	Age group of participant	0=Age: 18-38 (M); 18-40 (F) 1=Age: 39+ (M); 41+ (F)
Years lived in community	How long participant lived in Sandy Bay	Number of years
Marital status	Marital status	0=Not married (Never married/ Sep/Div and Widow/Widower) 1=Married
Education	Highest level of education completed	0-12 (Grade school; Grade completed) 13 Post-secondary
Education group	Highest level of education completed	0=0-9 1=10+
Employment status	Is participant employed for pay	0=No 1=Yes
Language	Aboriginal language spoken well enough to carry on conversation	0= Can't speak or understand 1=Can't speak but can understand 2=Yes
Number of people in home	Number of people in home	Number of people
Number of rooms in home	How many separate rooms in home	Number of rooms
Number of children <18 in home	Number of children <18 in home	Number of children
Self-rated health (SRH)	Compared with other people your age, how would you describe your health?	0= Poor, Fair 1= Good, Very good, Excellent
Diabetes	Presence of diabetes	0=No 1=Yes
Diabetes duration	Years since diagnosis	Number
Diabetes-related amputations	Presence of diabetes-related amputation	0=No 1=Yes
Diabetes-related foot problems	Presence of foot problems	0=No 1=Yes
Diabetes-related kidney problems	Presence of kidney problems	0=No 1=Yes

Diabetes-related vision problems	Presence of vision problems	0=No 1=Yes
Hypertension	Presence of hypertension	0=No 1=Yes
Arthritis	Presence of arthritis	0=No 1=Yes
Arthritis duration	Years since diagnosis	Number of years
Heart problems	Presence of heart problems	0=No 1=Yes
Stroke	Participant ever had stroke	0=No 1=Yes
Time since stroke	Years since stroke	Number of years
Mobility difficulties	Any of: Difficulty walking 350 m. Difficulty walking up/down 12+ steps. Difficulty moving from one room to another on a single floor. Difficulty standing for more than 20 min.	0=No 1=Yes
Vision difficulties	Any of: Difficulty seeing page even w/glasses/contacts (if worn) Difficulty seeing face across room even w/glasses/contacts (if worn)	0=No 1=Yes
Perceived stress	How often have you felt?: unable to control important things in life, nervous or stressed, felt difficulties were piling up so high they could not be overcome?	1-15 based on combination of original, 5-pt separate scales for each question (1=Never, 2=Almost Never, 3=Sometimes, 4=Fairly Often, 5=Very Often)
Control over health	How much personal influence do participants feel they have over physical health	1=None 2=A little bit 3=Quite a bit 4=A lot
Control over mood	How much personal influence do participants feel they have over how they feel (emotions/well-being)	1=None 2=A little bit 3=Quite a bit 4=A lot

Control over life	How much personal influence do participants feel they have over life in general	1=None 2=A little bit 3=Quite a bit 4=A lot
BMI	Measure of waist for height	Number (kg/m^2)
Obese	Measure of waist for height	0=0-29.9 kg/ m^2 1=30.0+ kg/ m^2
Waist	Waist circumference	Number (cm)
Abdominal obesity	Waist circumference	0=0-102.9 cm (M); 0-88.9 cm (F) 1=103 cm+ (M); 89.0 cm+ (F)
Cardiometabolic risk	Presence of cardiometabolic risk – incl. waist and triglyceride levels	0=No 1=Yes
Metabolic syndrome	Presence of metabolic syndrome	0=No 1=Yes
Dyslipidemia	Presence of dyslipidemia – incl. HDL cholesterol and triglycerides	0=No 1=Yes
Presence of at least 1 condition	Presence of at least 1 of: diabetes, hypertension, obesity, dyslipidemia, arthritis	0=No 1=Yes
Number of chronic conditions	Number in total of the following conditions that the participant suffers from: diabetes, hypertension, obesity (BMI –not abdobesity), dyslipidemia, and arthritis	0=0 conditions present 1=1 condition present 2=2 conditions present 3=3 conditions present 4=4 conditions present 5=5 conditions present
Overcrowding in the home	Overcrowding in the home	1=Now 2=In the past 3=Now and in the past 4=Never
Houses in good condition	Most houses in this community are in good condition	1=Agree 2=Disagree 3=Neither agree nor disagree 4=Don't know
Roads in good condition	The roads in this community are in pretty good condition	1=Agree 2=Disagree 3=Neither agree nor disagree 4=Don't know

Water is safe in community	The water in this community is safe for drinking	1=Agree 2=Disagree 3=Neither agree nor disagree 4=Don't know
Community Conditions	Most houses in this community are in good condition, or the water in this community is safe for drinking, or there is overcrowding in the home	0= Agree/ or overcrowding In the past/Never 1=Disagree/ Neither agree nor disagree/Don't know or overcrowding Now/Now and in the past

3.3 Analysis

The associations between the following variables were investigated: SRH, sociodemographic variables (sex, age, educational level, work status, and marital status), chronic health conditions (diabetes, hypertension, neuropathy, microalbuminuria, arthritis, heart problems, obesity, dyslipidemia, and metabolic syndrome), mobility and functioning, and levels of perceived stress and control.

The analysis was carried out in three stages. Univariate analyses were conducted to examine the distribution of the variables. Bivariate analyses employing t-tests for Normally distributed continuous variables, non-parametric tests (i.e., Mann Whitney U) for continuous variables that do not follow a Normal distribution, and chi-square tests for categorical variables were then performed to investigate associations between SRH and the chronic health conditions, risk factors, perceived stress and control, mobility and functioning, and sociodemographic variables. To avoid committing a Type 1 error, the Bonferroni correction was applied to bivariate analyses. Lastly, logistic regression analyses were used to identify any predictors of SRH.

CHAPTER FOUR:

RESULTS

4.1 Sociodemographic Factors

The sociodemographic factors of the community are presented in Table 4.1. The sample was young and approximately equally distributed between the sexes. The age distribution between the sexes was also nearly equivalent. The median age was 41 years of age for females and 39 years of age for males. Most of the respondents were married, had lived in the community for the majority of their lives, and spoke an Aboriginal language well enough to carry on a conversation. The rate of unemployment in the sample was high, and the levels of educational attainment were low. Marital status, employment status, and educational attainment were generally evenly distributed between the sexes and no statistically significant differences were found (Table 4.2). When comparisons were made between older and younger adults (Table 4.3), older adults were found to have significantly lower levels of education than younger adults ($P < 0.001$), but no differences in employment or marital status were found.

Table 4.1: Sociodemographic Descriptive Statistics

Variable	Categories	N (%); Mean (SD); Median (Range)
Sex	Male Female	85 (49) 90 (51)
Age	Mean Median	40.75 (11.53) 39.00 (22, 76)
Years lived in community	Mean Median	36.36 (13.84) 37.00 (1, 76)
Marital status	Not currently married Married or common-law	61 (35) 107 (61)
Education (highest grade completed)	Mean Median	9.23 (2.52) 10.00 (0, 13)
Employment status	Currently employed Unemployed	55 (31) 120 (69)
Aboriginal language	Speak Aboriginal language Understand but do not speak Do not understand/speak	155 (89) 16 (9) 4 (2)

Table 4.2: Selected Sociodemographic Variables by Sex

Variable	Categories	M N (%)	F N (%)	P value
Age	Younger Older	43 (51) 42 (49)	45 (50) 45 (50)	0.938
Education	Completed grades 0-9 Completed grades 10+	40 (47) 45 (53)	44 (49) 46 (51)	0.809
Employment status	Currently employed Unemployed	27 (32) 58 (68)	28 (31) 62 (69)	0.926
Marital status	Currently Married Unmarried	50 (59) 35 (41)	57 (69) 26 (31)	0.184

Younger age group: 18-38 years of age (M); 18-40 years of age (F).
Older age group: > 38 years of age (M); > 40 years of age (F).

Table 4.3: Selected Sociodemographic Variables by Age Group

Variable	Categories	Younger N (%)	Older N (%)	P value
Education	Completed grades 0-9 Completed grades 10+	30 (34) 58 (66)	54 (62) 33 (38)	< 0.001
Employment status	Currently employed Unemployed	30 (34) 58 (66)	25 (29) 62 (71)	0.445
Marital status	Currently Married Unmarried	51 (59) 36 (41)	56 (69) 25 (31)	0.157

Younger age group: 18-38 years of age (M); 18-40 years of age (F).
Older age group: > 38 years of age (M); > 40 years of age (F).

4.2 Living Conditions

The living conditions of the community were assessed by measures relating to household crowding, perceptions of housing and road conditions and water safety. The distributions of number of individuals and children less than 18 years of age per home and perceptions of housing and roads maintenance and water safety are presented in Table 4.4, and sex and age differences of these variables are presented in Table 4.5. The median number of people in a home was 6.0 (range: 1-20) and the median number of children was 2.0 (range: 0-10). Interestingly, 33% of participants indicated that they experienced overcrowding in their homes 'now and in the past', another 33% indicated that they no longer lived in overcrowded conditions but had in the past, and the remaining 34% claimed that they had never experienced overcrowded living conditions. No significant differences were found in number of people, rooms, or children under 18 years of age in the home by sex, but older individuals (male 39+; female 41+) were less likely to have children under the age of 18 in the home than were younger adults. A remarkable 98% of respondents felt the roads in the community were not in good condition, and a substantial portion of the respondents (73%) felt that the houses were

also not in good condition. Forty-three percent (43%) of respondents believed the water in the community was unsafe, and an additional 22% of respondents did not know if the community's water was safe to drink. The only sex or age difference in regard to perceptions on community housing and road maintenance and water safety was women being more likely to disagree that the water in the community was safe for drinking than men.

Table 4.4: Living Conditions – Total Sample

Variable	Categories	N (%); Median (Range)
Number of people in home	1-3	49 (28)
	4-6	56 (32)
	7-8	43 (25)
	9+	27 (15)
	Median	6.00 (1, 20)
Number of children in home	0	44 (25)
	1-2	50 (29)
	3-4	40 (23)
	5+	41 (23)
	Median	2.00 (0, 10)
Overcrowding in home	Now	16 (9)
	In the past	58 (33)
	Now and in the past	42 (24)
	Never	59 (34)
Houses in good condition	Agree	32 (18)
	Disagree	127 (73)
	Neither agree nor disagree	4 (2)
	Don't know	12 (7)
Roads in good condition	Agree	2 (1)
	Disagree	171 (98)
	Neither agree nor disagree	1 (1)
	Don't know	1 (1)
Water safe	Agree	54 (31)
	Disagree	76 (43)
	Neither agree nor disagree	7 (4)
	Don't know	38 (22)

Table 4.5: Living Conditions by Sex and Age

Variable	Sex		Significance	Age Group		Significance
	M N (%); Median (Range)	F N (%); Median (Range)		Younger N (%); Median (Range)	Older N (%); Median (Range)	
Number of people in home	6.00 (1, 16)	6.00 (2, 20)	Z = -2.79, NS	6.00 (1, 16)	5.00 (1, 20)	Z = -1.903, NS
Number of rooms in home	6.00 (1, 9)	6.00 (2, 12)	Z = 1.141, NS	6.00 (1, 9)	6.00 (1, 12)	Z = -1.409, NS
Number of children in home	2.00 (0, 9)	2.00 (0, 10)	Z = -.951, NS	3.00 (0, 9)	2.00 (0, 10)	Z = -2.704, P < 0.01
Overcrowding in home						
No	61 (72)	56 (62)	χ^2 = 1.796, NS	58 (66)	59 (68)	χ^2 = 0.072, NS
Yes	24 (28)	34 (38)		30 (34)	28 (32)	
Houses are in good condition						
No	66 (78)	77 (86)	χ^2 = 1.830, NS	72 (82)	71 (82)	χ^2 = 0.001, NS
Yes	19 (22)	13 (14)		16 (18)	16 (18)	
Water is safe						
No	51 (60)	70 (78)	χ^2 = 6.476, P < 0.025	63 (72)	58 (67)	χ^2 = 0.497, NS
Yes	34 (40)	20 (22)		25 (28)	29 (33)	

Younger age group: 18-38 years of age (M); 18-40 years of age (F).
Older age group: > 38 years of age (M); > 40 years of age (F).
Overcrowding in home: Yes = Now/ Now and in the past; No = In the past/Never.
Houses are in good condition and Water is safe: Yes = Agree; No = Disagree/Neither agree nor disagree/Don't know.
Number of people, rooms, and children in home: Mann-Whitney U test.

4.3 Self-Rated Health

The distribution of SRH was initially assessed by asking respondents: 'Compared with other people your age, how would you describe your health?' and utilizing a 5-option response variable including the responses: 'excellent', 'very good', 'good', 'fair', and 'poor' (Table 4.6). A large proportion of respondents rated their health as poor (11%) or fair (26%). This is substantially higher than results obtained from a general Canadian sample. The 2003 Canadian Community Health Survey (CCHS) found that 3% of Canadians aged 25 years and older rated their health as poor and 10% rated their health as fair (Veenstra, 2009). Respondents in the present study were also far less likely to rate their health as excellent or very good compared to other Canadians (24% vs. 56%), but were slightly more likely to rate their health as good (39% vs. 31%).

Table 4.6: Distribution of Self-Rated Health – Total Sample

Variable	Categories	N (%)
SRH	Excellent	10 (6)
	Very good	32 (18)
	Good	68 (39)
	Fair	46 (26)
	Poor	19 (11)

For subsequent analyses, the SRH variable was dichotomized. Fair and poor health comprises one response category, and the other category is composed of the responses excellent, very good, and good. This dichotomous variable was used to test for age and sex differences in SRH (Table 4.7). Significantly more men were found to rate their health as poor or fair compared with women ($P < 0.05$), and older individuals were more likely to rate their health as poor or fair compared to younger individuals ($P < 0.001$).

Table 4.7: Self-Rated Health by Sex and Age

Variable	Categories	Poor/Fair N (%)	Excellent/Very Good/Good N (%)	P value
Sex	Male Female	38 (45) 27 (30)	47 (55) 63 (70)	0.044
Age	Older Younger	44 (51) 21 (24)	43 (49) 67 (76)	< 0.001

Younger age group: 18-38 years of age (M); 18-40 years of age (F).
Older age group: > 38 years of age (M); > 40 years of age (F).

4.4 Health Characteristics of the Population

The frequencies of chronic health conditions in the study population are presented in Table 4.8. Prevalence of disease and risk factors were high, and the burden of illness is highlighted when compared with general Canadian reference samples. Forty-two percent (42%) of respondents had a diagnosis of diabetes; while in the 2003 CCHS, 6% of Canadians over 25 years of age reported having diabetes (Veenstra, 2009). Similarly, 41% of study respondents had hypertension compared to 18% of all Canadians over 25 years of age (Veenstra, 2009). Among respondents with diabetes, 59% suffered from at least one complication, defined as amputation, or problems with feet, kidneys or vision. Heart problems were reported by 17% of the study population compared to 5% of all Canadians 12 years and older (CCHS, 2000/2001) (Chow et al., 2005). Obesity was identified in 52% of respondents, which is substantially higher than the 15% of all Canadians over 12 years of age found to be obese by the 2000/2001 CCHS (Tanuseputro et al., 2003). Indicators of cardiometabolic risk such as abdominal obesity (66%), the metabolic syndrome (52%), and hypertriglyceridemic waist (a measure based on triglyceride levels and waist circumference) (44%) were also present at alarming levels in the community (obesity and indicators of cardiometabolic risk were based on physical

exam and fasting serum samples). The prevalence of self-reported vision (22%) and mobility (38%) difficulties appear quite elevated given the young sample.

Table 4.8: Distribution of Health Conditions – Total Sample

Variable	Categories	N (%); Mean (SD); Median (Range)
Diabetes (Measured and self-report)	Yes No	74 (42) 101 (58)
Duration of diabetes	Mean Median	10.99 (7.44) 10.00 (1, 29)
Diabetes-related amputation	Yes No	3 (4) 68 (96)
Diabetes-related foot problems	Yes No	28 (39) 43 (61)
Diabetes-related kidney problems	Yes No	10 (14.50) 59 (85.50)
Diabetes-related vision problems	Yes No	28 (39) 43 (61)
Hypertension (Measured and self-report)	Yes No	71 (41) 104 (59)
Arthritis (Self-report)	Yes No	39 (22) 136 (78)
Duration of arthritis	Mean Median	8.83 (9.51) 5.00 (1, 33)
Heart problems (Self-report)	Yes No	29 (17) 146 (83)
Stroke	Yes No	6 (3) 169 (97)
Time since stroke	Mean Median	3.50 (3.51) 2.00 (1, 10)
BMI	Mean Median	31.33 (6.89) 30.21 (18.40, 53.30)
Obesity (BMI $\geq$ 30 kg/m^2) (Measured)	Yes No	91 (52) 83 (47)
Waist circumference	Male Mean Median	 102.86 (14.32) 102.00 (69, 135.50)
	Female Mean Median	 104.48 (16.44) 104.00 (69, 144)
Abdominal obesity	Yes No	116 (66) 57 (33)
Cardiometabolic risk	Elevated Not elevated	77 (44) 96 (55)
Dyslipidemia	Yes No	61 (35) 114 (65)
Metabolic syndrome	Yes No	91 (52) 82 (47)

Mobility difficulties	Yes No	66 (38) 109 (62)
Vision difficulties	Yes No	39 (22) 136 (78)

Obese = BMI ≥ 30.0 kg/ m^2, Abdominal obesity > 102 cm (M) > 88.0 cm (F), Cardiometabolic risk = measure of triglyceride levels and waist circumference, Metabolic syndrome = 3 of large waist, elevated triglycerides, blood pressure, glucose, and HDL-cholesterol, Dyslipidemia = measure of HDL cholesterol and triglycerides.

There were few significant sex differences in health conditions within the sample (Table 4.9). A significantly greater proportion of women had abdominal obesity compared with men ($P < 0.001$). That significantly more women (59%) experienced cardiometabolic risk than men (29%) ($P < 0.001$) but not a significantly higher prevalence of dyslipidemia (41% vs. 28%), suggests that the difference may be accounted for by the presence of abdominal obesity in the cardiometabolic risk measure. Far more men (27%), however, suffered from self-reported heart problems than women (7%) ($P < 0.001$). Older adults were significantly more likely than younger adults to suffer from every condition examined, apart from vision difficulties, obesity, and dyslipidemia (Table 4.10). The lack of a significant difference in dyslipidemia and obesity by age group emphasizes the high prevalence of dyslipidemia (28%) and obesity (42.5%) among young adults in the community. Health conditions by sex and age are presented in Table 4.11. Older women were more likely to suffer from diabetes than younger women ($P < 0.025$), but among women there were no other differences between the younger and older age groups. Among men, however, only dyslipidemia, vision difficulties, and arthritis were not found in significantly higher proportions among the older age group.

Table 4.9: Health Conditions by Sex

Variable	Categories	Male N (%)	Female N (%)	P Value
Diabetes (Measured and self-report)	Yes	41 (48)	33 (37)	0.122
	No	44 (52)	57 (63)	
Arthritis (Self-report)	Yes	16 (19)	23 (26)	0.285
	No	69 (81)	67 (74)	
Heart problems (Self-report)	Yes	23 (27)	6 (7)	< 0.001
	No	62 (73)	84 (93)	
Hypertension (Measured and self-report)	Yes	35 (41)	36 (40)	0.874
	No	50 (59)	54 (60)	
Obesity (BMI ≥ 30kg/m^2) (Measured)	Yes	38 (45)	53 (60)	0.050
	No	47 (55)	36 (40)	
Abdominal obesity	Yes	42 (49)	74 (84)	<0.001
	No	43 (51)	14 (16)	
Dyslipidemia	Yes	24 (28)	37 (41)	0.074
	No	61 (72)	53 (59)	
Metabolic syndrome	Yes	40 (47)	51 (58)	0.151
	No	45 (53)	37 (42)	
Mobility difficulties	Yes	27 (32)	39 (43)	0.115
	No	58 (68)	51 (57)	
Vision difficulties	Yes	16 (19)	23 (26)	0.285
	No	69 (81)	67 (74)	

Obese = BMI ≥ 30.0 kg/ m^2, Abdominal obesity > 102 cm (M) > 88.0 cm (F), Metabolic syndrome = 3 of large waist, elevated triglycerides, blood pressure, glucose, and HDL-cholesterol, Dyslipidemia = measure of HDL cholesterol and triglycerides.
Bonferroni correction: $\alpha = 0.005$.

Table 4.10: Health Conditions by Age

Variable	Categories	Younger N (%)	Older N (%)	P value
Diabetes (Measured and self-report)	Yes No	21 (24) 67 (76)	53 (61) 34 (39)	< 0.001
Arthritis (Self-report)	Yes No	10 (11) 78 (89)	29 (33) 58 (67)	< 0.001
Heart problems (Self-report)	Yes No	5 (6) 83 (94)	24 (28) 63 (72)	< 0.001
Hypertension (Measured and self-report)	Yes No	23 (26) 65 (74)	48 (55) 39 (45)	< 0.001
Obesity (BMI ≥ 30 kg/m^2) (Measured)	Yes No	37 (42.5) 50 (57.5)	54 (62) 33 (38)	0.010
Abdominal obesity	Yes No	48 (56) 38 (44)	68 (78) 19 (22)	0.002
Dyslipidemia	Yes No	25 (28) 63 (72)	36 (41) 51 (59)	0.072
Metabolic syndrome	Yes No	35 (41) 51 (59)	56 (64) 31 (36)	0.002
Mobility difficulties	Yes No	23 (26) 65 (74)	43 (49) 44 (51)	0.001
Vision difficulties	Yes No	13 (15) 75 (85)	26 (30) 61 (70)	0.016

Younger age group: 18-38 years of age (M); 18-40 years of age (F).
Older age group: > 38 years of age (M); > 40 years of age (F).
Obese = BMI ≥ 30.0 kg/ m^2, Abdominal obesity > 102 cm (M) > 88.0 cm (F), Metabolic syndrome = 3 of large waist, elevated triglycerides, blood pressure, glucose, and HDL-cholesterol, Dyslipidemia = measure of HDL cholesterol and triglycerides.
Bonferroni correction: $\alpha = 0.005$.

Table 4.11: Health Conditions by Sex and Age

Males	Variable	Categories	Younger N (%)	Older N (%)	P value
	Diabetes	Yes No	12 (28) 31 (72)	29 (69) 13 (31)	< 0.001
	Hypertension	Yes No	9 (21) 34 (79)	26 (62) 16 (38)	< 0.001
	Arthritis	Yes No	4 (9) 39 (91)	12 (29) 30 (71)	0.023
	Heart Problems	Yes No	5 (12) 38 (88)	18 (43) 24 (57)	0.001
	Dyslipidemia	Yes No	9 (21) 34 (79)	15 (36) 27 (64)	0.130
	Metabolic syndrome	Yes No	13 (30) 30 (70)	27 (64) 15 (36)	0.002
	Mobility difficulties	Yes No	7 (16) 36 (84)	20 (48) 22 (52)	0.002
	Vision difficulties	Yes No	5 (12) 38 (88)	11 (26) 31 (74)	0.086
	Obesity	Yes No	12 (28) 31 (72)	26 (62) 16 (38)	0.002
	Abdominal obesity	Yes No	13 (30) 30 (70)	29 (69) 13 (31)	< 0.001
Females	Diabetes	Yes No	9 (20) 36 (80)	24 (53) 21 (47)	0.001
	Hypertension	Yes No	14 (31) 31 (69)	22 (49) 23 (51)	0.085
	Arthritis	Yes No	6 (13) 39 (87)	17 (38) 28 (62)	0.008
	Heart Problems	Yes No	0 (0) 45 (100)	6 (13) 39 (87)	N/A
	Dyslipidemia	Yes No	16 (36) 29 (64)	21 (47) 24 (53)	0.284
	Metabolic syndrome	Yes No	22 (51) 21 (49)	29 (64) 16 (36)	0.207
	Mobility difficulties	Yes No	16 (36) 29 (64)	23 (51) 22 (49)	0.136
	Vision difficulties	Yes No	8 (18) 37 (82)	15 (33) 30 (67)	0.091
	Obesity	Yes No	25 (57) 19 (43)	28 (62) 17 (38)	0.604
	Abdominal obesity	Yes No	35 (81) 8 (19)	39 (87) 6 (13)	0.499

Female heart problems subsample too small for valid comparison.
Bonferroni correction: $\alpha = 0.005$.

The disease composite measures revealed similar trends to the individual condition measures (Table 4.12). Eighty-one percent (81%) of respondents had at least one of the following chronic conditions: diabetes, obesity, hypertension, arthritis, and dyslipidemia. The median number of cardiometabolic conditions was 2.00. Women were more likely than men to suffer from at least one chronic condition (Table 4.13), and age again produced a highly significant effect with older adults significantly more likely to have at least one chronic condition than were the younger adults (Table 4.14). Interestingly, the age association was more evident in males than in females (Table 4.15), with older females being no more likely to have at least one chronic illness than were younger females. This coincides with the few differences in individual conditions found among women of different age groups (Table 4.11).

Table 4.12: Distribution of Disease Composite Measures – Total Sample

Variable	Categories	N (%); Median (Range)
Presence of at least 1 chronic condition	At least 1 chronic condition No chronic conditions	141 (81) 34 (19)
Number of chronic conditions	0 conditions 1 condition 2 conditions 3 conditions 4 conditions 5 conditions Median	34 (19) 41 (23) 37 (21) 35 (20) 20 (11) 8 (5) 2.00 (0, 5)

Chronic conditions: diabetes, hypertension, obesity, dyslipidemia, and arthritis.

Table 4.13: Disease Composites by Sex

Variable	Categories	M N (%); Median (Range)	F N (%); Median (Range)	P value
Presence of at least 1 chronic condition	At least 1 condition No conditions	63 (74) 22 (26)	78 (87) 12 (13)	0.036
Number of chronic conditions	0 1 2 3 4+ Median	22 (26) 15 (18) 17 (20) 17 (20) 14 (17) 2.00 (0, 5)	12 (13) 26 (29) 20 (22) 18 (20) 14 (16) 2.00 (0, 5)	0.559

Chronic conditions: diabetes, hypertension, obesity, dyslipidemia, and arthritis.
Number of chronic conditions: χ^2 for linear association.

Table 4.14: Disease Composites by Age

Variable	Categories	Younger N (%); Median (Range)	Older N (%); Median (Range)	P value
Presence of at least 1 chronic condition	At least 1 condition No conditions	62 (70.5) 26 (29.5)	79 (91) 8 (9)	< 0.001
Number of chronic conditions	0 1 2 3 4+ Median	26 (30) 29 (33) 17 (19) 12 (14) 4 (5) 1.00 (0, 5)	8 (9) 12 (14) 20 (23) 23 (26) 24 (28) 3.00 (0, 5)	< 0.001

Younger age group: 18-38 years of age (M); 18-40 years of age (F).
Older age group: > 38 years of age (M); > 40 years of age (F).
Chronic conditions: diabetes, hypertension, obesity, dyslipidemia, and arthritis.
Number of chronic conditions: χ^2 for linear association.

Table 4.15: Disease Composites by Sex and Age

Males	Variable	Categories	Younger N (%)	Older N (%)	P value
	Presence of at least 1 chronic condition	At least 1 condition No conditions	24 (56) 19 (44)	39 (93) 3 (7)	< 0.001
	Number of chronic conditions	0 1 2 3 4+	19 (44) 10 (23) 8 (19) 4 (9) 2 (5)	3 (7) 5 (12) 9 (21) 13 (31) 12 (29)	< 0.001
Females	Presence of at least 1 chronic condition	At least 1 condition No conditions	38 (84) 7 (16)	40 (89) 5 (11)	0.535
	Number of chronic conditions	0 1 2 3 4+	7 (16) 19 (42) 9 (20) 8 (18) 2 (4)	5 (11) 7 (16) 11 (24) 10 (22) 12 (27)	0.002

Younger age group: 18-38 years of age (M); 18-40 years of age (F).
Older age group: > 38 years of age (M); > 40 years of age (F).
Chronic conditions: diabetes, hypertension, obesity, dyslipidemia, and arthritis.
Number of chronic conditions: χ^2 for linear association.

4.5 Psychosocial Characteristics of the Population

To assess the extent of control participants felt they had in their lives we asked the following question: "How much personal influence do you feel you have in terms of: 'your physical health'; 'how you feel, by that I mean your emotions or sense of well-being'; and 'your life in general'. Interestingly, 43% of participants felt they had a little bit or no control over their health, 44% felt they had a little bit or no control over how they felt, and 37% felt they had a little bit or no control over their life in general (Table 4.16). The median level of perceived control on a 1-4 scale was 3.00. There were no significant sex or age differences in the distribution of control variables (Tables 4.17 and 4.18).

Table 4.16: Distribution of Control Variables – Total Sample

Variable	Categories	N (%); Median (Range)
Control over health	1 = None	20 (11)
	2 = A little bit	58 (33)
	3 = Quite a bit	40 (23)
	4 = A lot	55 (31)
	Median	3.00 (1, 4)
Control over mood	1 = None	17 (10)
	2 = A little bit	60 (34)
	3 = Quite a bit	54 (31)
	4 = A lot	43 (25)
	Median	3.00 (1, 4)
Control over life	1 = None	20 (11)
	2 = A little bit	45 (26)
	3 = Quite a bit	42 (24)
	4 = A lot	66 (38)
	Median	3.00 (1, 4)

Table 4.17: Control Variables by Sex

Variable	Categories	M N (%); Median (Range)	F N (%); Median (Range)	P value
Control over health	1 = None	13 (15)	7 (8)	0.145
	2 = A little bit	29 (34)	29 (33)	
	3 = Quite a bit	19 (22)	21 (24)	
	4 = A lot	24 (28)	31 (35)	
	Median	3.00 (1, 4)	3.00 (1, 4)	
Control over mood	1 = None	10 (12)	7 (8)	0.760
	2 = A little bit	26 (31)	34 (38)	
	3 = Quite a bit	26 (31)	28 (32)	
	4 = A lot	23 (27)	20 (23)	
	Median	3.00 (1, 4)	3.00 (1, 4)	
Control over life	1 = None	20 (24)	12 (13)	0.087
	2 = A little bit	16 (19)	25 (28)	
	3 = Quite a bit	11 (13)	21 (23)	
	4 = A lot	17 (20)	16 (18)	
	Median	3.00 (1, 4)	3.00 (1, 4)	

χ^2 for linear association.

Table 4.18: Control Variables by Age

Variable	Categories	Younger N (%); Median (Range)	Older N (%); Median (Range)	P value
Control over health	1 = None	7 (8)	13 (15)	0.190
	2 = A little bit	29 (33)	29 (34)	
	3 = Quite a bit	22 (25)	18 (21)	
	4 = A lot	30 (34)	25 (29)	
	Median	3.00 (1, 4)	3.00 (1, 4)	
Control over mood	1 = None	6 (7)	11 (13)	0.160
	2 = A little bit	32 (36)	28 (33)	
	3 = Quite a bit	23 (26)	31 (36)	
	4 = A lot	27 (31)	16 (19)	
	Median	3.00 (1, 4)	3.00 (1, 4)	
Control over life	1 = None	9 (10)	11 (13)	0.498
	2 = A little bit	22 (25)	23 (27)	
	3 = Quite a bit	22 (25)	20 (24)	
	4 = A lot	35 (40)	31 (37)	
	Median	3.00 (1, 4)	3.00 (1, 4)	

Younger age group: 18-38 years of age (M); 18-40 years of age (F).
Older age group: > 38 years of age (M); > 40 years of age (F).
χ^2 for linear association.

Different methods of assessing and presenting control variables makes comparisons between samples difficult, however, the present study sample appears to perceive themselves as considerably lacking in control compared to the general Canadian population. Although we did not measure 'mastery', our respondents appear to have less of a sense of personal control than a general Canadian sample. The National Population Health Survey (NPHS) employs the Pearlin and Schooler's (1978) Mastery Scale that is composed of 7 items rated on a 5-point scale producing a mastery score with a minimum of 0 and a maximum of 28. The 2004/2005 NPHS found that for Canadian adults between the ages of 25 and 64, the mastery mean for males on this scale was 18.86 ± 3.26, and the mastery mean for females was 18.73 ± 3.35 (Gadalla, 2009). The present study sample

also appeared to have a lower sense of control compared to other Canadian FN populations. Employing Pearlin and Schooler's (1978) Mastery Scale, but averaging the scores on a scale ranging from 0-5, Daniel and colleagues (1995) found mean scores ranging from 3.7 ± 0.8 to 3.9 ± 0.6 in British Columbia FN community samples composed of respondents 18 years of age and older with diabetes or at high risk for diabetes.

In order to determine levels of perceived stress, respondents were asked how often in the past month: they felt unable to control the important things in their life; they felt nervous and "stressed"; and they felt difficulties were piling up so high that they could not overcome them. Respondents assessed the frequency of these incidents on a response scale including the responses: 'never', 'almost never', 'sometimes', 'fairly often', and 'very often'. These responses were combined into a 15-point scale. The results suggest that community members frequently experienced stress over a month long period. The median level of stress among participants was 8.00, and 26% of respondents rated their stress levels as 11 or above on the 15-point scale (Table 4.19). Females rated their levels of stress higher than males; however there were no age differences in levels of perceived stress (Table 4.20). These results appear comparable to those obtained from the 2002 CCHS that found that 25% of men and 29% of women aged 18 to 75 reported experiencing high levels of general day-to-day stress (Shields, 2006).

Table 4.19: Distribution of Perceived Stress – Total Sample

Variable	Categories	N (%); Median (Range)
Perceived Stress	3-6 7-8 9-10 11-15 Median	48 (27) 41 (23) 41 (23) 45 (26) 8.00 (3, 15)

Table 4.20: Perceived Stress by Sex and Age

Variable	Categories	Median (Range)	Significance
Sex	Male Female	8.00 (3, 15) 9.00 (3, 15)	Z = -2.146, P < 0.05
Age	Younger Older	9.00 (3, 15) 8.00 (3, 15)	Z = - 0.408, NS

Younger age group: 18-38 years of age (M); 18-40 years of age (F).
Older age group: > 38 years of age (M); > 40 years of age (F).
Mann-Whitney U test.

4.6 Bivariate Associations with SRH

Associations between SRH and sociodemographic, functional, psychosocial, and health-related variables are presented in Table 4.21. Apart from male sex and older age, poor or fair SRH was not associated with any sociodemographic variables. Females were 1.9 times more likely to rate their health as good, very good, or excellent compared to men. With each increase in age by year, the odds of reporting poor or fair health increased by 1.05 times. Relating to function, both self-reported vision (P = 0.001) and mobility difficulties (P < 0.0025) were associated with poor or fair SRH. Individuals who reported mobility difficulties were 2.7 times more likely to rate their health as poor or fair than individuals without mobility difficulties, and respondents with vision difficulties were 3.2 times more likely to rate their health as poor or fair compared to those without vision difficulties. The psychosocial variables revealed that while a perceived lack of

control over one's physical health was associated with poor or fair SRH ($P < 0.001$), and every unit increase in perceived control increased an individual's likelihood of reporting good, very good, or excellent health 1.8 times, perceived control over life in general or over one's mood and perceived stress levels were not associated with SRH.

Health conditions that were self-reported, arthritis and heart problems, were strongly associated with poor SRH ($P < 0.001$), as were those variables that included both self-reported diagnoses and clinical assessments, diabetes ($P < 0.001$), and hypertension ($P < 0.0025$). Respondents who reported arthritis were 4.3 times more likely to report poor or fair health than respondents without arthritis, and individuals who reported heart problems were 6.1 times more likely to report poor health than those without heart problems. Individuals with diabetes were 3.2 times more likely to report poor or fair health than individuals without diabetes, and respondents with hypertension were 2.7 times more likely to report poor or fair health than those without hypertension. However, chronic conditions and risk factors identified exclusively based on physical examination or fasting serum samples, including obesity, abdominal obesity, dyslipidemia, and the metabolic syndrome were not associated with SRH. Nevertheless, suffering from an increasing number of both self-reported and clinically assessed chronic conditions (diabetes, obesity, hypertension, arthritis, and dyslipidemia) was strongly associated with reporting poorer SRH ($P < 0.001$). For each additional condition reported, the odds of reporting poor or fair health increased 1.7 times.

Table 4.21: Bivariate Associations with SRH

Variable	Categories	Good SRH N (%); Median (Range)	Poor SRH N (%)	Odds Ratio	95% C.I.	P value
Age group	Young Old	67 (76) 43 (49)	21 (24) 44 (51)	0.950	(0.923, 0.978)	< 0.001
Sex	Male Female	47 (55) 63 (70)	38 (45) 27 (30)	1.887	(1.013, 3.512)	0.044
Education	Grades 0-9 Grades 10+	44 (52) 66 (72.5)	40 (48) 25 (27.5)	1.186	(1.044, 1.346)	0.006
Employment	Yes No	41 (74.5) 69 (57.5)	14 (25.5) 51 (42.5)	2.165	(1.068, 4.387)	0.030
Diabetes	Yes No	35 (47) 75 (74)	39 (53) 26 (26)	0.311	(0.164, 0.589)	< 0.001
Arthritis	Yes No	14 (36) 96 (71)	25 (64) 40 (29)	0.233	(0.110, 0.494)	< 0.001
Heart problems	Yes No	8 (28) 102 (70)	21 (72) 44 (30)	0.164	(0.068, 0.399)	< 0.001
Hypertension	Yes No	35 (49) 75 (72)	36 (51) 29 (28)	0.376	(0.200, 0.708)	0.002
Obesity	Yes No	50 (55) 59 (71)	41 (45) 24 (29)	0.496	(0.264, 0.931)	0.028
Abdominal obesity	Yes No	67 (58) 41 (72)	49 (42) 16 (28)	0.534	(0.269, 1.059)	0.070
Dyslipidemia	Yes No	34 (56) 76 (67)	27 (44) 38 (33)	0.630	(0.333, 1.192)	0.154
Metabolic syndrome	Yes No	48 (53) 60 (73)	43 (47) 22 (27)	0.409	(0.216, 0.775)	0.006
Mobility difficulties	Yes No	32 (48.5) 78 (72)	34 (51.5) 31 (28)	0.374	(0.198, 0.708)	0.002
Vision difficulties	Yes No	16 (41) 94 (69)	23 (59) 42 (31)	0.311	(0.149, 0.648)	0.001
Number of chronic conditions	0 conditions 1 condition 2 conditions 3 conditions 4+ conditions	26 (76.5) 35 (85) 24 (65) 16 (46) 9 (32)	8 (23.5) 6 (15) 13 (35) 19 (54) 19 (68)	0.591	(0.465, 0.750)	< 0.001
Control over health	None A little bit Quite a bit A lot	8 (40) 30 (52) 26 (65) 44 (80)	12 (60) 28 (48) 14 (35) 11 (20)	1.840	(1.331, 2.543)	< 0.001
Control over mood	None A little bit Quite a bit A lot	7 (41) 39 (65) 36 (67) 27 (63)	10 (59) 21 (35) 18 (33) 16 (37)	1.177	(0.850, 1.631)	0.326
Control over life	None A little bit Quite a bit A lot	10 (50) 23 (51) 28 (67) 48 (73)	10 (50) 22 (49) 14 (33) 18 (27)	1.473	(1.091, 1.991)	0.011

Perceived Stress	Composite of the following: -inability to control important things in life -felt nervous or stressed -felt difficulties were too much to overcome	8.00 (3, 15)	8.00 (3, 15)	0.932	(0.843, 1.032)	0.271

Good SRH: Excellent, very good, or good SRH; Poor SRH: Fair or poor SRH.
Younger age group: 18-38 years of age (M); 18-40 years of age (F).
Older age group: > 38 years of age (M); > 40 years of age (F).
Chronic conditions: diabetes, hypertension, obesity, dyslipidemia, and arthritis.
Number of chronic conditions: χ^2 for linear association.
Perceived stress: Mann-Whitney U test.
Bonferroni correction: $\alpha = 0.003$.

4.7 Associations with SRH Controlling for Age and Sex

Associations between SRH and all investigated variables controlling for age and sex are presented in Table 4.22. In terms of sociodemographic factors, age was inversely associated with SRH, and females were over twice as likely to report good, very good, or excellent health compared to males while controlling for age (OR 2.2). Regarding psychosocial variables, the positive association between SRH and perceived control over health remained significant, and every unit increase in sense of personal control over one's health increased the odds of reporting good, very good, or excellent SRH 1.8 times. The positive relationship between control over life and SRH and the inverse relationships between SRH and control over mood and SRH and perceived stress remained insignificant. Individuals with vision difficulties were 3.3 times more likely to report poor or fair health than respondents without vision difficulties, but mobility difficulties were not significantly associated with SRH. Concerning chronic disease related variables, only arthritis remained significantly associated with SRH. Respondents with arthritis were 3.7

times more likely to report poor or fair health than those without arthritis. The number of chronic conditions a respondent reported, however, remained inversely associated with SRH. After controlling for age and sex, for each additional condition reported, the odds of reporting poor or fair health increased 1.6 times.

Table 4.22: Associations with SRH Controlling for Age and Sex

Variables	Odds Ratio	95% C.I.	Significance
Education	1.104	(0.960, 1.270)	0.164
Employment	2.200	(1.048, 4.620)	0.037
Diabetes	0.476	(0.235, 0.967)	0.040
Arthritis	0.271	(0.120, 0.615)	0.002
Heart Problems	0.265	(0.102, 0.692)	0.007
Hypertension	0.519	(0.260, 1.034)	0.062
Obesity	0.487	(0.247, 0.959)	0.037
Abdominal obesity	0.468	(0.211, 1.036)	0.061
Dyslipidemia	0.633	(0.319, 1.256)	0.191
Metabolic syndrome	0.459	(0.230, 0.914)	0.027
Mobility difficulties	0.375	(0.188, 0.748)	0.005
Vision difficulties	0.301	(0.137, 0.662)	0.003
Number of chronic conditions	0.642	(0.494, 0.834)	0.001
Control over health	1.779	(1.267, 2.499)	0.001
Control over mood	1.153	(0.819, 1.625)	0.414
Control over life	1.475	(1.072, 2.028)	0.017
Perceived stress	0.889	(0.795, 0.994)	0.039

Controlling for age and sex.
Chronic conditions: diabetes, hypertension, obesity, dyslipidemia, and arthritis.
Bonferroni correction: $\alpha = 0.003$.

4.8 Multivariate Analyses

Backward stepwise regression was used to establish independent associations with SRH. The results are presented in Tables 4.23-4.27. The first four models explored the relationship between SRH and chronic conditions. Model 1 examined the relationship between diabetes and SRH. Diabetes was the focus of the larger screening study and given its high prevalence in the community, it was chosen as the initial explanatory variable in order to assess its impact on SRH. Included in the model were those variables

known to affect diabetes prevalence, including age and sociodemographic factors, variables that co-exist with diabetes, such as hypertension and functional impairments, and variables that were positively associated with SRH in bivariate analyses that were related to diabetes. After controlling for age, sex, employment status, hypertension, mobility difficulties, vision difficulties, and heart problems, diabetes was not significantly associated with SRH. Age ($P < 0.025$), sex ($P < 0.025$), hypertension ($P < 0.05$), and vision difficulties ($P < 0.005$) remained in the final model.

Table 4.23: Regression Model 1 - Diabetes

Variables	Odds Ratio	95% C.I.	Significance
Diabetes	0.754	(0.337, 1.687)	0.492
Age	0.971	(0.938, 1.004)	0.089
Sex	2.174	(0.998, 4.734)	0.050
Employment	1.648	(0.751, 3.618)	0.213
Hypertension	0.572	(0.263, 1.245)	0.159
Mobility difficulties	0.512	(0.244, 1.075)	0.077
Vision difficulties	0.421	(0.174, 1.019)	0.055
Heart problems	0.528	(0.182, 1.539)	0.242
Age	0.967	(0.936, 0.999)	0.042
Sex	2.271	(1.054, 4.895)	0.036
Employment	1.739	(0.803, 3.768)	0.160
Hypertension	0.538	(0.252, 1.148)	0.109
Mobility difficulties	0.509	(0.243, 1.067)	0.074
Vision difficulties	0.407	(0.170, 0.978)	0.044
Heart problems	0.521	(0.180, 1.508)	0.229
Age	0.963	(0.933, 0.994)	0.020
Sex	2.690	(1.310, 5.526)	0.007
Employment	1.843	(0.855, 3.971)	0.119
Hypertension	0.492	(0.234, 1.034)	0.061
Mobility difficulties	0.488	(0.234, 1.016)	0.055
Vision difficulties	0.355	(0.153, 0.824)	0.016
Age	0.963	(0.933, 0.994)	0.018
Sex	2.694	(1.319, 5.503)	0.007
Hypertension	0.479	(0.230, 0.997)	0.049
Mobility difficulties	0.484	(0.233, 1.002)	0.051
Vision difficulties	0.333	(0.145, 0.765)	0.010
Age	0.960	(0.931, 0.991)	0.012
Sex	2.444	(1.221, 4.894)	0.012
Hypertension	0.456	(0.221, 0.943)	0.034
Vision difficulties	0.275	(0.123, 0.616)	0.002

Model 2 focused on the relationship between the number of chronic diseases (diabetes, obesity, hypertension, arthritis, and dyslipidemia) and SRH, in order to assess whether number of chronic conditions has a cumulative effect on SRH. The model included the same control variables as Model 1, with the exception of hypertension. In the final model, the number of chronic conditions remained associated with SRH ($P < 0.0025$), as did sex ($P < 0.01$) and vision difficulties ($P < 0.01$). Specifically, for each additional chronic condition, the odds of reporting poor or fair SRH increased 1.5 times. Women were 2.6 times as likely as men to report their health as good, very good, or excellent, and individuals with vision difficulties were 3.0 times as likely to report their health as poor or fair than those without vision difficulties.

Table 4.24: Regression Model 2 – Number of Chronic Conditions

Variables	Odds Ratio	95% C.I.	Significance
Number of chronic conditions	0.686	(0.521, 0.904)	0.007
Age	0.977	(0.945, 1.011)	0.179
Sex	2.347	(1.072, 5.139)	0.033
Employment	1.730	(0.790, 3.788)	0.171
Mobility difficulties	0.543	(0.256, 1.153)	0.112
Vision difficulties	0.458	(0.192, 1.094)	0.079
Heart problems	0.502	(0.172, 1.466)	0.207
Number of chronic conditions	0.677	(0.515, 0.889)	0.005
Age	0.972	(0.941, 1.005)	0.093
Sex	2.823	(1.357, 5.876)	0.006
Employment	1.846	(0.847, 4.023)	0.123
Mobility difficulties	0.520	(0.246, 1.099)	0.087
Vision difficulties	0.407	(0.175, 0.944)	0.036
Number of chronic conditions	0.672	(0.513, 0.881)	0.004
Age	0.972	(0.941, 1.004)	0.084
Sex	2.837	(1.371, 5.868)	0.005
Mobility difficulties	0.510	(0.243, 1.073)	0.076
Vision difficulties	0.387	(0.169, 0.888)	0.025
Number of chronic conditions	0.612	(0.477, 0.785)	< 0.001
Sex	2.748	(1.339, 5.642)	0.006
Mobility difficulties	0.495	(0.237, 1.032)	0.061
Vision difficulties	0.377	(0.165, 0.859)	0.020
Number of chronic conditions	0.591	(0.462, 0.757)	< 0.001
Sex	2.502	(1.244, 5.032)	0.010
Vision difficulties	0.316	(0.142, 0.702)	0.005
Number of chronic conditions	0.655	(0.500, 0.858)	0.002
Age	0.970	(0.939, 1.002)	0.067
Sex	2.592	(1.278, 5.254)	0.008
Vision difficulties	0.328	(0.146, 0.736)	0.007

Chronic conditions: diabetes, hypertension, obesity, dyslipidemia, and arthritis.

Model 3 investigated the relationship between arthritis and SRH. Arthritis was chosen as an explanatory variable due to its high prevalence in the community and its well-established relationship with SRH from other studies. Metabolic conditions were included in the model to determine whether they remained significantly associated with SRH in the presence of arthritis or whether their relationship to SRH was entirely

attributable to the presence of arthritis. The model included the same control variables as Model 1. Arthritis remained associated with SRH ($P = 0.005$), as did, again, sex ($P < 0.01$), hypertension ($P < 0.05$), and vision difficulties ($P < 0.005$). Individuals suffering from arthritis or vision difficulties were 3.3 times as likely to report poor or fair SRH as those without arthritis or vision difficulties. Women were 2.7 times as likely to report good, very good, or excellent SRH as men. Respondents with hypertension were 2.1 times as likely to report poor or fair SRH as those without hypertension.

Table 4.25: Regression Model 3 – Arthritis

Variables	Odds Ratio	95% C.I.	Significance
Arthritis	0.321	(0.134, 0.770)	0.011
Age	0.977	(0.944, 1.010)	0.164
Sex	2.453	(1.111, 5.414)	0.026
Employment	1.853	(0.835, 4.112)	0.129
Hypertension	0.555	(0.255, 1.208)	0.138
Mobility difficulties	0.585	(0.273, 1.256)	0.169
Vision difficulties	0.428	(0.177, 1.038)	0.060
Heart problems	0.535	(0.179, 1.600)	0.263
Arthritis	0.319	(0.133, 0.760)	0.010
Age	0.973	(0.942, 1.006)	0.103
Sex	2.893	(1.378, 6.071)	0.005
Employment	1.959	(0.886, 4.334)	0.097
Hypertension	0.509	(0.238, 1.093)	0.083
Mobility difficulties	0.565	(0.265, 1.208)	0.141
Vision difficulties	0.378	(0.161, 0.888)	0.026
Arthritis	0.288	(0.122, 0.679)	0.004
Age	0.972	(0.941, 1.005)	0.096
Sex	2.687	(1.300, 5.552)	0.008
Employment	2.002	(0.905, 4.431)	0.087
Hypertension	0.485	(0.228, 1.035)	0.061
Vision difficulties	0.332	(0.144, 0.763)	0.009
Arthritis	0.241	(0.105, 0.552)	0.001
Sex	2.579	(1.261, 5.274)	0.009
Employment	2.035	(0.926, 4.472)	0.077
Hypertension	0.391	(0.193, 0.793)	0.009
Vision difficulties	0.306	(0.134, 0.700)	0.005
Arthritis	0.251	(0.111, 0.568)	0.001
Sex	2.561	(1.261, 5.202)	0.009
Hypertension	0.377	(0.187, 0.759)	0.006
Vision difficulties	0.282	(0.125, 0.636)	0.002
Arthritis	0.301	(0.129, 0.702)	0.005
Age	0.972	(0.940, 1.004)	0.084
Sex	2.685	(1.307, 5.513)	0.007
Hypertension	0.467	(0.222, 0.984)	0.045
Vision difficulties	0.304	(0.134, 0.690)	0.004

Model 4 explored the relationship between the metabolic syndrome and SRH. The metabolic syndrome was investigated in order to take into account the high degree of comorbidity in the sample relating to chronic cardiometabolic conditions (i.e. hypertension, diabetes, obesity, and dyslipidemia) (Bruce et al., in press) and to assess the effect of this comorbidity on SRH. The model included the same control variables as Model 1, except for hypertension. The metabolic syndrome ($P < 0.05$), age ($P < 0.025$), sex ($P < 0.005$), mobility difficulties ($P < 0.05$), and vision difficulties ($P < 0.025$) remained associated with SRH in the final model. Having the metabolic syndrome increased the odds of reporting poor or fair SRH by 2.1 times. Women were 2.9 times as likely to report good, very good, or excellent SRH as men. For every increase in age by year, the odds of reporting poor or fair SRH increased by 1.04 times. Individuals with mobility difficulties were 2.1 times as likely to report poor or fair SRH as those without mobility difficulties, and individuals with vision difficulties were 2.8 times as likely to report poor or fair SRH as those without vision difficulties.

Table 4.26: Regression Model 4 – Metabolic Syndrome

Variables	Odds Ratio	95% C.I.	Significance
Metabolic syndrome	0.518	(0.249, 1.078)	0.079
Age	0.966	(0.936, 0.998)	0.036
Sex	2.353	(1.084, 5.106)	0.030
Employment	1.565	(0.715, 3.425)	0.262
Mobility difficulties	0.497	(0.237, 1.040)	0.064
Vision difficulties	0.435	(0.183, 1.029)	0.058
Heart problems	0.468	(0.165, 1.329)	0.154
Metabolic syndrome	0.494	(0.239, 1.022)	0.057
Age	0.967	(0.937, 0.999)	0.041
Sex	2.321	(1.072, 5.027)	0.033
Mobility difficulties	0.495	(0.237, 1.034)	0.062
Vision difficulties	0.418	(0.178, 0.982)	0.045
Heart problems	0.438	(0.155, 1.236)	0.119
Metabolic syndrome	0.472	(0.229, 0.971)	0.041
Age	0.961	(0.932, 0.991)	0.012
Sex	2.877	(1.393, 5.943)	0.004
Mobility difficulties	0.467	(0.225, 0.968)	0.041
Vision difficulties	0.358	(0.157, 0.815)	0.014

Model 5 focused on the relationship between SRH and perceived stress and included variables thought to serve as stressors and psychosocial variables to assess the experience of social stress. Age, sex, employment, number of chronic conditions, control over health, control over mood, control over life, community conditions (a variable combining responses to questions relating to overcrowding in homes, housing maintenance, and water safety), mobility difficulties, and vision difficulties were included as control variables. Perceived stress remained associated with SRH in the final model ($P < 0.01$), as did sex ($P < 0.05$), number of chronic conditions ($P < 0.001$), control over health ($P = 0.001$), control over life ($P < 0.01$), and community conditions ($P < 0.025$). Intriguingly, control over mood was negatively associated with SRH in the final model ($P = 0.025$). Specifically, with each increase in levels of perceived stress, the odds

of reporting poor or fair health increased 1.2 times. With every additional chronic condition, the odds of reporting poor or fair SRH increased by 1.9 times. Women were again over twice as likely to report good, very good, or excellent SRH compared to men (OR 2.6). Every unit increase in perceived control over health increased the odds of reporting good, very good, or excellent SRH 2.4 times, and every unit increase in belief in control over life increased the odds of reporting good, very good, or excellent SRH 2.0 times. For every unit of increased belief in control over mood, however, the odds of reporting poor or fair health were elevated 2.0 times. Remarkably, community conditions (i.e., doubting the water safety in the community, believing the housing maintenance in the community is poor, or experiencing overcrowding in the home) elevated the odds of reporting poor or fair SRH 11.6 times.

Table 4.27: Regression Model 5 – Perceived Stress

Variables	Odds Ratio	95% C.I.	Significance
Perceived Stress	0.850	(0.737, 0.981)	0.026
Age	0.967	(0.931, 1.004)	0.082
Sex	3.019	(1.266, 7.201)	0.013
Employment	2.234	(0.924, 5.400)	0.074
Number of chronic conditions	0.534	(0.386, 0.740)	< 0.001
Control over health	2.237	(1.319, 3.794)	0.003
Control over mood	0.486	(0.266, 0.889)	0.019
Control over life	1.916	(1.149, 3.197)	0.013
Community conditions	0.072	(0.010, 0.524)	0.009
Mobility difficulties	0.775	(0.323, 1.858)	0.568
Vision difficulties	0.476	(0.179, 1.270)	0.138
Perceived Stress	0.843	(0.733, 0.970)	0.017
Age	0.967	(0.931, 1.004)	0.078
Sex	2.915	(1.237, 6.871)	0.014
Employment	2.260	(0.933, 5.471)	0.071
Number of chronic conditions	0.526	(0.381, 0.727)	<0.001
Control over health	2.283	(0.1352, 3.856)	0.002
Control over mood	0.493	(0.271, 0.898)	0.021
Control over life	1.900	(1.140, 3.168)	0.014
Community conditions	0.069	(0.010, 0.503)	0.008
Vision difficulties	0.460	(0.174, 1.219)	0.118
Perceived Stress	0.830	(0.724, 0.952)	0.008
Age	0.964	(0.928, 1.002)	0.060
Sex	2.720	(1.172, 6.314)	0.020
Employment	2.307	(0.963, 5.525)	0.061
Number of chronic conditions	0.519	(0.377, 0.714)	< 0.001
Control over health	2.406	(1.428, 4.052)	0.001
Control over mood	0.492	(0.270, 0.896)	0.020
Control over life	1.939	(1.152, 3.263)	0.013
Community conditions	0.074	(0.010, 0.561)	0.012
Perceived Stress	0.830	(0.723, 0.952)	0.008
Age	0.963	(0.927, 1.001)	0.055
Sex	2.555	(1.119, 5.830)	0.026
Number of chronic conditions	0.513	(0.374, 0.704)	< 0.001
Control over health	2.413	(1.433, 4.064)	0.001
Control over mood	0.503	(0.276, 0.918)	0.025
Control over life	2.005	(1.189, 3.382)	0.009
Community conditions	0.086	(0.012, 0.637)	0.016

Chronic conditions: diabetes, hypertension, obesity, dyslipidemia, and arthritis.

CHAPTER FIVE

DISCUSSION

5.1 Summary of Results

This study sought to determine which sociodemographic, mobility and functioning, living conditions, psychosocial, and chronic health-related factors were associated with SRH in a Manitoba FN community. To achieve this aim, three research questions were addressed. The first research question involved determining how study participants rated their own health compared with others their own age. The second research question was concerned with establishing how self-rated health differed by socio-demographic variables (e.g., age, sex, and educational level), presence of chronic disease risk factors, perceived stress, and chronic health conditions. The final research question was concerned with determining which factors were independently associated with SRH in multivariable analyses.

Regarding the first research question, it was found that members of the community rated their health considerably worse and were far less likely to rate their health as excellent compared to other Canadians. This low rating of subjective health coincided with the substantially higher prevalence of chronic disease reported and measured in the community compared to the general Canadian population. This suggests that members of this community do not differ substantially in how they interpret the SRH construct compared to other Canadians, at least in terms of health-related conditions. Individuals' self-ratings of health in this community were strongly related to the number

and severity of chronic illnesses from which they suffered, as it is among Canadians in general.

With respect to the second research question, it was found that males rated their health significantly worse than females, despite there being few differences in reported or measured health conditions, living conditions, sociodemographic factors, or psychosocial factors. Where differences did exist between the sexes, women were typically disadvantaged compared to men. Older adults rated their health worse than younger adults, which is unsurprising given older adults' generally worse health compared to young adults in this community. Individuals who reported vision or mobility difficulties were significantly more likely to report poor or fair self-rated health than those without vision or mobility difficulties. Control over health was positively associated with SRH in bivariate analyses. Conditions based on self-report or self-report and clinical measurements such as heart disease, arthritis, diabetes, or hypertension, or the disease composite, number of chronic conditions, were found to associate with SRH in bivariate analyses. However, conditions based solely on clinical measurements including obesity, abdominal obesity, dyslipidemia, cardiometabolic risk, and the metabolic syndrome were not associated with SRH.

In multivariable analyses, men remained significantly more likely to rate their health as poor or fair compared to women. Certain self-reported conditions including diabetes, heart disease, and mobility difficulties were no longer associated with SRH; however, the metabolic syndrome and hypertension, conditions based on clinical measures or clinical measures and self-report were elevated to significance. The inverse relationship between number of chronic diseases and SRH remained significant, as did

the negative association between arthritis and SRH. Vision difficulties, perceived stress, perceived control over mood, and dissatisfaction with community conditions were negatively associated with SRH, while perceived control over health remained positively associated with SRH.

Respondents in this community rated their health substantially worse than a general Canadian sample. In the 2003 CCHS, only 3% of Canadians aged 25 years and older rated their health as poor (Veenstra, 2009), compared to 11% of the present study community. Twenty-six percent (26%) of the present study sample rated their health as fair, which is substantially more than the 10% of Canadians that were surveyed in the 2003 CCHS (Veenstra, 2009). Far fewer community members rated their health as excellent (6%) compared to the general Canadian sample (21.5%), and far fewer community members rated their health as very good (18%) compared to the general Canadian sample (31%). Slightly more community members rated their health as good (39%) compared to the general Canadian sample (35%). This is likely a reflection of how few community members felt their health was excellent or very good compared to the general Canadian sample and not necessarily that more of the study participants considered themselves to be in good health compared to the general Canadian sample.

5.2 Effect of Gender on SRH

One interesting finding from the present study is the consistent independent association of female gender and better SRH in multivariate analyses, which differs from the majority of studies in which women rate their health worse than men (Baron-Epel, 2004). However, the relationship between SRH and gender remains complex and

generalizations may be over-simplifications of more complicated issues. The effect of gender on SRH and how gender influences the relationship between SRH and mortality has been a major focus of research and debate. In general, the relationship between SRH and mortality is attenuated in females compared to males (Idler and Benyamini, 1997; Benyamini and Idler, 1999), although there are exceptions (e.g. McCallum et al., 1994). A number of plausible hypotheses have arisen to explain this phenomenon, and the seemingly paradoxical relationship between SRH, gender, and mortality wherein women typically report worse health but survive longer than males. One frequently cited possibility for the SRH of men being a better predictor of mortality is that men may incorporate more mortality-relevant information into their SRH assessments and women may focus more on disabling but non-life threatening conditions (Benyamini et al., 2000; Deeg and Kriegsman, 2003; Idler, 2003), although other researchers were unable to confirm this hypothesis (Spiers et al., 2003). It is also possible that women absorb more health information than men and are thus more aware of their own health status and able to give a more accurate recounting of their various health conditions. Providing this complete profile of health may diminish the relationship between SRH and mortality in women by leaving only a very small body of information to be supplemented by SRH, whereas men's less comprehensive self-reported health descriptions may allow for SRH to incorporate more mortality-relevant information not otherwise included in statistical analyses (Idler and Benyamini, 1997; Benyamini and Idler, 1999; Benyamini et al., 2003; Deeg and Kriegsman, 2003; Spiers et al., 2003). Another proposed hypothesis is related to health trajectories over time. Men die sooner than women and a man reporting poor health in old age is likely approaching his death faster on average than a woman reporting

poor health in old age, who may continue to live a longer life (Idler and Benyamini, 1997; Benyamini et al., 2003), but will do so in a likely more disabled state than male peers (Ferraro, 1980; Arber and Cooper, 1999).

Our finding that men reported their health less positively than women has been found in previous work (e.g. Ferraro, 1980; Heistaro et al., 2001; McCollum et al., 2007). Interestingly, some studies have also found that the gap that appears to exist between men and women's SRH closes with age (Ross and Bird, 1994; Macintyre et al., 1996; McCullough and Laurenceau, 2004; Gorman and Read, 2006). Our sample is typically younger than other samples that addressed the relationship between SRH and gender. The gap in SRH between males and females may, therefore, be a result of the age structure of our sample. Males' SRH deteriorated significantly over time, although females' SRH did as well. This undoubtedly relates to increasing morbidity with age. Older males' health appeared to deteriorate with age to a greater degree than females' health did, based on the distribution of composite and individual disease measures by sex and age. Older women and younger women did not differ significantly in any condition apart from diabetes. Older men and younger men differed significantly in all health conditions apart from arthritis, dyslipidemia, and vision difficulties (Table 4.11). These results may suggest that males have better health overall and then decline noticeably at a particular age or that females have substantially worse health throughout the lifecycle and age does not markedly adversely affect them.

Importantly, our use of a comparative version of the SRH measure, wherein we asked individuals to rate their health compared to the health of others their own age may have influenced the genders' assessments of their health. This form of a comparative

question produces the widest discrepancy between genders in terms of the association between SRH and mortality (Deeg and Kriegsman, 2003), and Sargent-Cox and colleagues (2010) found that while older women's response to the comparative question remained generally stable throughout time, older men's SRH starts positive and becomes progressively negative over time. It may be that as our sample ages, the discrepancy in SRH between the genders will diminish, or that if we had used a non-comparative measure of SRH, a different pattern regarding gender and SRH may have emerged.

Addressing what factors may have contributed to the differences in SRH between the genders in our sample is difficult given the few significant differences between the genders in the majority of variables investigated. Other studies have provided a variety of SRH determinants that may account for the differences between the sexes. Researchers have found that the gap between men and women's SRH may close or even reverse itself, with women reporting better health than men, after controlling for various co-variables, often particularly those relating to socioeconomic status (Idler, 1993; Arber and Cooper, 1999; Leinsalu, 2002; Denton et al., 2004; Roy and Chaudhuri, 2008). Using 14 years of data from the U.S. National Health Interview Survey, Case and Paxson (2005) found that the differences in SRH between men and women were entirely attributable to the distribution in chronic conditions faced by the genders. Individuals of either sex suffering from the same conditions were as likely to report the same SRH. In our sample there were unlikely to be noticeable differences in the socioeconomic statuses of the sexes, although in the larger community women were found to have greater educational attainment than men (Bruce and Young, 2008), and 90% of respondents felt that socioeconomic class differences were a reality in the community. Additionally, within

our sample there were few gender differences concerning sociodemographic factors or living conditions, and males and females did not differ substantially in terms of health. Women, in fact, generally reported a higher prevalence of those conditions found to be significantly different between males and females, such as obesity and abdominal obesity and were more likely to suffer from at least one condition than men. Women were also disadvantaged in terms of levels of perceived stress. While more men than women reported having heart problems in our sample, a mortality-relevant condition to which they may ascribe more importance, heart problems affected too small a portion of the sample to have had a major effect on the relationship between gender and SRH. It seems unlikely that the discrepancy between male and female SRH in our sample can be merely attributable to differences in the distribution of chronic conditions or sociodemographic factors.

The worse SRH reported by men in this community may therefore result from differences in how the genders experience the same conditions. Case and Paxson (2005) have also suggested that individuals with the same condition may experience the same symptoms and thus report similar SRH, but this may not translate into a direct indication of the severity of the condition. This may explain the paradox of women generally reporting worse health but surviving longer. A similar pattern may be evident in our community. Men may be more negatively affected by diseases that are equally prevalent in women. These results may also be viewed within the context of the larger Screening Study for Diabetes and Diabetes Complications. Among participants with diabetes, men were found to have a higher prevalence of albuminuria (a complication of diabetes). Case and Paxson (2005) found that this pattern of men being more severely affected by the

same conditions compared to women was especially noticeable in smoking-related health conditions. For the purposes of our study it is important to note that we did not include behavioural factors that may have more adversely affected male health than female health, such as smoking, alcohol use, inactivity, or poor diet. It may be that men in this community, particularly at older ages when their health declines disproportionately compared to females, are more affected by the health conditions they contract or have a more difficult time coping with compromised health compared to females. This may be especially true if the illness contracted relates to smoking. Women, however, may be more accustomed to coping with poor objective health throughout their lifetime and this may manifest in their self-ratings of health. These differences may have been exacerbated by the use of an age comparative question, such that men and women employed different reference groups for evaluating their health depending on their age and this intensified disparities in their SRH scores.

5.3 SRH, the 'Labelling effect', and Clinical Biomarkers

Idler and Benyamini (1997) hypothesized that the persistence and consistency of the association between SRH and mortality may be attributable to SRH including symptoms of undiagnosed disease in preclinical or prodromal stages. Following this publication, a number of researchers have attempted to investigate whether the presence of a diagnosis was required to affect SRH or whether clinical biomarkers appear to influence an individual's evaluation of their own health, although these remain relatively new avenues of research. Results have been inconsistent as to whether SRH is affected by a known diagnosis of a medical condition more so than symptoms of an undiagnosed

condition, although the majority of studies appear to indicate that a known diagnosis does adversely affect SRH over and above the effects of the condition itself. Campbell and colleagues (2008) found that amongst individuals suffering from dementia, remembering a diagnosis of dementia was associated with poorer SRH, but self-reported subjective memory problems did not affect SRH. More bodily pain was reported in individuals with known hypertension than in individuals with unknown hypertension (Mena-Martin et al., 2003), and in one of the earliest studies on the adverse effects of drug treatment for hypertension, Jachuck and colleagues (1982) found that patients, unlike their doctors, reported that the respondents were in worse condition following hypotensive drug treatment. Close proxies of the hypertensive patients similarly reported deterioration in the conditions of the patients. Barger and Muldoon (2006) determined that hypertensive labelling was associated with poorer SRH, but hypertension itself, after controlling for hypertension labelling, was not associated with poorer SRH. Delpierre and colleagues (2009) established that relationships between SRH, cardiovascular risk factors, and education were more consistent when the cardiometabolic conditions were identified by self report and not clinically determined. However, Edelman and colleagues (2002) found that MOS SF-36 scores were not affected by a positive result at a diabetic screening study after 1 year, and that similar scores were attained for those with and without diabetes. In terms of effect of SRH on mortality, Idler and others (2004) found that only poor SRH in individuals with known, but not unknown, circulatory problems was found to predict mortality. These findings would also seem to coincide with a number of studies conducted on a sample of elderly Dutch men that added credence to the hypothesis that patients incorporate only known conditions into their self-ratings of health and are

unaware of undiagnosed subclinical conditions. Pijls and colleagues (1993) determined that SRH predicted mortality but not chronic disease incidence, and Giltay and colleagues (2008) found that clinically-determined cardiovascular risk was not associated with SRH.

The bivariate results of the present study initially suggested that the only health conditions incorporated into individuals' SRH were those that had been previously diagnosed. The health-related variables that associated with SRH were those that were based solely upon self-report (arthritis, heart problems) or those that involved a self-reported component in addition to a measured component (diabetes, hypertension), whereas variables composed entirely of laboratory or anthropometric measures such as the metabolic syndrome, obesity, abdominal obesity, dyslipidemia, and cardiometabolic risk were not associated with SRH. This would seem to suggest that individuals in this community only incorporate those health factors into their SRH that they have been made aware of by a medical diagnosis. However, subsequent to controlling for various sociodemographic, health, and mobility and functioning factors, the clinically derived factors, metabolic syndrome and hypertension, and the composite variable, number of chronic conditions, remained independently associated with SRH. Heart disease and diabetes, conditions that were based partially or solely on self-report, were found to no longer associate with SRH. These results more closely mirror those of other researchers who found associations between SRH and clinical biomarkers. Some cardio-metabolically relevant risk factors found to have been associated with SRH in other studies include high blood pressure (Froom et al., 2004; Delpierre et al., 2009; Haseli-Mashhadi et al., 2009), BMI (Goldberg et al., 2004), cholesterol measures (Goldman et al., 2004; Tomten and Høstmark, 2007; Delpierre et al., 2009), the metabolic syndrome

(Balasubramanyam et al., 2008), glycosylated hemoglobin (Delpierre et al., 2009), and insulin and insulin resistance (Haseli-Mashhadi et al., 2009). In our sample, the majority of individuals with hypertension had already received a diagnosis. Additionally, individuals with the metabolic syndrome may have been aware they had hypertension, diabetes, or were obese. However, some aspects of these conditions are not clinically ever-present and some are asymptomatic. Our results therefore suggest that individuals' SRH in this community may incorporate conditions in asymptomatic stages.

Even if individuals are capable of including subclinical conditions in their self-ratings of health, this does not explain why certain self-reported or partially self-reported conditions that have been found to affect SRH in previous studies were not associated with SRH in this community. Heart disease is often found to be associated with SRH and to exert a more powerful effect on SRH than many other health conditions (e.g. Chandola et al., 2000; Manor et al., 2001; Haseli-Mashhadi et al., 2009). In our sample, however, heart disease was not significantly associated with SRH in multivariate analyses. Heart disease may have affected too small a subsample of the respondents and may have been too non-specific a measure to remain associated with SRH in our study, unlike arthritis, the other chronic health condition variable based solely on self-report, which remained independently associated with SRH in multivariate analyses. The relationships between SRH and diabetes and hypertension and the metabolic syndrome, all variables based at least in part on clinical measures, however, suggest more complex patterns. While it is possible that the association between the metabolic syndrome and SRH may be attributed to individuals being aware of certain anthropometric conditions that partially comprised the composite variable, such as a large waist circumference or obesity, and not to the

presence of subclinical conditions such as elevated triglycerides, this does not seem likely as neither obesity nor abdominal obesity were associated significantly with SRH in bivariate analyses. Also, while the independent association between number of chronic diseases and SRH may be entirely attributable to the self-reported conditions incorporated within the variable, this would not explain the persistent association of hypertension, a variable derived from both self-report and clinical measurement, with SRH in multivariate analyses, and the lack of association between SRH and diabetes, another variable derived from both self-report and clinical measurement.

Diabetes is frequently found to be associated with SRH (Fylkesnes and Forde, 1991; Goldberg et al., 2001; Otiniano et al., 2003; Froom et al., 2004; Phillips et al., 2005; Jylhä et al., 2006; Tomten and Høstmark, 2007; Delpierre et al., 2009; Gerber et al., 2009; Haseli-Mashhadi et al., 2009; Pirkola et al., 2009; Ramkumar et al., 2009), and diabetes often exerts a stronger effect than hypertension on SRH (e.g. Froom et al., 2004; Delpierre et al., 2009; Gerber et al., 2009; Haseli-Mashhadi et al., 2009). It seems likely that community-specific social factors may be influencing how diabetes and the metabolic syndrome and hypertension associate with SRH. It may be that diabetes has reached a high enough level of prevalence in the community that it has become normalized and is no longer considered a particularly adverse condition in assessing SRH. Alternatively, a diagnosis of diabetes may allow for certain benefits that offset a wholly negative response, in a manner that is absent from a diagnosis of hypertension and the metabolic syndrome. A diagnosis of diabetes may provide access to medical resources previously unavailable to respondents, and thus may not be viewed as a purely negative situation (Bruce, 2007). Similarly, if individuals feel considerably pressured to

take preventative measures to avoid contracting diabetes in a community with a very high prevalence of the condition, it may even come as a relief to receive a diagnosis and no longer be under the onus of trying to substantially alter behaviour and lifestyle in order to prevent a condition that may seem inevitable.

5.4 SRH, Perceived Stress, and Control Variables

Control variables were independently associated with SRH in our sample. Numerous studies in diverse populations including American adults (Cotter and Lachman, in press), nursing home residents (Bowsher, 1990), COPD and chronic heart failure patients (Arnold et al., 2005; Nguyen et al., 2008), and Canadians with disabilities or chronic conditions (Cott et al., 1999), have identified similar associations between increased perceptions of control and SRH. While SRH was not included in analyses, among Canadian FN, mastery was positively associated with positive affect, HDL cholesterol, and negatively associated with fasting glucose levels and smoking, factors that may ultimately influence SRH (Daniel et al, 1995, 2001, 2004).

Our study confirms these previous studies, in that increased sense of control over health and life associate with better SRH. Unfortunately, a large proportion of respondents in the study felt they were lacking in this control. This may have a major impact on the effectiveness of prevention programs and individuals' willingness to adhere to treatment. An individual's belief in their capacity to influence their own health and life may also have an impact on how that individual copes with stress (Cairney and Krause, 2008; Gadalla, 2009), and therefore how capable that individual is at coping with and counter-acting the debilitating consequences of stress on well-being.

Perceived stress was also independently associated with SRH in our study. Stressors may affect health through direct neuroendocrine and indirect behaviourally-mediated pathways. While we did not measure chronic stress, the self-reported stress measure may be a measure of chronic stress. The cumulative physiological effects of chronic stress and the body's attempt to compensate for them has been termed allostatic load (McEwen, 1998a,b; McEwen and Seeman, 1998). Repeated stress, an ineffective stress response, and compensatory over-secretion of stress hormones may result in a hyperactive stress response system that progresses to a "burned-out" state as manifested in dysregulation of the hypothalamus-pituitary-adrenal (HPA) axis or sympathetic nervous system (SNS) (McEwen, 1998a,b; McEwen and Seeman, 1998). This dysregulation has been associated with accumulation of visceral body fat, insulin resistance, dyslipidemia, elevated blood pressure, impaired glucose metabolism, the metabolic syndrome, and an increased incidence of type 2 diabetes and cardiovascular disease (Rosmond et al., 1998, 2000, 2003; Björntorp and Rosmond, 2000; Brunner et al., 2002; Hemingway et al., 2005).

Chronic stress may also contribute to chronic disease through indirect, behaviourally-mediated pathways dependent upon individuals' varied coping mechanisms and lifestyle choices, such as inactivity, nutrient-poor diet, alcohol consumption, and tobacco use (McEwen, 1998a,b; McEwen and Seeman, 1998). The relationship between stress and food intake is particularly relevant in examining the effect of chronic stress on chronic, cardiometabolic disease. High stress-related cortisol secretion has been found to predict food intake (Epel et al., 2001; Roberts, 2008), and self-reported stress-eating and a cortisol pattern suggestive of HPA axis "burn-out" has

been associated with increased BMI (Laitinen et al., 2002; McDonough et al., 2002; Epel et al., 2004; Chandola et al., 2006; Daniel et al., 2006; Norberg et al., 2007; Roberts, 2008). Cortisol may mediate other stress-related factors linked to fat-regulation and cardiometabolic health such as leptin, neuropeptide Y, and cytokines (Epel et al., 2001). Rat models suggest that in the presence of insulin, palatable food consumption reduces HPA axis activity, thereby diminishing the unpleasant effects of a chronically-stimulated stress response via an abdominal fat-associated, negative-feedback signal or the dopaminergic "reward" system (Dallman et al., 2003, 2005, 2006; Warne, 2009). Stress-related neuroendocrine dysfunctions and subsequent adverse health behaviour may produce the subclinical chronic disease symptoms that individuals incorporate into their self-ratings of health.

Attempts to link the physiological indicators of chronic stress to SRH have revealed that SRH is associated with a number of stress-related biomarkers. Hasson and colleagues (2009) determined that SRH is associated with a variable they termed allostatic load, composed of waist-to-hip ratio (WHR), BMI, triglycerides, prolactin, dehydroepiandesterone sulphate (DHEAS), cholesterol measures, glycosylated hemoglobin, and blood pressure in middle-aged Swedish women. Higher levels of circulating inflammatory cytokines were also associated with poorer SRH in Swedish women but not men (Lekander, et al., 2004). In middle-aged Swedish men, the stress-related indicators, increased s-prolactin and decreased s-testosterone, were associated with a decline in SRH at follow-up, although not at baseline or in those whose SRH improved or remained unchanged over time (Halford et al., 2003).

The effects of stress on SRH have been examined in other Canadian contexts. Using data from the 2000/2001 CCHS and the 1994/1995 to 2000/2001 National Population Health Survey, it was found that stress was associated with poorer physical health, increased psychological distress, and poorer SRH (Orpana and Lemyre, 2004; Shields, 2004; Orpana et al., 2007). Maddigan and colleagues (2006) also identified stress as a major form of health-related quality of life deficiency among Canadians with diabetes. This may be particularly relevant for this community, given the high level of diabetes prevalence.

In the Canadian FN community in which the present study was conducted, the relationship between particular clinical biomarkers and culturally-specific stressors has begun to be explored. For example, preliminary data from the community revealed that individuals who reported personal experience of unfair treatment vis á vis inequitable access to community resources, were more likely to have abnormal cardiometabolic health markers (i.e., higher glucose, triglyceride, and homocysteine levels) than those who did not, controlling for age, sex, BMI, diabetes, and smoking status (Bruce et al., 2009). Individuals in the community experiencing similar forms of community-level inequities may have ranked their health poorer due to these physical manifestations of stress without necessarily having to be made aware of their dysregulated cardiometabolic states through a physician's diagnosis.

The association between SRH and health in the present community may arise both from an immediate awareness of the psychological impacts of stress in promoting anxiety and distress and from the manner in which stress may compromise cardiometabolic health. These cardiometabolic disturbances may be something to which this community is

already particularly susceptible. Therefore, aspects of daily life that may promote stress, such as perceived negative community attributes and vision difficulties, may also contribute to an individual's perceived worse health by elevating stress levels.

Community conditions, relating to respondents' lack of faith in housing maintenance and water safety and experience of overcrowding in homes, were independently associated with SRH in our sample. Neighbourhood problems and deprivation may serve as a health-impacting form of chronic stress (Steptoe and Feldman, 2001; Adler and Newman, 2002; Daniel et al., 2008). Neighbourhood problems and deprivation have been found to associate with a number of health conditions such as obesity (Burdette et al., 2006) and type II diabetes (Cox et al., 2007) that may ultimately influence SRH. Associations between various neighbourhood factors and SRH have also been identified (Steptoe and Feldman, 2001; Patel et al., 2003; Franzini, 2008). Respondents in our study who were dissatisfied with community conditions may have viewed this as a persistent form of stress that they had no power to address, and the physiological effects of this unrelenting stress may have manifested in somatic symptoms that resulted in individuals rating their health as poor.

Vision difficulties were also persistently associated with SRH in our community. Other researchers have identified associations between SRH and vision-related measures (Wang et al., 2000; Tsai et al., 2004; Jacobs et al., 2005; Lee et al., 2005; Polack et al., 2008; Damián et al., 2008), although there are exceptions (Tay et al., 2005; Chandrasekaran et al., 2008). This relationship has predominantly been related to effects on functioning or social relations. While this undoubtedly would have an effect on members of this community, as well, the association between SRH and vision difficulties

may relate to stress and the effect of structural forces on promoting stress. Individuals may be hampered by lack of access or perceived lack of access to vision resources. Canadian FN have access to free eye examinations, eye glasses and eye glass repairs, eye prosthetics, and other vision services through Health Canada's Non-Insured Health Benefits (NIHB) Program. While individuals may have access to vision care resources, understanding and navigating the complex intra-jurisdictional infrastructure to gain access to these resources likely contributes to stress. Additionally, arranging for transportation to the nearest optometrist to receive a prescription and incurring any costs for these services would likely contribute to making vision difficulties a major stressor in this community. Therefore, vision difficulties and its effects on function and social interactions may influence SRH, and vision difficulties may also be emblematic of the consequences of larger structural forces serving as stressors that may adversely affect both objective and subjective health.

In our community, stress, community conditions, vision difficulties, and a perceived lack of control over life and health independently impacted SRH. These factors also likely interacted. Vision difficulties and community conditions, in addition to an increasing number of chronic conditions, may have served as major sources of stress. A great degree of stress may have been insurmountable for individuals who felt they had little control over their own health and life and may have increased psychological distress, neuroendocrine dysregulation, and adverse coping mechanisms such as excess eating, drinking, or smoking, all factors that promote cardiometabolic ill health. Ultimately, this compromised health would manifest in symptoms and conditions acknowledged by individuals and incorporated into poorer self-ratings of health.

5.5 Strengths and Limitations

The primary strength of this study is that it operated within a community-based participatory framework. Community members were involved in the project, of which this study is a component since its inception and will continue to be involved in the project through all subsequent stages, including dissemination. One aspect of this larger project involved ethnography and the subsequent development of a population-specific questionnaire that was pilot-tested on a smaller sample and assured local credibility. The administration of this questionnaire has produced population-specific variables that were employed in this analysis. These variables allowed for a culturally relevant examination of SRH to be carried out in a population in which this measure has not been thoroughly analyzed before. Additionally, objective, clinical biomarkers for this community were included. This provided better insight into the health status of this community and allowed for a further developing of literature on the association between SRH and clinical biomarkers.

One limitation of this study is its use of a small, volunteer sample that may not be generalizable to the entire community. However, in meetings organized with the community to discuss findings from the initial study, feedback concerning the results was largely positive and did not suggest that the results obtained were anomalous or irrelevant to the population as a whole. As this study was conducted in a Canadian FN community and employs population-specific variables, its findings are unlikely to be generalizable to other populations, but may be pertinent for comparison studies with other FN

communities. The study's cross-sectional design also prohibits the identification of causal relationships in the associations investigated.

5.6 Conclusions

This study sought to better understand how individuals rated their health and what factors were associated with SRH in a Manitoba FN community. It was established that individuals in the community suffered from worse SRH and worse objective health than the general Canadian population. Men rated their health poorer than women, which differs from the majority of studies in SRH. It may be that women in this community experience poorer health throughout their lifetime compared to men and men are more severely affected by increasing morbidity with age. Men may also be more adversely affected by the same diseases as women or find them more difficult to cope with than women.

Health conditions found to be associated with SRH in bivariate analyses were generally only those that included a self-reported component, rather than those based exclusively on laboratory measurements. In multivariate analyses, however, it was established that the metabolic syndrome, a clinically-derived variable, and hypertension, a variable that included a self-reported component and a clinically-derived component remained associated with SRH, while the self-reported conditions, diabetes and arthritis, were no longer associated with SRH. This suggests that individuals may incorporate asymptomatic conditions into their self-ratings of health. Additionally, the relationship between SRH and diabetes may be mediated by social factors. A diagnosis of diabetes may allow for access to better resources and may allow individuals to feel a sense of relief over no longer having to undertake preventative measures.

Increasing levels of perceived stress, lower levels of perceived control over life and health, and poor community conditions were all found to be independently associated with poorer SRH. It is also likely that these conditions interact. A lack of belief in one's personal control over one's health and life may impede one's ability to handle high levels of stress. High levels of stress, in turn, may influence one's belief in personal control. Stress may affect SRH both by increasing distress, anxiety, and psychological ill-health and by affecting somatic health through direct neuroendocrine pathways and indirect behaviourally-mediated pathways that may involve poor health behaviours and adverse coping mechanisms. Poor community conditions may serve as a stressor that stimulates these pathways. In addition to the directly negative effect of health on SRH that many health conditions may produce, they may also contribute to poorer SRH by increasing stress. Vision difficulties and barriers to accessing vision care services, in addition to effects on functioning and social interaction, may also have an impact on SRH by contributing to stress.

Given the widespread use of SRH as a measure in surveys employed in diverse populations, a better understanding of what the measure refers to in specific populations that have not been fully investigated is required. Canadian FN individuals, particularly those living on reserves, are one such population. Through its use of ethnographically produced, population-specific variables, this study allowed for better, more culturally-specific and relevant interpretations of results obtained from surveys conducted in FN populations employing this measure and more valid cross-cultural comparisons. This study allowed us to better understand the distribution of perceived health status, which has proven to be an important risk indicator for morbidity and mortality, and objective

health indicators in a Canadian FN community, the relationship between these factors, and the population-specific variables that contribute to poor objective and self-rated health in this community.

Chronic diseases are influenced by complex biocultural interactions involving genetic, biological, lifestyle, environmental, and psychosocial factors. A better understanding of how these variables interact in a FN community and a greater comprehension of the manner in which these variables are associated with how individuals evaluate their general health was provided by this study and will aid in the implementation of culturally relevant and sensitive intervention programs. For example, this study demonstrates that SRH in this community may be substantially improved if individuals were able to access pre-existing vision care resources more readily. If access to these services was more accessible, vision difficulties may no longer have as pronounced a deleterious effect on SRH through its possible effects on functioning, social relationships, and perceived stress. That diabetes was not independently associated with SRH suggests that if access to resources is sufficient, debilitating health conditions may not necessarily substantially and independently affect SRH.

How people perceive their health may be influenced by pre-existing conditions and also impact health outcomes directly or indirectly through the effects of optimism and motivation on lifestyle choices, health-related behaviour, and adherence (Idler and Benyamini, 1997). This study determined that the degree to which an individual believes in their capacity to control their health and life is associated with SRH in this community. This suggests that improving SRH may provide individuals with an enhanced sense of control over their health and lives that may result in improved health-related behaviour

and subsequent benefits to both self-rated and objective health. Understanding what specific factors cause individuals to rate their health better or worse may allow for the development of lifestyle intervention and health education programs that enhance compliance and improve quality of life. In addition to health-related factors, this study emphasized the importance of implementing interactions on lowering perceived levels of stress and improving community conditions such as housing and road conditions and water safety, factors that have a significant effect on SRH. Additionally, this study contributed to the field of SRH research by expanding into a population not yet substantially studied and employing clinical biomarkers and risk factors that have only recently been begun to be explored in relation to SRH.

Additional research on SRH within this community is required to better delineate the effects of gender and age on SRH. Also, further research is required on how to improve the health of women throughout their lifetime and to prevent men's health from deteriorating to such an extensive degree with age. A better understanding on how to alleviate stress within the community, improve community conditions, and enhance feelings of personal control over health and life would also benefit individuals' SRH within this community.

As this research was conducted within a community-based participatory framework, it is essential that community members be involved in the dissemination process. The findings of this study will be presented to the Community Advisory Committee. Should the Community Advisory Committee deem it necessary, the study will be presented to the community more generally. The community will review any manuscripts for publication prepared from this study.

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