Food Insecurity and Self-Reported Psycho-Social Health Status in Manitoba First Nation Communities: Results from the Manitoba First Nations Regional Longitudinal Health Survey 2002/2003

by

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A Thesis submitted in to the Faculty of Graduate Studies of the University of Manitoba

In partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

Department of Community Health Sciences

University of Manitoba

Winnipeg, Manitoba

ABSTRACT

Food Insecurity and Self-Reported Pscyho-Social Health Status In Manitoba First Nation Communities: Results from the Manitoba First Nations Regional Longitudinal Health Survey 2002/2003

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The purpose of the study is to provide a descriptive analysis of food insecurity within the adult First Nations population in Manitoba. A bivariate analysis is used to determine strength of relationships between food insecurity and socio-demographic variables as well as self-reported general health and psycho-social health. This research study also includes a gender-based analysis (GBA), which allows for possible food insecurity prevalence differences between women and men

The data obtained for this research study is from the second wave of the Manitoba First Nations Regional Longitudinal Health Survey (MFNRLHS, 2002/2003). Select socio-demographic variables as well as self-reported general health status, 'life balance,' and elements of psycho-social health, including self-reported health, 'life balance,' depression, intense anxiety, stress level, and domestic dispute were included. A P-value of 0.05 was used to identify significant differences.

Significant results from this study include elevated food insecurity in Manitoba First Nations (37.2%). The bivariate analysis reveals that food insecurity is marginally associated with age group, with the highest food insecurity among young and middle-aged women; middle-aged men, and those with lone-parent status. Food insecurity is also significantly associated with total household income, the number of incomes per household, as well as employment versus government support over a two-year period. Food insecurity is elevated in both southern (29.4%) and northern (51.4%) regions of the province.

Overall, significant associations exist between food insecurity and general health, ‘life balance’ and psycho-social health. From a gender perspective, poor health status, and psycho-social health are associated with increased food insecurity for both men and women.

The results of this study have the potential to contribute to effective food policy and the development of holistic food security initiatives that recognize the socio-economic, geographic, and psycho-social health needs of First Nations people and the unique programmatic needs of the food insecure.

Dedicated to: My mother and father,

Margaret Adeline Tonn

and

Ewald Waldemar Tonn

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Chapter 1

Introduction

Food insecurity is one form of life stressor (Radimer, 1990; Kendall et al., 1995; Hamlin et al, 2003), which includes issues related to the nature, quality, quantity and food supply accessibility and is generally defined as the "the inability to acquire or consume an adequate diet quality or sufficient quantity of food in socially acceptable ways or the uncertainty that one will be able to do so" (Hamelin, 1999; Tarasuk, 2001; McIntyre et al., 2003). The occurrence of food insecurity in the First Nation population is not a modern phenomenon, as the impact of colonization has had a negative impact on present day food insecurity (Lang, 2001; Gould, 2004; Raschke & Cheema, 2007) and the health of First Nations people (Young, 1994; Bartlett, J., 2003, Waldram, J., et al., 2006). Acculturation, segregation of the population through the reserve system and other forms of legislated marginalization have contributed to endemic poverty, and the increased prevalence of stressful life circumstances (Bartlett, 2003; Frohlich et al., 2006), and elevated levels of mental health issues (e.g. depression) in many First Nation communities (Kirmayer et al., 2000; First Nations and Inuit Health Branch, 2004; MacMillan et al., 2008). Concomitantly, social and economic policy, food politics and environmental influences have contributed to a 'nutrition transition' in Canada's First Nation population (Kuhnlein, 2004). Furthermore, the rural and remote locations of First Nation communities have influenced food insecurity through transportation issues, food store proximity, and community store types (Lambden et al., 2006; Skinner et al., 2006). Overall, globalization has also impeded access to the local food economy through the introduction of cheap food production. As well, local suppliers in rural minority communities, such as First Nation communities, are often small scale grocers, convenience stores and monopoly chain enterprise (Cummins et al., 2007; Powell et al., 2007; Sharkey and Horel, 2008). These stores offer a limited quantity and variety of affordable healthy market foods and generally more cheap food alternatives (Thompson et al. 2010). While

recognizing the diversity and regional variation within the First Nations population, access to traditional foods, with their nutritional, symbolic and spiritual value, is vital to offset reliance on store bought food and maintain health (Kuhnlein, 2004; Nakano et al., 2005; Lambden et al., 2007).

Given the negative impact that colonization has had on creating widespread poverty and social suffering in First Nations communities and the elevated levels of food insecurity and poor psychological health outcomes that have been documented in several other epidemiological studies of low-income populations (Che & Chen, 2001; Pheley et al., 2002; Vozaris & Tarasuk, 2003; Vozoris & Tarasuk, 2007), this study aims to describe the prevalence of food insecurity in a representative sample of First Nation adults living on reserve in the province of Manitoba. This research will extend our understanding of food insecurity and psychosocial health by exploring the relationship between food insecurity and self-reported health, holistic health (feeling in balance) stress, depression, anxiety, and domestic dispute. While the scientific literature has documented the relationship between food insecurity and negative health outcomes, what is lacking is the unique context of rural and remote communities as well as gender differences within and between men and women. As well, food insecurity and psycho-social health experiences have yet to be investigated in First Nation communities. This research, therefore, is novel and has the potential to inform gender-specific community health programming, health policy, and future food security research. The full rationale for undertaking this research is explained in Chapter 2 in a comprehensive review of the literature.

Chapter Two: Review of Literature

Food Insecurity: A Population Perspective

Food insecurity is a complex psycho-social phenomenon and public health nutrition concern (Tarasuk, 2001) influenced by the government, the food supply chain, and civil society (Lang, 2005). Government policies, which give rise to and support poverty via inadequate employment opportunities, as well as limited health and social programming, also contribute to food insecurity at the household and individual levels (Riches, 1997; Koc & Dahlberg, 1999; Tarasuk, 2001; Hamm & Bellows, 2003; Rideout et al., 2007; Cook & Frank, 2008). The corporatization of food production and distribution influences the development of unsustainable food systems, thus, negatively impacting the availability and access to healthy foods at the community level (Power, 1999; Koc & Dahlberg, 1999; Lang, 1999). These are among the greater structural forces which act against the benefits of attaining and implementing nutritional knowledge at the individual and household level (Lang, 1998, Lang, 2006; Power, 2008, Sharkey & Horel, 2008).

Any comprehensive strategy to improve food insecurity must include the creation of full-time, meaningful employment, and a rise in real incomes, both in terms of government welfare payments and appropriate working wages (Nolan & Colleagues 2006; pg.252). However, structural forces such as high levels of unemployment and political agendas that focus on controlling the market economy via deficit reduction and ensuring corporate economic growth instead of investing in sustained community economic development and health and social programming have contributed to an unequal distribution of wealth and elevated levels of poverty in Canadian society (Riches, 1997; Hamm & Bellows, 2003; McIntyre, 2004; Power, 2008). In the province of Manitoba, Fernandez and Hudson (2010; pg. 189) contend that there are limited employment training opportunities for unemployed and marginalized members of the labour force. The unemployment rate in northern Manitoba First Nations in the year 2000, for instance, was 30.8%, compared to 27.2% in the south (Government of Manitoba, 2000). According to

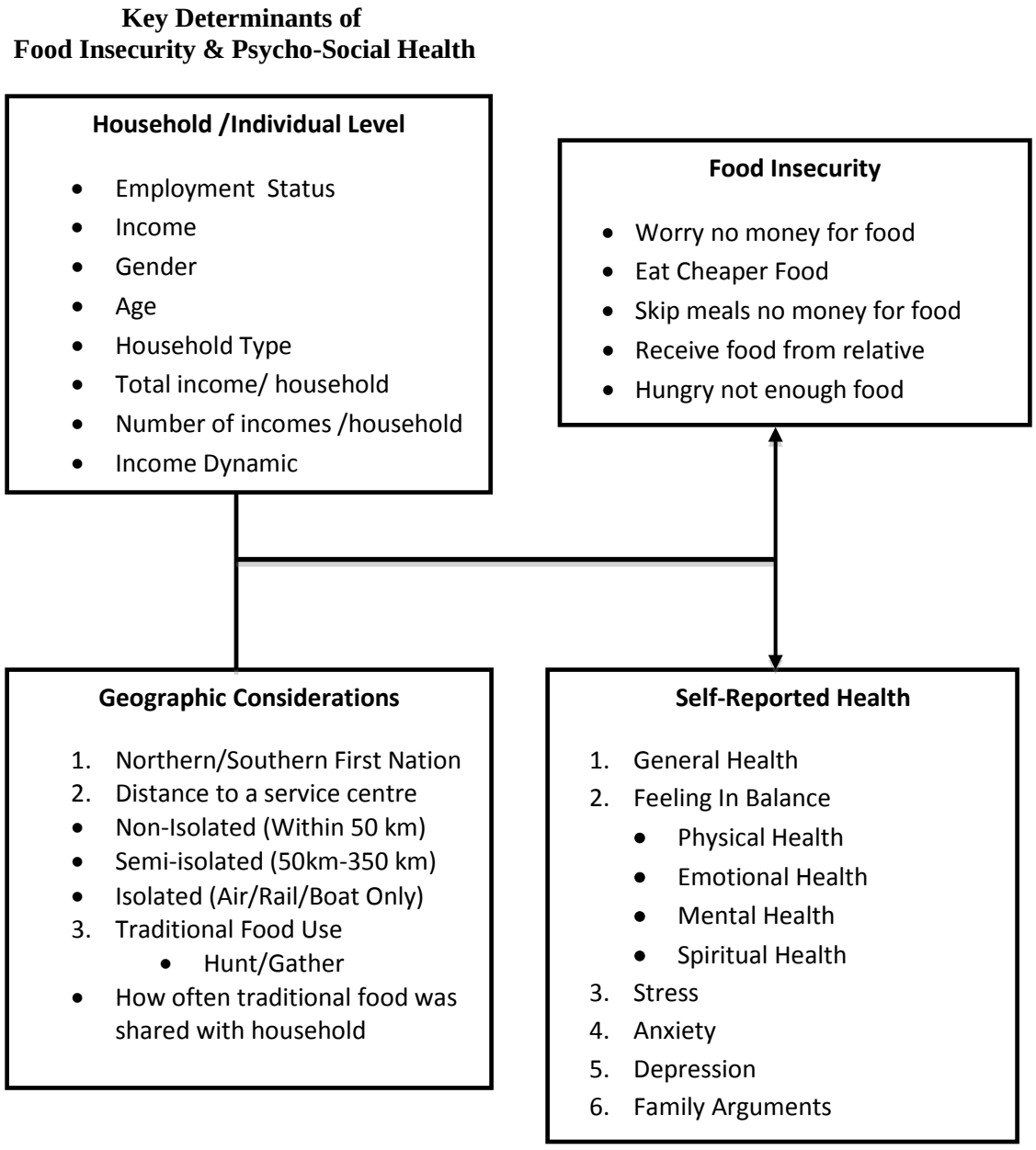
Riches (2007; pg. 65), such evidence demonstrates that the Canadian government has failed to provide unemployed individuals with guaranteed, adequate, minimum incomes, resulting in 'primary poverty'- or economic insufficiencies that prevent individuals from meeting their minimum physical needs. Indeed, income differentials between First Nations and the general population are quite different in that there is substantial income inequality between First Nations and the majority of Canadians. In Manitoba, for instance, the median-income of the on-reserve population, as of 2010, was $32,574 versus $61,000 in the general population (Fernandez and Hudson, 2010; pg. 86).

At the macro level of food production, the limited role of federal governments to enforce the regulation of corporate entities has promoted the monopolization of production and distribution within the food system (Lang, 1999). Such globalization has affected food security by diminishing local and traditional food systems that provide greater long term economic and ecological stability, and alternatively, offer greater access to cheaper and nutritionally deplete alternatives (Koc & Dahlberg, 1999; Lang, 1998; Lang, 2005; Riches, 1997). The food retail sector, furthermore, acts as an influential power situated between the production and consumption of food (Dobson, 2001; Dobson, 2003). Retail competition, food store type, high freight and transportation costs, and all-weather road accessibility are all economic variables driving food selection and food prices in rural environments (Manitoba Government, Aboriginal and Northern Affairs, 2003; Moore and Diez Roux, 2006; Sharkey & Horel, 2008), where higher poverty rates often exist (Morris et al., 1992; Palermo et al., 2008*;* Champagne et al., 2007*).*

As noted earlier, this environment has a major role in influencing food insecurity as well a number of health issues associated with such insecurity. Given this complex environment the following conceptual framework (Figure 1.) has been developed to guide our understanding of food insecurity in First Nation communities. This framework identifies the key determinants of

food insecurity and its relationship with psycho-social health. Following this framework, the state of knowledge of each of the areas has been reviewed.

Figure 1. Food Insecurity Conceptual Framework : Exploring the Determinants of Food Insecurity the Relationships with Psycho-Social Health.



Conceptualization of Food Insecurity

It is widely recognized that food insecurity is conceptualized a complex phenomenon, having four core domains. These include: 1) uncertainty over the food supply, 2) inadequate food quality and safety, 3) inadequate food quantity and 4) acquiring food through socially, unacceptable means. Furthermore, food insecurity acknowledges the physical pain of hunger, as the most severe form of food insecurity experience (Radimer et al., 1990, Radimer et al., 1992; Hamelin et al., 2002, Wolfe et al., 2003; Coates et al., 2003; Webb et al., 2006). The concepts discussed here, are present in both the original Radimer/Cornell food insecurity measure, as well as the United States Household Food Security Survey Measure (USHFSSM). Overall, this model identifies limited financial resources as the main household factor contributing to severe reductions in the quality and quantity of foods (Health Canada, 2009). In Canada, as summarized by Kirkpatrick & Tarasuk (2008), there have efforts to standardize food insecurity measurement in food insecurity. National surveys such as the Canadian Community Health Survey (CCHS) and National Population Health Survey (NPHS) include the United States Household Food Security Survey Measure (US HFSSM), which demonstrates the suffering associated with food insecurity, and allows for improved development, monitoring and evaluation of health and social programs (Hamm & Bellows; Coates, 2004; Power, 2005). Aspects of this model are discussed below.

Food-Related Anxiety: Uncertain Access to Food

Acute episodes of food insecurity may occur as a result of financial crisis, such as the sudden loss of employment or welfare payment, marital separation or an unexpected increase in expenses, including the obligation of feeding visiting family members (Sinclaire, 1997; Hamelin et al., 2002). Experiencing the uncertainty of limited access to the food supply is known to produce initial feelings of worry in the short term, feelings which can continue during long term experiences of food deprivation (Radimer, 1990; Hamelin et al., 2002, Willows, 2005). The continuous threat of a scarce or unpredictable food environment may also precipitate feelings of

insecurity, powerlessness, guilt, embarrassment, shame, anxiety, panic, and psychological fatigue (Tarasuk & Maclean, 1990; Radimer et al., 1992; Hamelin et al., 2002; Wolfe et al., 2003; Willows et al., 2005). In a number of studies, individuals cite concern over the health of their family members (Tarasuk & Maclean, 1990; Hamelin et al., 2002; Power, 2006) and may fear the loss of child custody due to the inability to provide a food secure environment for their children (Ahluwalia et al., 1998; McIntyre et al., 2003; Hamelin et al., 2002). From this and other research, it is noted that food constraints can contribute to elevated levels of stress within the household (Hamelin, 1999; Willows, 2005).

Food Quality

Economic insufficiency is another leading barrier to acquiring a safe, nutritious food supply, and contributes to dietary monotony for the poorest and most marginalized members of society (Hamelin et al., 2002; Kirkpatrick & Tarasuk, 2003; Guyot et al., 2006). Variation in the food expenditures of Canadian households is known to vary across income quintiles (Ricciuto et al., 2006; Kirkpatrick & Tarasuk, 2007), and the food expenditures of many low-income families do not reach the minimum cost of a basic nutritious diet (Nelson et al., 2002). Low-income families are therefore required to make nutritional compromises, such as purchasing the most economical foods, rather than a variety of higher quality, nutrient-dense foods (Morris et al., 1992; Holben et al., 2004; Nolan et al. 2006; Champagne et al., 2007; Kropf et al., 2007). What this means is that low-income status can contribute to chronic compromises in diet quality, and has negative implications for both physical and mental health outcomes. The decreased consumption of vegetables, fruit and fluid milk among low-income households due to economic constraints have been recorded in several nutritional studies (KirkPatrick & Tarasuk, 2003; Ricciuto et al., 2006; Cassady, et al., 2007). As well, several qualitative studies have revealed that the consumption of unsafe or nutritionally inadequate foods have contributed to feelings of

frustration, restriction and hopelessness in both the short term and over time (Hamelin et al., 1999; Hamelin et al., 2002; Lambden et al., 2006).

Food Quantity

Food shortages at the household level may be precipitated by the sudden loss of employment, interruption in accessing social assistance benefits (Hamelin et al., 2002; McIntyre et al., 2002;), or changing one's place of residence. Competing demands, such as unexpected or unusual expenses, required payment for accumulated debt and necessary services such housing, utilities, and child care payments, many of which are fixed expenditures, may also create economic tensions within the home (Tarasuk & Maclean, 1990; Tarasuk, 2001; Hamelin et al., 2002; Wolfe et al., 2003). The elastic nature of the food budget therefore means that fewer funds are available for accessing and purchasing healthy foods (Wolfe et al., 2003),which leaves low-income families extremely vulnerable to experiencing food shortages (Tarasuk, 2003).

The depletion of household food stores also varies over time, meaning that for low-income, wage earning families and those in receipt of social assistance, the quantity of foods consumed toward month's end is often significantly reduced (Hamelin et al., 2002; McIntyre et al., 2003; Power, 2005). In response to economic constraints and limited food stores, individuals are known to use a variety of coping mechanisms. The methods employed to stretch the food budget include the use of coupons, comparison shopping, and grocery shopping at various locations. Moderate to severe food insecurity can also lead to disrupted meal patterns including the dilution foods to stretch out meals, eating less often than desired, skipping meals, hiding food from other household members and failing to eat (Tarasuk, 2001; Hamelin et al., 2002; Willows, 2005). Economically insecure household members, especially women, are known to limit their own food consumption in order to fulfill their duty of care-giving and feeding of children and other household members. Although this has become a socially acceptable way of extending food

resources, the act of self-deprivation diminishes nutritional intakes in women (Radimer, 1992; Bellows, 2002; Power, 2005). Women's nutritional compromises are evident within several quantitative studies. The inadequacies noted are vitamin A, vitamin B-6, folate, iron, magnesium (Tarasuk & Beaton, 1999), vitamin C, Vitamin B-6, Thiamin, and Zinc (McInty re et al., 2003) and reduced intakes of energy, carbohydrate, fruits and vegetables in moderately to severely food insecure women (McIntyre et al., 2002, Tarasuk et al., 2007).

Hunger

Hunger is considered the most extreme form of food insecurity. Hunger is a biological phenomenon, described as a painful, uneasy sensation due to lack of food intake (Eisinger, 1998; McIntyre et al., 2002). This sensation has been described as gastrointestinal 'pain,' 'hunger that interrupts sleep and the activities of daily living', 'lack of substance in the body,' and 'stress that inhibits eating or the ability to hold in food' (Chilton et al., 2007). The severe emotional anguish associated with a life of poverty and chronic stressors, such as food insecurity can also contribute to the physical pangs of hunger (Chilton et al., 2007). Although signs of physical pathology may not be evident, the physical discomfort of hunger may be present. Persistent hunger, as discussed by Eisinger (1998, pg.17), is also a condition which is inextricably associated with malnutrition, and one cannot be separated from the other. Thus, individuals suffering from hunger require immediate alleviation of their symptoms, in order to restore both physiological *and* psychological states.

Social Methods of Food Procurement & Social Outcomes

As food insecurity is a managed process, individuals in need of improved food access will first strive to obtain food through socially acceptable channels (Riches, 1997). Coping with food insecurity can include accessing food through social networks in order to buffer the effects of elevated levels of stress (Radimer, 1992; Ahluwalia et al., 1998; Coates et al., 2006). In order to

fulfill familial roles, members of the primary, secondary and tertiary levels of social networks may be approached for food or monetary resources (Ahluwalia et al., 1998). Receiving support from parents, grandparents, siblings, extended family and in-laws, friends and neighbours is an important strategy used to alleviate the strain of food insecurity (Sinclaire, 1997; Ahluwalia et al., 1998; Hamelin et al.,1999; Neufeld, 2003; Wolfe et al., 2003; Lemke et al., 2003). This method of food procurement can take the form of sharing, in which case food is given as a gift; food may also be provided in exchange for other food items and favours, such as child care, feeding hungry children, and transportation (Ahluwalia, et al., 1998; Neufeld, 2003; Martin et al., 2004).

Although individuals utilizing social networks are better able to manage food situations more successfully in adverse times (Lemke et al., 2003; Martin et al., 2004; Chan et al., 2006), those suffering from *chronic* food insecurity state that seeking support for food through social networks can have a negative impact on the individual's sense of self-worth and their participation in social activities (Pheley 2002; Wolfe et al., 2003). In an attempt to conserve limited economic resources and conceal household-level disturbances, there may be reduced participation in social and religious functions emphasizing food supply and status (Hamelin et al., 2002; Pheley et al., 2002; Power, 2006).

In summary, food insecurity is a complex phenomenon, and to fully comprehend the experience, it is necessary to understand food access issues from a social determinants perspective. The following section is a review of such common determinants as employment status and income, age, gender, marital status, lone parent status, and geographic location.

Determinants of Food Insecurity

As outlined in several epidemiologic studies, key determinants of food insecurity include employment status and income, age, gender, marital status, lone parent status, and geographic location. Although these determinants are recognized in the general Canadian population, the

distribution of food insecurity within the First Nations population, specifically in Manitoba, has not been determined using these key health determinants. To date, limitations to the food insecurity literature include a lack of population data on the access to culturally appropriate foods or the sharing of these foods within community settings, a lack of research documenting the possible relationship between stable employment over time and food insecurity, and an analysis pertaining to the relationship between food insecurity and 'multiple income' adult income earners per household within Manitoba First Nations. The proposed research aims to document the distribution of food insecurity using the aforementioned determinants, to assess relationships with psycho-social health and to add a wholistic conceptualization of health (physical, mental, emotional, spiritual) to the analysis. The following is a review of the state of knowledge about such determinants.

Employment Status & Income

The association between economic instability and food insecurity, alleviating financial constraints to improve household level food insecurity (Riches, 1997; Koc & Dahlberg, 1999; Borjas, 2002), and the elevated unemployment levels in First Nations communities are well documented. The Canadian Community Health Survey (CCHS) and the National Population Health Study (NPHS), as illustrated below, are two national health surveys that have made it possible to document the relationship between food insecurity, employment status and income within the general population. Given this evidence, it becomes apparent as to why it is important to monitor the prevalence of food insecurity within low-income, under-employed and unemployed First Nation adults.

The 1998-99 cycle of the National Population Health Survey, as analyzed by Che & Chen (2001), had shown that that 58% of families dependent upon welfare as their main form of income report food insecurity. A total of 35% of low-income wage earners also experienced some

form of food insecurity, with 30% reporting compromised food intake due to limited incomes. Twenty-eight percent of households receiving employment insurance, worker`s compensation, or child tax benefits had also experienced the hardships of food insecurity. In 2004, Health Canada (2004) demonstrated, by way of an analysis of the CCHS 2.2, that the prevalence of food insecurity was the least common among wage earners (7.3%) and individuals receiving seniors pension (4.9%). Among those in receipt of social assistance, workers' compensation or employment insurance, food insecurity was far more prevalent (59.7%). Similarly, 29.6 % of individuals in receipt of social assistance experienced moderate food insecurity (CCHS, 4.1; 2007). Severe food insecurity was present in 30.2% of households receiving social assistance as their main source of income. Food insecurity among the unemployed had decreased slightly since 2003 (CCHS 4.1 2007) with 55.5% of households with social assistance as their main source of income suffering from food insecurity.

Improvement of food insecurity with greater income was also documented in the two national surveys. The strong association and increased risk of food insecurity by low income was noted in an analysis of the 1998/99 NPHS. In this survey, a greater percentage of gross income was shown to be dedicated to food purchases in low-income households. The likelihood of households in the lowest income category reporting food insecurity was high, with an adjusted odds ratio of 12.8 (9.2–17.9; CI 95%). The adjusted odds ratio for those among lower- middle, and middle-income categories to experience food insecurity was 9.4 (7.2-12.4; CI 95%) and 4.1(3.1-5.3; CI 95%) respectively.

Data from the CCHS 2.2 (2004) was also analyzed and a clear relationship was noted between food insecurity and adequate income. A total of 48.3% of households with 1-4 members in the *lowest income* quintile were shown to be food insecure. These households had earnings of less than $10,000, and were the most likely to experience severe (23.5%), as well as moderate (24.8%) forms of food insecurity. In *lower middle income* households with 1-4 members earning

between $10,000- $19,999, 29.1% were food insecure; with a greater percentage of individuals reporting moderate levels of food insecurity (18.4%) versus severe food insecurity (10.7%). Of the middle-income households, or those with incomes from $15,000- $39,999, 13.6% were food insecure, with 10.1% reporting moderate food insecurity and 3.5% suffering from hunger. The lowest prevalence of food insecurity was present in the upper-middle, and highest income brackets. The upper-middle class ($30,000 -$79,999) had a prevalence of 5.2% food insecurity; while a comparatively small percentage (1.3%) of households experiencing difficulties acquiring food were in the highest earnings category (>$60, 000) (Health Canada, 2007). A comparison subsequently made use data from the CCHS 4.2 (2007) showed that food insecurity in the lowest income category was 45.9% in the Off-Reserve Aboriginal population, which was nearly twice the prevalence of low-income adults in the general population (Health Canada, 2007).

There are also several population-based studies that have identified relationships specific to *food insecurity*, as either an experience or composite measure, by income level. Several studies have shown that the majority of participants experiencing food-related struggles did so while living with comparatively low-incomes at approximately $15,000 or less (Stuff et al., 2004; Normen et al., 2005; Green et al., 2008). According to a study conducted by Normen and Colleagues (2005), incomes less than $10,000 were significantly associated with the presence of hunger. Although the income category cut-offs used in these studies varied, a general pattern of elevated food insecurity prevalence by income level was observed; and again, there was a noticeable, and significant reduction in the prevalence of food insecurity among participants who were more financially secure (Stuff et al., 2004; Kaiser et al. 2007; Vahabi et al., 2010). It should be noted that based on household income level, the vast majority of these households would fall below Statistics Canada's Low-Income Cut-Off (LICO), a commonly used measure of poverty in Canada (National Council on Welfare, 1999).

Gender

Food insecurity has also been examined from a gendered perspective (Van Esterik, 1999). In many societies, the acts of feeding and care giving are predominately women's issues, as women are often the gatekeepers to the household food supply (DeVault, 1997). It is most often women, for example, who have intimate knowledge of food problems within the household (Fieldhouse, 1995), and it is well documented in qualitative studies, that women deprive themselves of food in order to feed other family members, especially their children (Campbell & Desjardins, 1989; McIntyre et al., 2002; Hamelin et al. 2002; McIntyre et al., 2003; Power, 2006; Tarasuk et al., 2007). Food insecurity items from the CCHS have yet to be analysed from a gendered perspective. Gender differences have been explored in other national surveys, such as the NPHS. Using the 1998-1999 NPHS, Che & Chen (2001) found significant gender differences in food insecurity, with 10.8% of women experiencing food insecurity versus 9.9% of men. Currently, food insecurity among and between both First Nation females and males is currently not known. There has been some work, as reviewed below, that has explored the link between gender and other characteristics (marital status and household type) in relation to food insecurity.

Age

As noted, the experience of food insecurity varies throughout the lifespan (Radimer et al., 1990; McIntyre et al., 2002). A greater proportion of younger and middle aged adults have been found to be struggling with food insecurity (Ahluwalia et al., 1998; Jacobs Starkey et al., 1998; Che & Chen, 2001; McIntyre et al., 2002). According to several researchers, adults under 40 years of age are most vulnerable to food insecurity, while the prevalence of food insecurity among older adults generally decreases (Che & Chen, 2001; Pheley et al., 2002; Kaiser et al., 2007; Tarasuk et al., 2007). The prevalence of food insecurity among older adults also remains the lowest of all age groups within several population studies (Jacobs-Starkey et al. 1998; Che & Chen, 2001; Pheley et al., 2002; Martin et al., 2004, Sharkey & Horel, 2011).

Marital Status

Familial structure, including marital status has been shown to influence food insecurity among adults. Che and Chen (2001) analysed the NPHS 1998/1999 data and found that married individuals experience the highest levels of food security, with 7% of households reporting limited food access (Che & Chen, 2001). Divorced and separated individuals exhibited elevated levels of food insecurity, with 21% (or greater than 1 in 5) reporting that they resided in food deprived households. Food insecurity among single adults was also present in13% of these individuals experiencing reduced access to a food supply (Che & Chen, 2001). In a study conducted by Hanson and colleagues (2007), they discovered that divorced men were more likely to report high levels of food insecurity compared to single (never married) men. Similar patterns, however, were not found for women.

Household Type

With regard to parental status, lone-parent headed households are at the highest risk of experiencing food insecurity (Crotty & Germov, 1994; Che & Chen, 2001). A number of population-based studies support the notion that female-led, lone-status households experience elevated levels of food insecurity (MacIntyre et al., 2000; Pheley et al., 2002; McIntyre et al., 2002). From the 1998/99 NPHS, it has been noted that Canadian lone-parent women are significantly more likely to experience food insecurity than male-led households (17% and 13% respectively) (Che & Chen (2001). Using the CCHS 2007 data, Health Canada (2007) also found strong evidence to support this idea of greater prevalence in overall food insecurity (22.9%) among female-led lone parent households. A study of food insecurity among women by Kaiser and Colleagues (2007) also showed that food insecurity to be high among single, female-led dwellings, (48%) than in households with two-parent households with children less than 6 years (35.8%). More recently, Willows (2009) using the CCHS 2.2 (2004) showed that 52% of single,

Aboriginal parents experienced depleted food stores compared to 20% of single, non-Aboriginal parents.

Geographic Considerations

The geographic location of communities is another important pathway to food security, particularly for Indigenous communities. Little attention, however, has been paid to the local nutrition environments in rural areas (Liese et al., 2007; Powell et al., 2007; Sharkey & Horel, 2008) where the prevalence of food insecurity is often higher than the urban population (Morris et al., 1992; Holben et al., 2004; Champagne et al., 2007; Kropf et al., 2007). Geographic location, for instance, influences the type of retail establishment that will serve a community (Williams & Collins, 2001; Liese et al., 2007; Powell et al., 2007), as well as the foods that are available for purchase and their cost (Alwitt & Donley, 1997; Liese et al., 2007; Powell, et al., 2007). There is mounting evidence that income and such environmental barriers like geography may have a greater impact on food insecurity than that of contemporary nutrition interventions which often fail to meet the needs of the most underprivileged members of society (Badun et al., 1995; Travers, KD., 1995; Lang, 2006; Powers, 2008).

Indeed, rural and rural remote populations face many challenges in accessing healthful, appropriately priced foods. Previous research has documented that the prevalence of food insecurity is often higher than in urban populations (Morris et al., 1992; Holben et al., 2004; Champagne et al., 2007; Kropf et al., 2007). And there is mounting evidence that economic and environmental barriers may be more influential than the benefits of nutritional knowledge (Powers, 2008; Stuff et al., 2004; Champagne et al., 2007; Sharkey & Horel, 2008), little attention has been paid, as The geographic location of First Nations community, for example, would impact transportation, the proximity of food stores, and the store type. It is has been contended that geography should be considered as an important pathways to safe, nutritious market foods for

First Nation communities and as a determinant of food insecurity in those communities (Lambden et al., 2006; Skinner et al., 2006).

Numerous federal government food price and nutrition surveys in northern communities have illustrated the difficulties First Nations people have in acquiring a healthy diet due to the high cost of market food (Wein, 1993; Wein, 1994; Indian and Northern Affairs Canada, 2002; Indian and Northern Affairs, 2004). With regard to transportation, both the transportation of food to rural and remote communities, These transportation challenges increase the cost associated with attaining a healthy diet and are significant barriers to household food security in Northern Manitoba communities (Government of Manitoba, 2003; Johnston, 2001; Willows, 2005; Thompson et al., 2010). Although food transport and distance from service centres may also be a factor contributing to food insecurity in southern First Nations, this information is currently lacking within the literature.

Also considered in many research studies, is the type, size and number of food stores within the local food environment, factors which also influence the consumption of healthy foods (Cummins et al., 2007; Powell et al., 2007; Sharkey and Horel, 2008). For many First Nations people, food store availability and access to affordable quality food is of increasing importance particularly for communities that have transitioned from a predominantly traditional to a market based food system (Kuhnlein, 2004). Due to their rural and remote locations, First Nation population like other rural populations are more likely to access foods from convenience stores and small scale grocers, which are more common in rural, minority communities (Liese et al., 2007; Powell et al., 2007; Williams & Collins, 2001). Communities with limited stocks of overpriced fresh foods such as milk, meat, and fruits and vegetables and an emphasis on low-cost, energy dense grains, fats and sweets have been termed ‘toxic food environments’ (Drewnowski and Darmon, 2005; Lang, 2005; Galvez et al., 2007).

A limited number of dietary intake studies in First Nations communities have shown that traditional foods are consumed in higher quantities in northern First Nations (Wein et al., 1991; Receveur et al., 1997; Kuhnlein et al., 2001; Kuhnlein & Receveur, 2007). At this time, the accessibility and consumption of traditional foods in southern and northern First Nations communities, along with it association with food insecurity, are currently under reported within the scientific literature.

Access to Traditional Food: Hunting & Gathering

There is sufficient literature supporting the importance of accessing safe, traditional foods and food security, as these foods are important in maintaining the health of First Nations (Kuhnlein & Receveur, 1999; Orchard, 2000; Wahlqvist, 2003; Gould, 2004; Batal et al., 2005; Lambden et al., 2007; Richmond & Ross, 2009). It is important to consider that the impact of colonisation on traditional food access, geographic displacement, impeded access to environmental resources in various regions and a transition to a mixed traditional or market economy has also resulted in rapid lifestyle changes and reduced intakes of traditional foods in many First Nation communities. In addition to nutritional value and impact on physical well-being, traditional, country foods are also a central component of cultural expression, connection to cultural well-being and provide a direct link to the environment and human health (Kuhnlein et al.,2004, RCAP, 1993). As the emotional and spiritual dimensions of traditional foods carry significant value in First Nations' cultures, and are therefore, important in the formation of identity (Wein et al., 1991; Kuhnlein et al., 2004). Wild foods are also attributed to good health, building pride and self-confidence, receiving respect from others, encouraging sharing within the community, learning important lessons of patience, and restoring relationships with the natural environment (Receveur and Kuhnlein, 1996; Orchard, 2000; Lambden et al., 2007). As noted, there are physical and economic limitations impeding access to diverse traditional diets. In the wake of these limitations, the increased uptake of highly available processed, energy dense foods

has had negative implications for the health of Aboriginal people (Willow, 2005; Richmond & Ross, 2008). Nevertheless, although ensuring access to traditional, bush foods is essential to retaining cultural identity and strengthening multiple aspects of health, it remains unknown whether access to traditional foods is associated with greater levels of food security at the individual/household level (Chan, 2006; Lambden, 2007). This study will assess the possible relationship.

Food Insecurity & Psychological-Social Health

Finally, there is growing evidence that food insecurity is associated with self-reported fair/poor health in adults in the North American general population (McIntyre et al., 2000; Che & Chen, 2001; Tarasuk, 2001; Pheley et al., 2002; Vozaris & Tarasuk, 2003; Siefert et al., 2004; Stuff et al., 2004; Kaiser et al., 2007). The association between food insecurity and multiple health co-morbidities has also been noted (Che & Chen, 2001; Tarasuk, 2001; Vozoris & Tarasuk, 2003). The experience of multiple life stressors (Siefert et al., 2001; Wehler et al., 2004; Laraia et al., 2006; Kaiser et al., 2007), depression (Pheley, 2002, Vozoris & Tarasuk, 2007; Kaiser et al., 2007), anxiety (Che & Chen, 2001; Laraia, et al., 2006; Whitaker and colleagues, 2006; Kaiser et al., 2007) and the experience of domestic violence (Corcoran et al., 1999; Siefert et al., 2001; Weinreb et al., 2002; Siefert et al., 2004), which represent psycho-social health experiences, have been linked to food insecurity. It should be noted, however, that food insecurity has not been assessed in relation to a wholistic measures of indigenous health; a measure which includes emotional, mental, physical and spiritual elements of health and has culturally specific meaning to First Nations.

Self-reported Health Status

To date, most evidence has focused on food insecurity as a determinant of self-reported fair/poor health status in adults (McIntyre et al., 2000; Che & Chen, 2001; Tarasuk, 2001; Pheley

et al., 2002; Vozaris & Tarasuk, 2003; Kaiser et al., 2007). A cross-sectional analysis of the NHPS 1996/1997 household survey (Cycle 2) conducted by Vozoris & Tarasuk (2003) provides a glimpse into the socio-demographic profile and health characteristics of families experiencing food insufficiency. Seeking to better understand the food insecurity and its association with health outcomes, Vozoris and Tarasuk (2003) examined data from all 10 Canadian provinces. They found that food insecure individuals had significantly higher odds of reporting poor or fair health (AOR: 2.9; 95% CI), and were more likely to suffer from multiple chronic ailments (AOR: 2.8; CI 95%) than their food secure counterparts. Poor functional health was also more common among the food insufficient, as illustrated by the adjusted odds ratio of 3.0 (CI 95%).

Data from the 1998/1999 National Population Health Survey was assessed by Che & Chen (2001), and they found that several health problems were more common within food insecure households than in homes that were food secure. Among the health concerns assessed was self-reported health. Individuals indicating that they were unable to pay for food were more likely to report health that was 'fair' or 'poor,' compared to individuals reporting food security (OR 3.2; CI 95%). The significant difference between the two groups was present even when the effects of age, sex and household income are considered in the analysis.

Similar findings are presented in a study of women (n=153) accessing charitable food assistance in Toronto, Tarasuk (2001), reported that women with longstanding health conditions, illness or disability also had a higher odds of experiencing food insecurity (OR: 2.394; 95% CI). Women with health conditions that limit activity levels were also at greater risk of experiencing food insecurity with hunger (OR: 2.485; CI 95%). Alternatively, women rating their health as 'good or excellent' within the previous 12 months were less likely to have experienced food insecure with hunger than women with 'fair', 'poor' or 'very poor' self-reported health (OR: .531; CI 95%). Women rating their health as 'excellent' or 'good' within the past 30 days were

also less likely be experience food insecurity with hunger (OR: .444; CI 95%), indicating that there is a degree of consistency and validity in this measure.

The 2004 California Women's Health Survey by Kaiser and colleagues (2007) also contributed to a growing understanding of the link between insecurity and health issues. The study assessed food insecurity and associated health experiences of 4037 women in California, Food insecurity was assessed using a 6-item short-form of the standardized US Household Food Security Survey Measure. Outcome measures included self-reported health status and the number of days spent in poor physical and mental health within 30 days prior of the survey. Analsysis showed that women in food insecure households (n= 1037) were more likely to report 'fair to poor' general health (52%) versus 'good to excellent' (20.1%) health. Food insecure women were 1.49 (CI 95%) more likely to report 'fair or poor' health. Food insecure women also were two time more likely (AOR; 1.81; CI 95%) to experience physical or mental health problems that interfered with normal activity nearly than those who were food secure .

Stressful life circumstances

Life stressors are defined as "demands to which there are no readily available or automatic adaptive responses (Antonovsky, 1987)." Individuals experiencing food insecurity are significantly more likely to experience a greater number of life stressors, than adults in food secure households (Siefert et al., 2001; Wehler et al., 2004; Laraia et al., 2006; Kaiser et al., 2007).

The first wave of the Women's Employment Study (1997) documented the barriers to employment among mothers utilizing social assistance. It also provided important data according to Siefert and colleagues (2001) on stressful life circumstances, as defined by the Difficult Life Circumstances Scale (Booth et al., 1989; Quint et al., 1997), which they analyzed in relation to food insecurity. This scale measured stressors that often occur in poor communities, such as

adequate living arrangements, and material hardships such as utility shutoff, eviction and homelessness. Siefert and colleagues (2001) found that stressful life circumstances was significantly greater among women living with moderate to severe levels of food insecurity ($P<0.1$).

Wheler and colleagues (2004) also included psychological factors in their assessment of risks and protective factors among low-income housed and homeless female-headed families (n= 354) in the Worcester Family Research Project survey. Psychological factors included a count of major life events, based on the Life Experiences Study (Sarason et al., 1978). This survey assessed the impact of major life changes in adulthood. Reporting on the mean number of life events during adulthood, Wheler and colleagues (2004) found that respondents who reported hunger had a significantly higher number of major life changes (mean 9.5 vs. 7.6) ($p<. 001$). Similarly, perceived parenting hassles as a form of stress were shown to be significantly associated with adult hunger ($P< .001$).

With regard to stress and food insecurity among pregnant women, Laraia and Colleagues (2006) used data (n=606) from the 2000-2004 Pregnancy, Infection and Nutrition (PIN) cohort which documented the association of these phenomena utilizing the Cohen's Perceived Stress Scale (CPSS). The CPSS scale was developed to assess "chronic stress or strain, and one's ability to cope with life stresses." Strong, significant differences in perceived stress were shown for women experiencing food insecurity, as measured using the US HFSSM of food insecurity ($p\leq$ .0008). Although several psychosocial factors were shown to be positively associated with food insecurity (trait anxiety, depression, locus of control), perceived stress was the predominant psychosocial factor independently associated with marginal food insecurity (AOR: 1.80; CI 95%) and food insecurity (AOR: 2.24; CI 95%). These finding suggest that women reporting greater stress in their lives also experience greater levels of food insecurity.

Anxiety

Negative, external stress factors can produce a physiological response known as anxiety, which can have negative consequences on health (Krause & Van Tran, 1989). Mental health problems, such as anxiety are significantly associated with low socio-economic status and more specifically, anxiety is shown to be more prevalent among the food insecure than the food secure (Che & Chen, 2001; Laraia, et al., 2006; Kaiser et al., 2007; Miller, 2008).

The relationship between anxiety and food insecurity was documented by Che and Chen (2001) using data from the 1998/1999 NPHS. The survey, included a total of 17, 226 respondents, of which 1265 completed the Food Insecurity Supplement. Using multiple regression analysis they were able to determine which individuals lacked sufficient resources for food, and this lack of resources with related health problems, such as anxiety. Researchers assessed food insecurity and whether individuals were 'distressed.' For this analysis, Che & Chen (2001) used the Distress Index, included in the survey, which is a six-item measure of mental health covering sadness, nervousness, restlessness, hopelessness or worthlessness and perceived effort. Che & Chen (2001) found a significant difference between 'distress' in food insecure and food secure households; that is, the odds of experiencing distress was 3.7 times more often than among the food insecure ($P<.05$).

In 2008, Miller and colleagues published a study assessing the relationship between mental health among hungry and non-hungry families. The presence of 'psychological distress' was determined through the use of the Mental Health Inventory-5 (MHI-5), a five-question scale which measured the presence of anxiety, depression, loss of behavioural control and psychological well-being. This study also included the use of one question item, derived from the standardized measure of food insecurity, the US HFSSM, in order to categorize adult respondents as 'not hungry' and 'hungry' (Kleinman et al., 2007). Using these screening tools, the authors

determined that adults reporting household food insecurity with hunger had significantly lower MHI-5 scores, indicating greater levels of psychological distress within this group ($p<.001$). The authors also indicated that the one-item US HFSSM question demonstrated good sensitivity and specificity and could potentially be used for screening hunger in primary health settings.

The results of a 2006 cross-sectional study by Laraia and colleagues were also consistent with the scientific literature on food insecurity and the association with lower mental health status. According to Laraia and colleagues (2006), mental health issues such as anxiety, can put low-income women at risk for food insecurity, due to increased job instability, limited income and coping skills. As part of the Pregnancy, Infection and Nutrition prospective cohort study, 606 women completed the USDA 18-item food insecurity scale along with a number of psychosocial measures. In order to determine the presence and intensity of anxiety, the Speilberger's Trait Anxiety Inventory was used. This measure provided a greater understanding of how often and intensely individuals responded to stressful situations with anxiety. Women experiencing food insecurity were shown to have higher levels of trait anxiety than women with marginal food insecurity and the food secure. Significant differences between anxiety among the food insecure and the fully food secure were noted ($P\leq 0.008$). The Adjusted odds ratio (OR) for marginal food insecurity in women with a positive trait anxiety score was 1.74 (1.38, 2.19) and 2.14 (1.55, 2.96) among the food insecure.

In an attempt to understand whether specific social stressors were associated with elevated levels of mental health issues in low-income women, Whitaker and colleagues (2006) examined data from the Fragile Families and Child Wellbeing Study, which included both the US HFSSM and the World Health Organization Composite International Diagnostic Interview-Short Form (CIDI-SF), to interpret food insecurity data and anxiety in this population (n=2870). Within this study, there was a significant difference between the prevalence of anxiety within each category of food insecurity ($p<.0001$). The adjusted prevalence (%) of Generalized Anxiety

Disorder (GAD) among the fully food secure was 4.1%, 6.2% among the marginally food insecure and 9.6% among the food insecure group. Women were 1.4 (95% CI 1.1-1.8) more likely to have generalized anxiety disorder if they identified as marginally food secure and GAD was 2.2 (95% CI 1.6-2.9) times greater than among the food insecure.

Little research has examined this dynamic in the First Nations population. One study conducted by Willows and colleagues (2005), documented the prevalence of maternal anxiety specific to the food supply, among Cree women in northern Quebec. A total of one-fifth (20.8%) of women indicated that they worried about inadequate funds to secure the household food supply and were therefore, said to have 'anxiety' about food. The results of the multivariate analysis showed that adjusted ORs for anxiety were 3.87 (95% CI, 1.12-13.36) for mothers bottle-feeding infants, 3.10 (95% CI, 1.1-8.65) for women who experienced anemia during their first trimester, and 2.12 (95%, CI 1.05-4.29) for women who smoked. The high cost of infant formula, and smoking as a response to external stressors were cited as probable factors driving heightened anxiety around securing a supply of food. The authors stated that further research within the population was warranted in order to further elucidate the influential factors.

Depression

Food insecurity has also been positively associated with validated measures of depression in several cross-sectional, (Che & Chen, 2001; Pheley et al., 2002; Vozoris & Tarasuk, 2003; Casey et al., 2004; Laraia, et al., 2006; Wu & Schimmele, 2005) and longitudinal population studies (Siefert & Colleagues, 2004; and Heflin & Colleagues, 2005). Food insecurity and its association with depression was assessed using the 1996/97 NPHS by Wu & Schimmele (2005) (n=65, 532; 35, 403 women and 30, 129 men). The NPHS, Cycle 2 (1996-1997) measured food insecurity using questions related to 'Food Anxiety,' 'Compromised Diet,' and 'Food Poverty.' Depression was measured using questions on depressive symptoms, as set out in the American

Psychiatric Association's Diagnostic Statistical Manual of Mental Disorders (DSM-111-R). The authors hypothesized that food insufficiency was a source of stress and an independent predictor of depression in this population. Within the study, food insufficiency was shown to be a highly significant determinant of depression, when considering the addition of common socioeconomic variables into the logistic regression models. According Wu & Schimmele (2005), individuals living with acute levels of food insufficiency were 2.08 times more likely to experience depression, while those with chronic food insufficient situations were at greatest risk of experiencing depression (OR: 2.084, CI (5%), after several common socioeconomic indicators were entered into the regression analyses.

Che & Chen (2001) furthered examined the 1998/1999 NPHS, Cycle 3 in order to elucidate the relationship between food insecurity and several health outcomes, including depression. Che and Chen (2002) identified individuals who had experienced a Major Depressive Episode (MDE),as assessed by the Composite International Diagnostic Interview Question items. Food insecurity was assessed by measures on the use of charitable food assistance and child hunger. Their analysis revealed that 14% of individuals in food insecure households reported symptoms of a major depressive episode in the 12 months prior to the survey, compared with 4% of adults in food secure households experiencing past MDE (OR: 3.7; CI 95%). These results remained, even when common variables such as age, sex, and household income were entered into the multivariate logistic regression.

The analysis of food insecurity in relation to major depression was also undertaken by Vozoris and Tarasuk (2003) using later NPHS data. The mental health measure used to diagnose major depression in this analysis was based the University of Michigan-Composite International Diagnostic Interview-Short Form (UM-CIDI-SF). In this national sample (n= 81,804), individuals experiencing major depression were shown to be at the greatest risk of experiencing

moderate to severe levels of food insecurity (AOR: 3.5; CI 95%), compared to those with positive food secure scores.

In a 2002 study, Pheley and colleagues used the USDA core module to determine household food security status and the Medical Outcome Study Short Form-36 was used to collect data on functional health and wellbeing in a low-income, rural population (n=1006). The SF-36 Scale contains questions specific to mental health issues such as the depression items of feeling blue/sad' and 'down in the dumps.' These authors found a mental health gradient when comparisons with food security status were made. For example, significant differences in SF-36 mental health scores were noted between individuals who were 'food secure,' and 'food insecure without hunger' ($P<.05$). Similarly, significant differences were noted between those who were 'food insecure with moderate hunger ($P<.01$) and those who were 'food insecure with severe hunger' ($P<.001$).

Domestic Dispute

Various forms of domestic dispute have been strongly associated with food insufficiency in several quantitative studies (Corcoran et al., 1999; Siefert et al., 2001; Toleman & Rosen, 2001; Wehler et al., 2004). These studies documented elevated levels of violence within the home, rather than lower levels of unrest, such as problematic family arguments. As a result, the review is limited to to food insecurity and chaotic family environments.

Corcoran and colleagues (1999) published a study related to food insufficiency and material hardship using data from the Women's Employment Survey (WES, 1997). These authors examined socio-demographic factors capable of constraining basic living or household economic resources. An analysis of the relationship between domestic violence and food insufficiency was included in the study. The Conflict Tactics Scale (CTS), a widely used measure of family violence and a food insufficiency classification of those who "sometimes" or " often" did not

have enough to eat (Alaimo et al., 1998) was used . Domestic violence, considered a barrier to food insufficiency, was defined as 'severe physical abuse.' Within the post-TANF (Temporary Assistance for Needy Families) population (n=646) the women who had experienced physical abuse within the 12 months prior to the interview were significantly more likely to also experience food insufficiency (OR: 1.5919; CI 95%). This study was among the first to document domestic violence as an independent predictor of food insufficiency.

Another study has shown that domestic violence and material hardship among women living on welfare was a serious health concern that warranted further investigation (Toleman & Rosen, 2001). It has been theorized that women who experience physical abuse by a male partner are more likely to suffer material hardship, including food insufficiency. In a study by Toleman and Rosen (2001), which used data from the Women's Employment Study (WES), they investigated food insufficiency ("sometimes' or "often" not having enough to eat) in relation to a domestic violence measure based on the Conflict Tactics Scale (CTS) that determined the presence of physical and non-physical forms of abuse. Women experiencing current and recent episodes of abuse were most likely to experience elevated levels of food deprivation. Among the 753 respondents, women reporting *recent*, severe violence (35.7%) were significantly more likely to experience food insufficiency than those reporting *past* experiences of severe violence (26.5%) ($P<.05$). The study also revealed a significant difference between food insufficient women with *past* experiences of abuse (26.5%) and those who had *never* been severely abused (19.8%) ($P<.001$).

IThe Worcester Family Research Project, an unmatched case-control study by Wehler and colleagues (2004), also examined risk and protective factors for hunger among low-income and homeless women and their families. In this study (n=354; 220 homeless, 216 never-homeless women), family violence was selected as a possible risk factor able to compromise a woman's ability to manage household resources. Wehler and colleagues (2004) conducted a bivariate

analysis to determine the association between intimate partner violence and both adult and child hunger - a more severe indicator of household food insecurity. In their analysis, intimate partner violence was significantly more common in food insecure households. Of the low-income and homeless women reporting adult hunger, 75% experienced intimate partner violence, versus, households with child hunger (63.3%). These results differed significantly from those households reporting no hunger (49%) ($p<.001$).

Monitoring Food Insecurity in the General Canadian Population

In summary, the vast majority of studies reviewed above have drawn on large scale surveys, and what is known about food insecurity among adults. In Canada, monitoring food insecurity began in the 1980's with the increased use of food banks serving as the primary indicator. A more direct measure of food insecurity displaced this approach. Food insecurity was first documented through the National Population Health Survey (NPHS) 1996/1997, 1998/1999 as noted above and then later in the Canadian Community Health Survey (CCHS) (Cycle 1.1, 2001; 2.2, 2004; 4.1 2007). Unfortunately, the surveys have not sampled members of the on-reserve First Nations population (Che & Chen, 2001; McIntyre et al., 2002; CCHS, 2004; Power, 2005). Nevertheless, the NPHS and CCHS have given a sense, comparatively, of the prevalence of food insecurity in Canada's Aboriginal population.

According to the 1998-1999 National Population Health Survey (NPHS) Food Insecurity Supplement, food insecurity was present in 9.3% of adults in the general Canadian population. Of these food insecure individuals, 7.3% exhibited signs of food worry/anxiety, 7.2% had compromised diets, and 3.9% were determined to be 'food poor' and experienced the pain of hunger due to inadequate financial resources. Upon reflection, the NPHS measure was more thorough and included questions related to transportation, disability, specific food management strategies and the temporality of the experience. As well, the core food insecurity questions used

to produce prevalence estimates were based on the US HFSSM. The NPHS 1998/99 estimated food insecurity levels in the off-reserve Aboriginal population to be at 31.2%, similar to the figure recorded in the CCHS (see below) (CCHS 2.1, 2004; CCHS 4.2, 2007).

From the CCHS 1.1 (2002) Ledrou & Gervais (2005) had reported that the prevalence of food-related deprivation was at 14.7% for all Canadian households - a figure which represented a total of 3.7 million Canadians over the age of 12. In comparison, food insecurity reported in the off-reserve Aboriginal population was documented at 31.0%. In the CCHS Cycle 2.2 (2004), the national level of food insecurity, based on the valid USHFSSM scale, was 9.2% overall, or greater than 1.1 million adults. When viewed in terms of the severity of food insecurity, 6.3% of the Canadian population experienced moderate levels of food deprivation, while 2.9% were severely impacted by food insecurity (CCHS, 2004). As determined by the same measure in CCHS 4.1 (2007), the prevalence of food insecurity in Canada had decreased slightly to 7.7%, with minimal changes to the level of severe food insecurity (2.7%). A greater percentage of the off-reserve Aboriginal population was shown to experience food insecurity, with 33.3%, or 1 in 3 individuals affected. Of these individuals, 14.4% were considered 'severely' food insecure. Although, food insecurity in the off-reserve Aboriginal population had also decreased over time (20.9% in the CCHS, 2007), the rates remained three times greater than non-Aboriginal households. Unfortunately, as noted, these national surveys did not investigate food insecurity experienced by the First Nation on-reserve population.

Food Insecurity and the on-reserve First Nations Population in Canada

The issue of a nutrition transition resulting from limited incomes, cultural constraints and elevated food prices provide evidence of the difficulties many First Nations families have in acquiring healthy dietary intakes. Food insecurity as a determinant of health within the First Nations on-reserve population has been documented (Willows et al., 2005; Indian and Northern

Affairs Canada, 2001; Indian and Northern Affairs Canada, 2004; Manitoba Aboriginal and Northern Affairs, 2003). However, regular monitoring of food insecurity is lacking, and monitoring is recommended in order to advocate for changes in economic, health and food policies and to advocate for improved food access within communities (Assembly of Manitoba Chiefs, 2006; National Aboriginal Health Organization, 2008).

Several dietary studies with First Nations people in northern regions throughout Canada have illustrated that First Nations are undergoing what has been termed a 'nutrition transition' (Kuhnlein et al., 2004), and several barriers and pathways to food security for Canada's Indigenous populations have been identified. Trends in decreased consumption of traditional foods and increased consumption of market foods is recorded in several studies (Kuhnlein & Receveur, 1996; Receveur et al., 1997; Kuhnlein et al., 2001, Kuhnlein et al., 2004), and these dietary changes are attributed to a number of complex political, environmental and socio-economic factors that give rise to individual preferences and food choices (Campbell, 1992; Wein et al., 1991; Wein et al., 1993, and Nakano et al., 2005; Guyot et al., 2006). European foods, which first entered First Nations communities by way of the fur trade, were later reinforced through the segregation of First Nations people through the reserve system. While the purchase of quality perishable foods, such as fruits and vegetables is a known struggle due to extreme food costs and lack of availability (Delormier & Kuhnlein, 1999); lower cost, packaged products are known to contain higher levels of fat and refined carbohydrate (Sharma, 2010). A dietary study by Stroink and Nelson (2009) indicates that market foods consumed by adults in on-reserve populations are heavily guided by economics, in addition to the taste, convenience and overall familiarity of the food product.These documented reductions in culturally significant food access and consumption in First Nations across Canada are detrimental not only for nutritional status, but for the overall health and wellbeing of the individual (Greyeyes, 1995; Kuhnlein et al., 2004).

To date, these exacerbated market prices, low-food quality and declines in traditional food intake are predominantly documented in northern populations.

What we do know thus far is that food insecurity in First Nations communities is disproportionately high compared to the general population in Canada (Hill, 1998; Indian and Northern Affairs Canada, 2001; Indian and Northern Affairs Canada, 2004; Willows et al., 2005; Elias et al., 2006). A baseline food security study for Fort Severn First Nation, Ontario, Canada was among the first large-scale food insecurity studies conducted in a remote First Nations community (Indian and Northern Affairs Canada, 2001; Indian and Northern Affairs Canada, 2004). The poor nutrition and food security status of adults within this community was documented using a culturally appropriate adaptation of the U.S. HFSSM (Indian and Northern Affairs of Canada, 2004). Within this remote community, 76% of adults worried about access to food, 73% reported that food purchases did not last long enough to feed the family, and 74% could not afford to eat healthy meals. Out of all households surveyed, 41% of adults were food insecure without hunger, while 26% experienced food insecurity with hunger (Indian and Northern Affairs of Canada, 2004).

The inclusion of mental health and wellness to the understanding of food insecurity in the on-reserve population could therefore support the development of social and culturally appropriate food security initiatives in First Nations communities. With regard to the documentation and discussion of the relationships between food insecurity and self-reported health and dimensions of psycho-social health in First Nations population health research has been limited to the one study conducted by Willows and Colleagues (2005), which further documented the prevalence of one aspect of food insecurity - maternal anxiety over the food supply in nine Quebec Cree communities. Worry about having enough money to buy food was reported by greater than twenty percent (20.8%) of women, and was a serious concern for the wellbeing of both mother and child.

Food Insecurity and the on-reserve Manitoba First Nations Population (Canada)

While, national food insecurity surveillance, such as the CCHS, includes general provincial data, information for the on-reserve First Nations population is not included. Therefore, very limited epidemiological data on food insecurity is available for the on-reserve First Nations population. In the province of Manitoba, however, the severity of food insecurity within the on-reserve First Nations population is also well illustrated by way of the 2002/2003Manitoba First Nations Regional Longitudinal Health Survey (MFNRLHS), which utilizes the core concepts of food insecurity found in both the Radimer/Cornnell and USHFSSM. Within a twelve month period, 50.2% of the adult population 'worried that food would run out before there was money to buy more.' Nearly half of the population (48.1%) 'ate cheaper foods or the same foods for several days in a row because there was not enough money for food,' while, 33.6% 'received food from a relative because there was not enough money for food.' Nearly 30% (29.4%) 'Skipped meals or ate less because there was not enough money for food.' Almost a quarter (22.3%) experienced the pain of hunger 'because there was not enough food in the house.' While these results demonstrate an alarming picture of food insecurity experienced by the Manitoba First Nation on-reserve population, there have not been any studies to investigate food insecurity that include gender and a determinants of health perspective.

Chapter 3: Methods

Statement of the Issue

The intent of the research is to provide an understanding of food insecurity in the Manitoba First Nations on-reserve population and to call attention to the psycho-social health concerns of food insecure members of these communities. As noted, food insecurity has been recognized as an important determinant of health (Public Health Agency of Canada, 2004; Health Canada, 2007). However, while there is limited research on components of food insecurity from some Manitoba First Nations communities (Thompson et al. 2010), there has been no population level analysis of the prevalence of *food insecurity* in the Manitoba First Nation on-reserve population, including its potential link to general health, psychological and social well-being within the on-reserve population (Manitoba Government, Aboriginal and Northern Affairs, 2003; Indian and Northern Affairs, 2004; NAHO, 2008). Using data from the adult sample of the Manitoba First Nations Regional Longitudinal Health Survey, this study will provide a descriptive analysis including the common social determinants of food insecurity within the adult First Nations population living on-reserve in Manitoba. The author will also explore food insecurity and possible associations between self-reported health status, and the self-reported psychosocial health of men and women .The results of this study have the potential to contribute to the development of effective food policy and holistic food security initiatives that recognize the socio-economic, psycho-social health dimensions of the food insecure.

Study Aims:

For the adult On-Reserve First Nation population in Manitoba:

1) To determine the distribution of food insecurity by socio-demographic variables, such as, age, gender, marital & parental status, employment status, income, traditional food access and geographic location in the adult, on-reserve First Nation population in Manitoba

2) To investigate associations between food insecurity status and socio-demographic variables, such as, age, marital & parental status, employment status, income, traditional food access and geographic location.
3) To investigate associations in food insecurity status and socio-demographic variables, such as, age, marital & parental status, employment status, income, traditional food access and geographic location by gender in the adult, on-reserve First Nation population in Manitoba.
4) To investigate associations between food insecurity and self-reported health status, holistic measures of health (emotional, mental, physical and spiritual), depression, anxiety, stress, and household conflict in the adult, on-reserve First Nation population in Manitoba.
5) To investigate associations between food insecurity, and self-reported health status, holistic measures of health, depression, anxiety, self-reported stress, and household conflict by gender in the adult, on-reserve First Nation population in Manitoba.

Null Hypotheses:

For the adult On-Reserve First Nation population in Manitoba:

1) There is not an elevated prevalence of food insecurity across select socio-demographic variables.
2) Significant relationships between food insecurity status do not exist by select socio-demographic variables, including- age, gender , marital status, household type, employment status, income dynamic, traditional food access and geographic location.
3) Significant relationships between food insecurity status do not exist within and between-gender by select socio-demographic variables, including- age, marital status, household type, employment status, income dynamic, traditional food access and geographic location.

4) There are no significant relationships between food insecurity and self-reported health, holistic health (emotional, mental, physical and spiritual) depression, anxiety, stress, and household dispute.
5) There are no significant associations between food insecurity within and between- gender, and select measures of self-reported health status, holistic health, depression, anxiety, stress, and household dispute.

Alternative Hypotheses

For the adult On-Reserve First Nation population in Manitoba:

1) There is an elevated prevalence of food insecurity across select socio-demographic variables.
2) Significant relationships between food insecurity status exists by select socio-demographic variables, including- age, gender , marital status, household type, employment status, income dynamic, traditional food access and geographic location.
3) Significant relationships between food insecurity status exists within and between-gender by select socio-demographic variables, including- age, marital status, household type, employment status, income dynamic, traditional food access and geographic location.
4) There are significant relationships between food insecurity and self-reported health, holistic health (emotional, mental, physical and spiritual) depression, anxiety, stress, and household dispute.
5) There are significant associations between food insecurity status that exist within and between- gender, and select measures of self-reported health status, holistic health, depression, anxiety, stress, and household dispute.

Study Data

The data obtained for this research study is from the second wave of the Manitoba First Nations Regional Longitudinal Health Survey (MFNRLHS, 2002/2003). This longitudinal

survey, developed in full partnership between the Assembly of Manitoba Chiefs and the Manitoba First Nations Centre for Aboriginal Health Research, on behalf of Manitoba First Nations communities, examines social determinants and health status within the adult, on-reserve population (Elias et al., 2006). The survey was undertaken using the First Nations Principals of OCAP (ownership, control, access and possession) which ensures that First Nations control the manner in which research is collected, used and shared. Ethics approval for a secondary analysis was obtained from the University of Manitoba Health Research Ethics Board. The Assembly of Manitoba Chiefs were notified of this study.

The Manitoba First Nations Regional Longitudinal Health Survey (MFNRLHS, 2002/2003) was implemented in 26 First Nations on-reserve communities in Manitoba. A multi-stage stratified random sampling method was used to select a sample representative of the Manitoba on-reserve First Nation population. A sample of small (population < 500), medium (population 500-999) and large communities (population >1000) were selected within each of the seven tribal areas. The total response rate for the adult survey was 77% (N=3067 sample; 4330 target sample), with 60% of these communities reaching response rates over 80%. The rate of participation among men and women was higher for females (55% n=1815) than males (45% n=1485) (Elias et al., 2006). In order to correct for this difference, individual statistical weights were calculated.

SPSS software was utilized to conduct all statistical analyses. Frequencies were generated to describe the distribution of food insecurity in the adult sample, between and within-gender. A bivariate analysis (using Chi-square) was conducted to determine associations between food insecurity and select socio-demographic variables as well as self-reported health status and psychosocial health outcome measures. This research study includes a gender-based analysis (GBA), which allows for possible food insecurity differences between women and men to be

accounted for, and can be used in planning food policy and programming. A P-value of 0.05 was used to identify significant differences (Hassard, 1991).

Socio-demographic Measures

In order to provide the prevalence of food insecurity within the adult population, age categories were selected for the secondary data analysis. Categories include 'young adults' ages 18-34 years, 'middle aged adults' ages 35-54 years and 'seniors' ages 55+. The age categories chosen are based on an extensive review of the food insecurity and health outcomes literature; research utilizing epidemiological health surveys (Wolfe et al., 2003; Green et al., 2008) and Statistics Canada national databases (Che & Chen, 2001; McIntyre et al., 2002; Kaiser et al., 2007; Tarasuk et al., 2007) to assess the prevalence food insecurity and associated physical and mental health outcomes.

Marital status categories include those who are married, living in common-law relationships, single adults (individuals identifying as 'never married'), as well as individuals who are divorced, separated and widowed. For the purpose of reporting food insecurity by marital status, individuals are grouped as follows: married/common-law; single/never married; and divorced/separated/widowed. A household composition variable was constructed from several measures in the survey and the variable represented the following: single adult, lone caregiver (1adult, 1 child), two adults (no children), and two or more adults with children (2+ adults, 1+ child).

Total income is documented in the MFNRHS as 'Total Household Income,' (Elias et al., 2006). Total household income is divided into three income categories. Individuals may be categorized as receiving less than $10,000 per 12 month period (ending December 2001), as receiving a total income within the range of $10,000-$29,000, or reporting earnings of $30,000 or greater per year. Due to high refusal and 'don't know' responses for this questions, these

categories were combined and included in the analysis. To further understand food insecurity distribution within households, the 'number of incomes per household' was calculated. The number of incomes was recoded as one, two and three or more incomes. An 'income dynamic' variable was created. This variable created from employment status ('currently working' versus 'unemployed') and income source ('paid employment' versus 'government assistance'). The dimensions of this variable represented individuals who were: 1) Employed at the time of survey administration, and who reported paid employment during the 2 year period; 2) Currently employed with a mix of both income and government assistance over the 2 years; 3) Unemployed at the time of the survey and previously received a mix of paid income and government-source income; and 4) Unemployed over the course of the two year period.

To assess possible geographic differences in food security, two variables were constructed using a community identifier added to the database. The variable "region" included the categories 1)Northern First Nation and 2) Southern First Nation. A remoteness variable was constructed to represent 1) non-remote communities (within 50km), semi-remote communities (between 50-350km), and 3) remote communities (air/rail/boat access only).

To investigate food insecurity in relation to cultural food sources, two measures were selected from the survey: 1) Access to traditional foods ('1=Yes,' '2=No') and 2) the practice of hunting, fishing, trapping and picking wild berries ('1=Yes,' '2=No'). To assess the frequency of traditional food sharing practices to food insecurity the following question was used from the survey: "In the past 12 months, how often did someone share traditional food with your household?" Respondents are presented with the options '1 = Often,' '2 = Sometimes' and '3 = Never.'

Food Insecurity Measures

In Canada, such surveys as the Community Health Survey (CCHS, Cycle 2.2) have adopted food insecurity measures from the US Household Food Security Scale Module (US HFSSM), which have been validate and utilized within a variety of cultural contexts (Coates et al., 2006; Webb et al., 2006). The food insecurity questions used in the MFNRLHS 2002/2003, which include the core domains of the phenomenon, were further adapted for cultural appropriateness with the First Nations context. These questions include the core domains of food insecurity- worry or 'food anxiety,' food quality or inadequacy, food quantity, social methods of food procurement and hunger. Possible responses to all food insecurity measurement questions include 'Often,' 'Sometimes,' or 'Never.' The first question "Did you worry that food would run out before there was money to buy more?" reflects the domain of 'food anxiety'. In order to determine if the quality of the food accessed by the household is diminished, the question "Did you eat cheaper foods or eat the same foods for several days in a row because there was not enough money for food?" was used. The quantity of foods consumed is known to be reduced when household levels of food insecurity are moderate to severe (Radimer et al., 1992). Therefore, the question 'Did you skip meals or eat less than you should because there was not enough money for food?' acknowledges food shortages within the home and was included in this study. In recognition of the impact of social networks on food insecurity, the question 'Did you or anyone else in your household receive food from a relative because there was not enough money for food?' was also used. The final question 'Have you been hungry because there was not enough food in the house?' was included to document the presence of hunger, the most severe form of food insecurity.

To fully assess food insecurity, a composite measure of food insecurity was constructed using the five food insecurity domains (listed above). To ensure the newly constructed food insecurity measure was reliable, a Cronbach Alpha measure for internal reliability test was

performed. The results (α =0.901) indicated that the selected items questions were appropriate for a composite measure of food insecurity.

Psycho-Social Health Measures

For this study, the following measures of psycho-social health were included in the survey: holistic measures of personal wellness (emotional, mental, physical and spiritual well-being), self-report health status, depression, anxiety, stress, and family arguments (as a measure of domestic disturbance).

Self-reported health was selected from the survey. The question "In general would you say that your health is excellent, very good, good, fair or poor. The response were dichotomized into the categories 1) Excellent/Very Good and 2) Good/Fair/Poor."

A holistic measure of health called 'Feeling in Balance,' included elements pertaining to physical, emotional, mental and spiritual well-being. The measure was constructred from the items from the following question, "How often do you feel that you are in balance in the four aspects of your life? Physical (yes/no), emotional (yes/no), mental (yes/no) and spiritual (yes/no).' The yes responses were combined and coded as 'none', 'one, two, or three', or 'all aspects.'

For psychological measures, the survey included the following measure of stress: "As a whole, would you describe your life as very stressful, fairly stressful, not very stressful and not at all stressful. The question was recoded in a dichotomous measure, 1) Very stressful/Fairly stressful 2) Not very stressful/Not at all stressful.". Other measure included was self-reported depression: " During the past 12 months, was there ever a time when you felt sad, blue or depressed for 2 weeks or more in a row?" (yes / no). Another question covered anxiety, "In the last 12 months, did you have the following health condition? Intense anxiety (panic attacks) (yes /

no)." Finally, the survey included a question on domestic disputes in the last 12 months, and were coded as a‘ major problem,’ ‘ minor problem,’ or ‘not a problem’.

Chapter 4: Results

Descriptive Analysis

Individual Level Characteristics

The overall socio-demographic characteristics of the on-reserve population (N=3067) is described below for the following measures: age, household composition, economic/income descriptors, traditional hunting/gather practices and geographic location.

The age distribution for the participating Manitoba on-reserve First Nations population is as follows: Adults, ages 18-34 years represent 43.5% of the population and are referred to in this study as ‘young adults.’ ‘Middle aged’ adults, age 35-54 years represent 43.4% of the population, while 13.1% of adults are over 55+ years, a comparatively smaller proportion of the population. With regard to gender, the sample population is comprised of nearly equal numbers of men and women (48.2% Male, and 51.8% Female).

The majority of households (61.6%) are comprised of 2 or more adults with 1 or more children, while a smaller portion of the population (20.4%) of adults are in couple-led households with no children. A small percentage of the adult population (10.6%) identifies as lone-parent caregivers (7.4%), and live as single, unattached individuals without children and similarly, a comparatively. In terms of income dynamic, a total of 40.4% of the valid respondents were employed at the time of survey and were employed consistently during the previous 2 years. A much smaller percentage (5%) was employed at the time of the survey and reported both paid employment and government assistance over the 2 year period. A larger number of individuals identified as currently unemployed and in receipt of government assistance at the time of the

survey. These individuals had a previous history of paid income and government-source income (15%). Those experiencing unemployment consistently over a 2 year period represented a total of 39.6% of adults.

The majority of households have one source of income (61.1%). Nearly one-quarter of adults live in households with two income earners (24.2%), and 12.5% have three or more incomes. 1.8% of the population lives without an identifiable source of income.

Total household income was categorized according to a review of the food insecurity literature. The three categories included are: <$10,000, $10,000-$29,000 and household incomes of $30,000 or more. A large number of research participants did not report household incomes: over one-quarter (25.2%) did not know their household income, while 34.1% refused to answer the question and 16.4% of the response were 'missing' due to non-response. As for those reporting a household income, 7.9% reported lived in household with incomes less than $10,000. Sixteen percent of respondents reported low-incomes of $10,000-$29,000, and 16.8% reported total household incomes of $30,000 or more.

Geographic

The percentage of respondents from the north was 33% and 67% resided in southern communities. From Geo-zone Remoteness Index perspective, 19% of respondents resided in communities categorized as 'non-isolated/within 50km', 64.5% from 'semi-isolated/between 50km-350km' and 16.5% lived in 'remote with air/rail/boat access only'.

Traditional Food Access Hunt/Gather

Within the First Nations adult population, over sixty percent of individuals (61.4%) indicate that they hunt or gather food throughout the year. A total of 37.5% of hunter/gatherers

are food insecure versus a 36.4% of adults who do not participate in hunting and gathering activities throughout the year.

Traditional Foods Shared with the Household

According to traditional food sharing results, a total of 515 adults receive traditional foods 'often', for a total of 20.0%. A total of 1612 adults report receiving traditional foods 'sometimes 62.0%, while 484 of 'never' report never receiving traditional foods (19.0%).

Psycho-Social Health

A total of 39.5% of the respondents indicate that their health is 'Excellent/Very Good,' while 60.5% report health as 'Good/Fair/Poor.' In terms of 'feeling in balance,' 52.9% feel in balance in "All Aspects," while 25.9% 'feel in balance in "1, 2 or 3 Aspects" and 21.2% do not feel in balance in any aspect. A greater percentage (63.7%) of First Nation adults describe life as a whole as "Not being very stressful/ Not at all stressful," while 36.3% describe their life circumstances as "Very stressful/Fairly stressful." Feeling "Sad/blue/depressed for 2 weeks or more last year" was reported by 31.6% of adults, as opposed to the 68.4% who did not experience depressive symptoms during the 12 months prior to the survey. The majority of First Nation adults do not experience intense anxiety (88.4%), while a small percentage report anxiety in their lives (11.6%). A great majority of the participants (69.3%) did not report family arguments within the home as a problem, while 23.2% reported it as a minor problem, and 7.4% reported it as a major problem.

Bivariate Analysis

Food Insecurity by Socio-Demographic Variables

This section includes findings related to the prevalence of food insecurity by socio-demographic variables within the adult First Nations population. Significant associations between

food insecurity and select socio-demographic variables and psycho-social health are also presented.

Food Insecurity by Age

Food insecurity in the First Nations population is most prevalent among middle-aged adults, ages 35-54 at 38.9%, while the prevalence of food insecurity among young adults, ages 18-34 years is slightly lower at 37.0%. Older adults, age 55+ are the least food insecure group within the population, and 32.3% are shown to be food insecure. There are no significant differences in food insecurity prevalence between the age groups, at the p=.05 level, X^2= 5.426 (p=.066). (Table. 1)

The between gender analysis of the MFNRLHS data reveals few significant associations between gender and age as a demographic variable. However, in the select age categories a significant difference is present in the prevalence of food insecurity by gender. There are significant differences between middle-aged women and men, an age group where 41.7% of men are food insecure versus 35.9% of women, X^2= 4.405 (p=.036) (Table 2).

Within-gender, differences in food insecurity status by age group are evident for male respondents, but not females. Surprisingly, non-significance is present in the female segment of the population, where the prevalence of food insecurity varies minimally between age groups. While the results for food insecurity among women is X^2=4.714 (.095) (Table 3), for men the X^2 values are 7.312 (.026)

Food Insecurity by Marital Status

Thirty-six percent of those in married/common-law relationships are food insecure (n=514) compared to the prevalence of food insecurity in single/never married adults (38.8%). The bivariate analysis of food insecurity by marital status does not reveal a significant

relationship. There was little difference between separated/divorced/widowed adults (36.0%), married/common-law couples (36.2%) or single adults (38.8%), (X^2=2.083, p=.353). (Table 1). As well, there was no significant relationship in the prevalence of food insecurity and marital status between men and women, or within-gender (Table 2 & 3).

Food Insecurity by Household Type

The Chi-square analysis reveals that there is a significant relationship between food insecurity and household type at p=.05 level (X^2=8.122, p=.044) (Table 1).While a relatively small percentage of the population identify as living in a lone-care giver setting, food insecurity is greatest within lone caregiver households, where 42% experience food insecurity. The second highest prevalence of food insecurity is present among single adults (39.1%), followed by respondents living in households with two adults and children (37.1%) and then by individuals living in households with two adults and no children (32.5%), suggesting that there is an advantage for those living in a household as two adults without children.

In table 2, it is apparent that women and men in lone-parent dwellings experience food insecurity, however, the prevalence is greater among male lone-parent headed households. While fewer in number, 57.1% of male-led lone-parent households on-reserve are food insecure, versus the 37.6% of food insecure lone-female households. The relationship between food insecurity by lone-parent status is significant at X^2=7.652 (p=.006). The highest prevalence of food insecurity for women is in couple-led households with children (38.6%). Within-gender, there is also a significant association between food insecurity and household type. While the relationship between food insecurity among men is strong, non-significant results among females are present. A total of 57.1% of lone-parent males report a lack of adequate foods, as do single men (40.7%), men in dual parent settings (35.3%) and men living with a partner without children (35.1%). The Chi-square value for the within-gender analysis for men is X^2= 13.3012 (p=.005). For women, the

presence of food insecurity exists almost equally by household type, with the exception of couple-led households with no children. Women in these households exhibit the least food insecurity (29.3%). There is no a significant relationship present for women by household type, X^2=7.265 (.064).

Food Insecurity by Household Income

There are significant differences in food insecurity, particularly in relation to increasing household income. The prevalence of food insecurity in the lowest income category (<$10,000) (59.2%) is significantly greater than in middle income earners ($10,000-$29,999) (43.7%) and nearly triple than the highest income category ($30,000 and over) (20.4%) (102.554, p=.000). (See Table 1).

As noted, 57.6% (n= 1371) of the respondents refused to answer questions related to income, or did not know their total household income. This amounts to 26.3% of the sample population not knowing their income (n=626), and food insecurity is present in 36.3% of these adults. Nearly one-third of respondents (31.3%) refused to answer questions related to 'Total Household Income (n=745). A total of (33.7%) of these adults are food insecure. There are no significant associations between food insecurity and any level of reported total household income (Table 2). Within-gender, there are dramatic decreases in the prevalence of food insecurity demonstrated equally among men and women by income category. Food insecurity is present among 61.1% of men with incomes below $10,000, which is reduced considerably among those with incomes of $30,000 or greater. The food insecurity among women, which is 56.2% among the lowest income earners, falls to a similar 20.6% among the $30,000+ income category (Table 3).

Food Insecurity by Number of Incomes per Household

An analysis of the number of incomes per household and food insecurity was undertaken to better understand food insecurity within single and multiple income settings. Although there are few households that report having no income (n=49), over half of these households (55.1%) experience food insecurity. Forty-one percent of respondents who live in that rely on one income source are food insecure. Food insecurity is the least common among households with two incomes (28.5%). The occurrence of food insecurity, however, increases in households with three or more incomes (31.5%). The Chi-square value of 49.854 and (p-value =.000) is evidence of a significant relationship between food insecurity by number of income earners in the household. (Table 1).

The between-gender analysis indicates that no significant relationships exist between food insecurity prevalence and number of incomes. However, food insecurity status within-gender was a slightly less for individuals with a greater number of income within the home. Food insecurity is extremely high among men and women without any income source (52.9% and 60%). For men and women, respectively, food insecurity was less among those with one household income (41.5% and 40.6%) and even more so among those with 2 incomes (29.8% and 27.9%) (Table 2). Both men and women report increases in food insecurity with 3 or greater incomes (30.1% and 26.8%). The association between food insecurity and number of incomes per household is evident within male and female participants, with Chi-square values of 20.602 (p=.000) for men and 27.142 (p=.000) for women. (Table 3).

Food Insecurity by Income Dynamic

Income dynamic, which is comprised of employment status (‘currently working’ versus ‘unemployed’) and income source (‘paid employment’ versus ‘government assistance’) by food insecurity yielded significant differences, X^2 value = 40.322, (p=.000) (Table 1). There is greater

food insecurity among individuals who were unemployed and received government assistance in two year period. Food insecurity among those currently employed and with income over a two-year period is 28.1%, while food insecurity among individuals currently employed and with government supplement over a two- year period is much greater at 36.4%. For individuals currently unemployed with either income or government supplement over a two year period, the prevalence of food insecurity was higher at 41.7%. This disparity was more apparent (43.1%) for individuals who are unemployed over a two-year period on a government supplement or with no other income source. These results document the importance of employment, and income stability over time, and the direct relationship that these economic factors have with food insecurity.

In the between-gender analysis, there are no significant associations between food insecurity and employment status /income source by gender. The prevalence of food insecurity is similar for both men and women at each level of employment status /income source (See Table 2). Within-gender, the prevalence of food insecurity is greater among men and women who have experienced greater unemployment and income via government supplement; a pattern similar to those in the overall analysis. These results indicate that for both men (X^2=19.222, p=.000) and women (X^2=22.564, p=.000) the relationship between food insecurity status and the duration of employment and type of income is very strong and that more men and women with stable employment opportunities have food security (Table 3).

Food Insecurity by Geography

Food Insecurity and North/South Community Location

With a total of 519 food insecure respondents in the northern region (n= 1363) and 546 food insecure individuals in the south (n= 1498), the percent food insecure in northern Manitoba First Nations is significantly more than those living in southern First Nation communities (51.4% versus 29.4%). Food insecurity differences present between in northern and southern region First

Nations are strongly significant(X^2 = 134.734, p=.000) (Table 4). Between-gender, there are no significant differences in the food security status of individuals living in a northern region (X^2=.013, p=.910) versus a southern region (X^2= 0.483, p=.487). (Table 5). The within-gender analysis reveals significant food insecurity differences between individuals living in northern versus southern regions. A total of 51.6% males living in northern First Nation communities experience food insecurity, versus 30.3% in the south (X^2= 60.960, p=.000). The prevalence is very similar among females, where 51.3% of northern women experience lack of food, versus 28.8% in southern communities (X^2=73.623, p=.000). (See Table 6).

Food Insecurity by Remoteness Index

There are very strong significant differences in food insecurity based on remoteness. X^2= 131.035 (p=.000) (Table 4). The greatest food insecurity is experienced among adults in remote communities, where 60.4% of adult in communities accessible only by air, rail or boat are food insecure. Food insecurity is considerably less among adults living within 50km of the nearest service centre, where 36.6% of adults are food insecure. Food insecurity is the lowest (31.7%) in semi-remote regions, or those 50-350km to nearest service centre.

The between-gender analysis of food insecurity by remoteness indicates that food insecurity does not differ between men and women within each of the remoteness regions. However, within-gender the relationship between food insecurity and community remoteness is strong, as in the overall analysis. Food insecurity prevalence differs significantly by remoteness index for males (X^2=61.663, p=.000) and females (X^2=72.839, p=.000) (Table 5). Within-gender, the remoteness of the community has also accounted for differences for both men, X^2= 60.518 (.000) and women, X^2=70.581 (.000) (Table 6) in terms of food insecurity.

Food Insecurity by Hunting & Gathering

Although, adult hunter/gatherers as a group are slightly more food insecure, significant differences in food insecurity status by hunter/gatherer designation are not evident in this study (X^2=.399, p=.528). (See Table 4).

From a gender perspective, there are no apparent differences in food insecurity between men and women who hunt/gather within a 12 month period (37.8%, and 37.2%), respectively (X^2 = .080, p=.777). Similarly, no significant relationships are present between food insecurity among non-hunter/gatherer men (37.4%) and women (35.7%) (X^2=.318, p=.573) (Table 5). Within-gender, food insecurity prevalence doesn't vary by hunter/gathering practice among men (X^2=.023, p=0.880), nor does it differ by hunter/gather status among women X^2=.347 (p=.556) (Table 6).

Food Insecurity by Traditional Food Sharing

There is no a significant relationship between food insecurity prevalence and frequency of traditional foods shared with the household. Food insecurity occurs among adults receiving traditional foods frequently throughout the year (37.9%), followed by those receiving traditional foods as a gift 'sometimes' (37.7%), and somewhat less among those 'never' receiving traditional food stuffs (32.9%), non-significance is illustrated at X^2= 4.002, (p=.135) (Table 4). Between men and women, food insecurity levels do not differ significantly. While 41.6% of men report 'often,' receiving traditional foods, the 34.7% of women experiencing food insecurity and receiving traditional foods 'often' is not substantially different (X^2= 2.620, p=.106). Food insecurity, while a bit lower, is equally present among men and women receiving traditional foods 'sometimes' throughout the year, with no significant differences evident (X^2= .002, p=.962) (Table 5). Food insecurity is slightly lower among both females (30.7%) and males (35.1%) that report 'never' receive traditional foods compared to men (X^2=1.037, p=.309). Within-gender,

there is no significant relationship between food insecurity frequency of food sharing within the male and female categories (Table 6).

Food Insecurity and Psycho-Social Health

Food Insecurity by Self-Reported Health

There is a notable difference in food insecurity status by self-reported health in the study sample. Thirty-one percent of individuals with 'excellent/very good' reported food insecurity, while 40.9 % of individuals reporting 'good/fair/poor' health were food insecure. These differences are significant at $X^2 = 27.752$ (p=.000) (Table 7).

Of equal interest are the gender differences in food insecurity by self-reported health. The prevalence of food insecurity among adults reporting 'excellent/very good' health is significantly greater among men (34%) than women (27.9%). These results show a relationship between health status and food insecurity, while illustrating a gender difference (X^2=4.814, p=.028). In contrast, a positive relationship between food insecurity and poor self-reported health between genders does not exist. Food insecurity among those with 'good, fair, or poor' health is shown to be equal among men (40.8%) and women (40.9%), (X^2=.005, p=.942) (Table 8).The within-gender analysis yields significant results for both men and women. Food insecurity is higher with poorer health status for both men and women; with greater food insecurity differences present among females X^2 =25.084 (.000) than men (X^2= 6.494, p=.011). (See Table 9).

Food Insecurity by 'Feeling in Balance' Measure

Individuals who report greater balance in their lives was more food secure. The prevalence of food insecurity is greatest among those individuals who report almost 'almost never feeling in balance' in the four aspects of health (48.1%). The prevalence decreases to 39.7% among adults who experience between 1 to 3 aspects of wellbeing, and improves again amongst adults who 'feel in balance' in all four aspects (emotional, mental, physical and spiritual)

(31.5%). The relationship between food insecurity and holistic health is significant and very strong (X^2= 53.579, p=.000) (Table 7).

Differences in the prevalence of food insecurity only exist between gender among those experiencing 'all 4 aspects of balance,' or overall wellness (physical, emotional, mental, spiritual). A total of 34.5% of males who are 'in balance' in all four aspects of health are food insecure versus 28.4% of women 'in balance.' The results are significant, with a Chi-square value of 6.489 (p=.011). Food insecurity is similar among men and women experiencing one to three aspects of balance (X^2= .447, p=.504), or no life balance (X^2 =.111, p=.739) (Table 8). The significance of the within-gender results are similar to the overall food insecurity results. Within the male segment of the population, food insecurity prevalence differs by level of 'balance' (X^2= 13.599, p=.001). The significance of the results in the within-female analysis are also strong, with an X^2 = 46.147 (p=.000) (Table 9).

Food Insecurity by Stress

Of the individuals who describe their lives as being 'very stressful/fairly stressful,' 48.7% are food insecure. These results are significantly different from those who describe their lives as 'not very stressful/not at all stressful' in that only 29.8% of these individuals are food insecure. The significant differences are very strong at a Chi-square value of 89.235 (p=.000) (Table 7). The prevalence of food insecurity between women and men only differs significantly among individuals with minimal stress in their lives, with men exhibiting greater food insecurity than women (32.2% vs. 27.2%) (X^2= 4.813, p=.028). Alternatively, significant food insecurity between men and women with high levels of personal stress – or those who experience 'very or fairly stressful' lives do not exist (X^2=.681, p=.409) (Table 8). The within-gender analysis reveals that males with elevated stress have significantly more food insecurity than those without stress filled lives 48.3% versus 30.6% (X^2= 30.014, p=.000). Women with a stressful life (47.3%) are

also significantly more likely to be food insecure, compared to those who feel less stressed (26.7%) (X^2=64.586, p=.000) (Table 9).

Food Insecurity by Depression

Food insecurity is experienced by nearly half of all individuals feeling sad, blue or depressed (47.8%) versus 29.9% without depressive symptoms. A strong significant relationship between depression and food insecurity was found at X^2 =79.940 (p=.000) (Table 7). Food insecurity is nearly equal among men and women, with 49.1% of men and 47.1% of women who feel 'sad/blue' are also food insecure. No significant differences were found (X^2=.325, p=.568). Slightly lower but similar reporting of food insecurity are present for those who did not report depression, with 31.7% food insecure men and 28.2% food insecure women (X^2= 2.667, p=.102) (Table 8). Within-gender, there is higher food insecurity among men reporting depression (51.7%) versus those who do not (29.2%) (X^2=31.600, p=.000). A similar difference is reported by women with depression (46.7%) compared to those without (26.8%) (X^2=50.862, p=.000) (Table 9).

Food Insecurity by Intense Anxiety

Although intense anxiety is experienced by a smaller percentage of the First Nations population (11.6%), there is a greater occurrence of food insecurity among individuals experiencing anxiety attacks (45.1%) versus those without anxiety (36.0%) (X^2= 10.179, p=.001) (Table 7). The between-gender analysis reveals that significant differences in food insecurity are not present for adults without anxiety (36.7% vs. 35.2%), X^2= .554 (.457). Food insecurity, while being far greater for men and women who suffer from anxiety, significant associations are not present by gender (X^2=2.345, p=.126) (Table 8). Within males, the relationship between food insecurity and anxiety is shown to be significant. A total of 51.6% of men with anxiety are food insecure, compared to the 36.7% food insecure who do not experience anxiety (X^2=8.188;

p=.004). The relationship is significant for women, although less so, with a 42.2% of food insecurity among those with anxiety versus those without anxiety (35.2%) (X^2=3.997 p=.046) (Table 9).

Food Insecurity by Domestic Dispute

Within households that report family arguments as a major problem, food insecurity is high at 62.0%. There is a noticeable drop in food insecurity reporting among individuals where family discord is a minor problem (46.3%). Food insecurity is present to a lesser extent where family arguments are 'not problematic' (30.9%). These differences in food insecurity status by domestic dispute are very significant (X^2= 108.503, p-value=.000) (Table 7).

The between-gender analysis shows that food insecurity does not differ significantly at each level of domestic dispute. Food insecurity is equally high among men and women reporting high levels of domestic dispute (65.0% vs. 59.7%), X^2=.583, (p=445). A total of 44.6% of men citing domestic dispute as a minor problem are food insecure, compared to a slightly higher prevalence women (47%) (X^2=.567, p=.452). While food insecurity is less both among men and women who report that family arguments are not a problem (32.7% vs. 29.2%), gender differences are not significant (X2=2.77, p=.096) (Table 8). The within-gender analysis shows that the problem of food insecurity is significantly less prevalent among individuals who come from households with fewer family arguments. In short, the relationship between food insecurity and family dispute is very strong and significant among both women and men (X^2=44.609, p=.000) and among women (X^2=62.893, p=.000) (Table 9).

Chapter 5: Discussion and Conclusions

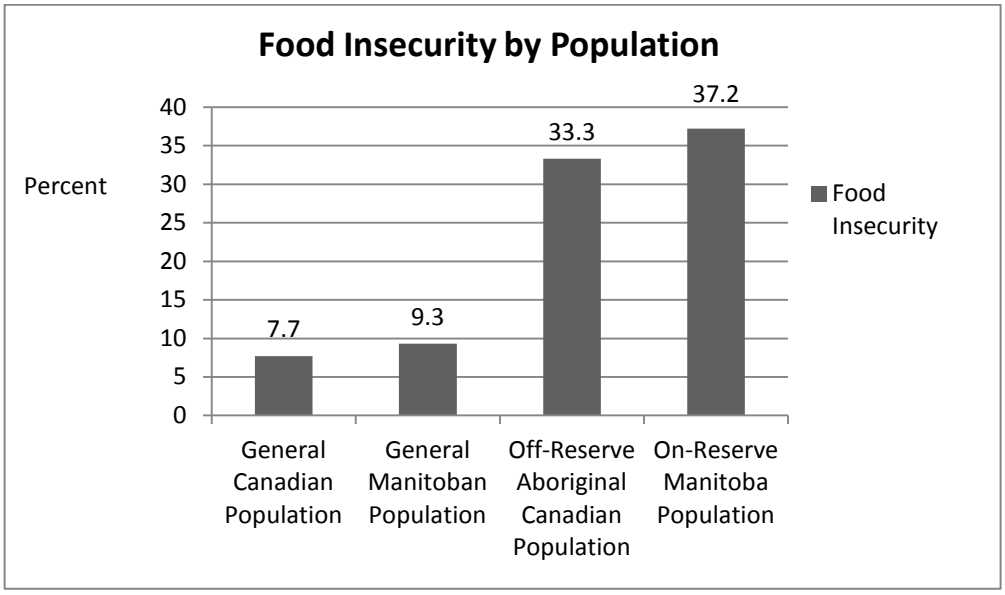
This is the first study to report food insecurity for the On-Reserve Manitoba First Nations population using a composite measure of food insecurity, and demonstrates important demographic differences, as well as relationships between food insecurity and psycho-social health. This study also illustrates an alarming prevalence of food insecurity in the On-Reserve adult population and gender differences were apparent. While this study was not a comparative study (First Nation and all other Manitobans), it showed the high rates of food insecurity in First Nations On-Reserve communities, which appears to exceed that experienced in the general Manitoban and Canadian population. As expected, food insecurity is higher in remote communities. The statistically significant relationships between food insecurity and self-reported health, feeling in balance, and some measures of psycho-social health are also revealing. There are higher levels of food insecurity among on-reserve First Nations adults with several aspects of poor self-reported health compared to those in good health, suggesting that bold, food policies and culturally sensitive food insecurity initiatives are required to ensure the health of all community members, and especially the individuals in greatest need.

Prevalence of Food Insecurity

Food insecurity is recognized as a public health concern in Canada. Food insecurity monitoring in on-reserve populations, although in its early stages, is an integral component of self-governance. This research provides important information on the social determinants of food insecurity, and important relationships between food insecurity, general well-being and measures of psychological and social health. The study findings provide an opportunity for First Nations to investigate the characteristics of food insecurity in the general population and the off-reserve Aboriginal populations in Canada using the CCHS database (CCHS 1.1, 2001; CCHS 2.2, 2004; 4.1, 2007). Figure 2.0 illustrates the potential for such research. This study documents that the overall prevalence (37.2%) food insecurity in the adult Manitoba On-Reserve population is nearly

five times the food insecurity found in the general Canadian population (7.7%) and four times that of province-wide food insecurity (9.3%) (CCHS 4.1, 2007). This study also showed how northern and southern First Nations can compare levels of food insecurity, which also exceed that of the general Canadian population exist.

Figure 2: Food Insecurity in the Adult, On-Reserve First Nations population, Manitoba general Population, Off-Reserve Aboriginal Population and General Canadian Population (CCHS 4.1, 2007).



By undertaking this study and reporting the prevalence estimates by On-Reserve and then by region, it is apparent that continued studies could be important to determine if food insecurity is decreasing at the population level. Three waves of Canadian Community Health Survey indicate that food insecurity is decreasing in the general population (14.7% in 2001, 9.2% in 2004, and to 7.7% in 2007) (CCHS 1.1, 2001; CCHS 2.2, 2004; 4.1, 2007). While this study shows some evidence that there may be greater food insecurity on-reserve than for off-reserve Aboriginal households, based on the CCHS 2.2; 2004 (33.3%) and CCHS 4.1; 2007 (20.9%), the comparison is not based on the same survey or period of time.

Food Insecurity and Social Demographics

There are significant relationships between food insecurity and select demographic variables, which is important data for First Nations communities and policy makers who are interested in improving food security in the on-reserve population as a whole, and more specifically among community members identified as those in greatest need.

The analysis of food insecurity by age reveals that there are marginally significant differences in food insecurity by the select age categories and the composite food insecurity measure. Food insecurity in the Manitoba On-Reserve population follows the age pattern in the NPHS and other epidemiological studies. The general pattern reported by Che & Chen (2001) from the NPHS 1999 data shows a reduction in food insecurity with increasing age. Similarly, other epidemiological studies indicate that food insecurity is lowest among adults ages 55+ (Che & Chen, 2001; McIntyre et al., 2002; Pheley et al., 2002; Tarasuk et al., 2007). Thus, the lower level of food insecurity among older First Nation adults is expected, and may be explained by a number of social and economic factors. These include a greater reliance on social networks comprised of family, friends, and neighbours and spiritual or religious affiliations. Older First Nations may have greater security due to public pension programs such as the Canadian Pension Plan and Old Age Security, which for many is their major source of income (Green et al., 2008). These factors may aid in reducing food insecurity among older adults that face greater risk of physical and emotional illness and limited abilities to access and prepare foods (Ledrou and Gervais, 2005). Other researchers suggest that the lower prevalence of food insecurity among the elderly may be due to the way that food insecurity is defined, measured and interpreted by members of this age group (Wolfe et al., 2003).

With regard to food insecurity and gender differences, it should be noted that there are few detectable differences, with the exception of middle-age and lone-parent status. The finding of

greater prevalence of food insecurity among middle-aged males is contrary to the epidemiological research, to date. Several food insufficiency studies have shown that food insecurity is greater among women than men (Gucciardi et al., 2009; CCHS 4.1, 2007; Carter et al., 2011), and one study by Starkey and Colleagues (1998) reported a greater prevalence among younger men. Further research will help clarify relationships between food insecurity, gender and age. Nevertheless, the gender differences recorded in this study are important as they are the first to confirm elevated food insecurity among First Nations women and document severe food insecurity among middle-aged First Nations men, who are often excluded from food insecurity research. The analysis of food insecurity within-gender and by age is also of interest, in that, significant food insecurity differences are present for men, but not for women. Food insecurity prevalence varies considerably by age among males, with a striking peak among the middle-aged. Significant associations between food insecurity and age are not shown for women, and a different pattern in food insecurity is present. Food insecurity is greatest among younger females and gradually decreases with age. The pattern of food insecurity by age among First Nations women is similar to the Che & Chen (2001) epidemiological study, but differs from the study by Tarasuk and Colleagues (2007), which illustrates increased food insecurity among middle-aged women. As discussed by Ahuwalia and Colleagues (1998), there could be social isolation and economic hardships that are experienced among low-income families, particulary under the age of 55 years. While previous research illustrates that both men and women limit caloric consumption, express a loss of dignity and reluctance to utilize food resources, men may be more likely to have smaller support networks and have fewer food management skills such as borrowing from family and friends for the purpose of acquiring food, comparison shopping and altering meal preparation methods (Hamlin, 1999; Dietitians of Canada, 2005).

In the study, it was also demonstrated that food insecurity varies by household type (number of adults and children per household), and such data is critical to the successful funding

and planning of community-based food and nutrition programs. Limited food access is highest among lone-parents, and 42% of these households are food insecure. Elevated levels of food insecurity in lone-parent households are also shown in numerous epidemiological studies exploring relationships between food insecurity and household type (Che & Chen, 2001; Ledrou and Gervais, 2005; Kaiser et al., 2007; Willows et al., 2009; Kirkpatrick & Tarasuk, 2011). Although, the majority of studies indicate that low-income, lone-parent women exhibit greater food insecurity as a sub-group, this study contrasts these findings. Lone-parent men, although, fewer in number, are shown to experience greater food struggles on-reserve. Thus, particular attention should be paid to lone-parent men and women, especially those experiencing recent separation, as these individuals may have reduced economic and social support and therefore, a limited capacity to cope with food access issues (Che & Chen, 2001; Hanson et al., 2007). The food insecurity among single adults in the on-reserve population is also highlighted as a household type of concern. The 39.1% food insecurity among single adults may be due to the prioritization of financial resources to other areas during life transition phases for young or mid-life adults, as indicated by Ledrou & Gervais (2005) and Hanson and Colleagues (2007). In the this study, the lower food insecurity among couples without and with children are similar to those in all three waves of the CCHS (CCHS 1.1, 2001; CCHS 2.2, 2004; CCHS 4.1, 2007). It is posited that couples are more likely to have greater discretionary income and may have the benefit of familial pressures as additional motivating factors influencing food access and preparation, which could improve food security status overall (Che & Chen, 2001; Hanson et al., 2007).

An analysis of food insecurity and the number of *incomes per household* was also undertaken to understand the relationship between food access in single and multiple income settings. Significant food insecurity differences are shown to be present. An overview of food insecurity among those with no source of income, and those with multiple forms (1, 2 and 3+) of

adult income earners reveals an expected decrease in households with of additional incomes into. However, Vahabi and Colleagues (2011) indicate that the highly significant association is between greater *total household income* `and the occurrence of food insecurity, versus number of incomes within the home.

In this study, an evaluation of food insecurity by household income level also shows that there are extreme levels of food insecurity among low-income households, and that the prevalence of food insufficiencies is significantly reduced with improved access to monetary resources. While few in number (n=49), 59.2% of adults live with less than $10,000 annually and experience food insecurity. These finding are problematic, as hunger, a severe form of food insecurity, is common among households with such dire economic circumstances (Vahabi et al., 2011). According to this study, food insecurity is lower in households with greater income and is substantially better in households with incomes of $30,000 plus. These differences are important when compared with the CCHS 2.2 as reported by Health Canada (2004), wherein the most significant drop in food insecurity are also observed as households move to lower to middle-incomes of $15,000-$39,999, and greater. A very noticeable decline in food insecurity is also present in studies, as noted earlier, using the NPHS 1998/1999 data, where a significant drop in food insufficiency occurs once household income increases to $18,064-$31,897. Once household income reaches this income bracket, food insecurity falls from 24.6% to 6.7%. These results provide significant evidence toward the need for improved economic development strategies and social assistance to ensure that all members of the on-reserve First Nations population are able to achieve the financial means required to obtain a healthy diet.

This study explored a relationship between food insecurity and employment status/income source, by way of an *income dynamic* measure. The strong, significant relationships found are consistent with several population health studies documenting greater levels of moderate to severe forms of food insecurity experienced by individuals supported in whole or in part, by

government supplements compared to those with paid employment alone (Kaiser et al., 2002; Vozoris and Tarasuk, 2002; Kaiser et al., 2007; CCHS, 2007/2008; Kirkpatrick & Tarasuk, 2011). This study shows the need for meaningful employment opportunities as a buffer for food insecurity. Indeed, although the unemployment rate on Manitoba reserves has improved from 30% to 27.4% over the span of the past decade (Statistics Canada Census, 1996), meaningful employment opportunities would significantly improve the general well-being and food security of Manitoba First Nations people (Manitoba Aboriginal and Northern Affairs, 2000). While current economic policies to counter the effects of low incomes and the higher costs of living in rural and remote regions, these policies can be insufficient to improving food problems in First Nations communities. This study demonstrates the importance of improving the living wage on-reserve, and shows a need for community economic development efforts to reduce food insecurity.

Food Insecurity and Geographic Location

In this study, the prevalence of food insecurity is shown to be significantly associated with geographic location. The food insecurity prevalence in southern First Nations communities is a new contribution to the scientific literature, while the extreme food insecurity present in remote regions is similar to those provided by INAC (2004) and Thompson and colleagues (2010). This study contributes to the evidence showing greater food inaccessibility, in both rural and remote on-reserve communities, where high levels of unemployment and poverty often exist (Morris et al., 1992; Holben et al., 2004; Champagne et al., 2007; Kropf et al., 2007; Thompson et al., 2010; Dean & Sharkey; 2011). A number of food barriers are related to economic deprivation, which are elevated in Manitoba First Nation communities compared to surrounding rural regions (Wilson and Macdonald, 2010). The cost of healthy foods in northern parts of the province versus the south have also been recorded with significant differences ($393 versus $233 per National Nutritious Food Basket) (p=.000), indicating that immediate attention is needed to

remedy the alarming food insufficiencies in northern communities (Thompson et al., 2010). This study shows that there is also a need for food security action in southern Manitoba First Nations, where high levels of food insecurity also co-exist with lower socio-economic circumstances. The distribution of food disadvantages by remoteness was also made apparent in this study. Individuals living in remote First Nations communities accessible by air, rail and boat and are all located in the north experience extremely high food insecurity, which is supported by the work of Thompson and Colleagues (2010). Although significant gender differences were anticipated, greater influence in food insecurity could be due to strong economic and geographic variables affecting food availability, food costs and social factors. Several studies, as noted below, illustrate the challenges these communities can face. Access to healthy foods have been shown to vary by the type of food store in several rural locations, and significant variation in the availability of healthy foods and food prices is evident between grocery stores, convenience stores and supermarkets (Morris et al., 1992; Liese et al., 2007). The presence of larger supermarkets versus small-scale grocery stores or convenience stores is dependent on multiple factors such as corporate marketing strategies and competition, small business perception of consumer demand and purchasing power, and transportation costs (Moore et al., 2006; Liese et al., 2007). Remote minority communities are less likely to have access to supermarkets which offer a greater selection of affordable, quality of produce and non-perishable foods (MacMillan, 1991; Moore and Diez Roux, 2006). Food stores in northern and remote communities face greater transportation challenges, including the elevated costs associated with frequent air transport versus the lengthier route of freight carriers or train (MacMillan, 1991). A descriptive analysis of National Nutritious Food Basket prices by Thompson and Colleagues (2010) confirms significant food price differences exist by both remoteness (remote: $418 versus non-remote: $302 per NNFB) and store type in Manitoba ($393: Northern Store versus $292:other chain) (p=.000).

Hunting Gathering, Traditional Food Sharing & Food Insecurity

While several studies by Canadian authors such as Kuhnlein & Receveur (1999), Lambden et al. (2007), Richmond & Ross (2008) indicate that traditional food intakes in First Nations are increasingly being substituted with the purchase of energy dense, low-nutrient market foods which are more available to rural and remote communities, this is the first epidemiological study to document relationships between hunting and gathering and food insecurity status in First Nations. Although, a greater proportion of First Nation adults are participating in hunting and gathering than those who do not hunt/gather (Elias et al., 2006), the prevalence of food insecurity is not shown to differ between groups of hunter/gatherers or non-hunter-gatherers, indicating that access to these culturally important acts do not alter the individual/household food insecurity at the population level. Thompson (2010), however, reports that existing country food programs in Nelson House Manitoba are related to reduced food insecurity in this northern community. A gender analysis also revealed that food insecurity does not differ between men and women by hunter/gatherer status. Further research on the availability and acquisition of traditional foods in Manitoba First Nations is required.

Traditional food sharing is also an important part of First Nation cultures, and this study showed that wild foods are being shared with the food insecure, who are, overall, in the minority when it comes to participating in hunting and gathering activities. Among the food insecure, the majority of individuals report receiving traditional foods 'often' or 'sometimes,' indicating that wild foods are being shared with those in need. However, approximately one-third of food insecure adults, however, are not receiving traditional foods. From a gender perspective, there are no significant differences in the prevalence of food insecurity by the frequency of sharing of traditional foods, although individuals with higher levels of food insecurity, especially males, receive culturally relevant foods often from other community members. Individuals not receiving traditional food may lie beyond the existing familial and social networks required to access food,

and the sharing of foods may be due to limited financial means of family, friends and extended members of the community (Lithman, 1992; Ahluwalia, 1998; Sinclaire, 1999).

Food Insecurity and Psycho-Social Health

The study results provide insight into how closely health is connected to the ability to acquire healthy, culturally and socially appropriate foods, and makes a unique contribution to the scientific literature. This is evident in the analysis of food insecurity and general self-reported health, 'feeling in balance' as a holistic viewpoint and unique contribution; and with regard to stress, depression, anxiety, and domestic dispute within the home. The documentation of strong associations between food insecurity and health status by gender in the on-reserve First Nations population is also a significant and contribution to the epidemiological literature.

The reporting of good/fair/poor health among food insecure First Nation adults is consistent with other food insecurity studies using self-reported health to assess associations with food insecurity (McIntyre et al., 2000; Che & Chen, 2001; Vozaris & Tarasuk, 2003; Siefert et al., 2004; Kaiser, 2007). A major contribution of this study is that it has reported for the first time that First Nation adults experiencing greater balance in their lives exhibit significantly less food insecurity than those reporting limited or no life balance, highlighting the important connection between 'wellness' in terms of physical, mental, emotional and spiritual health, and food security. This is the first quantitative study to document these important health relationships within a First Nations context and demonstrates perhaps areas of further research.

That being said, the process of colonization has exposed multiple generations of First Nations people to extreme levels of stress in the form of acculturation, segregation and marginalization; factors which contribute to elevated levels of stress within First Nation communities, and cannot be ignored when discussing present day food insecurity (Lang, 2001; Gould, 2004; Raschke & Cheema, 2007). This is the first epidemiological study to highlight the

significant relationships between stress experience and food insecurity in a First Nation population, living on-reserve population. The findings of this study are consistent with several studies documenting higher food insecurity among impoverished individuals with stressful life circumstances (Pheley et al., 2002; Vozaris & Tarasuk, 2003; Kaiser et al., 2007).

The co-existence of food insecurity and depression are important findings for this population, as depression is a mental health condition that is much higher among Aboriginal adults compared to the general population in Canada (Kirmayer 1993; Kirmayer 1994; MacMillan, 2008), with over 46.2% of Manitoba First Nations adults self-reporting feeling sad, blue or depressed for 2 weeks or more. In many qualitative studies, food insecurity is a demoralizing experience that can precipitate feelings of powerlessness, guilt, embarrassment, shame and psychological fatigue, which are elements of depression that can be disabling and interfere with daily functioning, including food procurement (Tarasuk & Maclean, 1990; Radimer et al., 1992; Hamelin et al., 2002; Chilton, 2007). The documented associations between food insecurity and depression in this study show a significant relationship, as is evident in other epidemiological studies by Pheley (2002), Vozoris & Tarasuk (2007), and Kaiser & Colleagues (2007).

Intense anxiety is also noted in several health studies as having an important influence on food insecurity (Che & Chen, 2001; Laraia, et al., 2006; Kaiser et al., 2007); in some cases nearly doubling the risk of food insecurity (Whitaker et al., 2006). While the number of adults in Manitoba First Nations with intense anxiety is relatively low over all, food insecurity is more prevalent among individuals experiencing anxiety. Thus, greater attention to implementing both mental health programming and food and nutrition initiatives that meet the specific needs of these community members is required.

Looking at social relationships within the home, family arguments are shown to be significantly associated with food insecurity. Other social research indicates that living within a chaotic family environment may affect social and psychological health, thus having the potential to limit the individual's ability to access adequate food stores for the home and changing individual food intake patterns (Corcoran et al., 1999; Siefert et al., 2001; Weinreb et al., 2002; Siefert et al., 2004). The effects of domestic disturbance, including psychological abuse are well described within the feminist and qualitative community nutrition literature (Ellis, 1983; Bellows, 2002; Power, 2006; Chilton and Booth, 2007).

The inclusion of a gender analysis to the study of food insecurity acknowledges the unique social and cultural influences to food access and dietary intake and aim to contribute to the improved development of gender appropriate programs, policies and future research in the area of food insecurity. In this study, the gender analysis of food insecurity by health status indicate that there are some interesting and significant differences in food insecurity present at the bivariate level. Specifically, gender differences in food insecurity do not exist among those with poorer health status, limited 'life balance,' elevated stress levels, anxiety, depression and major family arguments within the home. That is, women and men in poor health are both struggling to access and consume healthy foods. When general health, 'balance' and stress and domestic dispute are favorable, significant gender differences in food security appear. This suggests that poor health is a strongly associated with the presence of food insecurity at the individual and household level. These results have important implications in terms of food security programmatic design, and inclusion in the First Nations health & scientific literature.

Significance of the Research

Food Insecurity by Socio-demographic Variable

The proposed research is the first of its kind to report associations between food insecurity, socio-demographics and several aspects of psycho-social health in the Manitoba First Nations population. The inclusion of gender as a component of food insecurity research also represents important advances in the documentation of food insecurity. The combined food insecurity measurement used in this study is derived from components of the Radimer/Cornell measure and the USHFSSM, a gold standard of food insecurity measurement used for longitudinal analyses, the later being a preferred measure of food insecurity for epidemiological studies according to Health Canada (2007). As the five food insecurity questions in the MFNRLH 2002/2003 are also used in the CCHS, the food insufficiencies in First Nations communities can be compared with the general Canadian populations and the Off-Reserve Aboriginal populations.

These findings suggest that further age and gendered food security research is needed to ensure the inclusion of men and women with high food security needs, in the design of health promotion activities. The pattern of food insecurity in the adult First Nation population is similar to that of the general Canadian population in that middle-aged adults are the most food insecure, followed by younger adults (18-34 years of age). Older adults in both the on-reserve population and the general Canadian population both appear to be shielded from the detrimental effects of food insecurity. Of interest are the statistically significant differences in food insecurity among middle-aged First Nation men and women. A higher prevalence of food insecurity exists among First Nations men between the ages of 35-54 yrs compared to women of the same age, which contrasts much of the food insecurity epidemiological research to date (Che & Chen, 2001; Gucciardi et al., 2009; Carter et al., 2011). The high prevalence of both young and middle-aged women with children is also confirmed and can be used in the development of holistic food and family health initiatives.

This study also highlights the importance of economic policies to increase employment and rates of government assistance in Manitoba First Nations. Elevated levels of poverty continue to have detrimental effects on the food security and health status of First Nations, and this research provides evidence that food insecurity is not alleviated among some individuals utilizing current forms of government assistance. While, the Employment and Income Assistance (EIA) Program is available to low-income individuals and families on-reserve in order to alleviate the costs of basic amenities (including food costs), the price of food in both rural and isolated regions are extremely prohibitive and burdensome (Indian and Northern Affairs Canada, 2004; Wilson and Macdonald, 2010; Lozecznik, Klatt and Thompson, 2011). In Manitoba, on-reserve First Nations people are shown to earn less than half the median income of the general Canadian population, earning annual median incomes of $32, 574 on-reserves, compared to the median $61, 000 earned by the average Canadian. Providing further evidence that provincial and federal government economic policies are failing in efforts to improve the financial circumstances and quality of life (which includes food security) through meaningful employment for First Nations in Manitoba (Fernandez and Hudson, 2010). Furthermore, income supplementation through the Northern Food Allowance ranges from approximately $24 for single adults to $85 per month for two parent households with children (Government of Manitoba, 2005; Government of Manitoba, 2007). However, this policy does not appear to be an adequate solution to the food insecurity of First Nation people in northern regions given the extreme food access issues; and the impact of this policy on food insecurity in the on-reserve population is not known. The documentation of elevated food insecurity among unemployed individuals utilizing government aid in this study can be used in advocating for the improvement of economic conditions in Manitoba First Nations. Increasing the level of EIA and social assistance available to First Nations in northern communities is one potential avenue to reducing food insecurity on reserve (Thompson, 2010). In order to improve economic circumstances in First Nations, greater control over natural resources and business development; particularly those related to sustainable food systems, such as

community gardens, greenhouses and the marketing of local wild foods are important steps toward reducing poverty, inequality and the food insecurity that exists due to structural limitations (Thompson et al., 2010; Lozecznik, Klatt and Thompson, 2011).

Geographic context is also shown to be an important factor in elevating the prevalence of food insecurity in Manitoba First Nations. Again, it must be noted that food insecurity is alarmingly high in both southern and northern regions, and that there is a critical need to address food insecurity levels province-wide. The reporting of food insecurity data for all First Nations is critical to addressing the public health crisis from a population perspective. The results clearly demonstrate that food insecurity in southern First Nations is nearly three times the prevalence of the general population, while northern food insecurity is a striking eight times the prevalence of the general Canadian population, data which historically has not been available for community health policy planning and continued monitoring. Greater focus on improving the availability of safe, healthy foods in grocery and convenience stores via education and/or First Nation directed policy is warranted. Lee (1996), and Song and Colleagues (2009) indicate that nutrition intervention at the level of small-scale grocers can be successful in improving food stocking patterns and purchase of healthy foods. The results also support the need for improvements to the Food Mail program - a joint effort of Aboriginal Affairs and Northern Development Canada (AANDC), Canada Post, and Health Canada, which offers subsidized access to commercial foods via local stores, families with access to credit, social service providers and a limited number of school in 14 northern, remote communities in Manitoba. The recognition of the unique challenges of each community by region and remoteness is recommended when constructing further research and effective, multi-faceted food insecurity policy and initiatives in southern and northern Manitoba First Nations.

According to the MFNRLHS 2002/2003 results, there are fewer food insecure individuals take part in the hunting/gathering experience; and access to traditional foods may not be enough

to improve food insecurity for the following reason. Many First Nations face extensive costs associated with hunting and gathering, in terms of transportation, gun licensing and ammunition; thereby limiting their ability to take part in these traditional activities (Chan et al., 2006; Lambden et al., 2007). Sustainable food harvesting practices, which re-affirm connections to past generations, traditional knowledge, surrounding eco-systems, could have limit food insecurity and combined with other factors improve overall wellbeing (Hertlein, 1999, Wein et al., 1991; Gould, 2004; Kuhnlein et al., 2004). Sharing knowledge of traditional sharing and the role that the act of giving has in ensuring harmony in the community may improve access to food for those with limited social networks (Orchard, 2000). Efforts to include all community members in aspects of traditional food practices through community health promotion efforts in order to sustain traditions within communities should be prioritized to ensure those with limited social networks and individuals with identified needs are included in cultural activities and the receiving of traditional food gifts (Stroink and Nelson, 2009). Supporting the acquisition of traditional food for community events such as community feasts, Treaty Day celebrations, and intergenerational, holistic education at schools is important as a method of healing and improving physical, mental, emotional and spiritual health (Mundel & Chapman, 2010).

Food Insecurity by Psycho-Social Health

This study also reports on the less-often discussed issue of psycho-social health among First Nations living with food insecurity. The study confirms a greater prevalence of food insecurity among individuals with low levels of self-reported health, feeling less balanced in four aspects of life, and also among those with greater stress, depression, anxiety and domestic dispute- findings that are similar to other population-based food insecurity studies (Che & Chen, 2001; Pheley, 2002; Vozaris & Tarasuk, 2003; Siefert et al., 2004; Stuff et al., 2004; Laraia, et al., 2006; Kaiser et al., 2007). The study provides the basis for further dialogue on improving psycho-social health in conjunction with, and as part of holistic food security initiatives in Manitoba First

Nations. Thus, the inclusion and confirmation of these psycho-social health factors as having significant associations with food insecurity in Manitoba First nations has implications for future participatory research in the areas of economic and food security where a higher prevalence of emotional health issues are present (Elias et al., 2011). The research offers insight into the potential for future collaborations between health, social services and educators in order to provide much needed supports for individuals living with greater emotional health needs and to develop holistic food security initiatives with all members of the community in mind.

Gender & Food Insecurity Research

A closer examination of food insecurity using a gender lens provides evidence of some differences in the prevalence of food insecurity between men and women. A gender analysis enables discussion of the under-researched area of food insecurity among women *and* men. Of interest is the greater prevalence of food insecurity among males, who constitute approximately half of the adult population. Furthermore, the greater prevalence of food insecurity among lone-parent males - a family type which is fairly uncommon within the context of First Nations communities, is also of interest and is quantified for the first time in this study. Further qualitative research is required to better understand men's perspectives on food insecurity, and potential solutions. The data are important for the inclusion of men in the development of progressive, gender appropriate health education and food security initiatives at the community and individual/household level, as men have traditionally been involved in ensuring the food security of the household and the extended community through the fishing, hunting and trapping, as well as the recording of traditional teachings through oral storytelling, myths and legends (Hertlein, 1999). Feeding as an act of caring and an area of responsibility has been described by women in various cultural contexts via qualitative research (Fieldhouse, 1995, DeVault, 1997, Bellows, 2001), and food insecurity among low-income women is well documented in the epidemiological literature (McIntyre et al., 2000; Che & Chen, 2001; Tarasuk, 2001; Pheley et al., 2002; Vozaris

& Tarasuk, 2003; Siefert et al., 2004; Stuff et al., 2004; Kaiser et al., 2007). Greater support is required for women who strive to support their families and themselves under what are often difficult social and economic circumstances (Orchard, 2000, Neufeld-Tait, 2003). Within the context of Manitoba First Nations, this food security and gender research could be beneficial for further engaging First Nations from young to old. Overall, the documentation of food insecurity among women and men is useful for further epidemiological research and the promotion of women and men's unique contributions to food security as gender likely plays an important role developing solutions to the food crises in Manitoba First Nations.

Limitations of the Research

There are several limitations to this research study that are worthy of discussion. While, the design of the study, which includes the use of the Chi-Square statistical method, does enable documentation of descriptive food insecurity statistics; there are limits to the conclusions that can be drawn from the data. The chosen method of a Chi-square analysis does not provide information on causality; rather the results confirm the existence of significant relationships between food insecurity and several demographic variables as well as poorer general health status, limited experience of life balance, and poorer psycho-social functioning among Manitoba First Nations. Thus, the results provide little understanding of the very complex nature of the relationships influencing food insecurity, psycho-social health and overall wellbeing.

Further limitations exist in the food insecurity measure used in the survey and analysis. The food insecurity measure used in the MFNRLHS 2002/2003 is condensed to a 5-item scale comprised of the core aspects of food insecurity. Therefore, the food insecurity measure may not be directly comparable to the food insecurity rates provided in national population databases. It should also be noted the NPHS national health survey includes a Statistics Canada food insecurity measure, which also differs from the MFNRLHS and the CCHS. Thus, the use of different

measurement scales makes the monitoring and direct comparison of food insecurity between First Nations, Off-Reserve Aboriginal populations and the general Canadian Population a challenge (Kirkpatrick and Tarasuk, 2008).

There are also issues specific to income. With regard to household income, a large number of respondents reported 'don't know' or 'refused'. The number of individuals who did not disclose income represents over fifty percent (57.5%) of respondents. In terms of income measures, national health surveys use income quintiles, which are not used in this study, and are recommended for future research so that results can be compared with greater ease. With regard to the food insecurity measure, there may be overlap between social networks- a core element of the food insecurity and *traditional* food sharing. Furthermore, the question pertaining to hunting and gathering does not allow for differentiation between the two activities.

There are also notable limitations to the measures in the analysis of general and psycho-social health. For example, while the depression measure is self-reported for periods of 2 weeks or more over a 12 month period, it does not distinguish between levels of depression. Also, the measure used for domestic dispute is a unique contribution and not directly comparable with other epidemiological food insecurity studies that include physical forms of violence.

Future research

As there is limited epidemiological food insecurity research in First Nations, there is a need for future research pertaining to numerous areas of this food experience, including further quantitative food insecurity research including other potential determinants of food insecurity, policy evaluation, qualitative and traditional food research.

The pursuit of a more rigorous quantitative analysis (logic regression) would better elucidate the significance of each socio-demographic variable's influence on aspects of health in

the on-reserve First Nations population. In addition to the number of incomes per household, epidemiological and qualitative research including the total number of individuals per household and food insecurity could also be pursued. Issues of stress, overcrowding and barriers to healthy eating within the home could be included in future research.

Greater qualitative food insecurity research throughout the age continuum is also warranted to better understand the factors influencing food insecurity by age group in the on-reserve First Nations population (Wolfe, 2003). Socio-cultural factors, such as the familial support available to older adults in First Nations communities should be further explored as a possible explanation for reduced food insecurity in older age. Research identifying the need for home care and transportation services is required to ensure food security for individuals living with acute or chronic illness, those with mobility issues and few social networks. For example, research into food insecurity among those living with physical ailments such as diabetes and those living with disabilities is also warranted as elevated levels of co-morbidities exist within the on-reserve First Nations population (Elias, 2006; Bruce et al., 2011; Elias et al., 2011). A review of the health promotion literature and program evaluations will provide a better understanding of the learning requirements, as well as group and individual level support needed by male and female clients.

Greater research and evaluation of government food and economic policies that are in place to aid in the alleviation of poverty and food access issues in First Nations is needed to ensure that effective strategies are implemented (Epp, 2011). As dire economic circumstances are very strongly associated with food insecurity, a greater commitment to alleviating financial insecurities through improved government aid in southern, northern, remote regions, and in employment opportunities are necessary. Further research is required to determine if food policy level initiatives, such as Nutrition North Canada (formerly Food Mail Program) are available to all Manitoba First Nations communities in need and reaching families at all levels of socio-

economic status (INAC, 2004). An evaluation of the government policies that inhibit access to wild foods, food processing and clean drinking water in First Nations would not only benefit physical health, but contribute substantially to the social, cultural and economic wellbeing of community members.

Participatory Action Research (PAR) involving sustainable wild food harvesting, hunter's support programs and the infrastructure required for the preservation and sale of traditional foods may be central to maintaining and improving the uptake of wild foods in First Nations communities and should be further pursued (Thompson et al., 2010). Continued access to country foods is prerequisite to the distribution of traditional food distribution through kinship ties, extended social networks and community events. As access to and control of natural resources and improved food autonomy are inherent Indigenous rights, further participatory action research and political action are needed in order to maintain momentum in improving this aspect of holistic health in First Nations communities. Further participatory research and multi-disciplinary approaches could aid in better understanding how to improve access and funding for hunting/fishing, trapping and harvesting activities; in addition to advocating for access to clean drinking water, as a necessary dietary component, for all First Nations people. From a programmatic standpoint, Knowledge Translation could be used to aid in training of local health, nutrition and social service providers on the relationship between holistic health, psycho-social health and food insecurity; and to improve culturally relevant group and one-on-one food and nutrition learning sessions. The development and evaluation of gender appropriate food and nutrition programs, school nutrition education and life skills programming at the community-level is recommended to ensure access to all community members. Participatory research aiding in the development of culturally appropriate food and nutrition programs with local grocers could also be pursued. Lastly, using social capital research in conjunction with food security planning can

improve sustainable economic development and community health and greening opportunities in and between First Nations communities (Mignone, 2009; Thompson 2010).

In addition to improving community-level food access in First Nations communities, further qualitative research would be beneficial to understanding what specific health and social services and educational needs of individuals with health issues in order improve their ability to access foods for a healthy diet. Further knowledge of how coping with emotional health issues impact the quantity of foods accessed within the home, the quality of foods purchased, the repetitive nature of food consumption among individuals experiencing duress, the impact on one's ability to access foods through social networks and how psycho-social elements of health impact the experience of hunger. The current analysis of stress, depression, anxiety, domestic dispute and food insecurity, indicates that further research is warranted to better understand the forms of health, social strategies best aid in attenuating stress and improving the ability to access and consume the healthiest foods available. Emotional health is crucial to the overall wellbeing of Manitoba First Nations and further research that aims to improve psycho-social health is imperative to health progress (Elias et al., 2011). As there is greater use of food insecurity screening at the level of primary health care in urban settings the addition of a food insecure question at the time of intake and consultation could be used as an access point for referral to community food security programs (Fleegler et al., 2007; Kleinman et al., 2007). Future research on improving barriers to health services and the effectiveness of a one-item food insecurity measure in the primary health care in a First Nations setting could be pursued.

Conclusions

Within the context of Manitoba First Nations, a substantial portion of the adult population are faced with the burden of food insecurity while living under high levels of stress, and managing poor health which are largely due to the broad impacts of colonization, such as

acculturation, segregation and loss of autonomy (Iwasaki et al, 2004). This research documents the alarming food insecurity that is present in the on-reserve First Nations populations throughout the province of Manitoba, and draws greater attention to community members in great need of food insecurity interventions. The study highlights the strong association between income, geography and food insecurity. Limited employment opportunities and minimum incomes are currently contributing to primary poverty and preventing a great percentage of the population from accessing healthy foods. Any comprehensive strategies to improve food insecurity must include the creation of full-time, meaningful employment and improved levels of government assistance in order to see a rise in real incomes (Nolan et al., 2006). Broad forces of globalization are contributing to the greater access of cheaper, nutrient deplete foods, and act to diminish traditional food systems of First Nations communities (Koc & Dahlberg, 1999; Lang, 1998; Kuhnlein, 2004; Lang, 2005; Riches, 1997). The population food policies do not appear sufficient in addressing food insecurity in Manitoba First Nations. Further food policy initiatives developed with Manitoba First Nations are required to ensure that healthy food environments are created and sustained in these rural and remote settings. Social and psychological health of the individual should be given greater consideration when planning community-based food security interventions, in order to ensure all community members are able to benefit from effective food security programming. As there are elevated levels of stress and psycho-social health issues present in the adult population, greater attention and funding must be paid to address the food deprivation in First Nations communities, to improve mental health and wellbeing and support the development of decolonizing health promotion programs on reserve. Sharing the knowledge of food insecurity, feelings of balance and wellness can lead to the development of multi-faceted, community-specific food insecurity initiatives that promote the holistic benefits of healthy foods. The fostering of positive relationships between health, education, social service staff, and families may prove to be an important aspect to the implementation successful food security programs. Additional funding and participatory efforts that focus on training local health staff in

decolonizing forms of health promotion in order to celebrate the vital role of healthy market and traditional foods is vital to achieving and maintain good health for First Nations people (Bartlett et al., 2007; Mundel & Chapman, 2010).

In conclusion, effective strategies to improving food insecurity will likely include the immediate implementation of economic and food policies, multiple dimensions of health and wellness, community level food security programs and the promotion of nutritious foods at the individual level. Continued evaluation and funding of government economic policies, food policies and community-based food security efforts are required in order to ensure the development, sustainability and expansion of the initiatives in place in Manitoba First Nations communities.

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Appendix

Appendix A: Manitoba First Nations Regional Longitudinal Health Study Adult and Child Participant Information and Interview Consent Form

Assembly of Manitoba Chiefs

Study Copy

CENTRE *for* Aboriginal Health RESEARCH

Manitoba First Nations Regional Longitudinal Health Study

Joint Initiative of the Assembly of Manitoba Chiefs and the
Manitoba First Nations Centre for Aboriginal Health Research, University of Manitoba.

Adult and Child Participant Information and Interview Consent Form

STUDY TEAM

MFN-CAHR Principle Investigators: Brenda Elias, Associate Director (Research) and Dr. John O'Neil, Director

Regional Coordinator: Janet Longclaws, MFN-CAHR

Address: *Manitoba First Nations* Centre for Aboriginal Health Research
University of Manitoba
Dept. Community Health Sciences, Faculty of Medicine
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727 McDermot Avenue
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Ph: (204) 977-5600 Fax: (204) 975-7783

Manitoba First Nations Health Information and Research (HIR) Committee:

Doreen Sanderson, Policy Analyst-Health, Assembly of Manitoba Chiefs
Joseph Perch, Manitoba Keewatinowi Okimakanak
Gary Munroe, Cree Nation Tribal Health Centre
Emile Garson, Keewatin Tribal Council
Andy Wood, Island Lake Tribal Council
Larry Starr, Southeast Resource Development Council
Gloria Cameron, West Region Tribal Council
Ceceila Stevenson, Fisher River Health Centre
Tracy Scott, Anishinaabe Mino-Ayaawin Inc.
Jeannie Daniels, Dakota Ojibway Health Services
Mike Burdett, Norway House Cree Nation

Address: Assembly of Manitoba Chiefs
Health Information and Research Committee
200 – 260 St. Mary Avenue
Winnipeg, Manitoba R3C 0M6
Ph: (204) 956-0610 Fax (204) 956-2109

You are being asked to participate in a research study. Please take your time to review this consent form and discuss any questions you may have with the research study team or staff. You may take your time to make your decision about participating in this study and you may discuss it with your friends or family before you make your decision. This consent form may contain words that you do not understand. Please ask the community interviewer to explain any words or information that you do not clearly understand.

PURPOSE OF THE STUDY

The Manitoba First Nations Regional Longitudinal Health Study is a joint project of the Assembly of Manitoba Chiefs and the Manitoba First Nations Centre for Aboriginal Health Research at the University of Manitoba. This study is part of a larger national study being conducted by the National Aboriginal Health Organization in First Nation and Inuit communities throughout Canada. The objective of the survey is to develop a better understanding of the many important factors that determine the health of Manitoba First Nations' children, youth and adults. The areas covered in the study include health conditions, dental health, disabilities, general wellbeing, physical activity, health behaviors, non-insured health benefits, health service utilization, residential school issues, housing, environmental health, and other social factors related to health. Information from this study will help assist First Nation policy makers in improving the health of First Nations people through the development of health care programs and policies.

Study Copy

STUDY PROCEDURES

In this study, we will ask to interview you, which would involve asking you a number of questions on your health status, health behaviors, health service utilization, and other factors linked to health. The interviews will take place in the language of your choice. The interviews will be entered into a computer database. We would like to assure you that all information you provide in this interview will be kept strictly confidential and will only be used to create a general picture of health.

As part of this study, we will also seek your permission to link the interview information you provide to government health service utilization databases for the period of April 1985 to March 2020 for adults and to the date of birth for children participating in the survey. The purpose of this linkage is to develop a general picture of what determines health, the use of health care services, and the way doctors and hospitals provide health care to Manitoba First Nations' people. To link the interview information to the health service utilization databases, we will need your full name (First, Middle, and Last Name), address (including postal code), and your personal and family health numbers from your Manitoba Health card. This personal information will be kept separate from the interview data and the health service utilization data to ensure that you will not be identified in any way. We would like to assure you that all personal information you provide would be kept strictly confidential and the linked study information will only be used to develop a general picture of health and health services.

As part of this study, we will also ask you if you would like to be contacted at another time to participate in another wave of this survey and to participate in other research studies. This survey will take place over a twelve-month period (March 2002 to April 2003) and other studies will occur between the years 2003 and 2020. To assist us in contacting you at a later time, we will also ask you to provide your name, address, and phone number, as well as the name of a contact person who may be able to help us contact you in case you move or your telephone number changes. We would like to assure you that all personal information you provide would be kept strictly confidential. The identifying information you provide will be retained in a database from March 2002 to December 2020, which is the duration of the survey. At the conclusion of this project, in December 1, 2020, we will destroy all computer records containing your identifying information.

To ensure that you will not be identified in any way, your name, address, phone number(s), personal health information, and contact information will be kept separate from the interview data and the linked health service utilization database. Access to personal information will be restricted to investigators and research associates only and will be secured electronically and physically from public access. **No staff from First Nation organizations or communities will have direct access to your personal information.** The same confidentiality will apply if students and other researchers later use the data for a research project.

The interview is approximately one hour long. You can stop participating at any time. However, if you decide to stop participating in the study, we encourage you to talk to the research study staff first.

RISKS AND DISCOMFORTS

We will make every effort to make certain that there will be no way that people can identify you in the study. However, we cannot guarantee you absolute confidentiality.

COSTS

The study procedures are conducted at no cost to you. You will receive no direct payment, and you will not receive reimbursement for any expense related to taking part in this study.

BENEFITS

There may or may not be direct benefit to you from participating in this study. When the research is completed, it will help First Nation policy makers and program developers understand the many factors that determine the health of Manitoba First Nations' children, youth, and adults.

PAYMENTS FOR PARTICIPATION

You will receive no payment or reimbursement for any expenses related to taking part in this study.

CONFIDENTIALITY

Information gathered in this research study may be published or presented in public forums; however, your name or other identifying information will not be used or revealed. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law. The University of Manitoba Research Ethics Board may review records related to the study for quality assurance purposes.

VOLUNTARY PARTICIPATION/WITHDRAWAL FROM THE STUDY

Your decision to take part in this study is voluntary. You may refuse to participate or you may withdraw from the study at any time. Your decision not to participate or to withdraw from the study will not affect the health care you receive. If the research study-team and-staff feel that it is in your best interest to withdraw you from the study, they will remove you without your consent. We will also tell you about any new information that may affect your health, welfare, or willingness to stay in this study.

QUESTIONS

You are free to ask any questions that you may have about your rights as a research participant. If any questions come up during or after the study, contact the research team/staff, Brenda Elias from the Manitoba First Nations Centre for Aboriginal Health Research, University of Manitoba at (204) 789-3358.

For questions about your rights as a research participant, you may contact the University of Manitoba, Bannatyne Campus Research Ethics Board at (204) 789-3389.

Do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

STATEMENT OF CONSENT

Participant:

I have read this consent form. I have had the opportunity to discuss this research study with a staff member or investigator of the research study team. I have had my questions answered by them in the language I understand. The risk and benefits have been explained to me. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study. I understand that information regarding my personal identity will be kept confidential, but that confidentiality is not guaranteed.

I *(check)* ☐ **consent** to participate in the Manitoba First Nations Regional Longitudinal Health Study.

I *(check one only)* ☐ **consent** ☐ **do not consent** to having the information I provide in the survey linked to personal health information using the personal health number(s) provided.

I *(check one only)* ☐ **consent** ☐ **do not consent** to being contacted at a later time for other studies.

I *(check one only)* ☐ **consent** ☐ **do not consent** to providing the name, address, and phone number of contact people for the study team to contact in the event of a move or if a phone number changes.

I authorize the inspection of any of my records that relate to this study by the University of Manitoba Research Ethics Board for quality assurance purposes.

By signing this consent form, I have not waived any of the legal rights that I have as a participant in a research study.

Participant's Name (please print):	**Date Completed:**		
	Month	Day	Year
Participant's Signature:			

Consent from the parent or legal guardian and assent for participants who are under the age of twelve years:

By signing this consent form, I have not waived any of the legal rights that I have or the child as a participant in a research study.

Parent/Legal Guardian's Name (please print):	**Date Completed:**		
	Month	Day	Year
Parent/Legal Guardian's Signature:			

Research Staff

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believed that the participant has understood and has knowingly given their consent.

Printed Name:	**Date Completed:**		
	Month	Day	Year
Signature:			
Role in the Study:			

Appendix B: Health Research Ethics Board Approval

UNIVERSITY OF MANITOBA

BANNATYNE CAMPUS
Research Ethics Boards

P126-770 Bannatyne Avenue
Winnipeg, Manitoba
Canada R3E 0W3
Tel: (204) 789-3255
Fax: (204) 789-3414

APPROVAL FORM

Principal Investigator: Ms. N. Tonn
Supervisor: Dr. B. Elias

Ethics Reference Number: H2009:307
Date of Approval: October 15, 2009
Date of Expiry: October 15, 2010

Protocol Title: Food Insecurity and Self-Reported Psycho-Social Health Status: Results from the Manitoba First Nation Regional Longitudinal Health Survey (Linked to H2002:063)

The following is/are approved for use:

- Protocol, Version submitted October 6, 2009

The above underwent expedited review and was **approved as submitted** on October 15, 2009 by Dr. John Arnett, Ph.D., C. Psych., Health Research Ethics Board, Bannatyne Campus, University of Manitoba on behalf of the committee per your submission dated October 6, 2009. The Research Ethics Board is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement, and the applicable laws and regulations of Manitoba. The membership of this Research Ethics Board complies with the membership requirements for Research Ethics Boards defined in Division 5 of the *Food and Drug Regulations of Canada*.

This approval is valid for one year only. A study status report must be submitted annually and must accompany your request for re-approval. Any significant changes of the protocol and informed consent form should be reported to the Chair for consideration in advance of implementation of such changes. The REB must be notified regarding discontinuation or study closure.

This approval is for the ethics of human use only. For the logistics of performing the study, approval must be sought form the relevant institution, if required.

Sincerely yours,

John Arnett, Ph.D., C. Psych.
Chair, Health Research Ethics Board
Bannatyne Campus

Please quote the above Ethics Reference Number on all correspondence.
Inquiries should be directed to REB Secretary
Telephone: (204) 789-3255 / Fax: (204) 789-3414

Appendix C: Personal Background Information

Date of birth

___/___/___ ___ ___

Age Category

18-34 years 35-54 years 55+ years

Gender

Male Female

Present Marital Status

Married Common-law Separated

Divorced Widowed Single

Household Type: Number of People per Household

Number of children in Household

Number of adults in Household

Appendix D: Employment and Income

Are you currently working for pay?

1. Yes 2. No

During the year ending December 31, 2001, did you receive any income from the following sources?

A. Paid employment (wages or salary)

1. Yes 2.No 3. Don't know 4. Refused

D. Social Assistance

1. Yes 2.No 3. Don't know 4. Refused

For the year ending December 31, 2001, please think of the total income, <u>for all household members,</u> including yourself, before deductions, from <u>all</u> sources. Please look at these categories and tell me which range it falls into. Choose only <u>one</u> category.

< $10,000

$10,000 - $29,000

$30,000 and over

Refused

Including yourself, how many household members received income from any source for the year ending December 31, 2001.

__ __ Number with any income.

Appendix E: Geographic Categories

Remote:

1. Within 50 Km, 2
2. Between 50 km-350 Km
3. Air/rail/boat access only

Geographic Location

1. Northern First Nation
2. Southern First Nation

Appendix F: Traditional Food Use Questions

Do you hunt, trap, fish, pick wild rice, or pick berries?

1. Yes 2. No 3. Refused

In the past 12 months, how often did someone share traditional food with your household?

1. Often 2. Sometimes 3. Never

Appendix G: Food Insecurity Questions

In the past 12 months, how often…

A. Did you worry that food would run out before there was money to buy more?

1. Yes 2. No

B. Did you eat cheaper foods or eat the same foods for several days in a row because there was not enough money for food?

1. Yes 2. No

C. Did you skip meals or eat less than you should because there was not enough money for food?

1. Yes 2. No

D. Did you or anyone else in your household receive food from a relative because there was not enough money for food?

1. Yes 2. No

E. Have you been hungry because there was not enough food in the house?

1. Yes 2. No

Appendix H: Personal Wellness Questions

In general would you say that your health is:

1.Excellent/Very Good 2.Good/Fair/Poor

How often do you feel that you are in balance in the four aspects of your life? (Physical, emotional, mental and spiritual)
Ask about each aspect and mark a response for each.

1.All of the time 2.Most of the time
3.Some of the time 4.Almost none

As a whole, would you describe your life as:

1.Very stressful/Fairly stressful 2. Not very stressful/Not at all stressful

During the past 12 months, was there ever a time when you felt sad, blue or depressed for 2 weeks or more in a row?

1.Yes 2. No 3.Don't know 4.Refuse

In the last 12 months, did you have the following health condition?
Intense anxiety (panic attacks).

1. Yes 2. No

In your household, which of the following social concerns are a major problem, minor problem, or not a problem?

Family Arguments

1. Major Problem 2. Minor Problem 3. Not a Problem 4. Refuse

Table 1. Food Insecurity by Socio-demographic Variables

Socio-demographic Variables	Total (n)	Food Insecure Freq (%)	Pearson X^2 (P-value)
Gender			
Female	1363	517 (37.9)	.576 (.448)
Male	1499	548 (36.6)	
Age Group			
18-34	1234	457 (37.0)	5.426(.066)
35-54	1255	488 (38.9)	
55+	372	120 (32.3)	
Marital Status			
Married/Common-law	1421	514 (36.2)	2.083(.353)
Single	1053	409 (38.8)	
Divorced/Separated/Widowed	364	131 (36.0)	
Household Type			
1 adult and 0 child	197	77 (39.1)	8.122(.044)
1 adult and 1+ child	281	118 (42.0)	
2+ adults and 0 child	542	176 (32.5)	
2+ adult and 1+ child	1634	606 (37.1)	
Total Household Income			
<$10,000	196	116 (59.2)	102.55(.000)
$10,000-$29,999	391	171 (43.7)	
$30,000 and over	422	86 (20.4)	
Don't know	626	227 (36.3)	
Refused	745	251 (33.7)	
Number of Incomes Per Household			
0 Income	49	27 (55.1)	49.854 (.000)
1 Income	1874	697 (41.0)	
2 Incomes	775	223 (28.8)	
3+ Incomes	165	47 (28.5)	
Income Dynamic			
Currently Work/ Previous Work/Income Over 2 Years	740	208 (28.1)	40.322 (.000)
Currently Work/Previous Social Assistance, No Income	110	40 (36.4)	
Currently Unemployed/Previous Income and Social Assistance	283	118 (41.7)	
Unemployed 2 Years/Previous Social Assistance, No Income	777	335 (43.1)	

Table 2. Food Insecurity Between Gender & By Socio-Demographic Variables

Variable	Total Food Insecure (n)	Male Food Insecure Freq (%)	Female Food Insecure Freq (%)	Pearson X^2 (p- value)
Age				
18-34	457	202 (34.8)	255 (39.1)	2.418 (.120)
35-54	487	262 (41.7)	225 (35.9)	4.405 (.036)
55+	120	52 (34.0)	68 (31.1)	.355 (.551)
Marital Status				
Married/Common-law	514	248 (36.4)	266 (35.9)	.034 (.854)
Divorced/Separated/Widowed	131	54 (39.4)	77 (33.9)	1.120 (.290)
Single	408	212 (39.7)	196 (37.8)	.384 (.535)
Household Type				
1 adult and 0 child	77	50 (40.7)	27 (36.5)	.336 (.562)
1 adult and 1+ child	118	36 (57.1)	82 (37.6)	7.652 (.006)
2+ adults and 0 child	176	104 (35.1)	72 (29.3)	2.109 (.146)
2+ adult and 1+ child	606	265 (35.3)	341 (38.6)	1.827 (.176)
Total Household Income				
<$10,000	116	66 (61.1)	50 (56.2)	.490 (.484)
$10,000-$29,999	171	81 (44.8)	90 (42.9)	.142 (.707)
$30,000 and over	85	40 (19.7)	45 (20.6)	.057 (.811)
Don't Know	227	98 (33.2)	129 (39.1)	2.321 (.128)
Refused	251	126 (34.2)	125 (33.2)	.098 (.755)
Incomes Per Household				
0 Income	27	18 (52.9)	9 (60)	.210 (.647)
1 Income	769	366 (41.5)	403 (40.6)	.178 (.673)
2 Incomes	223	109 (29.8)	114 (27.7)	.343 (.558)
3+ Incomes	47	25 (30.1)	22 (26.8)	.219 (.640)
Income Dynamic				
Currently Work/ Previous Work/Income Over 2 Years	208	98 (29.4)	110 (27.0)	.523 (.470)
Currently Work/ Previous Social Assistance, No Income	40	16 (42.1)	24 (33.3)	.827 (.363)
Currently Unemployed/ Previous Income and Social Assistance	118	73 (45.3)	45 (36.9)	2.042 (.153)
Unemployed 2 Years/Previous Social Assistance, No Income	335	142 (44.1)	193 (42.3)	.217 (.641)

Table 3. Within-gender food insecurity by Socio-demographic variable

Variable	Food Insecure (n)	Male Food Insecure Freq (%)	Female Food Insecure Freq (%)
Age			
18-34	457	202 (34.8)	255 (39.1)
35-54	487	262 (41.7)	225 (35.9)
55+	120	52 (34.0)	68 (31.1)
Pearson Chi-Square (p-value)		7.312 (.026)	4.714 (.095)
Marital Status			
Married/Common-law	514	248 (36.4)	266 (35.9)
Divorced/Separated/Widowed	131	54 (39.4)	77 (33.9)
Single	408	212 (39.7)	196 (37.8)
Pearson Chi-Square (p-value)		1.496 (.473)	1.126 (.570)
Household Type			
1 adult and 0 child	77	50 (40.7)	27 (36.5)
1 adult and 1+ child	118	36 (57.1)	82 (37.6)
2+ adults and 0 child	176	104 (35.1)	72 (29.3)
2+ adult and 1+ child	606	265 (35.3)	341 (38.6)
Pearson Chi-Square (p-value)		13.012(.005)	7.265 (.064)
Total Household Income			
<$10,000	116	66 (61.1)	50 (56.2)
$10,000-$29,999	171	81 (44.8)	90 (42.9)
$30,000 and over	85	40 (19.7)	45 (20.6)
Don't Know	227	98 (33.2)	129 (39.1)
Refused	251	126 (34.2)	125 (33.2)
Pearson Chi-Square (p-value)		60.680(.000)	45.089 (.000)
Number of Incomes Per Household			
0 Income	27	18 (52.9)	9 (60.0)
1 Income	769	366 (41.5)	403 (40.6)
2 Incomes	223	109 (29.8)	114 (27.7)
Pearson Chi-Square (p-value)		20.602 (.000)	27.142 (.000)
Income Dynamic			
Currently Work/ Previous Work/Income Over 2 Years	208	98 (29.4)	110 (27.0)
Currently Work/ Previous Social Assistance, No Income	40	16 (42.1)	24 33.3)
Currently Unemployed/ Previous Income and Social Assistance	118	73 (45.3)	45 36.9)
Unemployed 2 Years/ Previous Social Assistance, No Income	335	142 (44.1)	193 (42.3)
Pearson Chi-Square (p-value)		19.222 (.000)	22.564 (.000)

Table 4. Food Insecurity by Geographic Variables

Geographic Region	Total (n)	Food Insecure Freq (%)	Pearson X^2 (P-value)
Northern First Nations	1363	519 (51.4)	134.734 (.000)
Southern First Nations	1498	546 (29.4)	
Remoteness Index			
Within 50km	525	192 (36.6)	131.035 (.000)
Between 50km-350km	1873	593 (31.7)	
Air/rail/boat access only	462	279 (60.4)	
Hunt/ Gather			
Yes	1734	651 (37.5)	3.99 (.528)
No	1090	396 (36.4)	
Traditional Foods Shared with Household			
Often	515	195 (37.9)	4.002 (.135)
Sometimes	1612	607(37.7)	
Never	484	159 (32.9)	

Table 5. Food Insecurity Between-Gender by Geographic Variables

Geographic Variable	Total (n)	Male Food Insecure (%)	Female Food Insecure (%)	Pearson Chi Square (p-value)
Northern First Nations	518	255 (51.6)	264 (51.3)	.013 (.910)
Southern First Nations	547	263 (30.3)	283 (28.8)	.483 (.487)
Remoteness Index				
Within 50km	192	84 (36.2)	108 (36.7)	.016 (.901)
Between 50km-350km	593	294 (32.6)	299(30.8)	.729 (.393)
Air/rail/boat access only	280	139 (60.4)	141(60.3)	.002 (.969)
Hunt/Gather				
Yes	651	358 (37.8)	293 (37.2)	.080 (.777)
No	396	150 (37.4)	246 (35.7)	.318 (.573)
Traditional Foods Shared with Household				
Often	195	99 (41.6)	96 (34.7)	2.620 (.106)
Sometimes	606	295 (37.7)	311 (37.6)	.002 (.962)
Never	159	80 (35.1)	79 (30.7)	1.037 (.309)

Table 6. Food Insecurity Within-Gender by Geographic Variable

Geographic Variable	Total Food Insecure (n)	Male Food Insecure (%)	Female Food Insecure (%)
Northern First Nations	518	255 (51.6)	264 (51.3)
Southern First Nations	547	263 (30.3)	283 (28.8)
Pearson X^2 Square (p- value)		60.960 (.000)	73.623 (.000)
Remoteness Index			
Within 50km	192	84 (36.2)	108 (36.5)
Between 50km-350km	593	294 (32.6)	299 (31.7)
Air/rail/boat access only	280	139 (60.4)	141(60.3)
Pearson X^2 Square (p- value)		60.518 (.000)	70.581 (.000)
Hunt/Gather			
Yes	651	358 (37.8)	293 (37.2)
No	396	150 (37.4)	246 (35.7)
Pearson X^2 Square (p-value)		.023 (.880)	.347 (.556)
Traditional Foods Shared with Household			
Often	195	99 (41.6)	96 (34.7)
Sometimes	606	295 (37.7)	311 (37.6)
Never	159	80 (35.1)	79 (30.7)
Pearson X^2 Square (p-value)		2.162(.339)	4.135 (.126)

Table 7. Food Insecurity by Psycho-Social Health

Psycho-Social Health Variable	Total (n)	Food Insecure Freq (%)	Pearson X^2 (p-value)
General Health			
Excellent/very good	1114	346 (31.1)	27.752 (.000)
Good/fair/poor	1706	697(40.9)	
Feel In Balance			
All Aspects	1497	471 (31.5)	53.579 (.000)
1 or 2 or 3 Aspects	733	291 (39.7)	
None	601	289 (48.1)	
Stress			
Very stressful/Fairly stressful	914	445 (48.7)	
Not very stressful/Not at all stressful	1606	479 (29.8)	89.235 (.000)
Sad/Blue Depressed for 2 weeks+ in Last Year			
No	1810	542 (29.9)	79.940 (.000)
Yes	836	400 (47.8)	
Intense Anxiety			
No	2441	878 (36.0)	10.179 (.001)
Yes	318	143 (45.0)	
Domestic Dispute/ Major Family Arguments			
Major Problem	205	127 (62.0)	108.503 (.000)
Minor Problem	640	296 (46.3)	
Not a Problem	1910	591 (30.9)	

Table 8. Food Insecurity Between-Gender by Psycho-Social Health

Variable	Total (n)	Male Food Insecure (%)	Female Food Insecure (%)	Pearson Chi Square (p-value)
General Health				
Excellent/very good	346	198 (34.0)	148 (27.9)	4.814 (.028)
Good/fair/poor	697	311 (40.8)	386 (40.9)	.005 (.942)
Feel In Balance				
In Balance				
All Aspects	471	262 (34.5)	209 (28.4)	6.489 (.011)
1 or 2 or 3 Aspects	291	127 (38.4)	164 (40.8)	.447 (.504)
None	289	132 (47.3)	166 (48.7)	.111 (.739)
Stress				
Very stressful/Fairly stressful	444	165 (50.5)	279 (47.6)	.681 (.409)
Not very stressful/Not at all stressful	479	273 (32.2)	206 (27.2)	4.813 (.028)
Sad/Blue Depressed for 2 weeks+ in Last Year				
No	542	292 (31.7)	250 (28.2)	2.667 (.102)
Yes	400	160 (49.1)	240 (47.1)	.325 (.568)
Intense Anxiety				
No	878	448 (36.7)	430 (35.2)	.554 (.457)
Yes	143	48 (51.6)	95 (42.2)	2.345 (.126)
Domestic Dispute/ Major Family Arguments				
Major Problem	126	52 (65.0)	74 (59.7)	.583 (.445)
Minor Problem	295	131 (44.6)	164(47.5)	.567 (.452)
Not a Problem	591	308 (32.7)	283 (29.2)	2.77(.096)

Table 9. Food Insecurity Within-Gender by Psycho-Social Health

Variable	Total (n)	Male Food Insecure (%)	Female Food Insecure (%)
General Health			
Excellent/very good	346	198 (34.0)	148 (27.9)
Good/fair/poor	697	311 (40.8)	386 (40.9)
Pearson X^2 Square (p- value)		6.494(.011)	25.084 (.000)
Feel In Balance In Balance			
All Aspects	471	262 (34.5)	209 (28.4)
1 or 2 or 3 Aspects	291	127 (38.4)	164 (40.8)
None	289	123 (47.3)	166 (48.7)
Pearson X^2 Square (p- value)		13.599 (.001)	46.147 (.000)
Stress			
Very stressful/Fairly stressful	444	165 (50.5)	279 (47.6)
Not very stressful/Not at all stressful	479	273 (32.2)	206 (27.2)
Pearson X^2 Square (p- value)		33.674 (.000)	59.833 (.000)
Sad/Blue Depressed for 2 weeks+ in Last Year			
No	542	292 (31.7)	250 (28.2)
Yes	400	160 (49.1)	240 (47.1)
Pearson X^2 Square (p- value)		31.600 (.000)	50.862 (.000)
Intense Anxiety			
No	878	448 (36.7)	430 (35.2)
Yes	143	48 (51.6)	95 (42.2)
Pearson X^2 Square (p- value)		8.188 (.004)	3.997(.046)
Domestic Dispute/ Major Family Arguments			
Major Problem	126	52 (65.0)	74 (59.7)
Minor Problem	295	131 (44.6)	164(47.5)
Not a Problem	591	308 (32.7)	283 (29.2)
Pearson X^2 Square (p- value)		41.250 (.000)	69.291 (.000)