CHARACTERIZATION OF INDIVIDUALS RESIDING IN THE PROVINCE OF NEWFOUNDLAND AND LABRADOR WHO CONSUME NATIVE GROWN AND LOCALLY AVAILABLE FOODS

SAHAR JAMEEL IQBAL

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by

SAHAR JAMEEL IQBAL

A thesis submitted to the

School of Graduate Studies

in partial fulfillment of the

requirements for the degree of

Master of Science

Division of Community Health
Faculty of Medicine
Memorial University of Newfoundland

2003

St. John's Newfoundland & Labrador

ABSTRACT

Indigenous foods are cheap and highly nutritious. The present study is a secondary analysis of data collected by the Newfoundland and Labrador nutrition (NNL) survey, 1996. The NNL survey was a province wide cross-sectional study that collected data on the dietary habits of residents of the province. The specific objectives of the present study were to see how prevalent was the consumption of indigenous foods by the population of the province and to compare consumers with nonconsumers. A multistage stratified cluster design was used to sample males and females, 18-74 years inclusive. Excluded were institutionalized individuals, people living on reserves, and pregnant and lactating women. The statistical program, SPSS, was used to analyze the data, collected on 1927 randomly selected adults. Analysis of data revealed that 93% and 79.5% of respondents respectively, claimed to have consumed wild berries and game meat during the previous year. Chi squared analysis showed a significant association of game meat consumption with sex ($p<0.001$), age ($p<0.001$), area of residence ($p<0.001$) and education level ($p<0.001$). Game meat was most often consumed by males, aged 55-64 years, less educated, rural residents in the low income adequacy group ($p<0.001$). Chi squared analysis of data on berry consumers showed a significant association with sex ($p=0.006$) but not with the other factors tested. In addition to the frequency of consumption of indigenous foods and their amounts were also calculated. Median serving size of moose meat was found to be 137g and median serving size of blueberries was 18g. Of those who

consume large game meat, 41% said they consumed at least 2 portions per month. Of those who consume berries, 25 % said they consumed more than 4 servings of berries per month. Analysis of health behaviour indicators showed that non-smokers were more likely to be berry consumers ($p<0.001$) whereas there was no difference between physical activity or intake of vitamin/mineral supplement between consumers and nonconsumers. Indigenous foods appear to be consumed by and thus accessible to a variety of people. Consequently their consumption can be practically encouraged to address food insecurity and health issues in Newfoundland and Labrador. Specific characteristics of consumers of local berries and wild game can be used to aid in the development of strategies to promote the intake of these foods.

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ACKNOWLEDGEMENTS

I would like to thank my supervisor Dr. Barbara Roebothan for the excellent and unerring guidance and support throughout my Masters program. I would also like to thank my supervisor Dr. Bill Bavington for inspiring and encouraging me, not only in my graduate studies but also in resuming my career as a clinician. My thanks also to committee members Dr. Doreen Neville and Dr. Gene Herzberg for providing excellent direction and advice. I could not have completed my work without the invaluable guidance and support of my supervisors and committee members.

I would also like to thank Dr. Veeresh Gadag and Alison Edwards for the expert help and support they provided with the statistical analysis of the study. Thankyou also to Beth Junkins (Bureau of Biostatistics and Computer Applications, Food Directorate, Health Canada) without whose advice the statistical analysis could not have been completed.
I would also like to thank Ed Butt (Small Fruit Specialist, Department of Forest Resources and Agrifoods, Government of Newfoundland and Labrador) for providing vital information, historical as well as current on native grown and wild berries of Newfoundland and Labrador.

As well I would like to thank my mother Sitara Jameel, my husband Dr. Tariq Iqbal and my son Aizaz Iqbal for their love, support and understanding throughout my time as a graduate student.

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CHAPTER I

REVIEW OF LITERATURE

1.1 New Perspectives on Health

Improved health is considered to be an important measure of human progress (Frank and Mustard, 1991). Traditionally improved human health has been attributed to the tremendous advancement in medical science and technology. However evidence suggests that the contribution that medical science makes to human health is tempered by many other variables. Lalonde (1974) drew attention to some of these other variables, including human biology, environment and lifestyle. Subsequent to the views expressed by Lalonde, many scientists have presented studies in support of this new perspective on health. McKeown (1976) attributed the decline in morbidity and mortality from infectious disease more to improvements in social and nutrition status than to advancement in medical science and technology. Reeves (1985) and Marmot (1992) provided evidence to support the view that declining mortality rates were directly consequent to improved social, environmental and economic conditions.

The Ottawa Charter of Health Promotion (WHO, 1986) sought to redefine health as a "resource for everyday life", an essential component to our everyday quality of life. Health cannot merely be a measure of the absence of disease and death but a state that individuals and communities can define and strive to achieve. Health is not merely a commodity or a service made available through the healthcare sector by the government

but a shared responsibility of individuals, the communities to which they belong and the choices they are willing to make to achieve it (Epp, 1986).

1.2 Health Promotion

Health promotion is the process of helping people take control of and improve their health. The realization that health is impacted by multiple factors, many of them outside of the traditional healthcare system, means that to improve the health of people these other factors must be given due consideration. In order for real improvement to occur governments must bring about major policy changes relevant to the new realities about healthcare and its provision. Canadian policy makers have responded to this need for realigning the healthcare system, but progress has been slow. Some reallocation of resources has made it possible to concentrate on the population health approach and this has allowed a strengthening of regional and local programs such as a greater attention to food and nutrition through the Health Products and Food Branch (Health Canada, 2000). The Strategic Health Plan for Newfoundland and Labrador envisages a similar approach towards health. It takes into account the role of determinants of health in promoting health and identifies food and nutrition as an important factor in the quest for better health (Department of Health and Community Services, 2002).

1.3 Determinants of Health

The Second Report on the Health of Canadians (Health Canada, 1999) identifies the key determinants of population health. These include income and social status, social support

networks, education, employment/working conditions, social and physical environment, personal health practices and coping skills, healthy child development, biology and genetic endowment, health services, gender, and culture.

1.3.1 Income and Social Status

There is evidence to suggest that income and social status are very important to health. Significant correlation exists between life span and wealth. People living in more developed and economically stable societies, where wealth is distributed more equitably demonstrate better health (Marmot, 2002). Marmot and Smith (1989) determined that the smaller the relative difference in income between the bottom and the top 20 per cent of the income distribution curve the greater the contribution towards a higher score on health measures. Marmot and Theorell (1988) observed that a gradient exists with job and rank amongst the British civil servants who were the subject of their study. A higher rank, and greater affluence were associated with better health.

1.3.2 Social Support Network

Support from family, friends, and communities contributes substantially to the health of individuals. According to a study conducted on American adults social support, self-esteem, and optimism were all positively associated with good health practices (McNicholas, 2002). In another recently published study, Krause (2002) while exploring the relationship between church-based support and health of older individuals determined that group support contributed to optimism and better health. Personal relationships like

those shared by married couples contribute to better health and longevity as hypothesized in the marital role theory (Tower, Kasl and Darefsky, 2002).

1.3.3 Education

Education is one of the key interrelated factors that impacts deeply upon human health. Individuals with higher education are more likely to be employed hence economically secure and in better health. According to the 1996-97 National Population Health Survey (Statistics Canada, 2003) in Canada, only 9% of respondents with less than a high school education rated their health as "excellent" compared with 30% respondents with a university education. Studies show that chronic disease risk is greater in individuals who are less educated. Educational level is said to be negatively correlated with risk of stroke and myocardial infarction and positively related to life expectancy (Chang, Marmot, Farley and Poulter, 2002)

1.3.4 Employment and Working Conditions

Research shows that being employed has a positive effect on health status. Unemployed individuals tend to keep poorer health. Beland, Birch and Stoddart (2002) showed that the association of individual unemployment with perceived health is statistically significant. The working environment impacts health in numerous ways. Individuals who enjoy their work and have some degree of control over their careers suffer much less stress and hence enjoy better health (Amick, et al., 2002).

1.3.5 Social and Physical Environments

Physical and psychosocial environments have a profound effect on the state of our health. Social and civic conditions such as polluted air and water, unsafe housing, a rising crime rate all impact health in a myriad of ways (Mcmichael, 1997).

1.3.6 Personal Health Practices and Coping Skills

For some time scientists have realized how great an impact personal behaviour, health practices, and ability to handle stress, can have on health. Hence the burden of disease preventing strategies was placed on individuals. Staying healthy was seen as a personal choice or responsibility. This perception has undergone considerable modification as medical researchers also realized that habits and lifestyle choices are governed by complex social, physical and environmental factors and are not merely a reflection of choice or preference. Individuals cannot be held unequivocally responsible for their own health while at the same time they cannot be absolved completely of all responsibility with regard to decisions and choices that directly affect their health (McLeroy, Bibeau, Steckler and Glanz, 1988)

The World Health Organization identifies food and nutrition as one of the major social determinants of health (Wilkinson and Marmot, 1998). Adopting healthy dietary habits and lifestyle behaviours such as not smoking and regular exercise can potentially reduce the risk of chronic disease (Hampl, Anderson, and Mullis, 2002). However modifying personal habits does not guarantee that risk from chronic disease disappears completely.

Many other factors that contribute to development of disease cannot be modified such as age or genetic predisposition must also be considered.

1.3.7 Healthy Child Development

The circumstances under which children grow and live have the potential to affect their ability to cope and consequently their health in later life (Frank and Mustard, 1991). Studying relationships between adverse childhood environment, dietary habits, and socioeconomic conditions has suggested that these are associated with higher risks of developing and dying from chronic conditions in later life (Frankel, Smith, and Gunnell, 1999; Frankel, Gunnell, Peters, Maynard and Davey Smith, 1998; Gunnell, Frankel, Nanchahal, Peters and Davey Smith, 1998). Prenatal factors such as fetal malnutrition causing low birth weight is believed to result in a higher risk of developing heart disease in later years and this has been confirmed by numerous studies over the past 15 years (Szathmari, Vasarhelyi and Tulassay, 2002).

1.3.8 Biology and Genetic Endowment

Biological and inherited characteristics determine human health to a large degree. The role human genetics plays cannot be ignored or underestimated. External factors such as environment, exposure to disease, and lifestyles are modifiable but genetic makeup is not. Despite our best efforts at prevention, certain genetic defects inevitably result in serious illness. For example, most people in the developed world consume excessive amounts of saturated fats, however only some have dangerously high levels of serum lipid. Hence the

difference between individuals with excessive lipid levels and those with normal lipid levels can be attributed to their genetic and biological makeup (Umans-Eckenhausen, Sijbrands, Kastelein and Defesche, 2002).

1.3.9 Health Services

Health services play an undeniable and extremely important role in healthcare. The services that combine provision of optimal treatment as well as preventive and protective care are considered to be the most appropriate endeavour in the struggle to achieve health for all. Historically primary preventive measures such as immunization, on a global scale have proven successful in controlling many and eradicating some infectious diseases (Andre, 2003; Payette and Davis 2001). Secondary preventive measures such as mammography (Jatoi and Miller, 2003) and pap smears (Hartikainen, 2001) have helped to reduce disease risk. Prompt management of disease conditions can contribute to decreased suffering as well as cost containment.

1.3.10 Gender

Health can mean different things to men and women. This difference is not limited just to the physical and biological characteristics of the male and female bodies but is tempered by the role society accords to the sexes and the interplay of influence and power between them. Potential years of life lost are still higher in men as more of them die prematurely, in comparison to women, however the gap between life expectancy of men and women is narrowing (Kinsella and Velkoff, 2001). Although women live longer they suffer more

chronic illnesses over prolonged periods of time and are more vulnerable to injuries resulting from violence (Society for Women's Health Research, 2003).

1.3.11 Culture

Culture and ethnicity contribute enormously to attitude and behavior towards health as do the socioeconomic conditions of individuals. Cultural factors can work in negative as well as positive ways. For example according to the 1996-97 National Longitudinal Survey of Children and Youth, children of immigrants and refugees in difficult financial conditions were doing better both emotionally and academically compared to their Canadian cohorts (Worswick, 2001) Conversely being part of a distinct culture may put individuals at a greater health risk. For example rates of suicide are three to four times higher in the First Nations youth (Rusen and McCourt, 2003).

1.4 Nutrition in Health and Disease

Nutrition is inextricably linked to human health. Adequate and appropriate nutrition is an essential component in maintaining optimal health. Research clearly recognizes nutrition as an important variable in the prevention, pathogenesis and management of the leading causes of death in the world today. The spectrum of diseases associated with nutrition stretches from conditions of deficiency to conditions of excess. Historically most illnesses associated with nutrition were those of deficiency, resulting from either inadequate or inappropriate nutritional intake. Over the last century as society became progressively more prosperous, and as food became more abundantly available these

deficiency diseases largely disappeared and were replaced with diseases associated with excessive intakes. The illnesses resulting from excess intake were initially described as Western diseases of opulence, however they are now increasingly prevalent in the developing world. The developing world presents a mixed picture where diseases of excess coexist with malnutrition and deficiency states. Both deficiency and excess of food are linked to increased morbidity and mortality.

An excess of total caloric intake may result in obesity, an independent risk factor in the development and progression of many chronic diseases such as heart disease, diabetes and some cancers. An excess of macronutrients such as dietary fat is linked to increased morbidity and mortality from cardiovascular diseases (Renaud and Lanzmann-Petithory, 2002) and some cancers (Ronco, De Stefani and Dattoli, 2002). Excessive intake of essential micronutrients is also associated with clinical problems. Vitamin C excess may lead to interference with vitamin B12 absorption and reverse scurvy. Vitamin A excess has been associated with bone and joint pains, vitamin D excess with hypercalcemia and skeletal decalcification (Patterson, 2002).

A deficiency in total caloric intake leads to starvation, malnutrition, and associated co-morbidities. Dietary deficiency of essential macronutrients, such as protein may lead to protein energy malnutrition, a condition prevalent in much of the developing world. Deficiency states for many of the micronutrients described in the early part of the twentieth century are now rarely observed. However some absolute and relative

deficiency states are a cause for concern at the present moment even in the developed nations of the world. Dietary iron deficiency may be responsible for many cases of anemia, especially in the more vulnerable population groups like women in the childbearing age and seniors. Dietary iron deficiency may also contribute to anemia of chronic disease. Deficiencies of dietary calcium and vitamin D may be associated with rickets in childhood and with osteoporosis and an increased risk of fractures in seniors. Giacosa, Hill and Davies (2002) determined that lack of dietary fibre increases the risk of cancer at certain sites, such as colorectal cancer. Inadequate intake of dietary fibre may also be linked to development of cardiovascular diseases and such gastrointestinal disorders as constipation and diverticulosis (Mia, et al., 2002).

Food not only nourishes and nurtures the human body but also protects it from disease. Different foods of animal as well as plant origin contain protective substances. There is growing evidence to support the view that deficiencies of protective substances contained in fruits and vegetables may play a role in the development of certain chronic illnesses (Gey, 1993). Protection is also conferred by animal based foods that contain substances like omega 3 and omega 6 fatty acids (Holub, 2002).

1.4.1 Diseases Associated With Poor Dietary Habits

Nutritional status and food habits can effect whether and when disease develops, how and at what pace it progresses and whether and what complications develop.

1.4.1.1 Cardiovascular Diseases

Despite being identified as potentially preventable, cardiovascular diseases (CVD) still rank as the leading cause of death in the world and particularly the Western world (WHO, 2002). Cardiovascular diseases are a large group of disease conditions involving the heart and the vasculature. Many epidemiological studies, in particular the Seven Countries Study have linked cardiovascular disease to poor nutrition (Dombrow, 2000). Poor dietary habits and sedentary lifestyles can contribute to the onset of disease at a younger age, a prolonged and possibly more aggressive natural history and the development of serious complications.

There is conclusive evidence from many trials that dietary saturated fat especially of animal origin is positively associated with the development of cardiovascular diseases (Hu, Stampfer, and Manson, 1999; Ascherio, 2002). Over-consumption of kilocalories, saturated fats, refined sugar and flour leads to obesity an independent risk factor in the development of heart disease (Rashid, Fuentes, Touchon and Wehner, 2003; La Vecchia, Chatenoud, Altieri, and Tavani, 2001). Excess salt intake has also been shown to be positively associated with heart disease (Zhao, Pollock, Inscho, Zeldin, and Imig, 2003; Flack et al.2003). Inadequate intake of fruits and vegetables, deficiency of dietary fibre (Mia, et al, 2000), calcium (Karppanen, 1991), magnesium (Toyuz, et al. 2002), selenium (Das, 2001) and lack of useful fatty acids like omega 3 and omega 6 fatty acids in diet are all implicated in causation of heart disease (Simopoulos, Leaf, and Salem, 1999; Dombrow, 2000; Holub, 2002).

1.4.1.2 Cancers

Cancers, a group of diseases that can appear in any part of the body are characterized by excessive and abnormal growth of tissue leading to serious morbidity and mortality. Large-scale epidemiological studies first pointed the way towards a causal link between diet and cancer. Subsequent work continues to clarify specific associations. The National Cancer Institute in America estimates that one in three cancer deaths are diet related and that 8 of 10 cancers have a nutrition/diet component (American Dietetic Association, 2003). It has been established after numerous trials that diets high in fats and low in fibre are positively associated with many cancers (Winther, Dreyer, Overvad, Tjonneland and Gerhardsson de Verdier, 1997). Highly salted, smoked meats and raw fish (Lee, et. al. 2003) as well as foods containing nitrates and nitrosamines (Palli, et al., 2001) are said to be positively associated with stomach cancer. Paan (Betel nut) chewing, a habit common to many residents of the South East Asian Subcontinent is said to be causally linked to oral cancers (Rajkumar, 2003).

1.4.1.3 Diabetes Mellitus

Diabetes mellitus is a heterogeneous metabolic disorder, primarily affecting carbohydrate metabolism that results from a relative or absolute insulin deficiency or resistance or both. It is characterized by high blood glucose levels that over a period of time lead to many complications such as neuropathies, vasculitis and end stage renal disease.
Diet therapy is an integral part of the management of diabetes mellitus. Onset of the condition and its sequelae can be delayed or prevented if dietary management is

combined with other modes of therapy to maintain meticulous control of blood glucose levels (Wyne, 2003). More recently type 2 diabetes is being diagnosed in much younger individuals and this has been surmised to be a function of transition in dietary habits and lack of physical activity leading to obesity (Silverstein and Rosenbloom, 2001).

1.4.1.4 Obesity

Obesity, a condition reaching epidemic proportions in the Western world is characterized by excessive weight gain resulting an excessive intake of calories combined with a lack of physical activity. Obesity in the adult can be defined in terms of body mass index (BMI) obtained by dividing total body weight in kilograms by square of standing height in meters. An adult male or female is considered overweight if value of BMI exceeds 27 and obese if the value of BMI is over 30 (Flegal, Carroll, Kuczmarski and Johnson, 1998). Obesity increases the risk of developing chronic diseases responsible for severe morbidity and mortality that are associated with substantial health care and social costs (Rossner, 2002).

Research shows that lipid profiles of obese individuals tend to be disturbed and manifest as hypertriglyceridemia, high levels of high-density lipoprotein (HDL) and low levels of very low-density lipoproteins (VLDL). Hence obesity is considered to be one of the major risk factors in the development of cardiovascular diseases (Drexler, 2003). Obesity is also associated with many different types of cancers for example risk of colorectal

cancer increases with excessive adiposity (Giovannucci, 2003). The risk of breast cancer increases with increasing BMI in post-menopausal women (Stephenson and Rose, 2003)

1.4.1.5 Other Chronic Conditions

Aging is associated with increased risk of osteoporosis and bone fractures. Dietary factors, such as intakes of protein, calcium, and vitamin D are essential for maintenance of the skeleton throughout the lifespan (Simon, LeBoff, Wright, and Glowacki, 2002).

Caries and periodontal disease are associated with excessive and frequent consumption of sugary foods and can be prevented partly by changes in dietary habits aided by addition of fluoride to drinking water in areas where it is deficient (Mobley, 2003).

1.4.2 Changing Focus in Management of Disease

In the early part of the twentieth century industrialization in many parts of the world caused an "epidemiological transition" from infectious to chronic disease. This transition occurred simultaneously with a nutritional transition when diets changed to over-consumption of energy-dense foods resulting in the epidemic of obesity, which is linked to chronic non-communicable diseases (NCD) now prevalent all over the world (Wilkinson and Marmot, 1998).

Millions of dollars are spent on state of the art, technologically advanced, extremely expensive treatment for conditions that can only be managed symptomatically or at best

their progression retarded. To date no effective cures have been found for chronic illnesses. Part of the reason for this is the multi-factorial nature of causation and an incomplete understanding of the causative mechanisms involved. Under the circumstances a re-evaluation of the approach towards chronic disease is warranted. There is an obvious need to redirect thinking, research and finance towards achieving and maintaining optimal health in an attempt to prevent the onset of chronic diseases rather than concentrating on treating largely incurable diseases. Many scientists have already shifted their focus from looking at cure to looking at prevention as the primary mode of therapy.

Whereas it is possible to control and change many factors, there are some that are non-modifiable and include the genetic component of causation in most chronic illnesses. Research suggests that modifiable factors including lifestyle, behavior and diet contribute significantly to reducing morbidity and mortality. Hence many scientists are investing more time in determining what the nature of these modifiable factors is and to what extent they contribute towards prevention of chronic disease.

1.4.3 Potential to Prevent Disease by Dietary Intervention

Evidence shows that dietary intervention is an efficient and cost-effective technique in preventing many diseases (de Longeril et al, 1999). This potential to prevent disease has revitalized interest in nutritional sciences as a primary component of disease prevention strategies. Evidence gathered primarily from epidemiological and experimental studies

confirms the role dietary habits coupled with lifestyle interventions plays in disease prevention. In this context it is believed that dietary modifications not only prevent but also modify the natural course of many diseases even if the diseases are not causally linked to diet. Nutritional intervention has been employed both as a primary as well as a secondary preventive measure. In an ideal situation nutrition intervention must start at a very early stage in any individual's life and must be sustained over generations (Szathmari, Vasarhelyi, and Tulassay, 2000). Many different types of food and diets have been evaluated for their effectiveness in preventing chronic disease. Prevention of disease using dietary intervention may consist of either reduction or elimination of a food or substance or its addition to diet.

The role of low fat, low sodium diets and other well-known dietary patterns such as the "Mediterranean diet" (de Lorgeril et al., 1999; Moreno, Sarria, and Popkin, 2002) are well-established dietary strategies to prevent heart diseases. Lowering dietary fat may also contribute to reducing obesity and thereby to decreasing cancer incidence and delaying onset of type 2 diabetes. Consuming diets rich in fibre may contribute to prevention against many types of cancers (Turini and DuBois, 2002; Baghurst and Rohan, 1994). High fibre intake also improves glycemic control, lowers lipid and improves insulin sensitivity in diabetics (Chandalia, et al. 2000).

Adequate consumption of protein supplies essential amino acids, required for growth, repair and regulatory functions in the human body. Kerstetter, O'Brien and Insogna

(2001) determined that a diet low in protein might be deleterious to the skeleton, especially if accompanied by a chronic reduction in calcium absorption. Results from large epidemiologic studies demonstrate that when other dietary factors are controlled, individuals who consume low-protein diets had lower bone mineral densities and were prone to fractures (Hannan et al, 2000; Kerstetter, Looker, and Insogna, 2000; Munger, Cerhan, and Chiu, 1999).

Flagg, Coates and Greenberg (1995) and Giacosa, Hill and Davies (2002) show that consuming fruits, vegetables and cereals is associated with a marked decline in cancer rates for many organs. Fruits and vegetables contain minerals, vitamins, fibre and antioxidants believed to play a role in disease prevention.

1.4.4 Prevalence/Incidence of Nutrition Related Chronic Diseases

Chronic diseases are a leading cause of morbidity, mortality and potential years of life lost in most of the developed world. The developing world presents a mixed picture with both chronic as well as infectious diseases causing significant morbidity and mortality. However over the next few decades chronic illnesses will become the leading cause of death worldwide.

1.4.4.1 Global Perspectives

Cardiovascular diseases cause the highest rate of mortality in the industrialized nations of the world. The World Health Organization projected in 1998 that almost 75% of all

mortality in 2020 will occur as a result of non-communicable chronic diseases (WHO, 1998). Dr Ruth Bonita, Director of Non-Communicable Disease Surveillance at WHO with regards to the MONICA (from MONItoring CArdiovascular disease) project acknowledged the possibility of a favorable trend in heart disease incidence and prevalence provided preventive measures were duly instituted. Rates of heart disease are highest in British and Finnish men and highest in British, Australian and Polish women (Tustall-Pedoe, et al., 1999). The lowest rates for both men and women were from China, Spain and France (Tunstall-Pedoe, et al., 1999). It is interesting to note that in the south of France, despite the prevalence of some lifestyle factors that would be expected to cause a rise in CVD rates, the mortality rates are the lowest. This has been referred to in literature as the "French paradox" (Alpert, 1999). In countries like Greece, Italy, and Spain heart disease morbidity and mortality are markedly lower and this effect is linked to the Mediterranean dietary habits practiced in the region (Trichopoulou, Costacou, Bamia and Trichopoulos, 2003).

The annual crude rate of cancer worldwide is 174.40 per 100,000 persons at risk. An enormous difference exists between developed countries where the rate is 433.36 per 100,000 persons at risk and less developed countries where the rate is 113.86 per 100,000 persons at risk (Globocan, 2001).

Type 2 diabetes mellitus is a widespread chronic condition occurring in all populations of the world. The rates are higher in Europe, America and Canada and rising in much of the

developing world. However studies show that prevalence in countries like China is very low with the crude rate being equal to 0.9 per cent of the population (WHO, 2002). Obesity is a growing problem globally. In 1995 there were an estimated 200 million obese adults the world over and 18 million children under-five years of age who were classified as overweight. In 2000 the number of obese adults worldwide was estimated at above 300 million. The epidemic of obesity is not confined to just the industrialized nations with 115 million people in the developing world suffering from the condition (WHO, 2000).

1.4.4.2 Prevalence/Incidence of Chronic Nutrition Related Diseases in Canada and Newfoundland and Labrador

According to the Canadian Heart Health Surveys (CHHS) the prevalence of hypertension in Canada is 21.1%. Cardiovascular diseases remain the major cause of morbidity and mortality in North America. Coronary artery disease is the leading cause of death in Canada accounting for 46,600 deaths annually. Cerebrovascular disease is the third leading cause of death amongst Canadians and accounts for 13,900 deaths per year (Health Canada, 2000).

The people of Newfoundland and Labrador are thought to have higher rates of many chronic, diseases compared to the Canadian national average (Statistics Canada, 2002). Notable amongst these are cardiovascular diseases including hypertension, coronary

artery disease, angina, myocardial infarction, and sudden cardiac death (Fodor and Rusted, 1980; Fodor, 1980).

Cancer rates in Canada are 444.37 per 100,000 persons at risk (Globocan, 2001). Cancer of colorectum, breast and prostate together cause 15,000 deaths annually amongst Canadians (Canadian Cancer Statistics, 2002). Some cancers such as colorectal, stomach, cervical are more prevalent in Newfoundland and Labrador (Canadian Cancer Statistics, 2002).

The overall percent prevalence of diabetes mellitus in Canada is 4.1(4.4 for males and 3.9 for female). The overall percent prevalence of diabetes in Newfoundland and Labrador is higher than the national average at 5.8 (5.4 for males and 6.1for females).

The percent prevalence of obesity (BMI 27 and above) in Canada is 31.9, 36.1 in men and 27.5 in women (Statistics Canada, 2002). Rates of obesity in Newfoundland and Labrador are far higher than the national Canadian rates. The overall rate is 42.8; it is 47.9 in males and 37.7 in female residents of the province (Statistics Canada, 2002).

1.5 Nutrition Recommendations to Decrease the Risk of Chronic Diseases

There is consensus amongst health professionals that nutritional intervention at an early stage may help reduce the burden of chronic disease. The World Health Organization and the Food and Agricultural Organization (FAO) provide guidelines on nutrient

requirements to reduce the burden of non-communicable chronic diseases (NCD). The recommendations of the consultation group on diet and nutrition and the prevention of chronic disease include maintaining weight within the normal range of BMI i.e., between 18.5 to 25 kg/m^2 and increasing physical activity. Other recommendations are a reduction in the intake of saturated fats, sodium, sugar and alcohol and increasing intake of fish and fish oil containing 3 and 6 omega fatty acids and fibre and consuming fruits and vegetables in amounts greater than or equal to 400g every day (WHO/FAO, 2003).

Health Canada also set dietary recommendations for the Canadian public in 1990 to help decrease risk of chronic disease (Health Canada, 1990). The Canadian diet should provide energy consistent with the maintenance of body weight within the recommended range. The Canadian diet should include essential nutrients in amounts recommended. It should include no more than 30% energy as fat, no more than 5% energy as alcohol and no more than 650mg of caffeine everyday. Protein intake should be equivalent to 0.8g per kg body weight and 55% energy should come from carbohydrates. A reduction in sodium intake is also recommended.

1.6 Dietary Sources of Nutrients and Phytochemicals

Diet provides the human body with the nutrients it needs to survive and also with many non-nutrient substances, the phytochemicals that contribute towards optimal good health. Nutrients and phytochemicals are found in a variety of foods, many of them indigenous to the province of Newfoundland and Labrador.

1.6.1 Game Meats

Hunting game for food has been a way of life in Newfoundland and Labrador for many hundreds of years. Meat from hunted animals remains an important source of high quality protein in the diets of many residents of the province both rural and urban. Surveys show that meat from domesticated animals has 25-30% fat while the average fat content of wild game animals is only 4.3%. In addition the fat contained in wild game meat consists of a higher proportion of heart healthy polyunsaturates (Medeiros, et al. 2002). Locally consumed game meats include moose, caribou, seal meat and blubber, wild birds (such as murres, wild ducks, ptarmigan, and grouse) rabbit, bear and other animals, both large and small. In Newfoundland and Labrador game meats may present more accessible and healthful options as compared to other high protein foods available in local retail outlets. The provincial government of Newfoundland and Labrador regulates hunting activity in the province.

1.6.1.1 Moose and Caribou

Moose (Alces alces), the largest member of the deer family, are not native to Newfoundland. They were introduced to the island from New Brunswick in 1904. They live in low-lying wooded valleys all across the island. The estimated population of moose on the Island is between 120,000 and 150,000. The population of the woodland caribou (Rangifer tarandus caribou) also referred to as reindeer, is estimated at between 80,000 and 120,000 animals on the Island. Labrador is host to the barren ground caribou (Rangifer tarandus granti) that number close to 750,000 animals. A license is required to

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hunt moose or caribou. Approximately 30,000 licenses are issued every year by the government of Newfoundland and Labrador (Newfoundland and Labrador, 2003). Moose or caribou meat if harvested from the wild may cost only the actual license fee and hence is a highly economical source of protein.

Locally available moose and caribou meat can potentially form an important component of a healthy diet. Apart from being a rich source of bioavailable heme iron, meat from the large muscles of moose and caribou has a much lower fat content as compared to that of beef, pork, veal, lamb and other red meats most frequently consumed by the Canadian public (Kealy, 2002). Consuming moose or caribou meat may provide an alternate source of good quality protein combined with high iron levels for individuals who may be at risk of developing iron deficiency (Van Grevenhof and Funderburg, 2003)

1.6.1.2 Seal

Seals (Harp seals) have been hunted in Newfoundland and Labrador for generations for seal pelt, blubber and meat. Seal meat and organs are an excellent source of protein, iron, Zinc and some B vitamins. Seal liver and blubber are an excellent source of vitamin A and contain some vitamin C (Hoppner, et al., 1978). Fatty acids in seal meat include 60% monounsaturated fatty acids, 22% other unsaturated fatty acids and 18% saturated fatty acids (Hoppner, et al., 1978). Seal fat or blubber is also a good source of omega 3 fatty acids (Nutrition Fact Sheet Series, 1996).

1.6.1.3 Wild birds

Murres are a commonly eaten wild bird of Newfoundland and Labrador. There are two types of murres, the common murre (Uria aalge) and the thick-billed murre (Uria lomvia) also known as the Arctic turr or northern turr in Newfoundland and Labrador. Hunting murres is a widespread activity in coastal Newfoundland and has traditionally been a major source of winter meat. It remains an important sporting and cultural activity providing food for about 15,000 hunters and their families. The birds are shot at sea by hunters in small open boats during the seven-month open season, when weather and ice conditions permit. Current Canadian Wildlife Service (CWS) surveys indicate that about 600,000 to 900,000 murres are taken annually, in one of the largest harvests of migratory birds in Canada (Elliot, 2002). Game meat obtained from sea birds such as murres is believed to be quite high in omega-3 fatty acids (Holub, 2002). This is believed to occur because a large source of the fat in the diet of sea birds is from the fish they consume.

Further inland, hunting activity centers around other wild birds such as wild ducks, geese, partridge and ptarmigan. Three different varieties of Ptarmigan, birds that are closely related to the grouse, live in alpine regions all across Newfoundland and Labrador. Hunting licenses are required to hunt these birds (Newfoundland and Labrador, 2003). The fat content in meats of wild birds is said to be between 0.5-1% (Wild game nutritional value, 2002). Many residents also consume the skin and layers of subepidermal fat with the meat.

1.6.1.4 Rabbit

Snowshoe hare (Lepus americanus) is one of the commonest small game species found wild in the province. Hunters can either shoot them or snare them. In both cases a license is required. Wild rabbit meat contains only 3g of fat per serving of cooked meat (1 serving=85g or 3ounces). This is quite low compared to beef or pork (Buege and Nitzke, 1995)

1.6.1.5 Bear

The black bear (Ursus americanus) is one of fifteen mammals that are native to Newfoundland and Labrador. Large numbers of black bears, that can weigh from 500lbs to 700lbs, live in the boreal forests of the province. Although rarer, polar bears (Ursus maritimus) can be seen in early spring in Labrador (Newfoundland and Labrador Biosphere, 2003) and occasionally travel to the island. Polar bear meat, like most country foods, is an excellent source of iron and protein. However unlike other game meats it has a high fat content of about 11.4g per serving (1 serving=85g or 3ounces) (Buege and Nitzke, 1995). Polar bear meat is rarely eaten. Polar bear fat contains vitamin A and omega-3 fatty acids which helps reduce the risk of heart disease. However polar bear liver contains excessive amounts of vitamin A and if eaten may cause symptoms of hypervitaminosis A.

1.6.2 Berries of Newfoundland and Labrador

Many different kinds of berries, cultivated and uncultivated, grow in Newfoundland and Labrador. Apart from the well known berries like blueberries, bakeapples, partrigeberries, raspberries and strawberries, many others grow wild in the province. Berries native to Newfoundland and Labrador are a rich source of readily available vitamins, minerals, dietary fibre and phytochemicals.

It has been noted that dried, canned or frozen berries tend to retain their nutrient content and are equally as delicious and healthful as fresh berries. In fact in some cases it has been noted that the antioxidant capacity of berries increased when they were stored at more than 0°C. The increase observed in antioxidant capacity through postharvest phenolic synthesis and metabolism suggests that commercially feasible technologies may be developed to enhance the health functionality of small fruit crops (Kalt, Forney, Martin, and Prior, 1999). Berries are rich in many antioxidant substances, particularly vitamin C, and polyphenols such as pro-anthocyanins, and tannins (Stark, Hall and Hendrickson, 1980). Out of the top ten fruits and vegetables ranked for their ability to eliminate Free oxygen radicals (FORs), four are berries, namely blueberry, blackberry, strawberry and raspberry (USDA, 1999)

1.6.2.1 Blueberry

Blueberries, also referred to as whortleberries and hurts in Newfoundland and Labrador, are native to the province and grow wild on approximately 400,000 acres of land. About

99% of the province's blueberries are harvested from Vaccinium angustifolium, which is the low bush variety, cultivated as well as wild. Very little fruit is obtained from the high bush variety Vaccinium corymbosum that grows more abundantly in British Columbia and the USA.

Blueberries are a good source of dietary fibre, vitamin C, beta-carotene as well as polyphenols including anthocyanins and condensed tannins (Wang, Cao and Prior, 1996). Kalt and McDonald (1996) report that lowbush blueberries from this province display a higher antioxidant capacity than those from many other parts of North America. According to scientists at Tufts University in Boston, blueberries demonstrate the most antioxidant activity when compared with 40 other fruits and vegetables (Prior, et al, 1998). In addition to their antioxidant properties anthocyanins also exhibit anti-adhesive properties and prevent bacteria from adhering to cell wall, thereby preventing infections (Howell, 2002; Penderson et al., 2000). Sweeney, Kalt, Mackinnon, Ashby and Gottscall-Pass (2002) report that the inclusion of blueberries in diet may also improve ischemic stroke outcomes.

One half cup (115g) or one serving of blueberries contains approximately 18 mg of vitamin C or 30% of the recommended daily intake, as well as high amounts of dietary fibre (4 g per serving) and antioxidant amounts equivalent to five servings of peas or carrots (Wang Cao and Prior, 1997).

Blueberries are a celebrated fruit in Newfoundland and Labrador. Each year the Brigus Blueberry Festival, which is held in mid-August, draws crowds from all over North America.

1.6.2.2 Partridgeberry

Partridgeberry (Vaccinium vitis-idaea L. var. minus Lodd) also referred to as lingonberry, cranberry, foxberry, or redberry in Labrador is another commercial wild fruit harvested from unmanaged natural stands (Hall and Shay, 1981). Partridgeberries are a staple in the diets of Newfoundlanders and Labradorians despite the fact that there are no partridgeberry farms like there are blueberry farms in the province (Collins, 1994). Vaccinium vitis-idaea L. var. minus Lodd is a low evergreen shrub (2 - 12 cm) that grows on rocky, dry peaty acid soils, barrens, and coastal headlands. Plants flower mid-June to mid-July and produce dark red berries that ripen by mid-September. Plants from Germany, where partridgeberries have been successfully grown commercially have been imported to Newfoundland and Labrador in an attempt to grow the berry experimentally and test its potential for commercial cultivation (Penney and Gallagher, 2002). One difference between the European and the local type is that while the former has two "flushes" of flowers (Dierking and Dierking, 1993) with the potential for two harvests annually, the local type flowers only once. The fruit of Vaccinium vitis-idaea has high tannin and anthocyanin content and is very acidic with an approximate pH of 2.5. Vitamin C content of the fruit was found to be 47mg per 100gm fruit which is two to

three times higher than the vitamin C contained in blueberries (Stark, Hall and Hendrickson, 1978).

1.6.2.3 Bakeapple

The bakeapple also referred to as cloudberry, salmonberry, and yellow berry (Rubus chamaemorus L.) is another of the provinces' wild fruits that grow in boggy barren lands and is harvested in late summer. The bakeapple is the fruit of a low, creeping herbaceous shrub with stalks that grow to a height of 7.6-25 cm. The stems are unbranched, hairless, with 1-3 leaves at the top. The bakeapple is a part of the rose family and is closely related to the raspberry and the blackberry. It is a yellow or orange coloured fruit that resembles a raspberry (Collins, 1994). Efforts to domesticate the plant have largely been unsuccessful.

The vitamin C and antioxidant content of bakeapple is considered to be very high (Stewart, Deighton and Davies, 2003). The vitamin C content of bakeapples from Newfoundland and Labrador varies between 50-110mg per 100g fruit (Stark, Hall and Hendrickson, 1980). This concentration is similar to and may even be greater than the vitamin C content of partridgeberries and considerably greater than that of blueberries. Bakeapples are well known and appreciated in many northern cultures and referred to by many names including molte (Norway), hjortron (Sweden), lakka (Finland), and cloudberry (England). Labrador City is said to be the bakeapple capital of the world and a

festival the bakeapple folk festival is held in various venues all over Labrador every year in mid-August.

1.6.2.4 Strawberry

The northern wild strawberry (Fragaria virginiana Mill, subsp. glauca [S. Watson] Staudt) grows wild in Newfoundland and Labrador, especially on the west coast of the island. The wild strawberry is smaller, has more seeds, is sweeter and more flavorful than the commercial variety (Vasseur, 2002). They are a source of 3.5g fibre per 100g fruit and 76mg vitamin C per 100g of fruit (USDA, 2003) and ellagic acid, a substance believed to have antimutagenic and anticarcinogenic properties (Maas, Wang, and Galletta, 1991). About 175 acres of land in Newfoundland and Labrador are being used to grow strawberries on a commercial scale (Forest Resource and Agrifood, Newfoundland and Labrador, 2003). Many Newfoundlanders and Labradorians consume store bought strawberries, which are often imports from the U.S. or from other provinces in Canada. The strawberry is celebrated in annual summer festivals such as the Humber Valley strawberry festival held each year.

1.6.2.5 Raspberry

Raspberries (Rubus idaeus L. subsp. strigosus (Michx) Focke) grow wild in the province but are relatively scarce. About 30 acres of land only in Newfoundland and Labrador are used for commercial raspberry farming (Forest Resources and Agrifoods, Newfoundland

and Labrador, 2003). Raspberries are a rich source of Vitamin C with approximately 24mg per 100g of fruit and 6.5g dietary fibre per 100g fruit (USDA, 2003).

1.7 Antioxidants and Oxidative Damage

The joint committee on DRI's has defined antioxidants as " a substance in food that significantly decreases the adverse effect of reactive oxygen and nitrogen species, on normal physiologic function in humans"

(Dietary Reference Intakes for Vitamin C. Vitamin E, Selenium, and Carotenoids, 2000, p. 42)

The pathologic basis of many chronic diseases is oxidative damage. Free Oxygen radicals FORs) or Reactive oxygen species (ROS) and reactive nitrogen species (RNS) can damage molecular and cellular structure. Antioxidants are intimately involved in the prevention of cellular damage, the common pathway for cancer, aging, and a variety of diseases. Experimental studies provide a sound biological rationale for the mechanisms of action of antioxidants, whereas epidemiological studies strongly sustain the "antioxidant hypothesis." (Marchioli, Schweiger, Levantesi, Tavazzi, and Valagussa, 2001; Jacob and Sotoudeh, 2002).

Oxidative damage is the primary mode of tissue injury in cardiovascular diseases (Jain et al., 2000; Pandya, 2002) and cancer (Tavani and La Vecchia, 1995).

Antioxidant substances include the vitamins C, A and E, the mineral Selenium and the phytochemicals. Scientific evidence suggests that an obvious strategy in the management of chronic disease would be administering antioxidant substances. Antioxidants may form a key component of a preventive strategy incorporating diet.

1.7.1 Phytochemicals

Phytochemicals are plant based non-nutrient, non-essential chemicals many of which act as powerful antioxidants and are believed to be beneficial to human health. The phytochemicals are chemically related compounds that give plants their color, flavor, smell, and texture. They include carotenoids and phenolic compounds among others. There are nearly 500 carotenoids that are known to occur in fruits and vegetables. Approximately 10% of all the carotenoids are precursors of vitamin A. Lutein, lycopene, alpha, beta and gamma-carotene, beta cryptoxanthin, zeaxanthin and xanthophyllys are some of the carotenoids that display antioxidant properties.

Plant phenols and polyphenols are derived from hydroxycinnamic acid and hydroxybenzoic acid. Polyesters of hydroxybenzoic derivatives with glucose form tannins that have significant antioxidant effects. More than 3000 flavonoids have been identified in fruits and vegetables. Non-flavanoids like ellagic acid also demonstrate antioxidant activity.

Numerous other bioactivities have been attributed to the flavonoids including anti-adhesive, anti-platelet, anti-inflammatory, anti-angiogenic, and anti-ischemic (Knekt et al, 2002; Maas, Wang and Galletta, 1991; Roy, et al., 2002). These and other such bioactivities may be responsible for the protective effect of fruits and vegetables when consumed whole, as opposed to consuming supplements.

Over the last few years much evidence has accumulated in support of the therapeutic role of phytochemicals in preventing many chronic diseases (Marchioli, Schweiger, Levantesi, Tavazzi, and Valagussa, 2001). Kuklinski, Weissenbacher and F„hnrich, (1994) showed that antioxidant protovitamin Q (ubiquinone) and flavonoids such as quercetin, rutin, resveratrol and catechin demonstrate a cardio-protective effect. Phytosterols, flavonoids and other antioxidants are believed to be inversely associated with cancers (Caperle, et al., 1996).

The Oxygen Radical Absorbance Capacity (ORAC) measures antioxidant activity of vitamins C, E, beta-carotene and phytochemicals that occur in fruits/vegetables (Hanasaki, Ogawa and Fukui, 1994). A method capable of quantifying the ORAC of antioxidants in plasma (Cao, Verdon, Wu, Wang, and Prior 1995) is important when we realize that scientists have shown that suboptimal plasma levels of antioxidants increase risk of disease (Gey, et. al., 1993; Block, Patterson, and Subar, 1992). Such studies support the view that intake levels should be based on individual requirements necessary to achieve optimal plasma levels of these micronutrients.

1.8 Consumption Patterns of Local Foods

Documentation of food consumption patterns in the form of nutrition surveys has not been done extensively in Newfoundland and Labrador. The earliest records of such work are reports presented by Adamson and colleagues in 1945, Cuthbertson in 1947 and Aykroyd and colleagues in 1949. These early works described mainly malnutrition and deficiency diseases prevailing at the time. The clinical problems were ascribed to the poor dietary habits of Newfoundlanders and Labradorians.

Dr. George Johnson traced the history of nutritional deficiency diseases and efforts to eliminate them in this province. Dr. Johnson also describes how the aboriginals suffered from the same deficiency diseases as the European settlers suffered when they changed from traditional food habits to European eating habits (Johnson, 1975).

The Bureau of Nutritional Sciences conducted a survey to determine nutritional status by region, population type, income, season, and life cycle group. The results of the survey conducted in Newfoundland suggested that mean caloric intake was higher than the national average. Yet the intake of many trace elements was inadequate in comparison to the rest of Canada (Bureau of Nutritional Sciences, 1975). However no information on consumption of indigenous foods by the non-aboriginal population was collected by this nation-wide survey.

In 1996 a province wide survey entitled Nutrition Newfoundland and Labrador (NNL) Survey was conducted and remains a source of the latest information on the dietary habits of residents of the province. It used a multistage cluster design to sample male and female residents of Newfoundland and Labrador between the ages of 18 and 74 years (Roebothan and Aucoin, 1998). The NNL survey is the only scientific survey available to date that collected information on consumption of indigenous foods by non-aboriginal populations.

1.8.1 Food Security in Newfoundland and Labrador

The World Bank defines food security as " access by all people at all times to sufficient food for an active, healthy life." (World Bank, 1986). Food security is determined by many socioeconomic factors like access and availability of food.

Food insecurity remains a recurring concern even to the present times, especially in the remote and rural communities of Newfoundland and Labrador. Historically food insecurity in this province was largely attributed to the inhospitable environment of the province, where land was infertile, transportation inadequate and poverty widespread (Adamson, et al., 1945).

Current research on issues of food insecurity in the province show that at the present time the prevalence of "lack of money as a cause of hunger" is similar to the Canadian national averages but slightly more Newfoundlanders and Labradorians say that "lack of

money can lead to poor choice of food" thus contributing to poor dietary habits (Newfoundland and Labrador, Health Accounts 2001).

CHAPTER II

RATIONALE AND OBJECTIVES

2.1 Rationale

It has been shown that the rates of some chronic diseases are higher in the province of Newfoundland and Labrador as compared to the national average (Statistics Canada, 2002; Health Canada, 2000). Prevention programs can potentially save millions of dollars in healthcare costs by providing outreach and education programs for persons at highest risk (Kaufman, 1990). The cost of chronic diseases resulting from factors such as poor nutrition habits is very high and therefore it is important to study nutrition habits to see where changes may prove helpful and whether they are possible.

This study will identify and characterize individuals residing in the province of Newfoundland and Labrador who consume native grown berries and game meats. It has been suggested that people who consume antioxidant rich foods such as berries are at a health advantage. A variety of berries rich in highly useful substances such as phytochemicals and fibre grow in this province and are often accessible and available year round (See section 1.6.2). These locally grown wild berries may be cheaper and in fact they may be picked at no cost whatsoever. Also they may be of better quality, and hence better able to promote health in residents of the province. People living in rural Newfoundland or remote areas of the province often have difficulty accessing regular adequate supplies of protein-based foods due to the high cost, poor quality and a limited

variety often found in retail outlets. For such communities game meats that are easily obtainable at a very low cost by hunting are low in fat and high in iron content and hence present a more healthful option.

Due to the prevalence of so many serious illnesses in the province it makes sense to investigate locally available, easily accessible healthful foods and relatively painless lifestyle changes that may contribute to better health for the people of this province. This study aims to provide a more insightful view of the traditional dietary habits that may not only be worth preserving but also worth promoting. This research is also important because once we are able to characterize consumers of indigenous foods and the reasons why they eat this kind of food, it will enable us to focus and direct possible promotion endeavours in the future.

2.2 Objectives

1. Identify individuals whose diet includes local game meats such as moose/caribou, rabbit, wild birds, seal, and bear.
2. Identify individuals whose diet includes native grown berries such as blueberries, raspberries, bakeapple, partridgeberries, strawberries and others.
3. Describe the demographic characteristics of individuals who consume local foods including their sex, age, area of residence, education, and income adequacy.
4. Explore factors associated with the consumption of indigenous foods to try to understand why they are consumed

- Compare urban/rural consumption to address the question of accessibility
- Compare income of consumers vs. non-consumers to address the issue of cost
- Compare other characteristics of consumers vs. non-consumers such as smoking, physical activity and nutrition supplement consumption to see if consumers appear to be more health-conscious than non-consumers.

5. Determine if there is seasonal variation in consumption of indigenous foods over the two seasons fall and spring.

6. Calculate percentage of respondents who consumed game meats and calculate the serving size.

7. Calculate servings of large game meats, small game meats, wild bird meat, and seal meat consumed per month.

8. Calculate percentage of respondents who consumed local berries and calculate the serving size.

9. Calculate servings of berries consumed per month.

10. Calculate litres of local berries consumed per person per year.

11. Examine whether residents of the province grow fruits/vegetables and whether individuals who do not, have land available to them if they want to grow their own fruits/ vegetables.

12. Compare amounts of game meats consumed to amounts consumed five years ago to examine the trend in consumption of such foods.

Chapter III

METHODOLOGY

3.1 Introduction

This study is a secondary analysis of some of the data collected by Nutrition Newfoundland and Labrador (NNL) in 1996 which was part of a nation-wide initiative to document food habits of Canadians. The NNL survey is a cross-sectional study conducted at the provincial level. The NNL survey primarily documented dietary habits of residents of Newfoundland and Labrador using the following five instruments: a Response/Non-Response Questionnaire, Form A2 (Appendix A); a quantitative Food 24-hour recall, Form B (Appendix B); Frequency Questionnaire, Form C (Appendix C); a provincial special interest questionnaire entitled Nutrition and Health Questionnaire Form D (Appendix D) and NNL Demographic Profile, Form E (Appendix E). The Nutrition and Health Questionnaire is unique to Newfoundland and Labrador as it surveys indigenous food habits of residents of the province (Weston and Laffey, 2001). The data relating to indigenous foods and their consumption obtained from the Nutrition and Health Questionnaire, Form D constitutes the major focus of the present study. The data obtained from NNL is representative of the residents of the province and was conducted in eleven designated areas throughout the province (Appendix F).

3.2 Study Population and Sample Design

The study includes all the individuals sampled by the NNL survey who responded to the Nutrition and Health Questionnaire, 24-Hour Recall and the Food Frequency Questionnaires. The NNL survey used a multistage stratified cluster design to sample men and women between the ages of 18-74 years inclusive, living in Newfoundland and Labrador. Excluded from the NNL survey were institutionalized individuals and those living on reserves or military camps, as well as pregnant and lactating women. The Newfoundland and Labrador Health Insurance Register File (NLHIRF or MCP file) was used to select the sample for the survey. The survey represented urban as well as the rural population of the entire province. Data was collected both on weekdays and on weekends. The survey was designed to select independent samples for two seasons, spring and fall (Nargundkar, 1996).

For the purpose of this study the sample population was divided into groups based on whether they consumed native grown berries or not and whether they consumed game meats or not. Consumers of locally grown berries and indigenous game meat were then characterized. The demographics, socioeconomic characteristics and health behaviour indicators of consumers were compared to nonconsumers.

3.3 Consent, Confidentiality and Approval

Consent for the original NNL survey was obtained in person at the time the interviews were conducted. Consent in the case of the present study is implied as it is a secondary analysis of data collected by NNL.

A number of measures were adopted to ensure confidentiality for the participants of the survey. For the purpose of the present study the researcher signed an oath of confidentiality in the presence of a notary public and witness (Appendix G). The files are kept in a locked storage area at the Memorial University of Newfoundland and access is limited. The computer files are on a secure server and are pass-word protected.
The original study Nutrition Newfoundland and Labrador, 1996 was granted full approval by the Committee on Research with Human Subjects, Faculty of Science, Memorial University of Newfoundland. Approval was granted for the present study by The Memorial University Faculty of Medicine Human Investigation Committee on 25 July 2002, for a period of one year (Appendix H).

3.4 Variables

Data were categorized into 2 groups based on whether they consume local berries or not and into 2 groups based on whether they consume game meats or not. Other issues studied include household consumption of berries, growing fruits/vegetables, availability of land amongst those who do not grow fruits/vegetables and whether there was any change in consumption of game meats as compared to five years ago.

3.4.1 Consumers and Nonconsumers of Game Meats and Berries

A consumer of game meats is an individual who had consumed one or more of the game meats including moose/caribou, rabbit, wild bird meat, seal or bear meat at least once over the past twelve consecutive months (Question 35, Part III, Form D, Appendix D). A consumer of local berries is an individual who had consumed one or more of the berries including blueberry, raspberry, bakeapple, partridgeberry, strawberry or other berry (See Appendix I) at least once over the past twelve consecutive months (Questions 29 & 30, Part III, Form D, Appendix D). A nonconsumer is an individual who had not consumed any of the game meats or berries over the same period of time. Respondents were regrouped based on definition of consumer and nonconsumer of game meats/berries and recoded into a numeric variable for the purpose of analysis.

3.4.2 Socioeconomic and Demographic Variables

3.4.2.1 Age and Sex

Both males and females were studied. Subjects were classified by age in two different ways. When studied for age, subjects were divided into 6 age groups (18-24, 25-34, 35-44, 45-54, 55-64 and 65-74 years). However when studied for type of berry and type of game meats consumed, subjects were divided into 8 age-sex groups (males and females18-34years, 35-49years, 50-64years, 65-74years).

3.4.2.2 Area of Residence

In the NNL survey a multistage stratified cluster design was used. Eleven population centres representing six large populations of 10,000 or more, three medium sized populations between 4000-10,000 and two small populations below 4000 were chosen. However for the purpose of this study the 6 large population centers (population 10,000 or more) were designated as urban and included St. John's, Mount Pearl, Corner Brook, Gander, Grand Falls/Windsor and Labrador city. The three medium and two small sized populations were designated rural and included Carbonear, Bonavista, Stephenville/Stephenville Crossing, Census district 1 and 4 (Appendix F). Statistics Canada defines urban as a population of 10,000 or more and rural as a population of less than 10,000 (Statistics Canada,1996).

3.4.2.3 Education Level

The original NNL survey contained 10 categories of education level. Respondents were asked to confirm the highest grade or level of education they had attended or completed (Appendix E). For the purpose of the current study the 10 categories were regrouped into 4 categories (1 to 4) as described in detail below.

- Education category 1: Consists of categories 1, 2 and 3 in the original NNL survey. Includes individuals who have no schooling or have either completed or have some elementary schooling.

- Education category 2: consists of categories 4 and 5 in NNL survey. Includes individuals who either completed or have some secondary education.
- Education category 3: consists of categories 6, 7 and 10 in NNL survey. Includes individuals who have completed some or all of a program offered by a community college, technical college or nurse's training. This group also contains individuals who specified that they had "other education or training" (Appendix K).
- Education category 4: consists of categories 8 and 9 in NNL survey. Includes individuals who have completed some or all of a program offered by a university.

3.4.2.4 Income adequacy

Respondents were asked during the interview to indicate what letter applied to their total household income before taxes. The household income levels were designated letters of the alphabet A to I, where A was the lowest income category (<$5000) and H the highest income category (≥$60,000). The last choice I "I do not know" was also offered to the original respondents (Appendix, E). Income adequacy, a household variable was calculated using reported income, household size i.e., number of individuals in each household (Question 1, Form E, Appendix E) and the provincial low income cutoff points, following procedures used in Canada Census as described by Russell Wilkins in1995 (Refer to Appendix J). The three groups of income adequacy employed in this study included low, middle, and high income adequacy groups.

3.4.3 Health Behaviour Indicator Variables

This study examined some health related behaviors of consumers versus non-consumers pf game meats and berries. The three variables used as indicators of health behaviour were smoking, physical activity and vitamin/mineral consumption.

A smoker was defined as an individual who answered "Yes" to the question " At the present time do you smoke?" (Question 17, Part II, Form D, Appendix D). A respondent was considered physically active if he/se answered "Yes" to the question "In your spare time, do you do any sport, physical activity, or hard work that would make your heart beat rapidly such as hockey, soccer, swimming, jogging or aerobics?" (Question 13, Part II, Form D, Appendix D). A respondent was considered to be a user of vitamin/mineral supplement if he/she answered "Yes" to the question "During the past month, did you use any vitamin/mineral supplement?" (Question 3, Form A2, Appendix A).

3.4.4 Other Issues Studied

Interviews were conducted during two separate seasons and intakes of the two seasons were compared. Season 1 designates spring/summer data that were collected in May, June, and July. Season 2 designates fall/winter data that were collected in September, October, November, and December.

Data was analyzed to study whether individuals or their families grow their own fruits/vegetables (Q. 32, Part III, Form D, Appendix D). To get a partial explanation of

why or why not, we analyzed the answers to a question addressed only to those who stated that they did not grow their own fruits/vegetables " If you wanted to grow fruits/vegetables would you have land available?" (Q.33, Part III, Form D, Appendix D).

In an attempt to see if the practice of consuming indigenous foods has changed much over recent years we analyzed answers to the question "did you eat more, about the same, or less game meat this year as compared to five years ago?" (Q.36, Part III, Form D, Appendix D).

3.5 Calculating Amounts and Frequencies of Indigenous Foods Consumed

The study primarily examines the frequency of indigenous food consumption but it was important that the amounts in which these foods are consumed was estimated as well. Frequency was determined using Form D (Appendix D) as explained in section 3.4.1. Data from the 24-Hour Recall was used to estimate the amount of game meat consumed. The number and percentage of respondents who had consumed game meats was calculated using unweighted 24-Hour Recall data. The game meats consumed on the day of the interview included moose/caribou, rabbit, wild birds and seal. All of those who consumed game meats on the day of the interview had consumed only muscle meat, with the exception of two instances where one individual consumed cooked caribou heart and another consumed boiled seal blubber. The serving size of the most frequently consumed game meat i.e., moose was calculated using weighted 24- Hour Recall data. Only information from those subjects who had consumed moose meat during the 24 hours

preceding the interview was employed. The median, mean, minimum and maximum serving sizes were calculated for moose meat.

To calculate the number of servings of large game meat (primarily moose or caribou) consumed per month data from the Food Frequency Questionnaire (Appendix C) was used. No respondents had consumed large game meat on a daily basis however some had consumed the meat on a weekly and some on a monthly basis. For respondents who had consumed the meat on a weekly basis the amounts were multiplied by a factor of 4.28 to represent amounts consumed on a monthly basis. The amounts thus obtained were then divided by the serving size 137g, as calculated from the 24-Hour Recall data, to obtain servings consumed per month. Similarly portions of small game meat (primarily rabbit), wild bird meat and seal meat consumed per month were also calculated (Questions 25,26, 27, Form C, Appendix C). However instead of a calculated serving size, a pre-determined standard reference volume equal to 74g was used as a portion size. This standard reference volume was approximated as a portion size by Health Canada when they developed questionnaires for earlier provincial nutrition surveys. This was necessary because the number of individuals who consumed small game meats, wild bird meat and seal meat according to the 24-hour recall were too few to calculate a valid or representative median serving size.

The number and percentage of respondents who had consumed local berries was calculated using unweighted 24-Hour Recall data. The berries consumed on the day of

the interview included blueberries, strawberries, partridgeberries and bakeapples. The serving size of the most frequently consumed local berry i.e., blueberries was calculated using weighted 24-Hour Recall data. Only information from those subjects who had consumed blueberries during the 24 hours preceding the interview was employed. The median, mean, minimum and maximum serving sizes were calculated for blueberries.

Amounts of local berries consumed were calculated using information from the Nutrition and Health Questionnaire (Question 31, Form D, Appendix D). Litres of local berries consumed per person per year was obtained by dividing the amounts consumed in litres per household by the number of individuals in each household.

In the interest of presenting information about monthly consumption of indigenous foods in a uniform way, servings of berries consumed by respondents per month was calculated using a method which was slightly different from that used to calculate servings of game meats consumed per month. This was necessary because the Food Frequency Questionnaire did not contain any information on consumption of berries. Therefore the information contained in the Nutrition and Health Questionnaire (Question 31, Form D, Appendix D) was used. The information available was litres per household per year. This was converted to litres per month. To obtain the number of servings consumed per resident per month, the amounts were divided by the median serving size of 18g as calculated from the 24-Hour Recall.

3.6 Data Analysis

The data analyzed in this study were obtained from the pre-existing database belonging to the NNL survey. The original data files were stored in SAS format. However these files were made available for the present study in the Statistical Package for Social Sciences (SPSS) format. The data were analyzed using SPSS Version 11. Analysis was carried out primarily on data weighted to reflect the overall population of the province (Weston and Laffey, 2001)

Descriptive statistics including frequencies and cross tabulation were used to analyze data. Chi square analysis, a non-parametric method that measures the degree of association between two categorical variables was employed for further analysis. A Yates correction was applied in case of 2x2 tables. Chi square analysis was carried out to measure the degree of association between consumers of game meats and local berries with sex, age, area of residence, education level, income adequacy, smoking, physical activity and vitamin/mineral supplement intake.

The study is population based hence it was deemed appropriate to subject it to a more rigorous standard thereby avoiding results that would only be a function of the large sample size. Therefore the level of significance chosen was at $p<0.01$(Daniel, 1999) and only when the p value was found to be <0.01 was the difference between the variables under consideration taken to be significant. If statistical significance was found it is

indicated on the appropriate table or figure with an asterisk. If weighted data were employed for analysis it is indicated on the appropriate table or figure.

The data in the tables are presented as % (n). The percent (%) refers to a percent of total population in the province as weighted data was used in calculation and (n) represents the actual number of respondents to that question.

CHAPTER IV

RESULTS

4.1 Introduction

The following section presents detailed results obtained from the secondary analysis of data collected by the NNL survey, 1996. The respondents were 1927 randomly selected residents of Newfoundland and Labrador, 18 to 74 years of age. Pregnant and lactating women, people living in institutions and on reserves were excluded from the survey. Of the 1927 reliable responders, 922 were interviewed in the spring and 1005 in the fall.

4.2 Response Rate

The present study analyzes data on indigenous food consumption of all the respondents of the NNL survey. Weston and Junkins (2002) describe the data collection response rate of the NNL survey as being 51.4% (Appendix L). Table I presents the demographic characteristics of the NNL sample as compared to findings on residents of Newfoundland and Labrador according to Canada Census, 1996.

Table 1: Characteristics of the NNL Sample as Compared to Findings on Residents of Newfoundland and Labrador According to Canada Census, 1996

Characteristics of the Sample	NNL Survey % [a]	NL, Canada Census % [b]
Sex		
Male	50.3%	50.6%
Female	49.7%	49.4%
Age		
18-24	18.5%	15.7%
25-34	20.2%	21.8%
35-44	18.3%	23.5%
45-54	23.4%	18.7%
55-64	9.8%	11.4%
65-74	9.8%	8.78%
Area of Residence		
Urban	41.4%	56.9%
Rural	58.6%	43.1%
Education [c]		
Without High School Certificate	5.2%	17.4%
With Some or Completed High School Certificate	45.2%	37.7%
Trades or Non-University	25.4%	26%
University	24.2%	19%
Income [d]		
Median Household Income	Range $30,000-40,000	$41,064

[a] Percentages calculated using population weighted NNL survey data.
[b] Data obtained from Canada Census, 1996.
[c] Education Data includes individuals 15 years and older for Census Canada only.
[d] Household Income recorded as a range only in case of NNL .

4.3 Frequency of Consumption of Indigenous Foods

Analysis of data from 1925 individuals who responded to questions on indigenous foods (Form D, question 29 and 35) revealed that 79.5% and 93% had consumed game meats and wild berries respectively at least once over a period of twelve consecutive months prior to the interview (Figure 1). Table 2 shows the age-sex distribution of the respondents by type of game meat consumed at least once over the past year. Table 3 shows the age-sex distribution of the respondents by type of berry consumed at least once over the past year. About 21% of the responders said they had consumed other berries. These included the following berries marshberries, gooseberries, black currants, red currants, wildberries, cherries, dogwoodberries/dogberries, English plum boys, squashberries, blackberries, cranberries, chuckly pears, jointwoodberries, damson plums, trashberries, manna tea berries, mulberries, creeping snowberries, rambleberries, green gages and choke cherries (Appendix I).

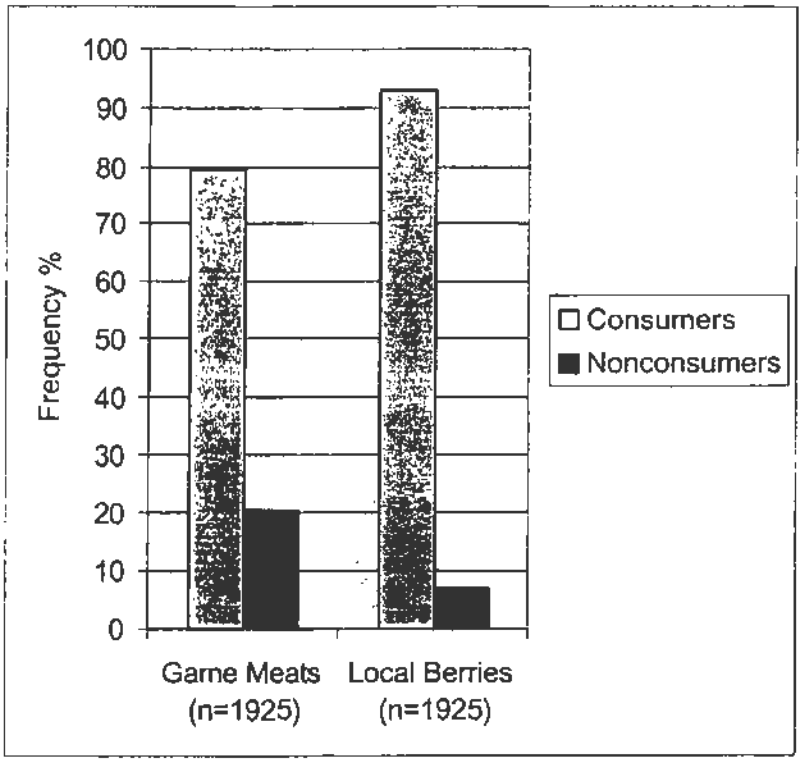


Figure 1: Distribution of Study Sample by Indigenous Food Consumption

[a] A consumer was a survey respondent who answered "yes" to whether they had eaten any of the game meats or berries at least once over the past twelve consecutive months (Q. 30 & 35, Form D, Appendix E).

Table 2: Age-Sex Distribution of Consumers of Game Meats

Age-Sex Group	Type of Game Meat				
	Moose/Caribou %[a](n)[b]	**Rabbit % (n)**	**Wild Birds % (n)**	**Seal % (n)**	**Bear % (n)**
Totals	**75 (1442)**	**34 (652)**	**26 (504)**	**24 (464)**	**3 (49)**
Male					
18-34	89 (208)	48 (96)	38 (92)	22 (62)	9 (16)
35-49	85 (227)	47 (112)	34 (97)	27 (82)	4 (13)
50-64	84 (220)	50 (115)	33 (86)	38 (105)	3 (8)
65-74	79 (140)	52 (89)	32 (57)	39 (71)	0.3 (1)
Female					
18-34	60 (174)	16 (38)	11 (41)	4 (16)	2 (5)
35-49	76 (191)	32 (69)	21 (54)	17 (44)	2 (4)
50-64	71 (182)	30 (77)	19 (54)	16 (50)	0.6 (2)
65-74	58 (100)	36 (56)	12 (23)	16 (34)	0 (0)

N=1925

[a] Values are given as percentage of total population within age-sex group that consumed the meat at least once during the past year. Percentages were calculated from weighted data.
[b] n refers to number of respondents.

Table 3: Age-Sex Distribution of Consumers of Local Berries

Age-Sex Group	Type of Berry					
	Blueberry %[a] (n)[b]	**Raspberry % (n)**	**Bakeapple % (n)**	**Partridge % (n)**	**Strawberry % (n)**	**Other[c] % (n)**
Totals	**85 (1636)**	**53 (1012)**	**44 (845)**	**61 (1182)**	**70 (1347)**	**21 (414)**
Male						
18-34	82 (195)	52 (117)	33 (76)	44 (110)	75 (165)	23 (37)
35-49	87 (227)	52 (129)	46 (116)	60 (159)	70 (176)	34 (71)
50-64	89 (220)	60 (153)	61 (138)	76 (188)	74 (177)	35 (73)
65-74	88 (156)	56 (96)	55 (93)	71 (137)	74 (129)	38 (59)
Female						
18-34	79 (231)	51 (146)	24 (71)	30 (105)	79 (206)	9 (22)
35-49	90 (233)	56 (141)	52 (120)	62 (171)	75 (188)	21 (45)
50-64	90 (235)	53 (137)	55 (138)	74 (192)	68 (183)	31 (71)
65-74	85 (139)	60 (93)	59 (93)	71 (120)	76 (123)	30 (36)

N=1925

[a] Values are given as percentage of total population within age-sex group that consumed berries at least once during the past year. Percentages were calculated from weighted data.
[b] n refers to number of respondents.
[c] Other berries are named in Appendix I.

4.4 Socioeconomic and Demographic Characteristics of Consumers Versus Nonconsumers

The results in this section refer to data from the Nutrition and Health Questionnaire (Appendix E) and the NNL Demographic profile (Appendix C). Figure 2 compares consumers of game meats and berries by sex. Statistical analysis used Chi squared test of association. Game meats were consumed more often by males ($p<0.001$). Berries were consumed more often by females ($p=0.006$). Figure 3 shows the frequency of consumption of game meats and berries by age. Game meats only were found to be associated with age ($p<0.001$). Figure 4 compares consumers of game meats and berries by area of residence. Game meat consumers were more often rural residents. Chi square analysis shows a significance of $p<0.001$ between consumption of game meats and area of residence. Figure 5 shows the frequency of consumption of game meats and berries by education level, ranging from some with no formal schooling to some who have completed more than one university degree. Game meats were found to be consumed differently by education level with a significance of $p<0.001$. Figure 6 shows consumers of indigenous foods by income adequacy. Income adequacy considers both the income of the family unit for the year prior to the interview plus the number of individuals in the family (Appendix J). Game meats were consumed more often by respondents in the low income adequacy group ($p<0.001$). Table 4 contains data pertaining to the consumption of game meats and local berries by season. Neither the consumption of game meats nor berries was found to be different by season.

Game meats were more likely to be consumed by older males, who are not highly educated, have low income adequacy and are residents of rural areas. Berries on the other hand are more likely to be consumed by females.

4.5 Health Behaviours of Consumers of Indigenous Foods

The three variables used as indicators of health behaviour were cigarette smoking, physical activity and consumption of vitamin/mineral supplement. Figure 7 shows frequency of consumption of indigenous foods by smoking habit. Smokers and non-smokers consumed berries differently with a significance of $p<0.001$. Non-smokers were more likely to consume berries. Figure 8 shows consumers of indigenous foods by physical activity. There is no significant difference between consumption between those who are physically active and those who are not. Figure 9 shows consumers of indigenous foods by vitamin/mineral supplement intake. There is no significant difference between consumption of those who took vitamin/mineral supplement compared to those who did not.

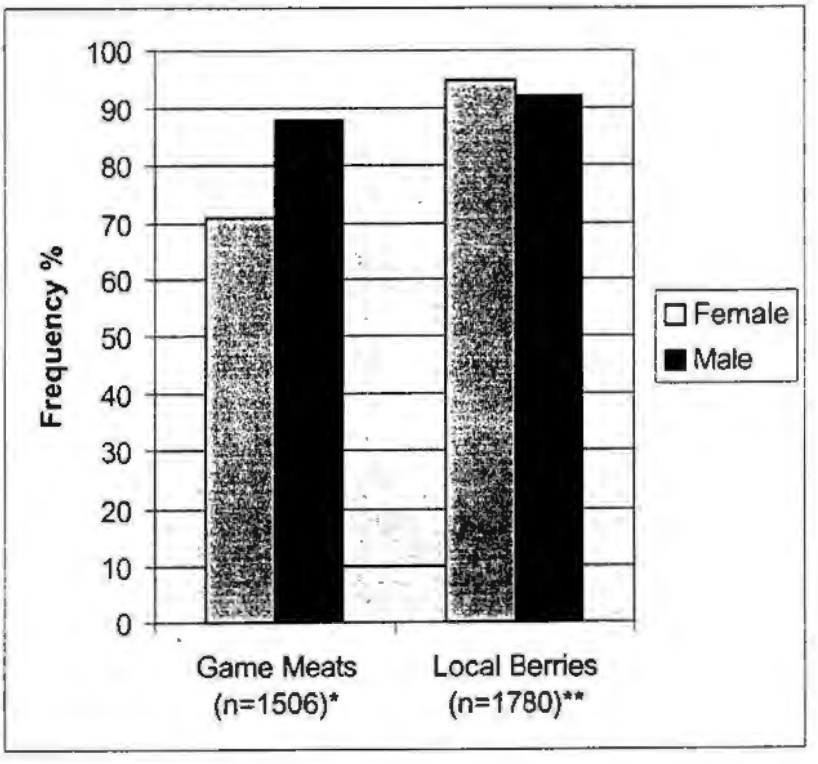


Figure 2: Consumers of Indigenous Foods by Sex

*Game meats were consumed more often by males than females with χ^2=79.5, df =1, and p<0.001.
**Berries were found to be consumed more often by females than males with χ^2= 7.4, df =1, and p=0.006.

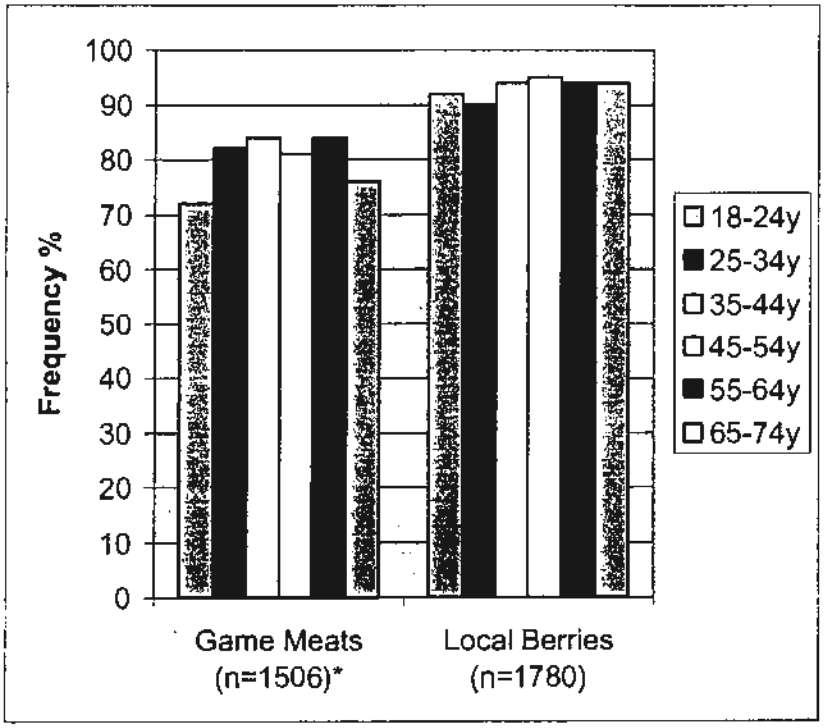


Figure 3: Consumers of Indigenous Foods by Age

*Game meats only were found to be consumed differently by age groups with $\chi^2 = 23.3$, df = 5 and $p<0.001$.

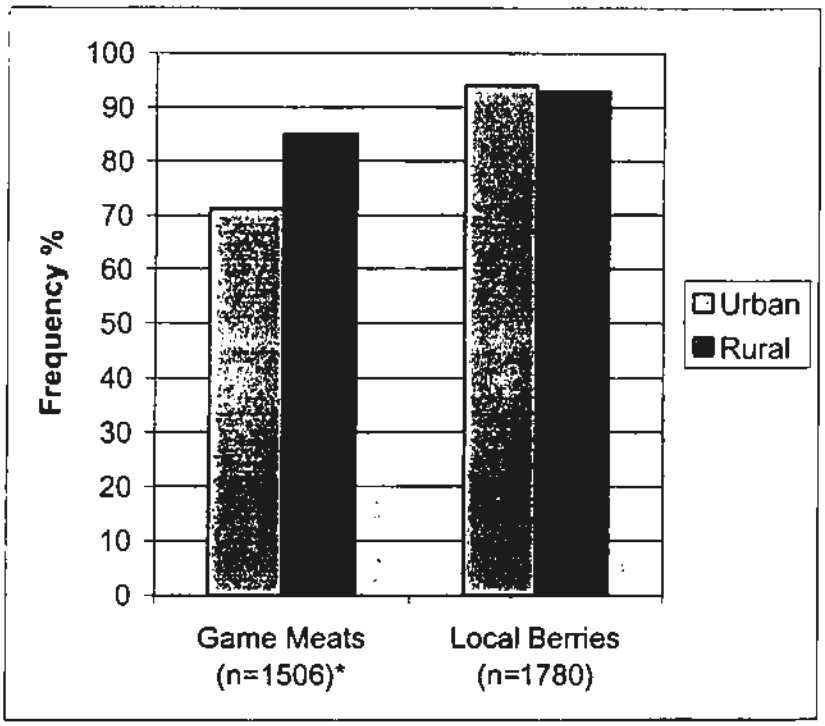


Figure 4: Consumers of Indigenous Foods by Area of Residence

*Game meats only were found to be consumed more by rural residents $\chi^2 = 55.9$, df = 1 and $p<0.001$.

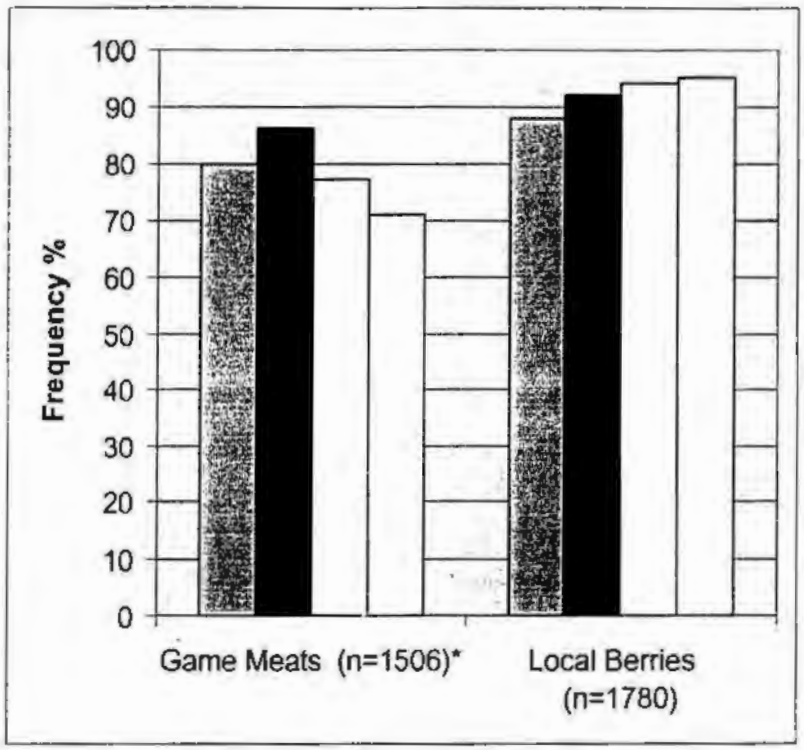


Figure 5: Consumers of Indigenous Foods by Education Level

■ Elementary School refers to those who have completed elementary school or less
■ High School refers to those who either completed or have some secondary education
□ Community/Technical College refers to those who have completed some or all of a program offered by a community, technical or nursing college
□ University refers to those who have completed some or all of a program offered by a university

*Game meats only were found to be consumed differently by education level with $\chi^2 = 42.848$, df = 3 and $p<0.001$.

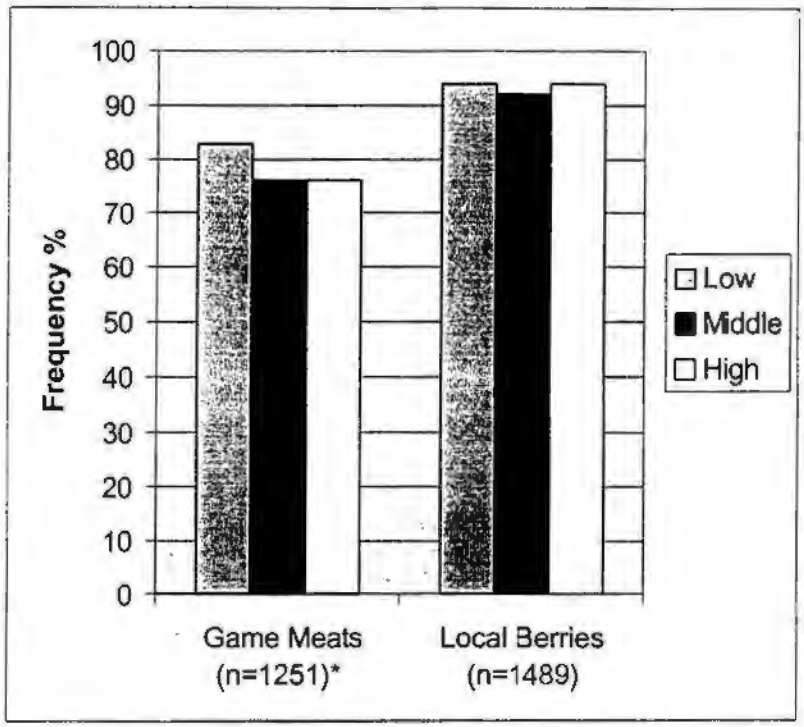


Figure 6: Consumers of Indigenous Foods by Income Adequacy[a]

*Game meats were consumed more often by people in the lower income adequacy group with $\chi^2 = 14$, df = 2, and $p<0.001$.

[a] Refer to Income Adequacy Table adapted from Russell Wilkins, Canadian Centre for Health Information, Statistics Canada, 1995 (Appendix J).

Table 4: Consumption of Game Meats and Local Berries by Seasons

	Game Meats		Berries	
	Spring %[a] (n)[b]	Fall % (n)	Spring % (n)	Fall % (n)
Consumers	81(726)	79 (780)	92 (839)	94 (941)
Nonconsumers	19 (195)	21 (224)	8 (82)	6 (63)
Totals	(921)	(1004)	(921)	(1004)

N=1925

[a] Values are given as percentage of total population that consumed indigenous food at least once during the past year within that season. Percentages were calculated from weighted data.
[b] n refers to number of respondents.

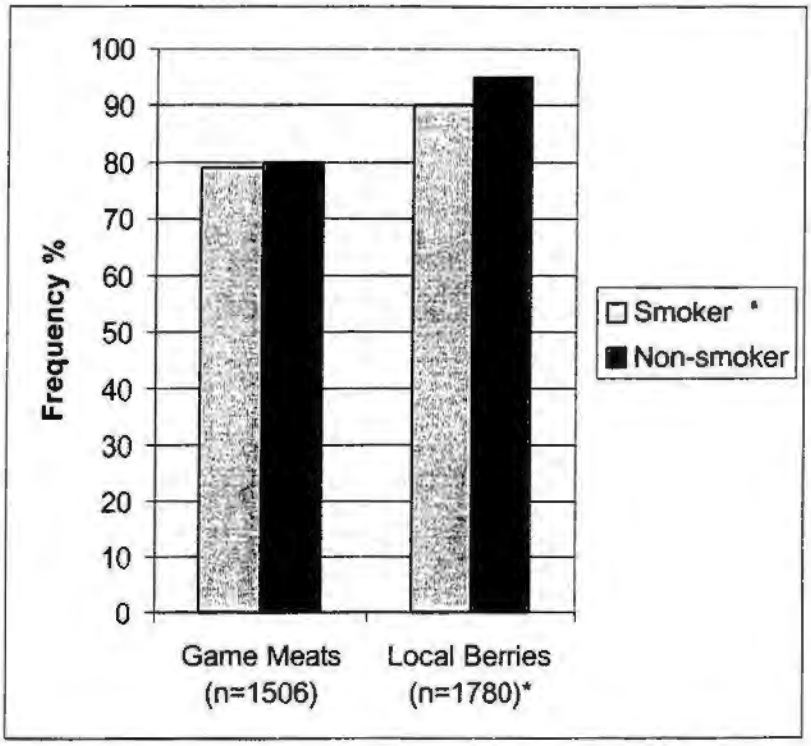


Figure 7: Consumers of Indigenous Foods by Smoking Habits

* Berry consumption only was found to be significantly associated with smoking habits with Yates χ^2 correction= 15.664, df = 1, and $p<0.001$.

*Individuals who said they smoked cigarettes at the present time were included (Q.17, Form D, Appendix D).

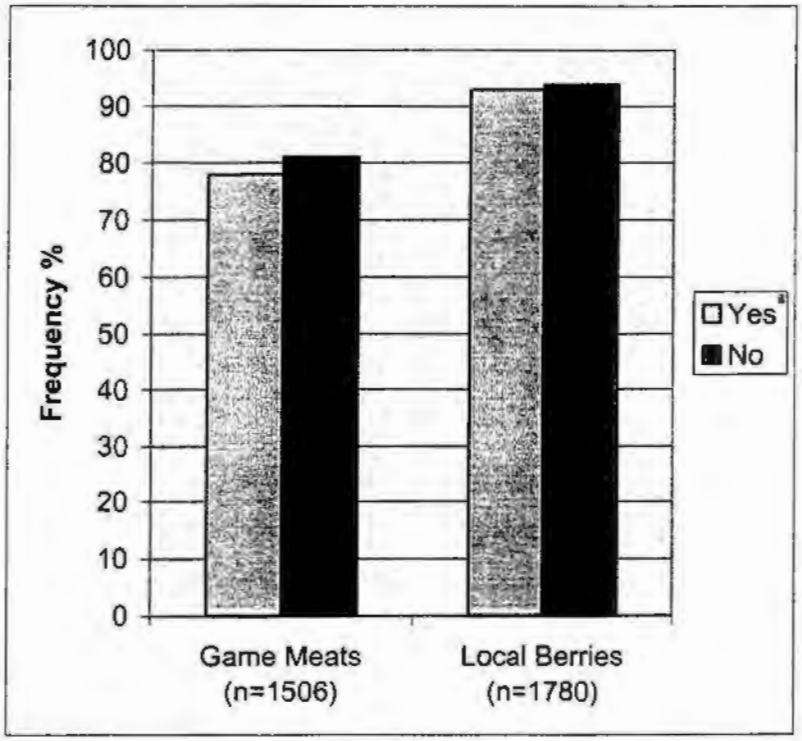


Figure 8: Consumers of Indigenous Foods by Physical Activity

[a] Individuals who answered "yes" to the question " In your spare time, do you do any sport, physical activity, or hard work that would make your heart beat rapidly such as hockey, soccer, swimming, jogging or aerobics (Q.13, Form D, Appendix D).

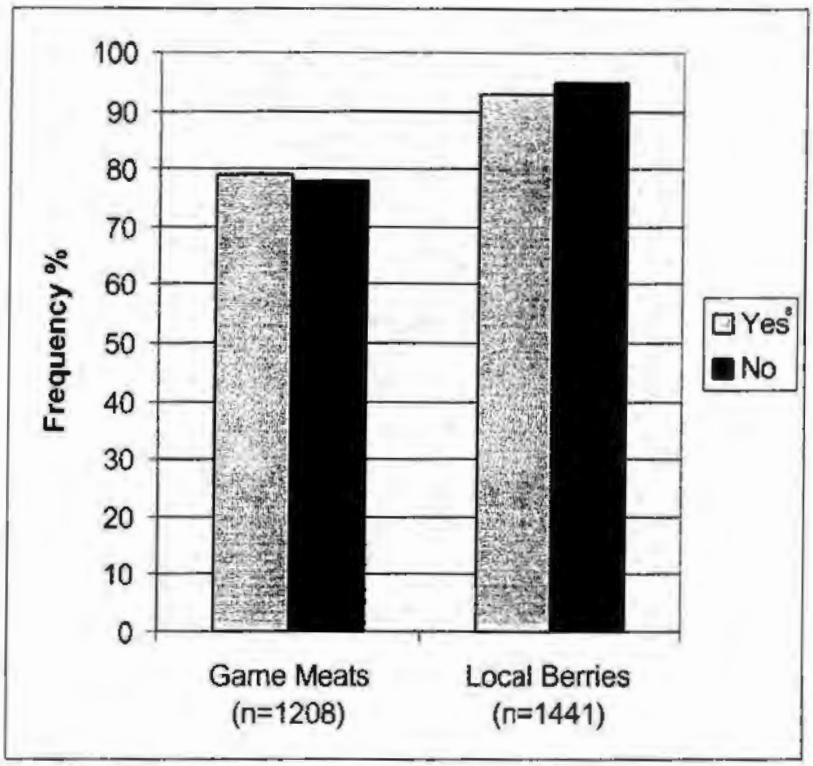


Figure 9: Consumers of Indigenous Foods by Vitamin/Mineral Supplement Intake

[a] Individuals who said "yes" to the question "During the past month, did you use any vitamin/mineral supplement?" (Q. 3, Form A2, Appendix A).

4.6 Amount of Game Meats Consumed

This section presents data on amounts of game meats consumed by the respondents. Table 5 shows the types of game meats cited in the 24-hour recall and the number and percentage of individuals who consumed that type of game meat on the day of the actual interview according to that particular questionnaire. The mean and median serving size of moose meat is presented in Table 6. Table 6 also shows the minimum and maximum amounts of moose meat consumed overall and by sex on the day of the interview.

Figure 10 shows the frequency of consumption of large game meat (primarily moose or caribou) by number of servings consumed per month. The serving size used was 137g as calculated from 24-hour recall data (See section 3.8.2). Figure 11 shows the frequency of consumption of small game meat (primarily rabbit) by number of portions consumed per month. Figure 12 shows the frequency of consumption of wild bird meat by number of portions consumed per month. Figure 13 shows frequency of consumption of seal meat by number of portions consumed per month. The portion size for small game meat, wild bird meat and seal meat used to calculate portions consumed per month was a given reference volume equal to 74g (See section 3.5).

4.7 Amount of Local Berries Consumed

Table 7 shows the types of berries cited in the 24-hour recall plus the number and the percentage of respondents who consumed each type of berry.

Table 5: Number and Percentage of Respondents who Consumed Game Meats According to 24-Hour Recall

Game Meat Cited in 24-Hour Recall Data	Number of Individuals that Consumed the Game Meat %[a] (n)[b]
Moose/Caribou	7 (139)
Rabbit	1 (20)
Wild Bird	0.15 (3)
Seal	0.40 (7)

N=1927

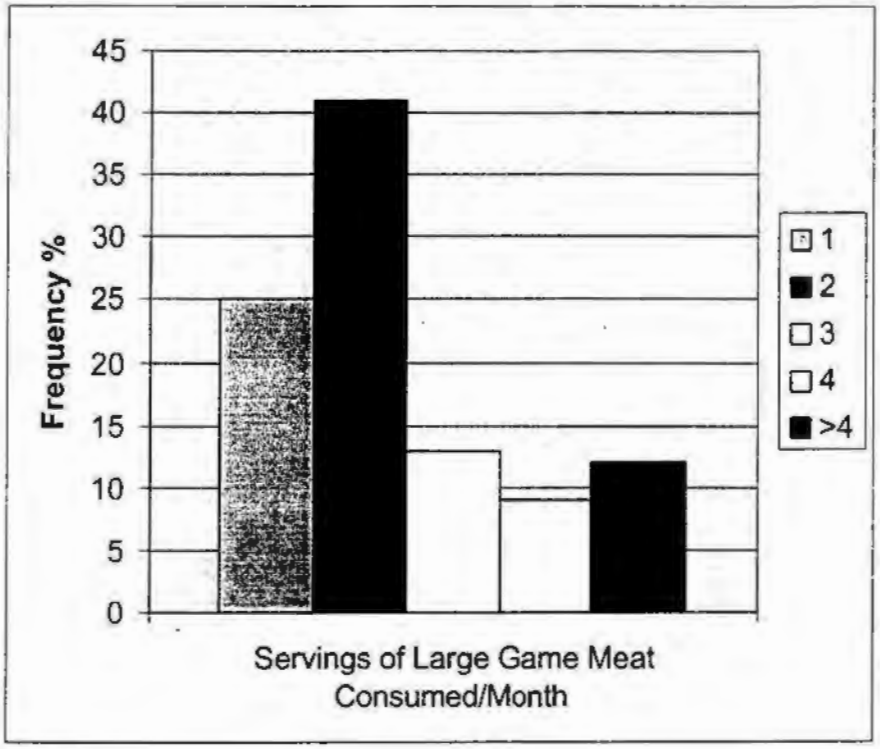
[a] Values are gives as percentage of respondents who consumed game meats on the day of the interview.
[b] n refers to number of respondents.

Table 6: Serving Size of Moose Meat Calculated from 24-Hour Recall data

Amounts Consumed[a]	Overall	Males	Females
Median Serving Size (g)	137	182	117
Mean Serving Size (g)	190	215	157
Minimum Serving Size (g)	23	23	54
Maximum Serving Size (g)	597	554	597

n=65

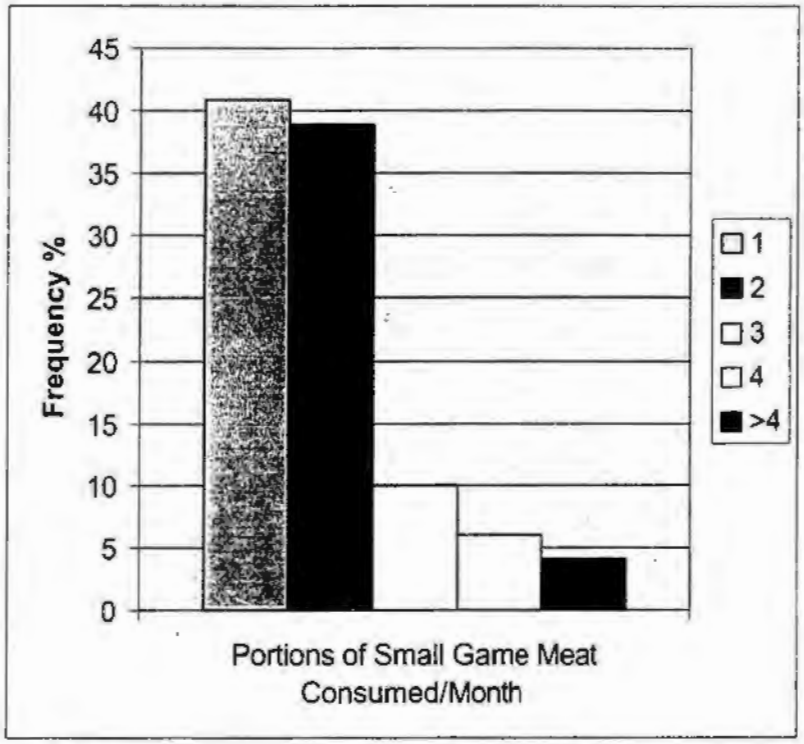
[a]All values are calculated using population weighted data from 24-hour recall data.



n=799[a]

Figure 10: Servings[b] of Large Game Meat Consumed by Respondents per Month

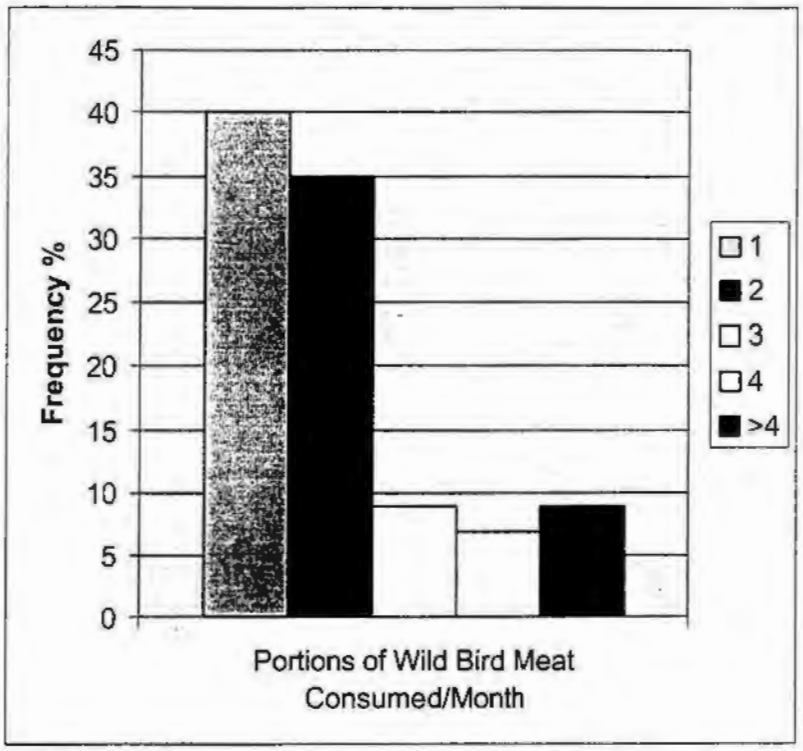
[a] Considers only those individuals who said they consumed large game meat (q.24, Food Frequency Questionnaire, Appendix C).
[b] 1 serving =137g.



n=184[a]

Figure 11: Portions[b] of Small Game Meats Consumed by Respondents Per Month

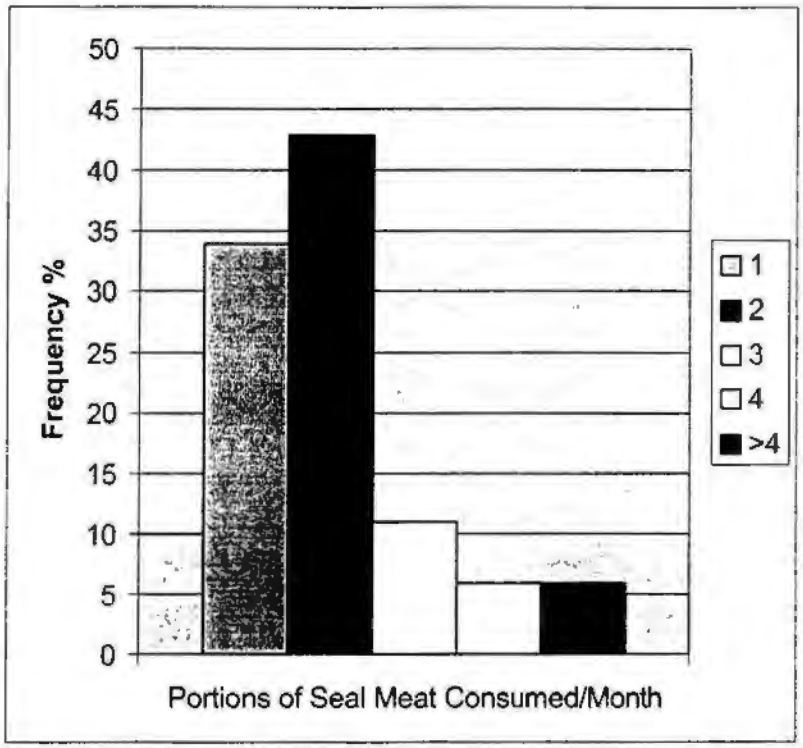
[a] Considers only those individuals who said they consumed small game meat (q.25, Food Frequency Questionnaire, Appendix C).
[b] 1 portion = 74g (reference volume).



n=118[a]

Figure 12: Portions[b] of Wild Bird Meat Consumed by Respondents Per Month

[a] Considers only those individuals who said they consumed wild bird meat (q.26, Food Frequency Questionnaire, Appendix C).
[b] 1 portion = 74g (reference volume)



n=115[a]

Figure 13: Portions[b] of Seal Consumed by Respondents Per Month

[a] Considers only those individuals who said they consumed seal (q.27, Food Frequency Questionnaire, Appendix C).
[b] 1 portion = 74g (reference volume).

Table 7: Number and Percentage of Respondents who Consumed Local Berries According to the 24-Hour Recall

Berries Cited in 24-Hour Recall Data	Number of Individuals that Consumed the Berry %[a] (n)[b]
Blueberries	4 (76)
Strawberries	3 (58)
Partridgeberries	2 (35)
Bakeapples	0.05 (1)

N=1927

[a] Values are gives as percentage of respondents who consumed game meats on the day of the interview.
[b] n refers to number of respondents.

The mean and median serving size of blueberries consumed by respondents is presented in Table 8. Table 8 also shows minimum and maximum servings of blueberries consumed overall and by sex on the day of the interview.

Figure 14 shows litres of berries consumed per person each year. Figure 15 shows the servings of berries consumed per month. This figure presents number of servings of berries consumed per month. The serving size used to estimate servings of berries consumed per month was 18g as calculated from 24-hour recall (See section 3.5).

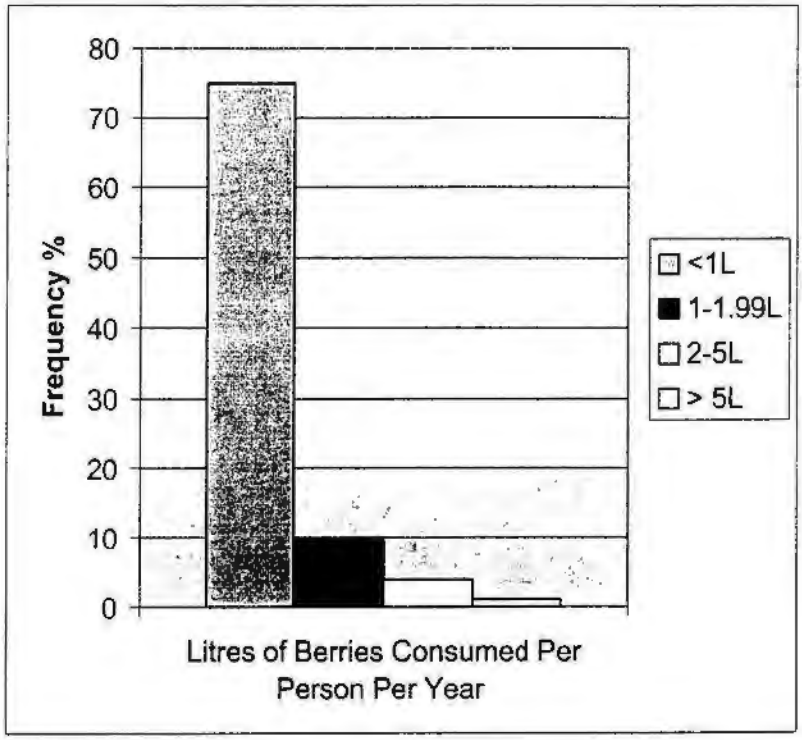
Table 9 shows whether respondents or their families grow fruits/vegetables by area of residence and whether those who do not grow fruits/vegetables have land available to them if they wanted to grow their own fruits/vegetables. Rural residents were more likely to grow their own fruits/vegetables ($p<0.001$). Table 10 shows whether respondents ate more, the same amount or less game meat in the year of the interview as compared to five years ago.

Table 8: Serving Size of Blueberries Calculated from 24-Hour Recall Data

Amounts Consumed[a]	Overall	Males	Females
Median Serving Size (g)	18	15	20
Mean Serving Size (g)	24	18	28
Minimum Serving Size (g)	3.5	4	3.5
Maximum Serving Size (g)	150	150	109

n=76

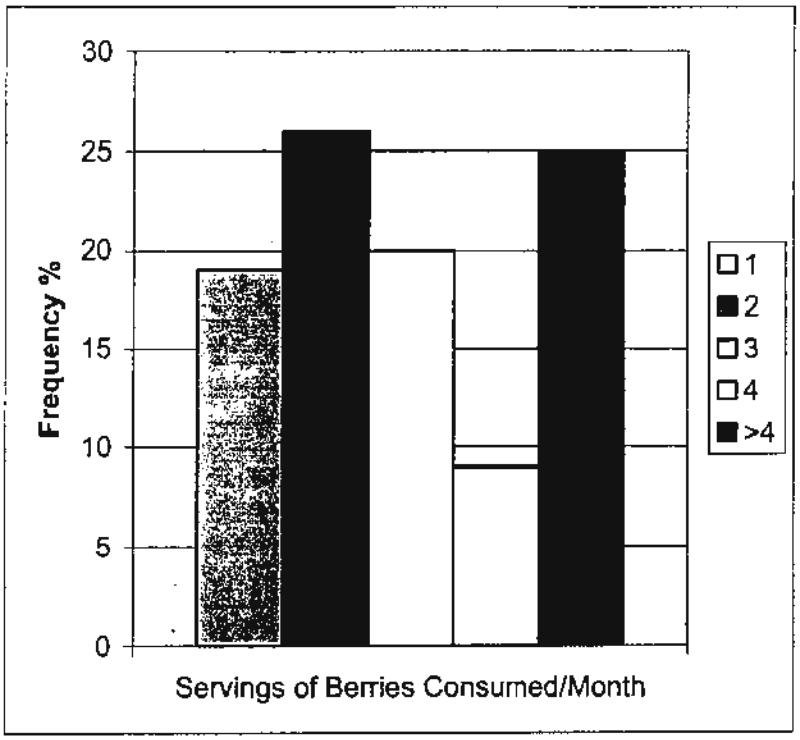
[a]All values are calculated using population weighted data from 24-hour recall data.



n=1755

Figure 14: Litres of Local Berries Consumed Per Person Per Year[a]

[a] Refers to information contained in Nutrition and Health Questionnaire (q. 31, Appendix D)



n=1755[a]

Figure 15: Servings[b] of Berries Consumed by Respondents Per Month

[a] Considers only those individuals who said they consumed berries (q.31, Nutrition and Health Questionnaire, Appendix D).
[b] 1 serving = 18g (according to 24-Hour Recall data).

Table 9: Growing Practices of Respondents by Area of Residence

Questions 32, Form D, Nutrition and Health Questionnaire	Urban %[a](n)[b]			Rural* %(n)		
	Yes	No		Yes	No	
Q.32 Do you or your family grow fruits/vegetables? (N=1925)	29(323)	71(777)		42(331)	58(494)	
Questions 33, Form D, Nutrition and Health Questionnaire		**Urban %[a](n)[b]**			**Rural %(n)**	
		Yes	No		Yes	No
Q.33 If you wanted to grow fruits/vegetables would you have land available? (n=1271)		36(381)	54(396)		36(290)	54(204)

*More rural residents grew their own fruits/vegetables χ^2=35.1, df 2, and p<0.001.

[a] Percentages were calculated from weighted data.
[b] n refers to number of respondents.

Table 10: Comparison of Amounts of Game Meats Consumed During the Year of the Interview with 5 Years Previous

Amount consumed compared to 5 years ago	Urban %[a] (n)[b]	Rural % (n)
More	28 (247)	31(220)
Same	55(452)	53(462)
Less	17(131)	15(90)

N=1925

[a] Percentages were calculated from weighted data.
[b] n refers to number of respondents.

Chapter V

DISCUSSION

5.1 Introduction

The results obtained in this study are further examined in detail in the following discussion. An advantage that emerged from analyzing data from the NNL survey was that it is reliable data representative of the entire population of the province.

Table 1 compares demographic characteristics of the sample with residents of the province using census data from 1996. The values appear comparable with regard to sex and age. The NNL data appears to have more rural residents. However this can be explained on the basis of how the sample was drawn for the original study. Equal numbers were chosen to represent each population center in the original study, but for the purpose of secondary analysis the medium and small sized population samples were combined to form the rural population group. Education data from the census includes individuals 15 years and older whereas NNL survey includes individuals between 18 and 74 years of age. This may help explain the difference between NNL and Canada Census findings in Table 1. The NNL data contain less complete information on household income as compared to Canada Census. Many NNL respondents chose not to answer the question and those who did were asked only to provide a range of income for their household. Census data is more exact as tax return data would have been utilized to calculate the median household income. Nevertheless incomes reported in Table 1 from NNL and Canada Census are quite similar.

Anecdotal evidence suggests that residents of Newfoundland and Labrador have the highest rates of consumption of game meats in all of North America. However not a lot of scientific literature was previously available to either support or refute the claim. The results of the present study provide some reliable scientific data relating to consumption of game meats. NNL appears to be the only study in recent times that includes information about consumption of indigenous foods such as game meats and local berries amongst the non-aboriginal population of Newfoundland and Labrador. Other provincial nutrition surveys have been conducted recently such as the Nova Scotia Nutrition Survey (Nova Scotia Heart Health Program, 1993) and the Saskatchewan Nutrition Survey (University of Saskatchewan, 2001) but appear not to have collected this information hence it is difficult to compare the results of the present study on a provincial level. Residents of many states in the US also consume game meats and berries native to their regions yet not much similar scientific information is available from the US either to make a valid comparison with the present study.

Although the data from NNL is representative of the entire province, certain subgroups were not sampled. One of the subgroups excluded were people living on a reserve in Newfoundland and Labrador. Although aboriginal people living outside the reserve may have been interviewed, nevertheless NNL data contains very little information on food habits of the native people living in the province. Many studies describe the consumption of indigenous foods amongst the native population (Kuhnlein, Receveur and Chan, 2001; Kuhnlein, Soueida and Receveur, 1996) but these studies could not be compared to the

present study because, even though they discuss indigenous foods, their subjects cannot be compared to those in the present study.

5.2 Response Rate

Weston and Junkins (2002) describe the response rate of the original study the NNL survey as 51.4% calculated at the data collection stage. The response rate of NNL survey and the Saskatechewan Nutrition Survey (University of Saskatchewan, 2001) are comparable but the response rate for NNL is somewhat lower in comparison with the response rate of Nova Scotia Nutrition Survey (Nova Scotia Heart Health Program, 1993) and the Prince Edward Island Nutrition Survey (Taylor, VanTil, and MacLellan, 2002). There is no acceptable or unacceptable response rate for a survey but the higher the response rate the more likely the findings truly represent the population.

The NNL survey used the medical insurance register as a sampling frame. At the time of sampling this register was not current. It contained inaccuracies with regards to individuals who had moved away from the province or had died. Almost 50% of the addresses in the file were out of date (Nargundkar, 1996). Individuals were categorized as ineligible if they could not be contacted at the place of residence noted in the register. Had the information in the register been accurate fewer ineligible subjects would have been selected thus increasing the chances that the response rate would be higher.

Evidence suggests that respondents are generally healthier individuals as compared to non-respondents (Brussard, Brants, Bouman and Lowik, 1997; Criqui, Barrett-Connor, and Austin, 1978). However a study assessing the impact of nonresponse on means, variances and relationships between variables concluded that nonresponse does not bias the relationship between variables (Goldberg, 2003). The results from Goldberg's study (2003) may help support the associations found between variables in the present study.

5.3 Frequency of Consumption of Indigenous Foods

For many hundreds of years game meats and berries have formed an essential component of the diets of many residents of the province. The consumption of both game meat and local berries appear to be quite prevalent by residents of NL (Tables 2 and 3). Figure 1 suggests that this is so for both sexes although males consume game more often and females consume berries more often than the other sex. Unfortunately the data presented refers only to the number of times that indigenous foods were consumed over the past 12 months. Moose/caribou meat was most popular and was consumed by about 75% of the total population. Rabbit meat, wild bird meat and seal meat were also consumed although by fewer people. The study revealed that respondents had consumed even bear meat although only by approximately 3% of the residents. Of the berries consumed, blueberries were most popular and were consumed by 85% of the total population. Strawberries, partridgeberries and bakeapples were also consumed by large numbers of people. Hence it appears that game meats and local and wild berries are a popular food with residents of the province.

5.4 Socioeconomic and Demographic Characteristics of Consumers Versus Nonconsumers

Studies suggest that consumption of meats is influenced by sex, age, economic factors and health concerns (Kealy, 2002). Game meats were consumed more often by males and consumption was found to be significantly associated with sex ($p<0.001$, Figure 2). Game meats are consumed by 88% men compared to 71% women. This may be partly explained by the fact that men are more likely the ones participating in hunting activities (Fessler, 2002). Game meats were consumed by people of all ages tested however middle aged subjects between 55 to 64 years were the most likely consumers (Figure 3). About 84% respondents between 55-64 years of age consume game meats more often compared to 72% respondents between 18-24years of age who appear to consume game meats least often (Figure 3). Chi square analysis of association between game meat consumption and age group showed a significant difference ($p<0.001$). This may reflect some of the social changes occurring in the province resulting from emigration and an aging population. The older generation of Newfoundlanders grew up in an atmosphere where hunting for food was more of a norm and hence game meats featured more regularly in their diets.

Figure 4 suggests that rural residents consumed game meats more often than urban residents yet a large percentage of urban residents had also consumed game meats during the past 12 months. About 85% rural residents compared to 71% urban residents consumed game meats ($p<0.001$). This difference by area of residence may be related to

greater opportunity to hunting activities within the rural setting thus improving accessibility to this type of food.

About 86% respondents who had completed at least some high school were consumers of game meats compared to only 71% respondents who had at least some university education (Figure 5). Chi square analysis showed this difference to be significant ($p<0.001$). Game meats were consumed more often by people in the lower income adequacy group ($p<0.001$, Figure 6). About 83% respondents in the lower income adequacy group were consumers compared to 76% individuals in the middle and higher income adequacy groups. Although game meats are eaten more often by those of lower education and income levels, more than 70% of all groups tested claim to have consumed these foods recently. This may partly be explained by the fact that the education and income levels of rural residents are lower as compared to urban residents (Bollman, 1998). In addition rural residents who have lower education levels and incomes may find that game meats present a cheaper easily accessible source of protein. Hence affordability and accessibility may be the prime factors in making game meats more popular in rural than in urban settings.

Women in general tend to eat more servings of fruits and vegetables compared to their male counterparts and this is especially true in older women (Jacobs-Starkey, Johnson-Down, and Gray-Donald, 2001). Although over 90% of residents said they had consumed local berries during the twelve month period prior to the interview (Figure 1), female

consumers outnumbered male consumers. Hence the consumption of berries was found to be statistically significantly associated with sex (p=0.006, Figure 2). Data showed that over 90% of residents of all ages tested had consumed berries. Berry consumption was not found to be very different between age groups (Figure 3). Berry consumption was not found to be different by area of residence. More than 90% of rural as well as urban residents consumed berries (Figure 4). Local berries were consumed by residents of various education and income levels. Data analysis on berry consumers revealed that 95% of university educated residents consumed berries compared to 88% who only had an elementary school education or less (Figure 5) but this difference was not statistically significant (Chi Square, p= 0.018). Berries were not found to be consumed differently by level of income adequacy either. More than 92% of respondents belonging to lower, middle or higher income adequacy groups consumed berries (Figure 6). It appears that berries are available, accessible and acceptable to respondents from all kinds of socioeconomic backgrounds.

Very little seasonal variation in consumption of game meats and berries was noted which suggests that effective mechanisms for preservation and storage exist hence game meats and local berries can be consumed even during the off season (Table 4).

5.5 Health Behaviour of Consumers of Indigenous Foods

Three indicators of health behaviour were considered to decide whether consumers were more health conscious than nonconsumers of indigenous foods. The indicators of health behaviours included, smoking, physical activity and vitamin/mineral supplement intake.

5.5.1 Smoking

There was no significant difference in consumption of game meats between smokers and non-smokers with 79.4% smokers and 79.6% non-smokers consuming game meat (Figure 7). DeBoer and associates (2003) determined that factors which predict adherence to the goals of consuming 5-10 servings of fruits/vegetables and limiting fat consumption to 30% of total caloric intake included female sex, non-smoking and physical activity. Figure 7 shows the smoking status of the consumers. In the present study consumption of berries was different by smokers versus non-smokers ($p<0.001$) and by sex ($p=0.006$). About 95% of non-smokers consumed berries compared to 90% of smokers who consumed berries. Evidence demonstrates that smokers are less likely to consume a healthy diet and that nonsmokers who live with smokers are likely to indulge in a less healthy dietary intake (Trobs, et al., 2002).

5.5.2 Physical Activity

About 81% of individuals who did not take part in a specified level of physical activity such as swimming, jogging or aerobics (Section 3.4.3) consumed game meats compared to 78% of individuals who took part in such physical activities. Hence from this data

there appears to be no association between physical activity and game meat consumption. Hunting itself and related activities are physical activity but these may not have been captured in a question such as the one employed for analysis within this study (Question 13, Form D, Appendix D). To analyze this possible connection more detailed information on physical activity would be required and could form the basis for another study. There was no difference in berry consumption between the two groups either, with over 93% of individuals whether physically active or not consuming berries.

5.5.3Vitamin/Mineral Supplement Intake

In general, diet, demographic and lifestyle characteristics of supplement users are typical of patterns associated with low risk of chronic disease (Slesinski, Subar and Kahle, 1996). This study found that there was no difference in the consumption of game meats or berries between users and nonusers of vitamin/mineral supplement which is consistent with findings of Troppmann, Gray-Donald and Johns (2002) who showed that supplement users had dietary intakes, from food alone similar to nonusers.

Overall, apart from difference in smoking habits of berry consumers there was no difference between the health behaviours of consumers and nonconsumers. This implies that consumption of indigenous foods is practiced throughout the population and not merely by the health conscious.

5.6 Amount of Game Meats Consumed

In order to get a clearer idea of indigenous food consumption both the frequency of consumption and the amounts in which these foods are consumed is important. Approximately 8.5% of the respondents had consumed at least one of the game meats in the 24 hours prior to the interview according to the 24-hour recall data (Appendix B). Of the individuals who had consumed moose meat on the day of the interview the median serving size for adults was found to be 137g. The median serving size for males was 182g and 118g for females (Table 5). A serving of Meat and Alternatives as defined by Health Canada is 75g, the mid-point of the range identified by Canada's Guide to Healthy Eating (Pasut, 2001, Health Canada, 1992). Thus if we consider 75g as the serving size and use it to calculate number of servings consumed per month then we can interpret information in Figure 10 a little differently. Of the respondents who consume large game meats 41% consume two 137 g servings of large game meat per month (Figure 10) according to the Food Frequency Questionnaire or 41% consume four 75g servings per month according to Canada's Food Guide. Also 12% individuals consumed more than four 137 g servings of large game meat per month (Figure 10) according to the Food Frequency Questionnaire or 12% consume more than eight 75g servings per month according to Canada's Food Guide. This means that the amounts of moose meat being consumed by residents of Newfoundland and Labrador are larger than the amounts of beef normally consumed by their Canadian cohorts.

About 80% of individuals consume two or fewer portions of small game meat per month. Only 4% of individuals consume more than four portions of small game meat per month (Figure 11). The pre-determined reference volume of 74 used to calculate portion sizes is very close to the reference volume of 75g the serving size for Meat and Alternatives determined by calculating the mid-point of the range identified in Canada's Food Guide to Healthy Eating (Pasut, 2001). Figure 12 shows frequency percent of individuals that consume wild birds by number of portions per month. Almost 75% of those who consume wild bird meat consume two or fewer portions per month. About 9% consume more than 4 portions of wild bird per month (Figure12). Almost 77% of individuals consume two or fewer portions of seal meat per month. Only 6% of individuals consume more than 4 portions of seal meat per month (Figure 13).

5.7 Amount of Local Berries Consumed

According to the 24-hour recall 4% of respondents had eaten blueberries on the day before the interview (Table 6). The median serving size was 18g. The maximum was 150g and minimum 3.5g eaten on the day of the interview (Table 7). About 83% individuals appear to consume one litre or fewer berries per year. About 12% consume between 1-2 litres of berries per year, 4% consume between 2-5 litres of berries per year and only 1% consume more than five litres of berries per year (Figure 14).

About 25% of respondents consume more than 4 servings of berries a month (Figure 15) The serving size of 18g was calculated from the 24-hour recall data. However the serving

size for blueberries as for other fruits and vegetables is half a cup (4oz or 115g) according to Canada's Food Guide to Healthy Eating. This means that according to these results the amounts of berries being consumed falls short of even a single serving as described by Canada's Food Guide to Healthy Eating.

5.8 Behaviours Associated with Consumption of Indigenous Foods

Table 9 examines some practices and attitudes of the respondents on growing fruits and vegetables for home consumption. A larger proportion of rural residents (about 58%) grow fruits and vegetables compared to about 29% urban residents. Of the respondents who said that they or their families did not grow their own fruits and vegetables many residents, both rural and urban said that they had land available to grow their own fruits and vegetables if they wanted to. Growing fruits/vegetables may be one way to increase amounts of fruits/vegetable intake to the recommended 5-10 servings a day (FAO, 1995). The activities associated with maintaining a garden may also count as physical activity, which is found lacking in the residents of the province. According to the Newfoundland Heart Health survey only about 50% of those who participated said they exercised at least once a week (Newfoundland Department of Health and National Health and Welfare, 1990).

Table 10 shows a comparison of amounts of game meats consumed during the year preceding the interview and amounts consumed five years before that. Approximately 55% of urban residents and 53% of rural residents said that these amounts were the same.

About 28% of urban residents and 31% of rural residents said they had eaten more game meat compared to five years ago. The connection between consumption of game meats and socioeconomic status may need further investigation to show if increasing rates of consumption are indicative of changes in socioeconomic status or not.

5.9 Promoting the Intake of Indigenous Foods

The Food Habits of Canadians study showed that individuals who were able to meet their daily recommended nutrient intakes for iron and zinc were those who consumed red meat (Pasut, 2001). Hence it may mean that individuals who consume game meats on a regular basis are more likely to be fulfilling their daily requirements for iron and zinc, however further investigation is required to ascertain these possibilities.

In addition if we compare the fat and iron content of game meat with beef and pork the advantage of consuming game meat as opposed to beef or pork becomes obvious (Table 11). If a serving of moose meat is substituted for an equal amount of beef, one would be consuming only 6 grams of fat, just 54 Calories from fat and a total of 229 Calories as compared to 26g of fat from the same amount of beef, 318 Calories from fat and 477 total Calories. Consuming moose meat may also mean an increase in the intake of iron, a nutrient that remains a cause for concern amongst the elderly and in women in the childbearing age. Roebothan, Friel and Healy (1994) report that meat and alternatives were consumed in low amounts in a group of seniors in Newfoundland and Labrador. This suggests that intake of game meats should be encouraged whenever possible within

Table 11: A Comparison of Roast Beef and Pork with Roast Moose and Caribou Meats

Nutrient[a]	Beef 100g[b] (137g)[c]	Pork 100g (137g)	Moose 100g (137g)	Caribou 100g (137g)
Total Fat (g)	26 (35)	25 (34)	4 (6)	0.97 (1)
Iron (mg)	3 (4)	1 (1.5)	6 (8)	4 (5)
Total Calories	348 (477)	323 (449)	167 (229)	134 (184)
Calories from Fat	232 (318)	221 (303)	40 (54)	8.7 (12)

[a] All nutrient composition data obtained from "Food Values of Portions Commonly Used" by Bowes and Church (Pennington, 1998).
[b]Nutrient composition of a standard amount equal to 100g.
[c]Serving size calculated for moose meat from NNL Survey.

subpopulations that may benefit from consuming adequate amounts of protein and iron in their diets.

Maloney (2000) reports that intake of fibre in almost 96% residents of this province is either low or moderate. Adding a serving or half a cup of berries containing 4-8g fibre (depending on type of berry) provides from one fourth to one eighth of the daily requirement for dietary fibre. The Food and Nutrition Board, U.S. Institute of Medicine define fibre requirement for men and women under 50 years as 38g and 25g respectively (Institute of Medicine, 2002). Berries are also a rich source of many vitamins, minerals and other useful phytochemicals that help fight chronic diseases (Refer to section 1.6.2).

5.10 Limitations of the study

Secondary analysis inherently has certain limitations. Since data was collected to address the aims and objectives of the original study, the information obtained may not be optimal for answering alternative or secondary questions such as the objectives of the current study. The limitations in the present study, as in any other study include the nonresponse, recall and self-report biases. However some limitations specific to the present study were encountered. Firstly the data available to evaluate the amounts of indigenous foods consumed are not always equivalent. For instance the Food Frequency questionnaire contains four questions about amounts of game meats consumed but none about amounts of local berries consumed. Also the Nutrition and Health Questionnaire contains three questions about berry consumption and only one about game meat.

Secondly some of the data analyzed in the present study refers to a period of twelve consecutive months immediately preceding the date of the interview. However many of the issues were offset by the fact that the data was collected by well trained interviewers on a randomly selected sample representative of the entire population of Newfoundland and Labrador.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

Research pertaining to the prevalence and incidence of many chronic diseases in Newfoundland and Labrador points to higher rates of chronic illness in the province as compared to the national rates (See sections 1.4.4.2 and 1.4.4.3). Evidence from scientific literature also suggests that indigenous foods such as game meats and local berries may have health benefits (See section 1.6). Therefore any health benefits that may be obtained from promoting indigenous food consumption may possibly form a component of the population health approach to achieving health for the people of this province.

The results of the present study suggest that it would be practical to encourage the consumption of indigenous foods to the residents of NL. The high rates of consumption detected in a wide variety of residents indicates that indigenous foods are available, acceptable and accessible by many. Hence consumption of indigenous foods could enhance nutritional status and also help address the problem of food insecurity in Newfoundland and Labrador.

The present study suggests that game meats appear to be a regular feature in the diets of many residents of the province. However if we are to encourage consumption of game meats it should be at the expense of consumption of other red meats. Game meats should preferably be consumed as a substitute to other types of meat and not in addition to other

kinds of meat. Excessive consumption of red meats especially beef and pork that are high in animal fat may be deleterious to health (Kushi and Giovannucci, 2002).

The present study also suggests that local berries are consumed frequently by Newfoundlanders and Labradorians. However the serving size of the local berries consumed appears to be well below the serving size of fruit recommended by Health Canada.

The Report of the Task Force on Agrifoods 1991, introduced the Northern Foods Concept suggesting that it may be viable to establish a two way flow of commodities, with wild game products moving to other Canadian, United States and European markets while fresh fruits and vegetables being brought into the province of NL (Hulan, MacRae and Oates, 1991). Such an arrangement not only makes business sense, but also nutrition sense. This would make it possible to encourage consumption of wild game as well as improve access to fresh fruits and vegetables. Both the prospective changes may potentially contribute to better health for the residents of the province.

Results from this study suggest that more extensive research needs to be conducted in order to understand the potential protective role that consuming an indigenous diet may have against development of chronic disease.

In conclusion it can be said that programs encouraging the increased intake of indigenous foods should put special emphasis on the consumption of game meats by females, very

young and very old adults, urban dwellers, and those with high levels of formal education and high incomes. Programs should also encourage intake of local berries emphasizing that the amounts consumed should be in accordance with those recommended by the Canadian Food Guide to Healthy Eating (Health Canada, 1992).

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APPENDICES

APPENDIX A

NON-RESPONSE QUESTIONS

FORM A-2

Identifier # ☐☐☐☐☐☐

Non-response questions completed ☐ Yes ☐ No

If you face a refusal: At the first phone contact, if an eligible person refuses to participate, tell the person that you have a few short questions to ask. Remind them that these questions refer to them personally, not the household. Ask all four questions below.

If the person accepts: Ask questions 1 and 2 only after completing the Demographic Profile (Form E) but before doing the height and weight measurements.

1. During the past month, did you eat bread?

☐ Yes ☐ No

If yes, what type of bread did you usually eat? (Check only one)

☐ Whole wheat (100%,75%,60%)
☐ Multigrain/Cracked Wheat
☐ Do Not Know

DO NOT READ

☐ White Bread
☐ Molasses Raisin Bread
☐ Other_____

2. During the past month, did you use milk?

☐ Yes ☐ No

If yes, what type of milk did you usually use? (Check only one)

☐ Whole milk
☐ 2% milk
☐ 1% milk
☐ Skim milk
☐ Powdered Skim milk

DO NOT READ

☐ Powdered whole milk
☐ Evaporated milk
☐ Other _____
☐ Do not know

---

3. During the past month, did you use any vitamin-mineral supplement?

☐ Yes ☐ No

4. Have you ever smoked cigarettes?

☐ Yes ☐ No → END. ☐ Refused to answer → END.

↓

At the present time do you smoke cigarettes?

☐ Yes ☐ No → END. ☐ Refused to answer → END.

↓

Do you usually smoke cigarettes every day?

☐ Yes ☐ No → END. ☐ Refused to answer → END.

↓

How many cigarettes do you smoke a day?

☐☐☐ Number ☐ Refused to answer

APPENDIX B

FORM B

NEWFOUNDLAND AND LABRADOR NUTRITION SURVEY

FACILITATOR # ☐☐

24 HOUR RECALL FORM

Identifier Number ☐☐☐☐☐☐

Time 00:01 23:59	Rest/ Cafe. *	Meal/ Snack **	Home Prep. ***	Food Description	Salt	# of Portions	Model	Thick-ness

* Restaurant/Cafeteria
C = cafeteria
F = fast food
R = restaurant (table service)
T = take-out outlet, deli
V = vending machine, snack bar

** Meal/Snack
BK = breakfast
L = lunch
D = dinner (supper)
BC = brunch
S = snack, in-between meals

*** Homemade
H = home made baked products made from scratch or a mix in your own home.
E = home made baked products made from scratch or a mix elsewhere than in your own home.

Did you prepare most of the foods you ate yesterday? Yes __ No __ (1)
FOR INTERVIEWER ONLY:
In the interview, was the respondent assisted by the person who prepared the meals? Yes__ No __ N/A __ (2)
Did the respondent have prior knowledge that a 24 hour recall would be taken? Yes __ No __ (3)

NUTRIENT SUPPLEMENT FORM

Identifier Number ☐☐☐☐☐☐

1. Did you take any vitamin or mineral supplements in last month? ☐ Yes ☐ No
2. Please tell me all vitamin or mineral supplements with their DIN (when available) that you took during the last month.
3. How often was each of these supplements taken during the last month? [Number of times per day, per week or per month]
4. How many pills (capsules, etc.) were usually taken on each occasion?
5. Yesterday, how many pills were taken?

SUPPLEMENT NAME	DIN	DURING THE LAST MONTH				YESTERDAY	COMMENTS
		HOW OFTEN			HOW MUCH	HOW MUCH	
		DAY	WEEK	MONTH	# PILLS/TAB/ CAPTSP, etc.	# PILLS/TAB/ CAPTSP, etc.	

RECIPE FORM #1

Name of the Recipe: _____

Cooking Time: _____

Temperature: _____

DESCRIPTION OF THE RECIPE AND COOKING PROCEDURES	QUANTITY

(For Health Canada to complete) TOTAL YIELD: _____

RECIPE FORM #2

Name of Recipe: _____

Cooking Time: _____

Temperature: _____

DESCRIPTION OF THE RECIPE AND COOKING PROCEDURES	QUANTITY

(For Health Canada to complete) TOTAL YIELD: _____

APPENDIX C

FORM C

Identifier #: | | | | | | |

NEWFOUNDLAND & LABRADOR NUTRITION SURVEY
FOOD FREQUENCY QUESTIONNAIRE

PART I. This section deals with the frequency of consumption of specific foods during the **past month.**

FOOD	FREQUENCY			PORTION SIZE		COMMENTS
	FURTHER FOOD DESCRIPTION(S)	#	DAY/D WEEK/W MONTH/M	REFERENCE PORTION SIZE OR MODEL	HOW MUCH/ HOW MANY?	
HOW OFTEN DID YOU CONSUME: 01 Broccoli				MO-M		
02 Carrots or mixed vegetables & carrots				MO-M		
03 Cabbage, coleslaw, and sauerkraut				MO-M		
04 Cauliflower				MO-M		
05 Spinach - cooked				MO-M		
06 Spinach - raw				MO-M		
07 Squash (dark yellow)				MO-M		
08 Turnip				MO-M or ½ CR-L, T-4		
09 Green peas				MO-S		
10 Greens				MO-M		
11 Fish (excluding shellfish) - fried				PC-S		
12 - cooked other ways				PC-S		
13 All shellfish -dipped in butter/ margarine/ mayonnaise -fried				10 units or 1/2 cup (w/o shell)		
14 - cooked other ways				10 units or MO-M (w/o shell)		

APPENDIX D

FORM D

Identifier # ☐☐☐☐☐☐

NEWFOUNDLAND AND LABRADOR NUTRITION SURVEY

NUTRITION AND HEALTH QUESTIONNAIRE

I would like to ask you some questions about your health.

PART I

I am going to read you a list of actions people might take to prevent heart disease or heart attacks. For each one, please tell me if you think it would have little or no effect, a moderate effect, or a large effect? **(READ LIST)**

		Little or No Effect	Moderate Effect	Large Effect	Not Sure
1	First, losing weight. If one is overweight, would weight reduction have little or no effect, a moderate effect, or a large effect in preventing heart disease?	1	2	3	9
2	How about reducing cigarette smoking? Would that have little or no effect, a moderate effect, or a large effect in preventing heart disease?	1	2	3	9
3	Lowering high blood pressure?	1	2	3	9
4	Lowering high blood cholesterol?	1	2	3	9
5	Eating fewer high-fat foods?	1	2	3	9
6	Eating fewer high cholesterol foods?	1	2	3	9
7	Eating fewer high-salt foods?	1	2	3	9
8	Eating more high-fibre foods?	1	2	3	9

Identifier # ☐☐☐☐☐☐

12 For each time that you do these activities on average how many minutes do you spend at it (or them)?

DO NOT READ

☐ < 20 minutes

☐ between 20 & 29 minutes

☐ 30 minutes or more

13 In your spare time, do you do any sport, physical activity, or hard work that would make your heart beat rapidly such as hockey, soccer, swimming, jogging or aerobics?

Y☐ N☐
(go to 16)

14 How many times during the average week do you do such activities?

DO NOT READ

☐ < 3 x per week

☐ 3 x per week

☐ > 3 x per week

15 For each time that you do these activities, on average how many minutes do you spend at it (or them)?

DO NOT READ

☐ < 20 minutes

☐ between 20 & 29 minutes

☐ 30 minutes or more

Identifier # ☐☐☐☐☐☐

23 Were you ever told by your doctor or other health care worker that you had high blood pressure (except during pregnancy)?

Y☐ N☐
(go to 26)

24 Are you now doing anything for your blood pressure?

Y☐ N☐
(go to 26)

25 What are you doing for your high blood pressure? **(DO <u>NOT</u> READ LIST. Check all that apply).**

☐ diet
☐ medications
☐ exercise program
☐ other (describe) _____

26 Have you ever been told by your doctor or other health care worker that you have diabetes, or high blood sugar (except during pregnancy)?

Y☐ N☐
(go to 29)

27 Are you now doing anything for your diabetes, or high blood sugar?

Y☐ N☐
(go to 29)

Identifier # ☐☐☐☐☐☐

33 If you wanted to grow fruits/vegetables, would you have an appropriate piece of land available to you?

Y☐ N☐

34 During an average week, how often do you eat pickled foods (including pickled vegetables and relishes, pickled meats and fishes, but excluding salt beef and salt pork)?

DO NOT READ

☐ < 1 x per week

☐ 1-2 x per week

☐ 3-4 x per week

☐ > 4 x per week

35 SinceMay of 1995, have you eaten any of the following game meats?

Moose or caribou	Y☐	N☐
Rabbit	Y☐	N☐
Wild birds	Y☐	N☐
Seal or whale	Y☐	N☐
Bear	Y☐	N☐

(If NO to all go to 38)

36 Did you eat more, about the same, or less game meat this year as compared to five years ago?

☐ More
☐ Same **(go to 38)**
☐ Less

Identifier # ☐☐☐☐☐☐

PART IV

42 During the last 30 days, which of the following statements best describes the amount of food available to be eaten by you and your family?

- Always enough food to eat ☐ **(Go to Form E)**
- Sometimes not enough food to eat ☐ **(Go to 43)**
- Often not enough food to eat ☐ **(Go to 43)**

43 To what extent did each of the following reasons contribute to this lack of food?

a. Problems with transportation.

- Not at all ☐
- A Little ☐
- A Lot ☐

b. Not having working appliances (such as a refrigerator or a stove) for storing or preparing foods.

- Not at all ☐
- A Little ☐
- A Lot ☐

c. Not having enough money to buy food or beverages.

- Not at all ☐
- A Little ☐
- A Lot ☐

d. Not having an adequate choice of foods available to you.

- Not at all ☐
- A Little ☐
- A Lot ☐

44 During the last month, did you or your family skip any meals because there was not enough food or money to buy food?

Y☐ N☐

Acknowledgements: *Nova Scotia Nutrition Survey*
Saskatchewan Nutrition Survey
Alberta Nutrition Survey
Prince Edward Island Nutrition Survey

APPENDIX E

FORM E

Identifier # ☐☐☐☐☐☐

NEWFOUNDLAND & LABRADOR NUTRITION SURVEY

DEMOGRAPHIC PROFILE

In order to compare your answers with people from similar backgrounds we would like to ask you a few questions about yourself.

1. How many people, including yourself, live in this household?

☐☐

2. Of that total number, how many persons are under 18 years old and are your dependents?

☐☐

3. What is the highest grade or level of education you have ever attended or ever completed? (Mark only one)

01 ☐ No schooling
02 ☐ Some Elementary
03 ☐ Completed Elementary
04 ☐ Some Secondary
05 ☐ Completed Secondary
06 ☐ Some Community College, Technical College, or Nurse's training
07 ☐ Completed Community College, Technical College, or Nurse's training
08 ☐ Some University (e.g. B.A. M.A. PhD) or teachers college
09 ☐ Completed University (e.g. B.A. M.A. PhD) or teachers college
10 ☐ Other education or training (Specify _____)

APPENDIX F

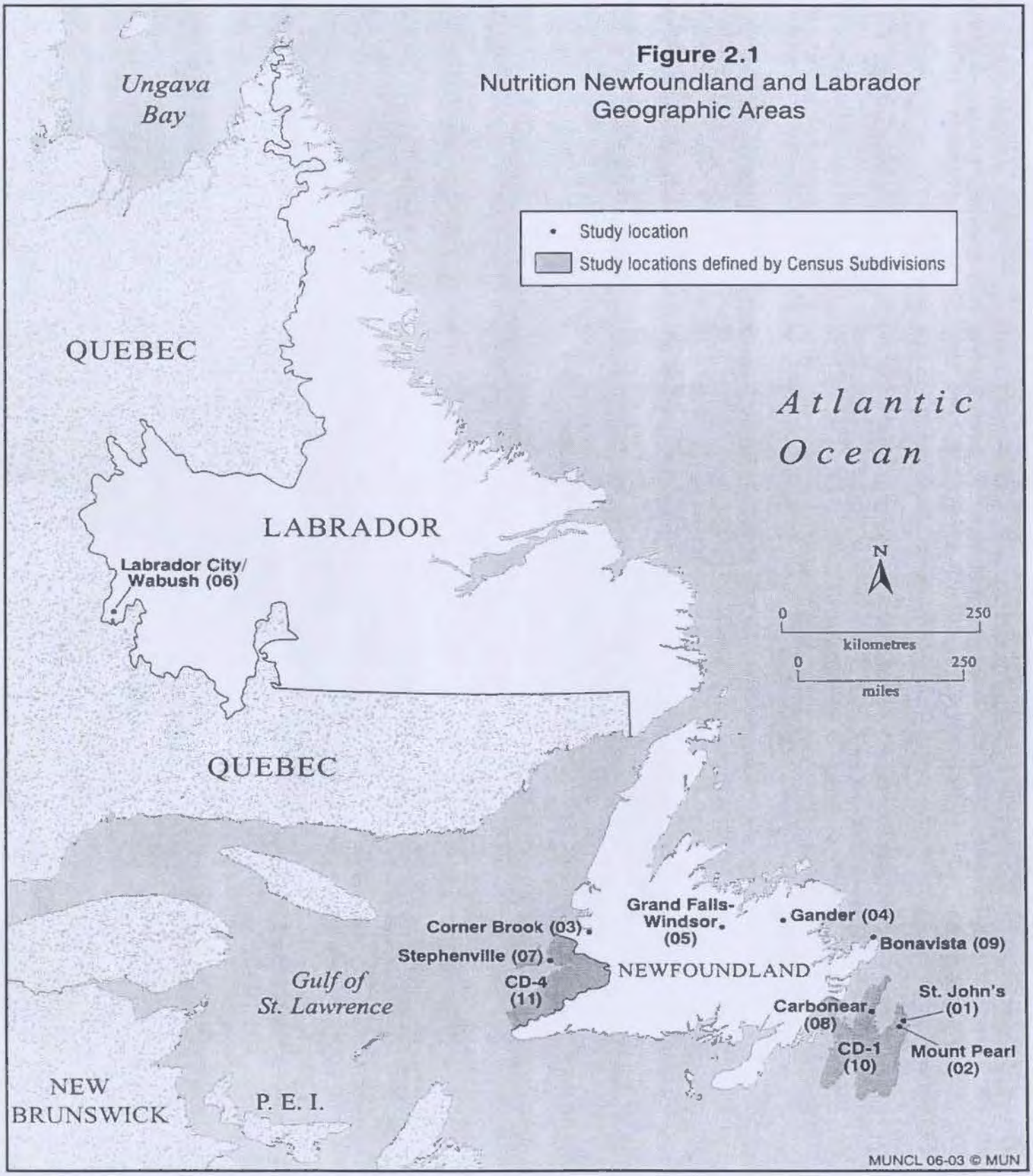

Figure 2.1
Nutrition Newfoundland and Labrador Geographic Areas

APPENDIX G

GOVERNMENT OF
NEWFOUNDLAND AND LABRADOR

Department of Health
Health Promotion

PRESERVATION OF CONFIDENTIALITY STATEMENT

WHEREAS the information held by the Newfoundland Medical Care Commission to which the Minister of Health has granted me access by approval dated December 13, 1995, is personal and confidential.

I, _____, agree to do my utmost to respect and protect the sensitivity and confidentiality of the information to which I have been granted access in the pursuit of my research.

I further agree that I will ensure that any person working with me or under my direction, who will have access to the confidential information, subject of this statement, will have signed a statement identical in form to this, before gaining access to any of the information.

I further agree that I will ensure that no research data or materials will be gathered or created, in whole or in part, based on the confidential information, which could lead to the identification of any individual.

Dated at St. John's, Newfoundland, this 12th day of July, 2002.

SIGNED P[illegible]

_____

APPENDIX H

Memorial
University of Newfoundland

Office of Research and Graduate Studies (Medicine)
Faculty of Medicine
The Health Sciences Centre

August 6, 2002

Ms. Sahar Jameel Iqbal
5-Blue River Place
St. John's, NF
A1E 6C3

Dear Ms. Iqbal:

Your application, entitled ***"Characterization of Individuals Residing in the Province of Newfoundland and Labrador who Consume Native Grown and Locally Available Foods"*** was reviewed by the Human Investigation Committee at the meeting held on **July 25, 2002**. The Committee has **granted full approval** of your application, as submitted.

Please be advised that the Human Investigation Committee currently operates according to the Good Clinical Practice Guidelines, the Tri-Council Policy Statement and applicable laws and regulations.

We wish you success with your study.

Sincerely,

Sharon K. Buehler, PhD
Co-Chair
Human Investigation Committee

Catherine Popadiuk, M.D., F.R.C.S. (C)
Co-Chair
Human Investigation Committee

Cc: Dr. C. Loomis, Vice President Research, MUN
Dr. R. Williams, Vice President Medical Affairs, HCC
Dr. B. Roebothan, Student Supervisor
Dr. B. Bavington, Student Supervisor

SKB:CP/mc

St. John's, NF, Canada A1B 3V6 • Tel.: (709) 777-6762 • Fax: (709) 777-7501 • email: rgs@mun.ca

APPENDIX I

Other Berries (Table 2)

1. Marshberries
2. Gooseberries
3. Black Currants
4. Red Currants
5. Wildberries
6. Cherries
7. Dogwoodberries/Dogberries
8. English plum boys
9. Squashberries
10. Rhubarb
11. Blackberries
12. Cranberries
13. Chuckly pears
14. Jointwood berries
15. Damson plums
16. Trashberries
17. Mana Tea berries
18. Mulberry
19. Creeping snowberries
20. Rambleberries
21. Green gages
22. Choke cherry
23. Plums (Locally grown)

Text responses to "other berries" category in Q. 30, Nutrition and Health Questionnaire.

APPENDIX J

Household Income Groups Used to Define Income Adequacy of Study Respondents

Household Income Group (CDN$)	Household Size (Number of Individuals in a Household)				
	1	2	3	4	≥5
Lower	≤5000-10,000	≤10,000-20,000	≤10,000-20,000	≤20,000-30,000	≤20,000-30,000
Middle	10,000-20,000	20,000-40,000	20,000-40,000	30,000-50,000	30,000-60,000
Higher	30,000-60,000	40,000-60,000	40,000-60,000	50,000-60,000	>

Income adequacy table adapted from Russell Wilkins (1995). Canadian Centre for Health Information, Statistics Canada.
Source: Segovia, J., Edwards, .C., & Bartlett, R.F., (1995) Adult Health Survey. Methodology and descriptive results;health and medical care research group, Division of Community Health, Memorial University of Newfoundland, St. John's, NL.

APPENDIX K

Other Education or Training

1. Automotive Technology
2. Book Keeping Courses
3. British Army Training and Course
4. Business
5. Canada Post/Sears Agent
6. Carpentry Course
7. Certified General Accountant
8. Certified Management Accountant
9. Clerical Courses
10. Computer Courses
11. Commercial Classes
12. Correspondence Course
13. Drug Clerk Course
14. Dentistry Courses
15. Short Hand and Typing Course
16. Electrician
17. Engineering Quality Assurance
18. Environment Canada Certificate
19. Food Service
20. Fitness (Certificate to Teach Aerobics)
21. Home Support Worker
22. Law School Management Courses
23. Management Courses
24. Nursing Assistant Training
25. Plumbing, Catering Courses
26. Probationer's Certificate
27. Profesional Accounting
28. Professional Glove Maker
29. Trade Show
30. Upgrading Special Education
31. Welding Course

Text response to "other education or training " Q. 3, NNL Survey Demographic Profile.

APPENDIX L

Response Status for the Newfoundland and Labrador Survey by Season

Summary Status	Season 1	Season 2	Total
Drawn	3229	3274	6503
Attempted	3228	3272	6500
Resolved	2277	2427	4704
Eligible	1815	1931	3746
Responding with Interview	924	1006	1930
Response Usable 1st Recall (% of eligible cases)	922 (50.8%)	1005 (52.0%)	1927 (51.4%)
Repeat Recalls (% of Usable 1st Recalls)	230 (24.9%)	244 (24.3%)	474 (24.6%)

Source: Weston, A. & Junkins, B. (2000). Analysis of Nonresponse NNL Survey 1996. Report BBCA 451311-008NR Bureau of Biostats and Computer Application Food Directorate. Health Canada.