AWARENESS, REPORTED BEHAVIOUR, AND DIETARY INTAKE OF FAT AND FIBER AS RISK FACTORS FOR CARDIOVASCULAR DISEASE

KELLY VERONICA MALONEY

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Awareness, Reported Behaviour, and Dietary Intake of Fat and Fiber as Risk Factors for Cardiovascular Disease

by

Kelly Veronica Maloney, B.Sc., R.Dt.

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Division of Community Health

Memorial University of Newfoundland

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ABSTRACT

This study is a secondary analysis of data collected by the Nutrition Newfoundland and Labrador Survey. It specifically analyzed data collected from adults to address three issues: 1) respondents' awareness of dietary fat and fiber as a cardiovascular risk factor 2) respondents' reported behaviours of avoiding fat and choosing fiber in their diet and 3) respondents' dietary intakes of high fat and high fiber foods as reported in the Food Frequency Questionnaire. The study population included non-institutionalized, 18 to 74 year-old adults living in Metropolitan St. John's. A Chi Square test was used to analyze the associations between awareness, reported behaviour, and dietary intake with socio-demographic variables. The Chi Square test was also used to analyze the association between respondents' awareness, reported behaviours, and dietary intakes.

There was a greater reported awareness of the link between heart disease and eating fewer high-fat foods (76.5%) as compared to heart disease and eating more high-fiber foods (46.7%). Sex was the only demographic variable tested which was significantly associated with the respondent's awareness that reducing dietary fat is associated with the prevention of heart disease. Female respondents reported a higher awareness. Respondents who were older, female, more highly educated, and with a higher income most often reported that they were avoiding foods because of the fat content. A larger and significant proportion of respondents who were older and female reported that they were choosing foods because of the fiber content. Age and sex were both significantly associated with dietary intake of fat. A larger percentage of respondents who were older and female were in the lower dietary

intake of fat category.

There was a significant association between awareness and reported behaviour for fiber but not fat. Respondents who had a greater awareness were choosing foods because of the fiber content. Significant positive associations were found between reported behaviour and dietary intake of both fat and fiber. There was no significant association between awareness and dietary intake of fat or fiber.

This research suggests that knowledge alone does not determine behaviour. Nutrition educators should focus on the many barriers to behaviour change to develop more effective strategies for nutrition programs.

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1.0 Introduction

Cardiovascular disease (CVD), ICD-9 390-459, continues to be the leading cause of mortality in Canada. Newfoundland has the highest rate of mortality from CVD of all provinces (Heart and Stroke Foundation of Canada, 1999) (Appendix A). CVD includes all diseases of the circulatory system, such as acute myocardial infarction, ischemic heart disease, valvular heart disease, peripheral vascular disease, arrhythmia, high blood pressure, and stroke (American Medical Association, 1997).

The economic and social costs of CVD are staggering. In 1993, the direct costs of CVD in Canada (i.e., hospitals, physicians, and drugs) were estimated to be $7.27 billion, while the indirect costs (i.e., costs related to mortality, long-term and short-term disability) were $12.37 billion (Moore, Mao, Wielgosz, Johansen, & Taylor, in press). One social impact of CVD is the potential years of life lost by Canadians due to premature death (i.e. before the age of 75 years). Cardiovascular disease resulted in 90,000 potential years of life lost during 1994 (Heart and Stroke Foundation of Canada, 1997). Another social impact of CVD survivors is the decrease in quality of life. This would include negative influences on physical, social, and emotional needs (Heart and Stroke Foundation of Canada, 1997).

Hypercholesterolemia is a major risk factor associated with the development of CVD. Epidemiological, clinical, and laboratory investigations have related several dietary factors to the development and/or prevention of hypercholesterolemia (Canadian Dietetic Association, 1988). Anderson and Tietyen-Clarke's (1986) conclusion from many studies

suggest that combining a diet high in fiber with a low fat, low cholesterol diet may aid in the treatment and prevention of CVD .

An important diet/disease relationship to markedly influence nutrition guidelines is the association between dietary fat and CVD. Dietary fat has been implicated in the etiology of CVD by a large body of evidence from epidemiologic, clinical and animal research (Health & Welfare Canada, 1990). Many epidemiologic studies have consistently found the positive association between the amount of dietary fat consumed and the level of circulating blood cholesterol (Yu-Poth et al.,1999).

Dietary fiber also has important lipid lowering effects and may reduce the risk of CVD (Kushi, Meyer, & Jacobs, 1999). Liu, Stamler, & Trevisan (1982) compared mortality from CVD with dietary fiber intake from 20 developed countries. The estimated fiber intake was inversely correlated with mortality rate from CVD. The inverse association between fiber and CVD can partially be explained by a displacement of fat in the diet (Swain, Rouse, Courley, & Sacks, 1990). Rimm et al. (1996), in a cohort of 43,757 US male health professionals, suggest the contrary; that dietary fiber, independent of fat intake, is an important component for the prevention of coronary disease.

1.1 Rationale

The associations between dietary factors and risk of CVD are well known, however a common concern of nutrition professionals is that nutrition education has only had a limited effect in getting people to eat a diet lower in fat and higher in fiber. While nutrition

education may improve people's awareness of the link between CVD and diet, knowledge alone is not sufficient for behaviour change (Avis, McKinlay, & Smith, 1990).

Some health educators assume a direct relationship between knowledge and behaviour. Research has shown, however, that a variety of factors influence behaviour change. These include social factors such as an individual's culture and peer influences, and emotional factors such as stress, access to the health care system, health beliefs, and feelings of self-efficacy (Avis, McKinlay, & Smith, 1990). For nutrition education to be successful, it must consider the factors that influence behaviour change. It must address the needs of the audience being targeted and take into consideration their current knowledge and behaviour patterns (Buttriss, 1997).

No studies of cardiovascular disease risk awareness and dietary patterns in relation to fat and fiber intake have been published on residents of Newfoundland and Labrador. The data obtained from the Nutrition Newfoundland and Labrador Survey provided an opportunity to do a secondary analysis in this research area. This current study will examine adult's awareness of dietary fat and fiber in relation to CVD and behaviour patterns. The relationship between their awareness, their reported behaviours, and their dietary intakes of fat and fiber will be analyzed to better understand more effective ways of educating the general population on heart health. The objectives of this study are:

1. To examine reported awareness of fat and fiber as a cardiovascular disease risk factor.
2. To examine reported behaviours of avoiding fat and choosing fiber in the diet.

3. To examine dietary intakes of fat and fiber as reported in the Food Frequency Questionnaire.

4. To examine the relationship between

    i) awareness and reported behaviour of avoiding fat and choosing fiber

    ii) reported behaviour and dietary intakes of fat and fiber

    iii) awareness and dietary intakes of fat and fiber.

2.0 Literature Review

Several studies have been conducted and literature published on the associations between people's awareness of the link between dietary fat and fiber with cardiovascular disease, their reported behaviour of avoiding fat and choosing fiber, and their actual dietary intake of fat and fiber. The current literature review will consider (a) recommendations for fat and fiber intake in a balanced diet, (b) awareness of fat and fiber intakes in relation to CVD, (c) people's concern with and reported behaviours associated with the consumptions of fat and fiber, (d) current intakes of fat and fiber, (e) relationships between people's awareness and dietary patterns of fat and fiber, and (f) relationships between people's reported behaviour and dietary intakes of fat and fiber.

2.1 Nutrition Recommendations

Nutrition Recommendations for Canadians are recommendations set for intakes of various nutrients including fat and fiber. They are intended to provide guidelines in the selection of a dietary pattern that will supply recommended amounts of all essential nutrients, while reducing the risk of chronic diseases (Health and Welfare Canada, 1990). They are meant to form the basis for advice to the general public and to provide planning and policy direction to those working in nutrition related areas (Nova Scotia Heart Health Program, 1993). The recommendations for fat and fiber are similar to those of other developed countries (Health and Welfare Canada, 1990).

2.1.1 Fat

Nutrition Recommendations for Canadians suggest that adults reduce the fat content of their diet to at least 30% of the total energy. It is also recommended that the intake of saturated fat should not exceed 10% of the total energy (Health & Welfare Canada, 1990). The same recommendations have been made by the Canadian Consensus Conference on Cholesterol (Canadian Consensus Conference on Cholesterol, 1988). The Canadian Consensus Conference on Cholesterol confirmed these recommendations as the cornerstone of a population approach to reducing the level of blood cholesterol of the Canadian adult population.

Various research studies have supported the reduction of fat to 30% of the total energy. Research by Denke and Breslow (1988) showed that young adults of both sexes, replacing a diet high in fat (42% of energy) with a diet lower in fat (30% of energy) significantly reduced total cholesterol levels. The LDL/HDL (low density lipoprotein/ high density lipoprotein) cholesterol ratio, which is thought to be a better predictor of cardiovascular disease incidence than either LDL or HDL alone, was similar with either a diet 30% or 25% energy from fat (Denke and Breslow , 1988).

2.1.2 Fiber

The Expert Advisory Committee on Dietary Fiber recommends that adult Canadians double their dietary fiber intake. This recommendation is based on the average of 15 grams of fiber per day, the fiber intake calculated from the Nutrition Canada Survey data of 1970-

72 and research which supports the health benefits of a high fiber diet (Health Protection Branch, 1985). For example, one study found that men who consumed an average of 37 grams of dietary fiber a day had the lowest mortality from all causes (Kromhout, Bosschieter, & Coulander, 1982). Similar amounts of dietary fiber or more are routinely consumed by healthy populations in many parts of the world (Health Protection Branch, 1985).

Nutrition Recommendations for Canadians do not suggest a quantitative recommendation for dietary fiber intake but rather a qualitative one. Considering that various kinds of fiber perform different functions, qualitative recommendations have been made to encourage the inclusion of a variety of fiber-containing foods in the diet (Health and Welfare Canada, 1990). Health organizations in the United States and other countries have set quantitative recommendations for adult dietary fiber intake which range from 20-35 grams per day (United States Department of Health and Human Services, 1990).

2.2 Reported Awareness of the Associations of Fat and Fiber Intakes with Cardiovascular Disease

Awareness is defined as "the quality or state of being aware either of general information, wide knowledge, or interpretative power" (Gove & Merriam Webster Editorial Staff, 1986). Awareness however does not necessarily change behaviour (Avis, McKinlay, & Smith, 1990).

2.2.1 Fat

The awareness of dietary fat and its association with CVD has been examined in many research studies over several years. Frank and his colleagues examined change in awareness of CVD risk factors during the 1980s (Frank, Winkleby, Fortmann, & Farquhar, 1993). This study surveyed 4.158 adults residing in two control cities of the Stanford Five-City Project. Analyses were performed on five independent cross-sectional surveys conducted in 1979 through 1990. Participants were asked "In your opinion, is there anything a person can do to keep from having a heart attack or stroke?" The percentage of respondents who identified high fat foods as a specific cardiovascular risk factor were 0% during 1979-1980, 19% during 1981-1982, 20% during 1983-1984, 32% during 1985-1986, and 30% during 1989-1990.

Respondents, in another study during the mid-80's in Australia, were asked "If your doctor told you that you have a high chance of having a heart attack in the next few years, what, if anything, would you do to avoid having a heart attack?" The results indicated 8.2% men and 9.4 % women reported that they would reduce their dietary fat intake. The authors concluded that one reason for the apparent low reporting to this question of fat as a risk factor may be due to the larger number of respondents reporting other factors such as weight loss as an answer (Rushworth et al., 1990).

Avis and her colleagues also asked open-ended questions about what a person could do to make a heart attack or stroke less likely. The results showed that 73% of the total population reported that cutting fat or cholesterol in their diet would have an effect on

reducing their risk for heart disease (Avis, McKinlay, & Smith, 1990). The respondents' awareness was correlated with sociodemographic factors. The reduction of fat was positively related to being female and more highly educated.

Woodward and his associates studied health awareness among 4767 males and 4724 females in a random cross-sectional study (Woodward, Bolton-Smith, & Tunstall-Pedoe, 1994). Participants were asked "Do you think eating less fat may reduce your chance of having a heart attack?" The results indicated that 78.5 % males and 76.5 % females answered yes.

Another study by Monneuse, Bellisle, & Koppert (1997) analyzed awareness by asking respondents about the relevance of such factors as food and alcohol consumption, smoking, stress and exercise on the development of such major diseases as heart disease; hypertension; lung, breast and skin cancers; and mental illness. Nearly all subjects were aware that eating animal fat was related to heart disease: 84% men and 81% women.

2.2.2 Fiber

Frank and his colleagues also investigated awareness of CVD risk factors such as fiber in their study during the 1980s (Frank, Winkleby, Fortmann, & Farquhar, 1993). Participants were asked "In your opinion, is there anything a person can do to keep from having a heart attack or stroke?" The percentage of respondents who identified increased fiber intake as a specific factor associated with cardiovascular risk was 0 % during 1979-1980, 1% during 1981-1982, 3% during 1983-1984, 8% during 1985-1986, and 9% during

1989-1990.

There has been an immense amount of education on the overconsumption of fat in the development of several major chronic diseases, including CVD (Mela, 1994). Research shows that as more heart health campaigns are developed, people are becoming more aware of the association between fat and CVD. Little data, however is available on awareness of fiber and its link with CVD. Many of the studies conducted to date have asked open-ended questions pertaining to the risk factors of CVD and not specifically addressed dietary fiber as a risk factor.

2.3 Concern and Reported Behaviours of Consuming Fat and Fiber

Canadians have been trying to alter their dietary practices in keeping with current nutrition recommendations (Beggs, Hendricks, Schwartz, & Biro, 1993). One way to assess the effectiveness of healthy eating among consumers is to analyze consumers' concern and reported actions in relation to dietary fat and fiber.

2.3.1 Fat

Concern for fat in the diet has grown steadily since 1980 and dietary fat is now the leading nutrition concern for many people (Glanz et al., 1994). This is quite evident given the attention paid in recent years to fat by health professionals and the media (Schwartz, 1994). Studies conducted by the National Institute of Nutrition collected data on Canadians during 1989 and 1994 regarding their concerns related to such dietary issues as fat, fiber and

cholesterol. A five-point Likert scale was used to measure the degree of concern. The results of the 1989 study showed that 71% of respondents were concerned about fat with the highest proportion of those residing in the Prairie provinces (75%) and the lowest being residents of the Atlantic provinces (66%) (Beggs, Hendricks, Schwartz, & Biro, 1993). Concern about fat was highest among women (65%) and those with the highest incomes (78%). The results of the 1994 study suggested that the degree of concern for fat (82%) had significantly increased ($p<0.05$) in comparison to the results of 1989 (Reid, Conrad, & Hendricks, 1996).

Another study in France assessed reported eating habits among university students in the age range of 18-30 years (Monneuse, Bellisle, & Koppert, 1997). Students were asked if they were making an effort to avoid fat and cholesterol in their diets. The results showed that about 45% females and 21% males reported that they were.

2.3.2 Fiber

The importance consumers place on increasing fiber in the diet remains relatively low, although fiber, a complex carbohydrate, is the nutrient that consumers should be choosing more often in replacement of high fat foods in the diet (Health and Welfare Canada, 1990). When asked in 1992 whether they were making an effort to eat foods high in complex carbohydrates, few consumers said that they were making a "strong effort" (Schwartz, 1994). The National Institute of Nutrition collected data on Canadians regarding their concern towards fiber during 1989 and 1994. The results showed a significant increase ($p<0.05$) in

the concern for fiber. In 1989, 35% of respondents were very concerned about their intake of fiber and in 1994, 38% reported being very concerned (Reid, Conrad, & Hendricks, 1996). The concern for fiber was highest among those residing in British Columbia (73%) and Quebec (71%) and lowest among those residing in the Atlantic provinces (58%) (Beggs, Hendricks, Schwartz, & Biro, 1993)

Monneuse, Bellisle, & Koppert (1997) also analyzed reported eating habits of fiber containing foods among university students. Students were asked if they were making an effort to eat more fiber containing foods in their diets. The results showed that 40% females and 19% males reported yes. Females reported 'healthier' behaviours than males in terms of their effort to eat fiber and to avoid fat.

2.4 Current Intakes of Fat and Fiber

Data are limited on the current daily fat and fiber intakes of residents of the province of Newfoundland and Labrador. The last national nutrition survey which considered intakes of residents of Newfoundland and Labrador was conducted in 1972 (Department National Health and Welfare, 1975). Data from the Nutrition Newfoundland and Labrador Survey will provide more current data on estimated intakes of fat and fiber, however results of this survey are not yet available.

2.4.1 Fat

The average fat intake of western nations has consistently remained between 37 and

42 percent of energy for some years. Slight decreases have occurred in some countries in recent years as a result of public health campaigns and changes in food product availability and marketing (Mela, 1994). Dietary patterns in the United States according to the National Health and Nutrition Examination Surveys (NHANES III) conducted in 1988 and 1991 show that the percentage of dietary energy contributed by fat decreased from the early 1970's to the 1990's from 36% to 34% among men and from 37% to 33% among women (Harrison, 1997). A decrease in fat intake has also occurred in Canada however not to the level recommended by Health Canada (McDonald, 1991).

Data from the Nova Scotia Nutrition Survey reported that in that province in 1990 the mean percent of calories derived from total fat was 35% (Nova Scotia Heart Health Program, 1993). The mean intake ranged from a low of 32% in elderly women to a high of 36% in young men. The percentage of individuals deriving 30% or more of total calories from fat was 79%. A higher percentage of men than women in all age groups exceeded this recommendation. However, this percentage declined with age for both sexes. Analysis of the Manitoba Nutrition Survey showed that total fat intakes ranged from 35% for senior females to 40% for young males (Sevenhuysen et al., 1993). Fat intakes and percent of energy from fat were found to be significantly higher for men than for women, in each of the young, middle, and senior age groups.

Georgiou and her associates analyzed fat intake via a semiquantitative food frequency questionnaire in three educational groups: college students, college graduates, and nonstudents (Georgiou et al., 1997). The results showed that the higher educated college

students and college graduates ate more lower-fat milk and meats than nonstudents. Women in all groups made significantly lower fat choices than men. Glanz et al. (1994) reported that being older, female, and better educated was significantly and positively associated with a lower dietary intake of fat.

2.4.2 Fiber

Data from the United States show that usual fiber intakes average about 11 grams per day with few people getting the recommended levels of dietary fiber of 20-30 grams per day (Slavin, 1995). Recent provincial nutrition surveys in Canada suggest that the fiber intake of a significant proportion of Canadian adults is below the general recommended range. For instance, approximately 50% of Ontario residents 20-44 years of age consumed less than 15 grams of fiber per day (Ontario Ministry of Health, 1992). The average fiber intake in Nova Scotia was 13 grams per day (Nova Scotia Heart Health Program, 1993). Women in all age groups consumed more fiber per 1000 calories than did similarly aged men (Nova Scotia Heart Health Program, 1993). Fiber consumption increased with age in both sexes but more so among women.

Georgiou et al (1997) also analyzed fiber intake using a food frequency questionnaire. They found that the consumption of high fiber foods such as vegetables was low for both males and females from the ages of 18 to 24 years. Higher educated respondents ate more grain foods high in dietary fiber and more fruits and dark green vegetables. Again, Glanz et al. (1994) showed that being older, female, and better educated

was significantly and positively associated with dietary intake of fiber.

2.5 Relationship Between People's Awareness and Dietary Intake

Information on the need to reduce fat intake has been widely available through health promotion campaigns. People's awareness of the need to increase dietary fiber has also slowly increased during the past several years. However, the current intakes of fat and fiber are still not at the recommended levels advised by health professionals. To assist consumers in making the appropriate dietary changes, it is necessary that they have both the knowledge of and belief in the need for change (Drummond, Kirk, & Looy, 1996).

More education and knowledge will not necessarily result in higher compliance with dietary recommendations. For example, many health professionals smoke although they are fully aware of the associated health risks (Drummond, Kirk, & Looy, 1996). Some health educators assume that once people are aware of and understand the appropriate information that they will change their behaviour. Surveys have found that many people know about healthful dietary behaviours but are unable or unwilling to adopt them (Kristal, Bowen, Curry, Shattuck, & Henry, 1990).

Nutrition interventions to improve dietary intake of the general population are more likely effective when they are based on an understanding of factors influencing food choice and a familiarity with the established theory and research on changing health-related behaviours (Glanz et al., 1994). Several theoretical frameworks for understanding dietary change have been operationalized in past research. These include the Health Belief Model

and the Stages of Change Model.

Strategies that foster behaviour change involve a combination of theories that systematically increase awareness and teach behavioural skills. A combination of theories and models allows nutrition educators to take into consideration the complexity of dietary change, the interaction among the variables involved, and the stage of change process. In all cases, an understanding of the motivators and reinforcers of change for target audiences is required for maximum effectiveness (American Dietetic Association, 1996).

2.5.1 The Health Belief Model

The Health Belief Model is one of the most widely recognized and used theories of behavioural change. This model provides a framework for understanding the relationship between an individual's perception of their own personal risks and their actual risk of developing health problems (Heimendinger & Van Duyn 1995). The model suggests that in order for an individual to take action to avoid a disease he/she needs to believe (1) that the individual is personally susceptible to the disease, (2) that the occurrence of the disease would have at least moderate severity on some component of his/her life, and (3) that taking a particular action would in fact be beneficial by reducing the individual's susceptibility to the condition and that it would not entail overcoming important psychological barriers such as cost, convenience, pain, and embarrassment (Rosenstock, 1977).

An individual may believe that a given action will be effective in reducing the threat of disease, but at the same time the individual might see that action itself as being

inconvenient, expensive, unpleasant, painful or upsetting (Rosenstock, 1977). The model identifies these negative barriers to adopting new behaviours and examines the benefits of behaviour change .

Educators must design health promotion programs and activities for the general public that not only educate people about the importance of heart health, but also address barriers to dietary change (Harnack, Block, Subar, Lane, & Brand 1997). Deeply ingrained dietary habits can be difficult to change. Some health behaviour changes may be unpleasant or require giving up pleasure. In some people, especially some older people, their attitudes provide the barrier. They feel that they have engaged in certain behaviours for a long time and that any new change would be ineffective (Westberg & Jason, 1996).

A person's cultural background, food preferences, belief systems, and economic status are all important factors which influence dietary practices and consideration of these can help to make nutrition education successful (Nestle, 1996). Heimendinger and Van Duyn examined trends in intakes of fruit and vegetables by using a combination of consumption and marketing data. Consumers consistently report taste as the most important factor that influences intake of low fat, high fiber foods like fruits and vegetables (Heimendinger et al., 1995). Taste must be a principal theme in health promotion strategies for healthy eating.

Buttriss (1997) conducted 1700 face to face interviews in the United Kingdom to examine the most common barriers to people changing their diet. A barrier to changing to a diet lower in fat and higher in fiber is money (Buttriss, 1997). Nutrition educators should

carefully assess how best to communicate appropriate nutrition messages to economically disadvantaged groups. This population has many other problems to deal with and does not usually view health promotion and disease prevention as a priority (Cotugna, Subar, Heimendinger, & Kahle, 1992). Ironically, it is among those lower socioeconomic groups that rates of morbidity and mortality of many disease conditions are greatest (Buttriss, 1997 and Federal, Provincial, and Territorial Advisory Committee on Population Health, 1994). Many features of modern life such as dual career families, increasing consumption of meals outside the home, and promotion of foods high in calories, fat, salt, and sugar by the fast food industry constitute barriers to translation of dietary knowledge into action (Nestle, 1996). Harnack et al. (1997) examined data from the 1992 National Health Interview Survey Cancer Epidemiology Supplement to analyze the relationship of nutrition knowledge and beliefs with dietary intake . They showed that those who believe it is difficult to eat a more healthful diet are less likely to do so. Therefore, nutrition messages should focus on providing simple and practical advice about dietary change .

Confusion over dietary recommendations has been another negative influence on the adaptation of appropriate dietary behaviour. A relatively high level of confusion about which foods and personal habits promote health has been reported by consumers (Ferrini, Edelstein, & Barrett-Connor. 1994). Ferrini and her associates in southern California surveyed educated. upper-middle class adults aged 50-89 years. They found that 47% of the respondents expressed confusion about which foods were healthful. Despite many attempts at public education over the past two decades many people still claim that they are confused

about which foods are healthy (Ferrini et al., 1994). People might soon begin to ignore the advice offered by health educators. There is some evidence to suggest that men, low socioeconomic groups, and the elderly say that they ignore most of the food and health advice that reaches them (Buttriss, 1997).

Researchers have noted that even common nutrition related tasks, such as the interpretation of the amounts of nutrients listed on labels, can present difficulties for many adults. A lack of what appears to be elementary and easy to understand, such as label reading, can extend to the college level (Greidanus & Contento, 1989). It is therefore important to make nutrition education messages simple and easy to understand. It has been suggested that written materials should be developed at a sixth-grade reading level, be culturally relevant, and include pictures to illustrate examples (Nebeling, 1997).

There are many obstacles to consumers who wish to decrease their fat intakes and increase their fiber intakes. Current work on potential barriers to change, and on the influences and modification of consumer attitudes and beliefs in relation to food selection, could make important contributions to future health promotion educational programs (Mela, 1994).

2.5.2 Stages of Change Model

Another framework for behaviour change that appears particularly promising is the Stages of Change Model (Glanz et al., 1994). In this model, behaviour change is conceptualized as a dynamic and non-linear process involving several distinct stages. These

stages have been defined and categorized according to the level of motivation to change behaviour as follows: precontemplation (unaware, not interested in change); contemplation (thinking about changing); preparation or decision (making definite plans to change); action (actively modifying habits or environment); and maintenance (sustaining new, healthier habits and preventing relapse). In this model, people vary in their readiness and intentions to attempt dietary change at any point in time (Curry , Kristal, & Bowen, 1992).

Many health programs presently are built on the assumption that people are ready to change their behaviour. Hotz (1996), a psychologist and professor in the Faculty of Medicine at the University of Ottawa, reports that only 20 to 30 percent of the population who are practicing an unhealthy behaviour are ready to change that specific behaviour based on point prevalence estimates. Therefore, programs that target all subjects equally, potentially ignore the 70 to 80 percent of the population who are in the precontemplation or contemplation stages and who are not ready to change (Hotz, 1996). Different intervention strategies may be needed for individuals at different stages of the change process. For example, motivational interventions may work best with individuals who are in the earlier contemplation stages of the process, whereas specific skill training interventions may be most appropriate for individuals who have already decided to change (Curry et al., 1992).

A randomized trial by Campbell and associates demonstrated a positive effect of tailored nutrition messages based on the stages of change model in promoting dietary change for disease prevention (Campbell et al., 1994). Participants who received tailored messages made significantly more dietary changes compared with participants who received non-

tailored messages.

The movement through the Stages of Change Model could be considered an intermediate measure of specific program impact. The outcome of improved nutrition behaviour regarding fat and fiber does not occur until the action stage. However, movement of a population through the stages could be viewed as a positive effect of a program, which may eventually lead to improved eating practices. The importance of adapting existing educational programs and materials to the stages of change model is evident especially for persons with lower levels of education (Hotz, 1996). Current group nutrition programs target everyone the same way by giving the same teaching material to all participants, assuming that everyone is ready to adopt a specific behaviour. The integration of the Stages of Change Model to current and future educational programs could make nutrition education more effective.

2.6 Relationship Between People's Reported Behaviour and Actual Behaviour

The gap between what people believe they are doing and what they are actually doing has been confirmed by surveys in the United States and Canada and suggests that the deluge of nutrition information over the last decade has not been as effective in promoting proper nutritional practices as it could have been. Indeed, consumers lack a clear understanding of what constitutes healthful eating, and this represents a major obstacle to practice (Schwartz, 1994). Paisley, Lloyd, Sparks, Phil, and Mela (1995) compared general reported behaviour and actual reported fat intake among male and female respondents of various social classes

in the United Kingdom. Only one-third of the subjects who were actually consuming a high fat diet thought that their diets were high in fat. Many people currently on a high fat diet may not feel that they need to reduce their fat intake because of a poor conception of actual fat intake.

Since people may choose to reduce their fat intake if they believe it to be too high, a useful first step towards reducing the average fat intake might be to educate consumers about the actual fat content of foods and of their total diet. This could also apply to dietary change to increase fiber. Educating people about the fiber content of foods and assessing personal sources and level of fiber consumption may help to overcome such obstacles to successful dietary changes (Mela, 1994).

Worsley and Crawford (1985) found that a major barrier to dietary change was the belief held by most people in their study that there was no need to make dietary changes. Barriers to dietary change were assessed by using a detailed questionnaire administered by mail to a random sample of Melbourne, Australian residents (Worsley and Crawford, 1985). Therefore, it is unlikely that these individuals would be receptive to advice for dietary change if they feel that they have achieved a low fat intake and are at no dietary risk (Drummond, Kirk, & Looy, 1996).

These finding were also supported by research done in Holland by Brug, Van Assema, Kok, Lenderink, & Glanz (1994). It was noted that although approximately 80% of the Dutch population have a diet which has a fat content exceeding the level of intake recommended for that country (recommended fat intake is 30-35% of total calories), less than

10% of their subjects actually rated their fat consumption as being too high. A significantly larger proportion of men were optimistic regarding dietary fat intake than were women. Females were significantly more often realistic about their dietary fat intake. This discrepancy between reported behaviour of fat consumption and actual fat intake has also been reported by Glanz et al. (1993) in the United States.

Another study by Mela (1994) showed that British consumers self-reported numerous changes in diet which were inconsistent with objective intake data. In addition, consumers commonly misjudged their fat intakes as optimistically low. Mela asked respondents whose fat intake represented over 42 percent of the energy of their diets, "Do you believe that the fat content of your diet is low, neither low nor high, or high?" Approximately 50 percent of the respondents rated their diet as being low in fat even though their diets were actually high in fat.

The discrepancies between general reported dietary behaviour, what they think that they are consuming, and actual dietary intake can be explained further. Many respondents made selected changes in their diets with the intention of reducing fat intake. However, the changes may not have been in the types or volume of foods needed to have any substantial impact on overall fat intake, and the changes may even have been negated by increasing the consumption of fat from other foods (Mela, 1994). A biased self-rating of dietary fat intake could also be caused by the lack of knowledge about the "hidden fats" in foods such as pastries, snacks, and fast foods (Brug et al., 1994)

Many consumers have gross misunderstandings of the relative fat and fiber contents

of common foods (Mela, 1993). This was supported by Buttriss (1997) when he analyzed the fat and fiber content of foods. Respondents, 18 year old females and males from the United Kingdom, were given a list of high and low fiber foods. They were then asked which foods contained fiber. The data showed that 1 in 3 people were unable to identify even 3 out of the 6 fiber-containing foods. A study by Barker, Thompson, and McClean (1995) also concluded that people's incorrect notions of where fat is in the diet are among the key factors compromising efforts to get the public to have better eating habits.

These results suggest a potentially important barrier to dietary change. Specifically, if consumers believe that they have made the appropriate changes, and incorrectly conclude that their diets are sufficiently low in fat, they may have little incentive for further dietary change. This suggests that a useful first step towards decreasing the average fat intake and increasing the average fiber intake would be to educate consumers about the actual fat and fiber content of common foods (Mela, 1994).

Consumers who are concerned about their fat and fiber intakes may have misconceptions regarding their current or desirable intake levels. Improved delivery of information about the fat and fiber content of foods and better guidance for assessing personal dietary sources may help to overcome such obstacles to successful dietary change. Current work on barriers to change and research on current knowledge and beliefs, should make important contributions to future public health and education programs (Mela,1994).

2.7 Assessing Dietary Intake

Dietary intake can be assessed by using weighed records, a food record, 24-hour recall, and/or a food frequency questionnaire. Assessing dietary intake by weighed records involves direct observation of the respondents' food intakes. In a controlled situation, a weighed amount of food is given to the respondent, the amount of uneaten food reweighed, and the difference recorded as the amount eaten. Although this is the most accurate method of evaluating food intake, it is also the most time consuming, expensive, and difficult (Czajka, 1992).

The food record method requires the respondent to write down everything consumed during a particular time period. The respondent is trained to write down the times foods are eaten, all foods and beverages consumed, the amounts consumed, and the methods of preparation (Cataldo, DeBruyne, and Whitney, 1995). A four day food record is recommended to predict usual nutrient intakes of individuals which should include at least 2 weekdays and 1 weekend day. It is usually more accurate if the food eaten is recorded throughout the day when it is consumed (Czajka, 1992). One limitation for using a food record to assess dietary intake is the act of recording one's intake has a tendency to influence food intake.

Another method of obtaining dietary information is the 24-hour recall, in which individuals are asked to describe the foods eaten in the previous 24 hours (Czajka, 1992). Sources of error when using the 24-hour recall include: 1) inability to recall accurately the kinds and amounts of food eaten; 2) atypical intakes on the previous day; 3) failure to obtain

the truth for a variety of reasons, one of which may be embarrassment; and 4) adding or omitting foods depending on the subject's concepts of an appropriate intake (Czajka, 1992).

The 24-hour recall provides accurate generalizations about an individual's usual food intake only when recalls are collected on several non consecutive days, including both weekdays and weekend days (Cataldo, DeBruyne, and Whitney, 1995). Due to the large amount of effort required to collect and process multiple days of recalls, this method is seldom used as the primary method for estimating usual intake in large epidemiologic research (Buzzard, 1998).

Another way to assess dietary intake is by a food frequency questionnaire. The respondent is asked how often he/she eats a specific type of food per day, week, or month using a list of foods or types of foods (Cataldo, DeBruyne, and Whitney, 1995). The food frequency questionnaire may be either selective, with questions about foods suspected of being deficient or excessive in the diet, for example foods that are high fat, or general, with questions concerning all foods likely to be eaten (Czajka, 1992). This information is one way to help validate the accuracy of the 24-hour recall data, however using both methods can be time consuming and expensive (Czajka, 1992).

Willett and his associates (1985) have showed that the use of the food frequency questionnaire alone can accurately measure dietary intake based on the food frequency questionnaire validation study from the Nurse's Health Study. A large cohort of 95,000 female registered nurses, being followed for the occurrence of cancer and heart disease, completed a semi quantitative food frequency questionnaire in 1980 . Nutrient intake scores

were obtained from the food frequency questionnaire and compared with a more detailed and quantitative estimate of dietary intake over an extended period of time. Food records were chosen as the comparison method. The study showed that a simple and inexpensive dietary food frequency questionnaire can usefully measure individual intakes for a variety of nutrients (Willett et al., 1985). Hence the food frequency questionnaire has become the primary method for measuring dietary intake in epidemiologic studies (Willett, 1998).

Brug and associates (1994) also assessed dietary intake, specifically fat intake, by means of a validated 25-item food frequency questionnaire. The validity of this short questionnaire was assessed in relation to 7 day food records and was considered sufficient and comparable to the validity of other often used food frequency questionnaires. The food frequency questionnaire, the measurement tool used to analyze dietary intake, is a practical and acceptable way to assess food consumption in large population studies (Brug et al., 1994).

2.8 Summary of the Literature Review

In summary, people may become more aware of the association between dietary fat and CVD as more heart health campaigns are developed. Consumers concern for choosing a diet low in fat has also grown steadily. The message of the need to increase dietary fiber has also slowly increased during the past several years. However, the current intake of fat and fiber are still not at the recommended levels advised by health professionals.

Research has shown that more awareness and knowledge will not necessarily result

in higher compliance to dietary recommendations. Several theoretical frameworks for understanding dietary change have been developed to bridge the gap between awareness and improved dietary intake. These include the Health Belief Model and the Stages of Change Model.

There is also a discrepancy between general reported behaviour, what individuals think that they are consuming, and their actual dietary intake. Many consumers lack a clear understanding of what constitutes healthful eating. They have gross misunderstandings of the relative fat and fiber contents of common foods. Educating people about the fat and fiber content of foods and assessing personal sources and levels of fat and fiber consumption may help to overcome obstacles to successful dietary change.

3.0 Methodology

Nutrition Newfoundland and Labrador was a survey designed to determine the dietary practices of the residents of Newfoundland and Labrador. The survey population consisted of a stratified random sample of all non-institutionalized, 18 to 74 year-old adults, residing in the province of Newfoundland and Labrador. The sample was drawn from provincial medical insurance files (MCP) with sample weightings calculated by Statistics Canada. Data were collected during both the spring and fall of 1996 to allow for seasonal variability. The survey investigators included partners representing Health Canada, the Province of Newfoundland and Labrador, Memorial University of Newfoundland and the Newfoundland and Labrador Heart Health Initiative.

3.1 Sample Population

This study was a secondary analysis of some of the data collected by the Nutrition Newfoundland and Labrador Survey. The population used in the present study included 18 to 74 year-old adults, who lived in metropolitan St. John's, as defined by Statistics Canada (Appendix B). Raw data collected from 270 males and 277 females were analyzed.

3.2 Data

Nutrition Newfoundland and Labrador collected data by personal interviews using four separate questionnaires. All survey questions were based on questionnaires from the Nova Scotia Nutrition Survey (Nova Scotia Heart Health Program, 1993). Minor

adjustments were made by the Expert Advisory Committee to modify the survey tool for use in Newfoundland and Labrador. The questionnaires were: 1) 24-Hour Recall Questionnaire, 2) the Nutrition and Health Questionnaire, 3) Food Frequency Questionnaire, and 4) Demographic Profile Form. In the present study, data from the Nutrition and Health Questionnaire (Appendix C), the Food Frequency Questionnaire (Appendix D), and the Demographic Profile Form (Appendix E) were used in the analysis. This analysis studied survey data collected from residents of metropolitan St. John's to address:

1. Respondents' awareness of dietary fat and fiber as cardiovascular risk factors in the prevention of heart disease.

2. Respondents' reported behaviours of choosing dietary fiber and avoiding dietary fat in the diet.

3. Respondents' dietary intakes of high fat and high fiber foods as reported in the Food Frequency Questionnaire.

4. Relationship between respondents' i) awareness and reported behaviour of avoiding fat and choosing fiber ii) reported behaviour and dietary intakes of fat and fiber iii) awareness and dietary intakes of fat and fiber.

Information was collected on

1) Sociodemographic Variables

2) Awareness

3) Reported Behaviour

4) Dietary Intake

3.2.1 Sociodemographic Variables

The following sociodemographic variables were used in the data analyses:

1) Age: The sample population was divided into age groups 18-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years, and 65-74 years. Age groups were combined into a younger population group (18–44 years) and an older population group (45-74 years) when statistical tests suggested significant differences.

2) Education: Respondents were categorized into the following groups: less than elementary (category 01 or 02), completed elementary only (category 03 or 04), completed secondary only (category 05, 06 or 08), completed technical college only (category 07), and completed university (category 09) (refer to the Demographic Profile Form). When statistical analyses detected true differences, education levels were combined into a lower education and a higher education group, completed secondary or less and those who had completed technical college and/or university, respectively.

3) Income Adequacy: Each respondent was classified into an income adequacy category, low, middle, or high. Income adequacy was based on household size and household income (Figure 1). Income adequacy for this study was adapted from the one used in The Adult Health Survey of 1995. The categories were based on the Statistics Canada low income cut offs (LICOs) for 1994 (A. Edwards, researcher, personal communication, February 18, 1998). Household income was the total income for the year 1995 of all household members before tax deductions. Respondents reported household income by looking at a card with a list of incomes, each one with a

Income Adequacy

Household Income	Household Size				
	1	2	3	4	5 or more
Low	$19,999 or less	$19,999 or less	$19,999 or less	$29,999 or less	$29,999 or less
Middle	$20,000 to $29,999	$20,000 to $39,999	$20,000 to $39,999	$30,000 to $49,999	$30,000 to $59,000
High	$30,000 or more	$40,000 or more	$40,000 or more	$50,000 or more	$60,000 or more

Figure 1: Adapted from Segovia J, Edwards AC, Bartlett RF. Adult Health Survey 1995-Methodology and Descriptive Results: Health and Medical Care Research Group, Division of Community Medicine, Memorial University, St. John's, 1996.

corresponding letter. The respondent was asked which letter applied to their total household income.

4) Sex: Sex was another sociodemographic variable used in the data analysis.

3.2.2 Awareness

The Nutrition and Health Questionnaire asked closed ended questions of the participants regarding their awareness of specified activities which could have varying influences on the prevention of heart disease. The awareness questions were used to evaluate the respondents' reported awareness that the avoidance/consumption of dietary fat and fiber were important to the prevention of heart disease or heart attacks (Appendix C - Nutrition and Health Questionnaire Part I). Awareness was based on the respondents' answers to the following questions:

1) Would eating fewer high-fat foods have little or no effect, a moderate effect, or a large effect in preventing heart disease? (Question 5)

2) Would eating more high-fiber foods have little or no effect, a moderate effect, or a large effect in preventing heart disease? (Question 8)

Awareness was measured by a 3 point Likert scale with a value of 1 meaning little or no effect, a value of 2 meaning a moderate effect, and a value of 3 meaning a large effect (Deaux & Wrightsman, 1988). The respondent also had the choice to answer "not sure" for each question. A value of 9 was given to the "not sure" response.

3.2.3 Reported Behaviour

Reported behaviour was the interviewees' reported behaviour of choosing or avoiding specific foods (Appendix F - Food Frequency Questionnaire Part IV). The questions asked referred to actions usually taken in the selection and consumption of foods. The questions were:

1) Are you avoiding foods or types of foods because of the fat content? (Question 202)

2) Are you choosing to eat foods or types of foods because of the fiber content? (Question 201)

Both questions were given a yes/no answer by the respondent.

3.2.4 Dietary Intake

The Food Frequency Questionnaire was used to estimate actual dietary intakes of foods containing fat and fiber as reported by the respondents (Appendix D). The respondents were asked:

1) How often during the past month did you consume a specific food?

2) What was your usual portion size?

For each food item used, there were 3 dimensional models presented to the respondent by the interviewer to help estimate the usual amount eaten. The 3 dimensional models represented predetermined volumes. These models were based upon those used in the Nova Scotia Nutrition Survey (Nova Scotia Heart Health Program, 1993). The volumes were similar to common portion sizes of foods consumed. The portion model symbols and the

corresponding portion sizes are found in Appendix G.

Occasionally the interviewer recorded the volume of a food consumed in a unit which did not correspond with the three dimensional models offered. The ESHA Food Processor software package was then used to convert amounts provided on the questionnaire to units equivalent to those in Appendix G (ESHA, Salem, Oregon). For example, if the respondent reported his/her intake of bacon in pounds instead of strips, then the interviewer would record the volume in pound units. The ESHA program was then used to convert pounds into strips.

Conversions were also necessary when the respondent stated that his/her portion size was different than the reference portion size stated on the food frequency questionnaire. For instance, if 1 MO-L (1 cup) of broccoli was stated by the respondent and the reference portion size on the food frequency questionnaire was MO-M (1/2 cup), then the stated reference portion was recalculated to units of MO-M.

3.2.4.1 Selection of Foods for Dietary Intake of Fat

The dietary intake of fat was determined by calculating the total amount of certain foods, designated as high fat foods, consumed during a one month period and reported in the Food Frequency Questionnaire. High fat food choices used in the analysis of dietary intake of fat contained at least 4.0 grams of fat per reference portion size. The reference portion size of a food was determined by the Expert Advisory Committee, Nutrition Newfoundland and Labrador and was deemed to be the approximate volume of that food consumed by an

average subject in one sitting.

The following foods in the Food Frequency Questionnaire were deemed to be high in fat and used in the analysis of self reported intake of fat:

1. fried fish
2. fried poultry
3. bacon
4. weiners or sausages
5. bologna
6. luncheon meats
7. salt meat or salt riblets
8. cheese with more than 24% b.f. (butter fat)
9. eggs or egg dishes
10. french fries or pan fried potatoes
11. potato chips or tortilla chips
12. rich gravy or pan drippings
13. scrunchions
14. regular or rich ice cream
15. donuts, cakes, pies, muffins, or croissants.

3.2.4.2 Selection of Foods for Dietary Intake of Fiber

Dietary intake of fiber was determined by calculating the amount of certain foods.

designated as high fiber foods. contained in the Food Frequency Questionnaire. High fiber foods contained at least 0.5 grams of fiber per reference portion size as defined in section.

3.2.4.1.

The following foods were considered to be high fiber foods according to the above criteria:

1. broccoli
2. carrots or mixed vegetables with carrots
3. cabbage, coleslaw, or sauerkraut
4. cauliflower
5. cooked spinach
6. raw spinach
7. squash
8. turnip
9. green peas
10. greens
11. boiled or baked beans
12. whole wheat bread.

3.2.4.3 Scoring of Dietary Intake of Fat and Fiber

Dietary intakes of fat and fiber were analyzed separately but in both cases using a

score of 1-6. A similar scale was used by Strychar and his associates in their analysis of fat intake and was adapted for use with this study (Strychar, Potvin, Pineault, Pineau, & Prevost, 1993). The following scale was developed because Strychar's system was not continuous for portion sizes and fractions were used for reference portion sizes in the current study:

Score 1 = 0 or less than 1 reference portion size consumed during the past month

Score 2 = 1 up to 4, but excluding 4, reference portion sizes consumed during the past month

Score 3 = 4 up to 8, but excluding 8, reference portion sizes consumed during the past month

(approximately equal to 1 reference portion size consumed per week)

Score 4 = 8 up to 20, but excluding 20, reference portion sizes consumed during the past month

(approximately equal to 2- 4 reference portion sizes consumed per week)

Score 5 = 20 up to 31, but excluding 31, reference portion sizes consumed during the past month

(approximately equal to 5-7 reference portion sizes consumed per week)

Score 6 = 31 or more reference portion sizes consumed during the past month

(more than 7 reference portion sizes consumed per week)

For each individual subject a score on fat intake was calculated which was equivalent to the sum of the scores for all of the high fat food items consumed. The total number of high fat food items (refer to 3.2.4.1 Selection of Foods for Dietary Intake of Fat) from the Food Frequency Questionnaire used in the analysis of fat was 15. The hypothetical score range was 15-90 for self reported intake of high fat foods, however the actual observed range

was 15-63. The subjects were divided into three groups according to the frequency distribution of scores on fat intake. The first group with scores of less than or equal to 30, was designated as having a low dietary intake of fat. the second group with scores of 31-45 inclusive was designated as having a moderate dietary intake of fat, and the third group with scores greater than or equal to 46 was designated as having a high dietary intake of fat.

Respondent's scores were also added for all of the high fiber food items for dietary intake of fiber. The number of high fiber food items from the Food Frequency Questionnaire used in the analysis of self reported fiber intake was 12. The hypothetical score range was 12-72 however the observed score range was 12-48. The subjects were then divided into three groups according to the frequency distribution of scores on dietary fiber intake. The first group with scores less than or equal to 24, was denoted as low dietary intake of fiber. the second group with scores of 25-36 inclusive. was denoted as moderate dietary intake of fiber. and the third group with scores greater than or equal to 48, was denoted as high dietary intake of fiber. The six groups. low. moderate and high intake of high fat and high fiber foods were used in all of the analyses of dietary intakes.

3.3 Data Analysis

The Statistical Package for Social Sciences (SPSS) program was used for all data analyses. Frequency analysis in terms of cross tabulation and Chi Square tests of association were used to analyze the data. Associations were studied between demographic variables and awareness of fat, awareness of fiber, reported behaviour of avoiding fat, reported

behaviour of choosing fiber, dietary intake of fat, and dietary intake of fiber. The level of significance used for all statistical tests was $p < 0.01$. Because there were many statistical tests performed, this p-value was used to control type 1 error instead of using $p < 0.05$.

When the number of subjects in any category was less than 5, categories were pooled. For instance, data collected on the awareness of fat were pooled into two categories before analysis 1) little or no effect plus moderate effect, and 2) large effect. The Chi-Square test of association is not appropriate for the analysis of categories with less than 5 subjects. An exception to this was for the analysis of dietary fiber when expected frequencies were less than 5 in the high dietary fiber category. The moderate and high dietary fiber categories were not pooled because the analysis showed that many of the respondents in the moderate intake of fiber category were consuming a diet relatively low in fiber (Refer to Section 5.4.2). Therefore, the researcher decided that it would be misleading to group these subjects with those who legitimately fit into the high dietary fiber category.

The relationships between awareness of fat, reported behaviour of avoiding fat, and dietary intake of high fat foods were analyzed using the Chi Square test of association. The relationships between awareness of fiber, reported behaviour of choosing fiber, and dietary intake of high fiber foods were also evaluated using the Chi Square test of association.

Sample weights were applied in the syntax file of SPSS for every individual and used in all data analyses (M.S. Nargundkar, Assistant Director Special Surveys, Statistics Canada, personal communication, February 16, 1998). With large population based research studies, it is impossible to survey the whole population. Sample weights were used so that

the study sample would better represent the general population and thus increase reliability (Banks, 1979). The sample weights were adjusted for sex and age. The sample weights were also adjusted for non-response. A flow diagram of the overall data analysis is in Figure 2.

3.4 Ethical Approval

Nutrition Newfoundland and Labrador was reviewed and approval was granted by The Ethics Committee for Research with Human Subjects, Faculty of Science, Memorial University of Newfoundland. The secondary analyses of the data collected by this survey and used in this study were approved by the Human Investigation Committee, School of Medicine, Memorial University of Newfoundland (Appendix H). The researcher was sworn in by a notary to access The Nutrition Newfoundland and Labrador survey data. A copy of the Preservation of Confidentiality Statement is found in Appendix I.

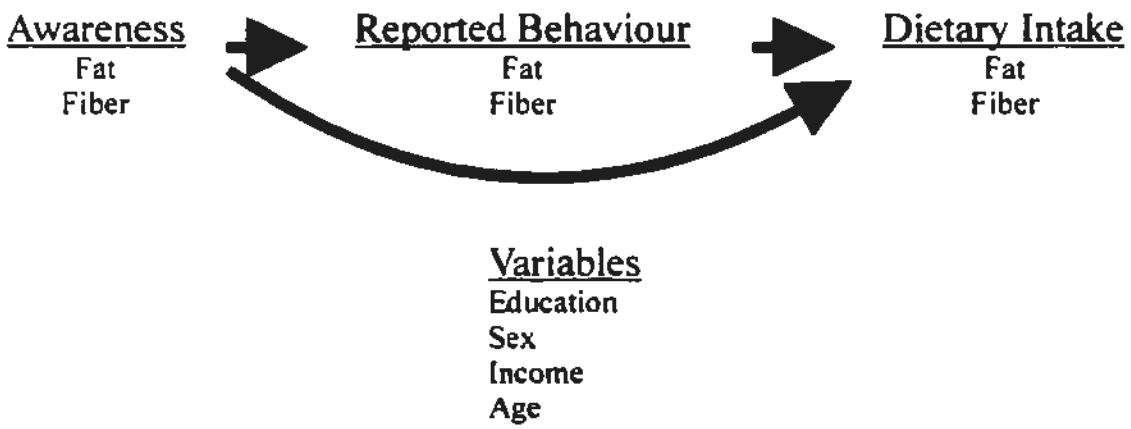


Figure 2: Data Analysis Flow Diagram

4.0 Results

The results of the secondary analyses of the Nutrition and Newfoundland and Labrador Survey are presented below. Statistical test were performed (refer to section 3.3). Data are presented in text, in tables, and/or in figures.

4.1 Characteristics of the Sample Population

The study sample consisted of 270 males and 277 females living in metropolitan St. John's. The frequency distributions for age, income adequacy, and level of education are illustrated in Figures 3, 4 and 5. A larger percentage of respondents (56.7%) represented the older age group (45-74 years), as compared to 43.3% in the younger age group (18-44 years). Income adequacy was based on the total income per household and the number of people per household (See Figure 1). More subjects fell in the high income adequacy group (41.0%) as compared to any other of the income categories (Figure 4). Approximately 9% of the respondents refused to give their household income. Figure 5 suggests that almost 19% of the subjects had completed a university education.

4.2 Response Rate

There were 4233 names drawn from Newfoundland Medical Insurance files (MCP) during sample selection for the original survey. These names were drawn in accordance with selection factors that were designated for each age, gender, and season. There were 2208 names drawn from the files that were from metropolitan St. John's. Of the 2208 names

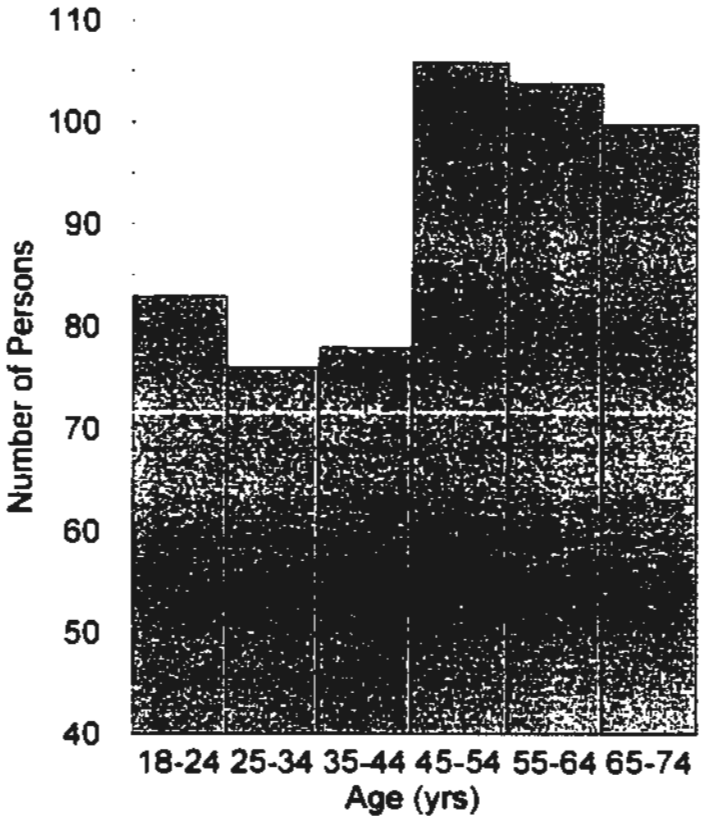


Figure 3: Distribution by Age

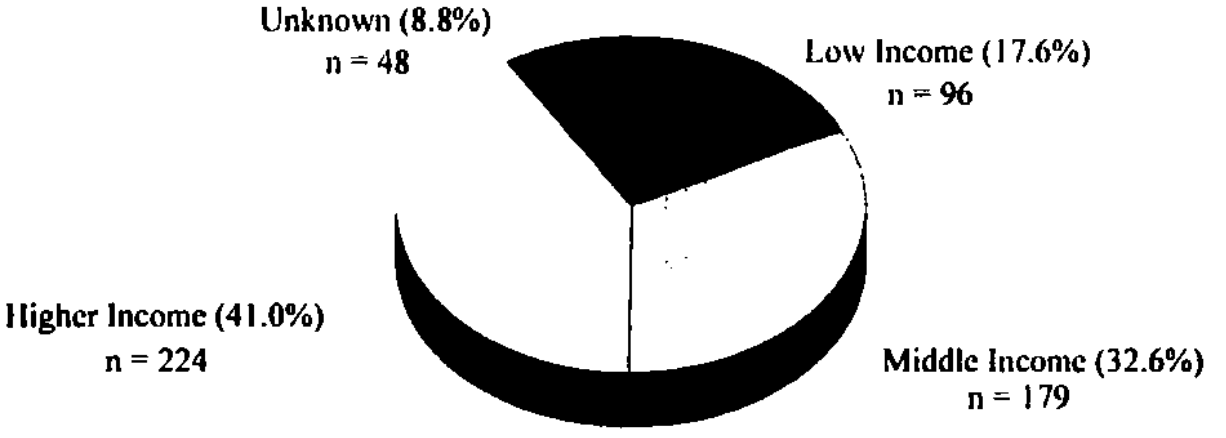


Figure 4: Distribution by Income Adequacy

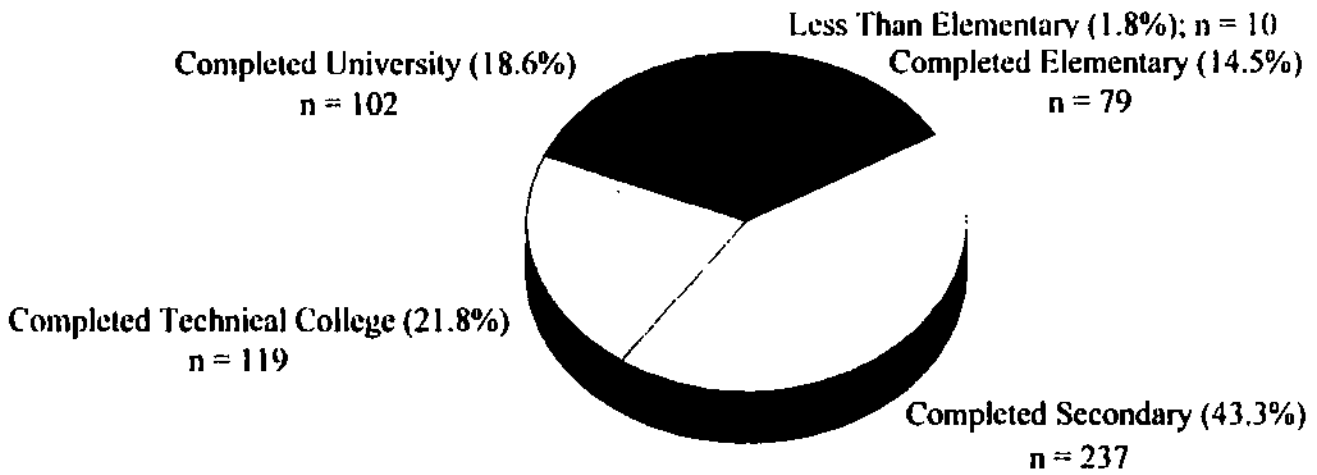


Figure 5: Distribution by Education Level

drawn, 1389 were located, 190 were ineligible and 547 interviews were obtained (Table 1).

A person was considered ineligible and unable to participate if he or she lived in an institution, worked for the military, was not presently residing in the province or was deceased. A woman who was pregnant at the time of the survey was also ineligible.

The response rate of 45.6% was obtained for the entire study sample of residents living in metropolitan St. John's. The response rate was higher for females (47.7%) as compared to males (43.6%). The overall response rate for the survey compared favourably with those attained in similar national studies (Nova Scotia Heart Health Program, 1993; Newfoundland Department of Health and Department of National Health and Welfare, 1990).

4.3 Awareness

The distributions of reported awareness of dietary fat and fiber as cardiovascular risk factors for the sample population are given in Figure 6. A higher percentage (76.5%) of the population reported that eating lower fat foods would have a large effect in preventing heart disease as compared to 44.7% of the population who reported that eating more high fiber foods would have a large effect in the prevention of heart disease.

Table 1: Response Rates by Gender from the Total Sample Drawn

	Female	Male	Total
# Drawn from file[a]	1112	1096	2208
# Located	685	704	1389
# Ineligible[b]	105	85	190
#Eligible Located[c]	580	619	1199
# Interviews Completed from Eligible Located	277	270	547
% Interviews Completed from Eligible Located[d]	47.7	43.6	45.6

a Total number of names drawn from a sample of 4223 of the Newfoundland Medical Insurance files.

b Total number of individuals located from (a) who lived in institutions, worked for the military, did not reside in the province of Newfoundland and Labrador, was deceased or pregnant.

c Total number of individuals located from (a) and was asked to participate in the Newfoundland and Labrador Nutrition Survey.

d Percentage of individuals that were located, eligible and completed the survey.

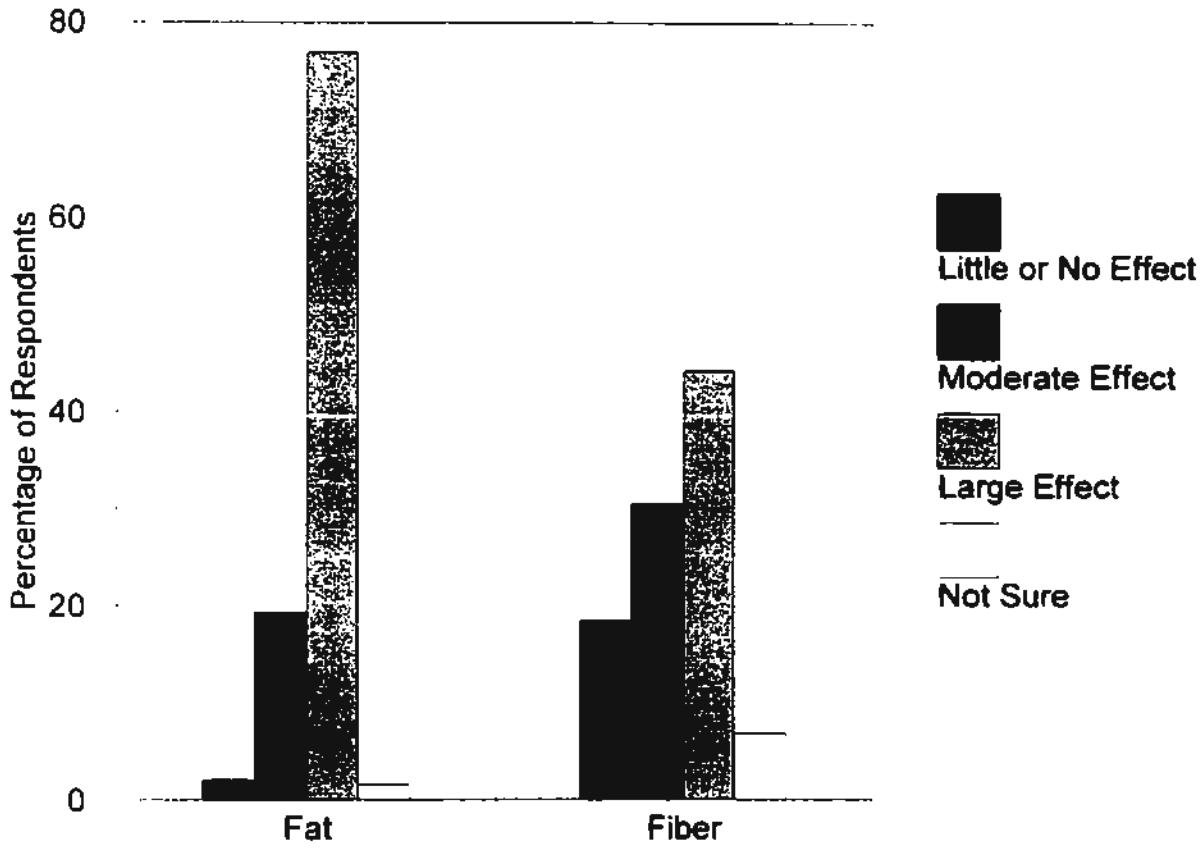


Figure 6: Awareness of Fat and Fiber as Cardiovascular Risk Factors

4.3.1 Awareness of Fat as a Cardiovascular Risk Factor

The Chi Square test was used to assess the association between awareness of fat as a risk factor with age, education, income adequacy and sex. The results are presented in Tables 2 through 5. From the p-values it is clear that sex was the only variable tested which was significantly associated with the awareness of fat as a cardiovascular risk factor. Table 5 shows that a higher percentage of females (81.4%) reported that eating fewer high fat foods would have a large effect in preventing heart disease as compared to males (71.9%).

4.3.2 Awareness of Fiber

The Chi Square test was also used to analyze the association between awareness of dietary fiber as a risk factor for developing heart disease with the demographic variables age, education, income adequacy, and sex. Tables 6, 7, 8 and 9 present data summarizing the analyses and the corresponding p-values. Although no demographic variables were statistically associated with awareness of dietary fiber, a substantially higher percentage of females (52%) reported that eating more high fiber foods would have a large effect in preventing heart disease as compared to 41% of males.

Table 2: Awareness of Fat by Different Age Groups

	Effect of Fat as a Cardiovascular Risk Factor	
Age	Moderate or Little or No Effect	Large Effect
18-24	26 (27.1 %)	70 (72.9 %)
25-34	28 (21.7 %)	101 (78.3 %)
35-44	31 (24.8 %)	94 (75.2 %)
45-54	18 (19.1 %)	76 (80.9 %)
55-64	10 (17.9 %)	46 (82.1 %)
65-74	9 (22.5%)	31 (77.5 %)
Total	122 (22.6%)	418 (77.4%)

$p = 0.720$ d.f. (degrees of freedom) = 5 χ^2 (Chi Square Value) = 2.87

Table 3: Awareness of Fat by Various Levels of Education

	Effect of Fat as a Cardiovascular Risk Factor	
Education	Moderate or Little or No Effect	Large Effect
Completed or Less than Elementary	11 (18.6 %)	48 (81.4 %)
Completed Secondary	54 (23.7 %)	174 (76.3 %)
Completed Technical College	24 (18.0 %)	109 (82.0 %)
Completed University	32 (26.9 %)	87 (73.1 %)
Total	121 (22.4%)	418 (77.6%)

p=0.318 d.f. = 3 $\chi^2 = 3.52$

Table 4: Awareness of Fat by Income Adequacy

	Effect of Fat as a Cardiovascular Risk Factor	
Income Adequacy*	Moderate or Little or No Effect	Large Effect
Low Income	21 (19.4 %)	87 (80.6 %)
Middle Income	39 (24.1 %)	123 (75.9 %)
High Income	51 (22.2 %)	179 (77.8 %)
Total	111 (22.2%)	389 (77.8%)

$p = 0.669$ d.f. = 2 $\chi^2 = 0.84$

* Refer to Figure 1

Table 5: Awareness of Fat by Sex

	Effect of Fat as a Cardiovascular Risk Factor	
Sex	Moderate or Little or No Effect	Large Effect
Male	63 (28.1 %)	161 (71.9 %)
Female	59 (18.6 %)	258 (81.4 %)
Total	122 (22.6%)	419 (77.4%)

$p = 0.009$ d.f. = 1 $\chi^2 = 6.80$

Table 6: Awareness of Fiber by Different Age Groups

	Effect of Fiber as a Cardiovascular Risk Factor		
Age	Little or No Effect	Moderate Effect	Large Effect
18-24	22 (24.2 %)	28 (30.8 %)	41 (45.1 %)
25-34	26 (20.5 %)	40 (31.5 %)	61 (48.0 %)
35-44	29 (24.0 %)	41 (33.9 %)	51 (42.1 %)
45-54	14 (16.1 %)	31 (35.6 %)	42 (48.3 %)
55-64	8 (14.8 %)	19 (35.2 %)	27 (50.0 %)
65-74	8 (21.1 %)	9 (23.7 %)	21 (55.3 %)
Total	107 (20.7%)	168 (32.4%)	243 (46.9%)

$p = 0.828$ d.f. = 10 $\chi^2 = 5.85$

Table 7: Awareness of Fiber by Various Levels of Education

	Effect of Fiber as a Cardiovascular Risk Factor		
Education	Little or No Effect	Moderate Effect	Large Effect
Completed or Less than Elementary	12 (21.8 %)	12 (21.8 %)	31 (56.4 %)
Completed Secondary	41 (19.1 %)	68 (31.6 %)	106 (49.3 %)
Completed Technical College	27 (20.6 %)	43 (32.8 %)	61 (26.6 %)
Completed University	28 (23.7 %)	44 (37.3 %)	46 (39.0 %)
Total	108 (20.8%)	167 (32.2%)	244 (47.0%)

$p = 0.365$ d.f. = 6 $\chi^2 = 6.54$

Table 8: Awareness of Fiber by Income Adequacy

	Effect of Fiber as a Cardiovascular Risk Factor		
Income Adequacy*	Little or No Effect	Moderate Effect	Large Effect
Low Income	19 (18.8 %)	30 (29.7 %)	52 (51.5 %)
Middle Income	38 (24.5 %)	45 (29.0 %)	72 (46.5 %)
High Income	40 (18.1 %)	81 (36.7 %)	100 (45.2 %)
Total	97 (20.3%)	156 (32.7%)	224 (47.0%)

$p = 0.337$ d.f. = 4 $\chi^2 = 4.55$

* Refer to Figure 1

Table 9: Awareness of Fiber by Sex

	Effect of Fiber as a Cardiovascular Risk Factor		
Sex	Little or No Effect	Moderate Effect	Large Effect
Male	52 (24.3 %)	75 (35.0 %)	87 (40.7 %)
Female	55 (18.0 %)	93 (30.4 %)	158 (51.6 %)
Total	107 (20.6%)	168 (32.3%)	245 (47.1%)

$p = 0.038$ d.f. = 2 $\chi^2 = 6.51$

4.4 Reported Behaviours

The frequency distributions for the reported behaviours of avoiding foods because of the fat content and choosing foods because of the fiber content for the sample population are given in Figure 7. Approximately 73% of the sample population reported that they were avoiding foods because of the fat content. Only 48% of respondents reported that they were choosing foods because of the fiber content.

4.4.1 Reported Behaviour of Avoiding Foods Because of the Fat Content

The Chi Square test of association was used to analyze the reported behaviour of avoiding foods because of the fat content with the variables age, education, income adequacy, and sex. The results for these variables are presented in Tables 10, 11, 12 and 13. All variables had significant associations with reported behaviour. When age was further divided into a younger population group (18-44 years) and an older population group (45-74 years), age was not statistically significant (Refer to Section 3.2.1).

The education groups were further divided into a lower education group and a higher education group. A larger percentage of the higher education group, approximately 77-83%, reported that they were avoiding foods because of the fat content as compared to the lower education group (60-70%) ($p = 0.002$). Table 12 shows that a large percentage of respondents (82.3%) in the high income adequacy group reported that they were avoiding foods because of the fat content. A higher percentage of females (79.3%) compared to males (64.6%) reported that they were avoiding foods because of the fat content (Table 13).

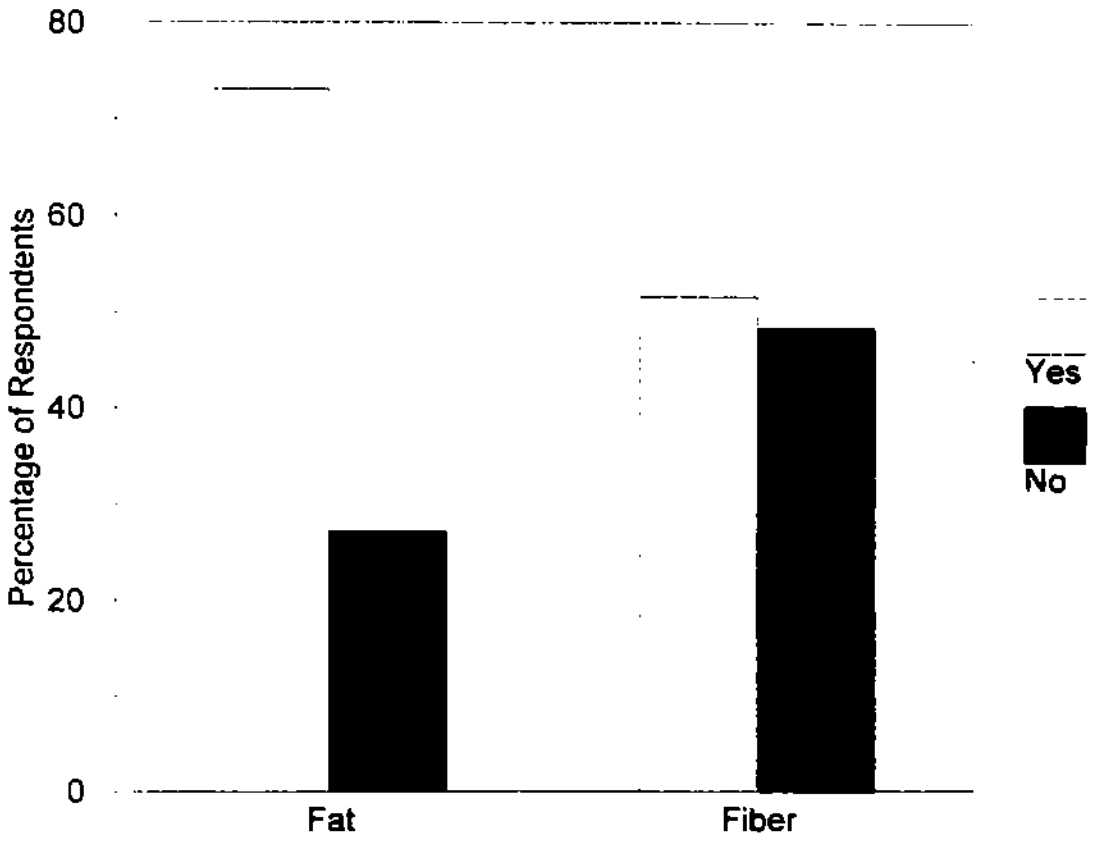


Figure 7: Reported Behaviour of Avoiding Fat and Choosing Fiber

Table 10: Reported Behaviour of Avoiding Fat by Different Age Groups

	Avoiding Foods Because of the Fat Content	
Age	Yes	No
18-24	61 (62.9 %)	36 (37.1 %)
25-34	87 (69.0 %)	39 (31.0 %)
35-44	90 (70.3 %)	28 (29.7 %)
45-54	81 (84.4 %)	15 (15.6 %)
55-64	49 (86.0 %)	8 (14.0 %)
65-74	31 (73.8 %)	11 (26.2 %)
Total	399 (74.4%)	137 (25.6%)

$p = 0.003$ d.f. = 5 $\chi^2 = 17.71$

Table 11: Reported Behaviour of Avoiding Fat by Various Levels of Education

		Avoiding Foods Because of the Fat Content	
	Education	Yes	No
Lower	Completed or Less than Elementary	36 (60.0 %)	24 (40.0 %)
	Completed Secondary	161 (70.0 %)	69 (30.0 %)
Higher	Completed Technical College	104 (76.5 %)	32 (23.5 %)
	Completed University	98 (83.1 %)	20 (16.9 %)
	Total	399 (73.3%)	145 (26.7%)

$p = 0.004$ d.f. = 3 $\chi^2 = 13.15$

Table 12: Reported Behaviour of Avoiding Fat by Income Adequacy

	Avoiding Foods Because of the Fat Content	
Income Adequacy*	Yes	No
Low Income	64 (58.7 %)	45 (41.3 %)
Middle Income	111 (68.5 %)	51 (31.5 %)
High Income	190 (82.3 %)	41 (17.7 %)
Total	365 (72.7%)	137 (27.3%)

$p < 0.001$ d.f. = 2 $\chi^2 = 22.79$

* Refer to Figure 1

Table 13: Reported Behaviour of Avoiding Fat by Sex

	Avoiding Foods Because of the Fat Content	
Sex	Yes	No
Male	146 (64.6 %)	80 (35.4 %)
Female	253 (79.3 %)	66 (20.7 %)
	399 (73.2%)	146 (26.8%)

$p < 0.001$ d.f. = 1 $\chi^2 = 14.52$

4.4.2 Reported Behaviour of Choosing Foods Because of the Fiber Content

The Chi Square test of association was used to assess the association of reported behaviour of choosing foods because of their fiber content with variables age, education, income adequacy, and sex. Tables 14, 15, 16 and 17 present cross tabulations together with their p values. Age and sex were significantly associated with reported behaviour of choosing fiber containing foods.

The Chi Square test was used to further analyze, two age groups, the younger age group and older age group (Refer to Section 3.2.1). A larger percentage of the older population group, approximately 60-75% reported that they were choosing to eat foods because of the fiber content as compared to the younger population group 29-52% (p-value <0.001). Females (53.9%) reported a larger concern with choosing foods because of the fiber content as compared to males (40.1%) (Table 17).

4.5 Dietary Intake

The frequency distributions for the calculated scores of dietary intakes of high fat and high fiber foods for the study sample are shown in Figures 8 and 9 (Refer to section 3.2.4.3 Scoring of Dietary Intake of Fat and Fiber). The hypothetical frequency for dietary intake of fat was 15-90 however the observed frequency range was 15 to 63. A large proportion of the sample population (279 of 525) had a frequency score between 31 to 45. Dietary fiber intake had a hypothetical score range of 12 to 72 however the observed range was 13-48. A small proportion (24 of 523) of the sample population had a frequency score of 37 or higher.

Table 14: Reported Behaviour of Choosing Fiber by Different Age Groups

		Choosing Foods Because of the Fiber Content	
	Age	Yes	No
Younger	18-24	28 (29.2 %)	68 (70.8 %)
	25-34	40 (31.5 %)	87 (68.5 %)
	35-44	66 (52.0 %)	61 (48.0 %)
Older	45-54	58 (60.4 %)	38 (39.6 %)
	55-64	43 (75.4 %)	14 (24.6 %)
	65-74	27 (63.3 %)	15 (35.7 %)
	Total	262 (48.1%)	283 (51.9%)

$p < 0.001$ d.f. = 5 $\chi^2 = 55.88$

Table 15: Reported Behaviour of Choosing Fiber by Various Levels of Education

	Choosing Foods Because of the Fiber Content	
Education	Yes	No
Completed or Less than Elementary	24 (39.3 %)	37 (60.7 %)
Completed Secondary	106 (45.9 %)	125 (54.1 %)
Completed Technical College	64 (47.1 %)	72 (52.9 %)
Completed University	69 (58.5 %)	49 (41.5 %)
Total	263 (48.2%)	283 (51.8%)

$p = 0.058$ d.f. = 3 $\chi^2 = 7.47$

Table 16: Reported Behaviour of Choosing Fiber by Income Adequacy

	Choosing Foods Because of the Fiber Content	
Income Adequacy*	Yes	No
Low Income	43 (39.4 %)	66 (60.6 %)
Middle Income	71 (44.1 %)	90 (55.9 %)
High Income	126 (54.5 %)	105 (45.5 %)
Total	240 (47.9%)	261 (52.1%)

$p = 0.017$ d.f. = 2 $\chi^2 = 8.14$

* Refer to Figure 1

Table 17: Reported Behaviour of Choosing Fiber by Sex

	Choosing Foods Because of the Fiber Content	
Sex	Yes	No
Male	91 (40.1 %)	136 (59.9 %)
Female	172 (53.9 %)	147 (46.1 %)
Total	263 (48.2%)	283 (51.8%)

$p = 0.001$ d.f. = 1 $\chi^2 = 10.16$

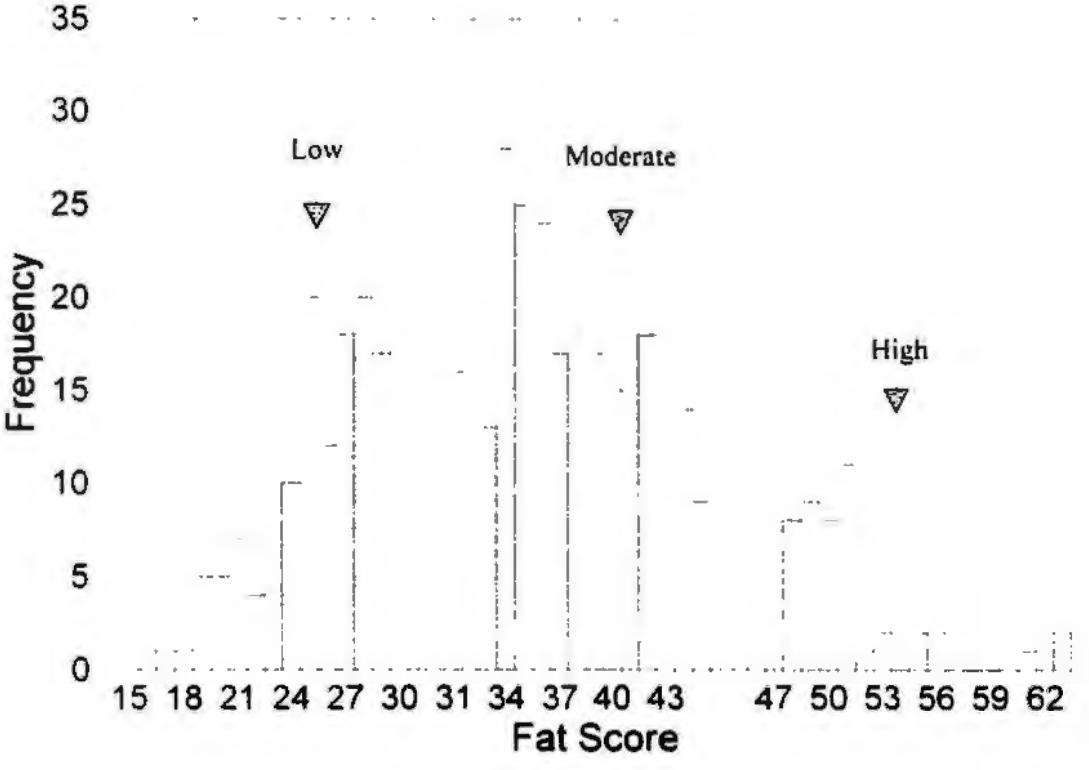


Figure 8: Dietary Intake of Fat

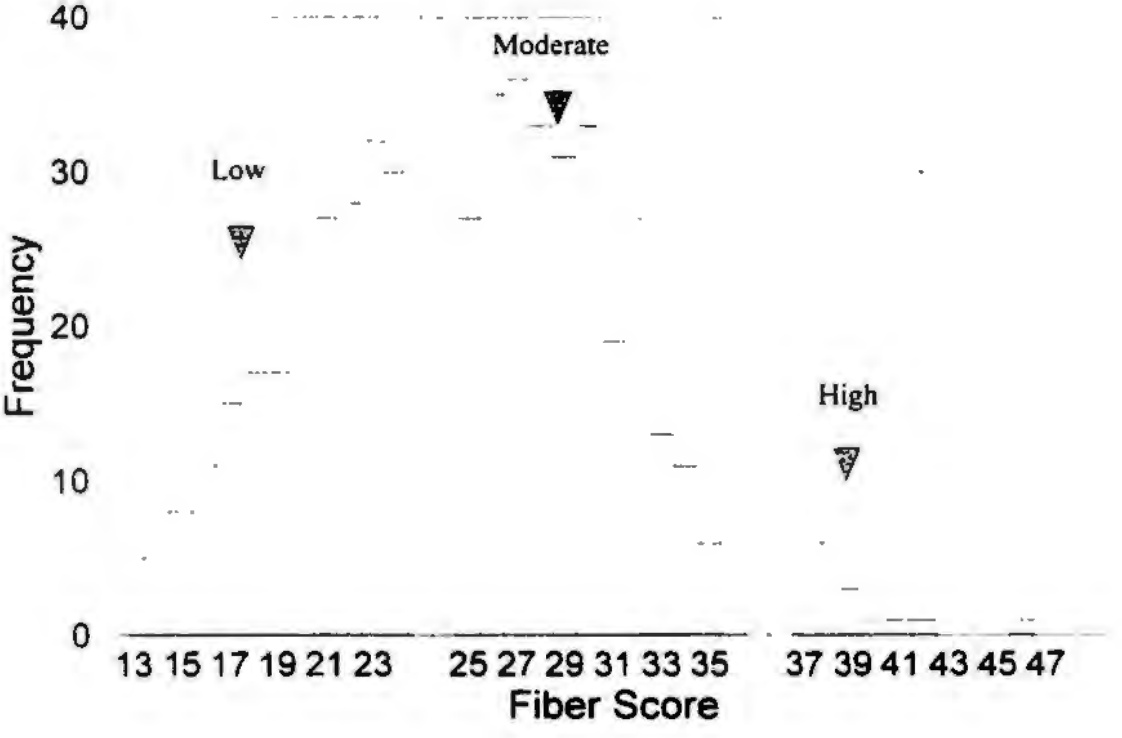


Figure 9: Dietary Intake of Fiber

4.5.1 Dietary Intake of Fat

The Chi-Square test was again used to analyze the association between dietary fat intake with the variables age, education, income adequacy, and sex (Tables 18, 19, 20 and 21). Age and sex were found to be significantly associated with dietary fat intake.

When age was pooled into younger and older groups, a lower percentage of the older population group approximately 6-14% was categorized in the high dietary intake of fat as compared to 19-25% of the younger population group (p-value <0.001). A larger percentage of males (25.3%) was grouped in the high dietary fat intake as compared to females (12.5%) as shown in Table 21.

4.5.2 Dietary Intake of Fiber

Dietary intakes of high fiber foods with variables are presented in Tables 22. 23, 24 and 25. Dietary intakes of high fiber foods with income adequacy and sex were analyzed using the Chi Square test of association. The Chi Square test was not appropriate for dietary intake of fiber with age and education because of the small number of respondents with a high fiber intake (refer to section 3.3). There was no significant association between dietary fiber intake and income adequacy or sex.

Table 18: Dietary Intake of Fat by Different Age Groups

		Dietary Fat Intake		
	Age	Low (≤ 30)*	Moderate (31-45)*	High (>46)*
Younger	18-24	25 (26.9 %)	50 (53.8 %)	18 (19.4 %)
	25-34	20 (16.8 %)	69 (58.0 %)	30 (25.2 %)
	35-44	30 (24.2 %)	67 (54.0 %)	27 (21.8 %)
Older	45-54	27 (30.3 %)	50 (56.2 %)	12 (13.5 %)
	55-64	21 (38.9 %)	30 (55.6 %)	3 (5.6 %)
	65-74	20 (50.0 %)	17 (42.5 %)	3 (7.5 %)
	Total	143 (27.6%)	283 (54.5%)	93 (17.9%)

$p = 0.001$ d.f. = 10 $\chi^2 = 29.66$

* Scores of dietary fat intake are explained in section 3.2.4.3.

Table 19: Dietary Intake of Fat by Various Levels of Education

	Dietary Fat Intake		
Education	Low (≤30)*	Moderate (31-45)*	High (≥46)*
Completed or Less than Elementary	17 (29.8 %)	25 (43.9 %)	15 (26.3 %)
Completed Secondary	57 (25.6 %)	124 (55.6 %)	42 (18.8 %)
Completed Technical College	28 (21.4 %)	76 (58.0 %)	27 (20.6 %)
Completed University	41 (36.9 %)	60 (54.1 %)	10 (9.0 %)
Total	143 (27.4%)	285 (54.6%)	94 (18.0%)

$p = 0.019$ d.f. = 6 $\chi^2 = 15.11$

* Scores of dietary fat intake are explained in section 3.2.4.3.

Table 20: Dietary Intake of Fat by Income Adequacy*

	Dietary Fat Intake		
Income Adequacy	Low (≤30)**	Moderate (31-45)**	High (≥46)**
Low	23 (22.1 %)	52 (50.0 %)	29 (27.9 %)
Middle	38 (24.2 %)	89 (56.7 %)	30 (19.1 %)
High	70 (32.3 %)	116 (53.5 %)	31 (14.3 %)
Total	131 (27.4%)	257 (53.8%)	90 (18.8%)

$p = 0.027$ d.f. = 4 $\chi^2 = 10.46$

* Refer to Figure 1

** Scores of dietary fat intake are explained in section 3.2.4.3.

Table 21: Dietary Intake of Fat by Sex

	Dietary Fat Intake		
Sex	Low (≤30)*	Moderate (31-45)*	High (≥46)*
Male	32 (14.7 %)	130 (59.9 %)	55 (25.3 %)
Female	110 (36.3 %)	155 (51.2 %)	38 (12.5 %)
Total	142 (27.3%)	285 (54.8%)	93 (17.9%)

$p < 0.001$ d.f. = 1 $\chi^2 = 34.88$

* Scores of dietary fat intake are explained in section 3.2.4.3.

Table 22: Dietary Intake of Fiber by Different Age Groups

	Dietary Fiber Intake		
Age	Low (≤24)*	Moderate (25-36)*	High (≥37)*
18-24	53 (55.8 %)	39 (41.1 %)	3 (3.2 %)
25-34	67 (55.8 %)	50 (41.7 %)	3 (2.5 %)
35-44	53 (44.9 %)	63 (53.4 %)	2 (1.7 %)
45-54	34 (38.6 %)	49 (55.7 %)	5 (5.7 %)
55-64	13 (23.6 %)	38 (69.1 %)	4 (7.3 %)
65-74	12 (29.3 %)	27 (65.9 %)	2 (4.9 %)
Total	232 (44.9%)	266 (51.5%)	19 (3.6%)

* Scores of dietary fiber intake are explained in section 3.2.4.3.

Table 23: Dietary Intake of Fiber by Various Levels of Education

	Dietary Fiber Intake		
Education	Low (≤24)*	Moderate (25-36)*	High (≥37)*
Completed or Less than Elementary	24 (42.1 %)	31 (54.4 %)	2 (3.5 %)
Completed Secondary	108 (48.9 %)	108 (48.9 %)	5 (2.3 %)
Completed Technical College	61 (48.0 %)	64 (50.4 %)	2 (1.6 %)
Completed University	38 (34.2 %)	62 (55.9 %)	11 (9.9 %)
Total	231 (44.7%)	265 (51.4%)	20 (3.9%)

* Scores of dietary fiber intake are explained in section 3.2.4.3.

Table 24: Dietary Intake of Fiber by Income Adequacy

	Dietary Fiber Intake		
Income Adequacy*	Low (≤24)**	Moderate (25-36)**	High (≥37)**
Low	50 (48.1 %)	50 (48.1 %)	4 (3.8 %)
Middle	74 (48.1 %)	75 (48.7 %)	5 (3.2 %)
High	90 (41.1 %)	117 (53.4 %)	12 (5.5 %)
Total	214 (44.9%)	242 (50.7%)	21 (4.4%)

$p = 0.561$ d.f. = 4 $\chi^2 = 2.96$

* Refer to Figure 1

** Scores of dietary fiber intake are explained in section 3.2.4.3.

Table 25: Dietary Intake of Fiber by Sex

	Dietary Fiber Intake		
Sex	Low (≤24)*	Moderate (25-36)*	High (≥37)*
Male	98 (46.0 %)	103 (48.4 %)	12 (5.6 %)
Female	134 (43.9 %)	162 (53.1 %)	9 (3.0 %)
Total	232 (44.8%)	265 (51.2%)	21 (4.0%)

$p = 0.234$ d.f. = 2 $\chi^2 = 2.90$

* Scores of dietary fiber intake are explained in section 3.2.4.3.

4.6 Association of Awareness with Reported Behaviour

The Chi Square test of association was used to study possible associations between 1) awareness of fat and reported behaviour of avoiding foods because of the fat content and 2) awareness of fiber and reported behaviour of choosing foods because of the fiber content.

Table 26 presents data for the comparison of the awareness of fat with the reported behaviour of avoiding fat. There is no significant association between being aware that fat is a risk factor for heart disease and the reported behaviour of avoiding foods because of fat content. Nevertheless most respondents (76.2%) who reported a higher awareness of the relationship between heart disease and fat, indicated that they were avoiding foods because of the fat content.

Table 27 presents data for the comparison of awareness of fiber with the reported behaviour of choosing foods because of their fiber content. The results reveal a significant relationship between awareness of fiber and reported behaviour of choosing dietary fiber. Approximately 56% of respondents, who reported a higher awareness of the relationship between heart disease and fiber, answered yes to choosing foods because of the fiber content.

4.7 Association of Reported Behaviour with Dietary Intake

The Chi Square test of association was used to study the relationships between 1) the reported behaviour of avoiding foods because of the fat content and the dietary intake of high fat foods and 2) the reported behaviour of choosing foods because of the fiber content with the dietary intake of high fiber foods.

Table 26: Awareness of Fat by Reported Behaviour of Avoiding Fat

	Avoiding Foods Because of the Fat Content	
Awareness of Fat	Yes	No
Little or No Effect	6 (50.0 %)	6 (50.0 %)
Moderate Effect	74 (67.9 %)	35 (32.1 %)
Large Effect	317 (76.2 %)	99 (23.8%)

$p = 0.034$ d.f. = 2 $\chi^2 = 6.74$

Table 27: Awareness of Fiber by Reported Behaviour of Choosing Fiber

	Choosing Foods Because of the Fiber Content	
Awareness of Fiber	Yes	No
Little or No Effect	38 (35.5 %)	69 (64.5 %)
Moderate Effect	85 (50.9 %)	82 (49.1 %)
Large Effect	136 (56.2 %)	106 (43.8 %)

$p = 0.002$ d.f. = 2 $\chi^2 = 12.75$

The relationship between reported behaviour of avoiding fat and dietary fat intake is presented in Table 28. There was a significant association between the respondents' reported behaviours of avoiding foods because of the fat content and their dietary intakes of high fat food choices. Respondents who reported that they were avoiding foods because of the fat content, were more likely to be in the low dietary intake of fat group (34.0%) as compared to 11.9 % who were categorized in the high dietary intake of fat group.

The relationship between reported behaviour of choosing fiber and dietary fiber intake is presented in Table 29. There was a significant association between respondents' reported fiber intakes represented by choosing foods or types of food because of the fiber content, and their dietary intake of high fiber foods. Respondents who reported that they were not choosing foods because of the fiber content, were more likely to be in the low dietary fiber intake group (58.0%) as compared to 2.6 % in the high dietary fiber intake group.

4.8 Association of Awareness with Dietary Intake

The associations between 1) awareness of fat in relation to heart disease with dietary intake of high fat foods and 2) awareness of fiber in relation to heart disease with dietary intake of high fiber foods were studied using the Chi Square test. There was no significant association detected between the awareness of fat in relation to heart disease with dietary intake of fat (Table 30). The analysis of awareness of fiber with dietary intake of fiber also showed no significant association (Table 31).

Table 28: Reported Behaviour of Avoiding Fat by Dietary Intake of Fat

	Dietary Intake of Fat		
Reported Behaviour of Avoiding Fat	Low (≤30)*	Moderate (31-45)*	High (≥46)*
Yes	128 (34.0 %)	204 (54.1 %)	45 (11.9 %)
No	14 (9.7 %)	81 (56.3 %)	49 (34.0 %)

$p < 0.001$ d.f. = 2 $\chi^2 = 50.72$

* Scores of dietary fat intake are explained in section 3.2.4.3.

Table 29: Reported Behaviour of Choosing Fiber by Dietary Intake of Fiber

	Dietary Intake of Fiber		
Reported Behaviour of Choosing Fiber	Low (≤24)*	Moderate (25-36)*	High (≥37)*
Yes	75 (30.4 %)	158 (64.0 %)	14 (5.7 %)
No	156 (58.0 %)	106 (39.4 %)	7 (2.6 %)

$p < 0.001$ d.f. = 2 $\chi^2 = 40.11$

* Scores of dietary fiber intake are explained in section 3.2.4.3.

Table 30: Awareness of Fat by Dietary Intake of Fat

	Dietary Intake of Fat		
Awareness of Fat	Low (≤30)*	Moderate (31-45)*	High (≥46)*
Moderate or Little or No Effect	36 (30.8 %)	64 (54.7 %)	17 (14.5 %)
Large Effect	104 (26.1 %)	219 (55.0 %)	75 (18.8 %)

$p = 0.436$ d.f. = 2 $\chi^2 = 34.88$

* Scores of dietary fat intake are explained in section 3.2.4.3.

Table 31: Awareness of Fiber by Dietary Intake of Fiber

	Dietary Intake of Fiber		
Awareness of Fiber	Low (≤24)*	Moderate (25-36)*	High (≥37)*
Little or No Effect	44 (45.8 %)	51 (53.1 %)	1 (1.0 %)
Moderate Effect	77 (46.7 %)	80 (48.5 %)	8 (4.8 %)
Large Effect	93 (40.6%)	126 (55.0 %)	10 (4.4 %)

$p = 0.372$ d.f. = 4 $\chi^2 = 4.26$

* Scores of dietary fiber intake are explained in section 3.2.4.3.

4.9 Summary of the Results

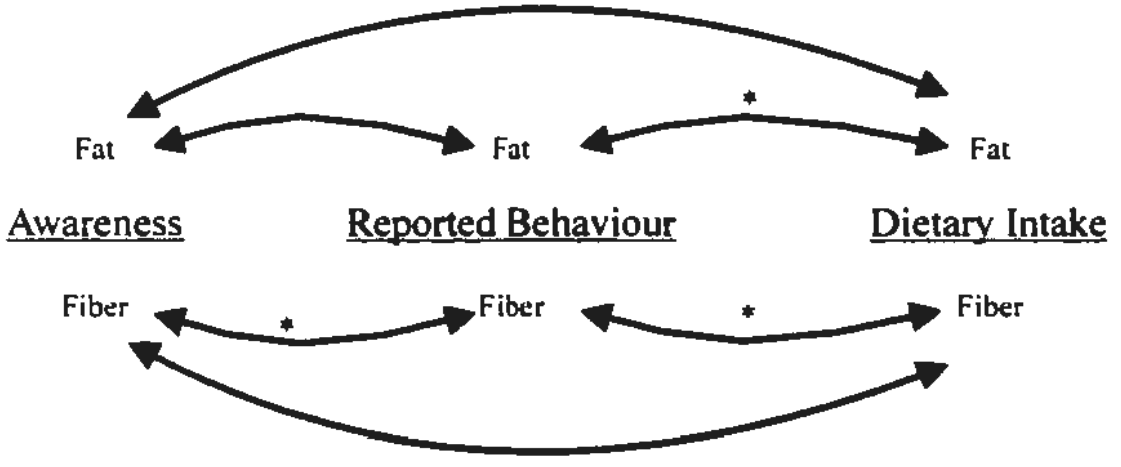
A summary of the statistical analyses is presented below. The associations and significant findings of awareness, reported behaviour, and dietary intake of fat and fiber with demographic variables are found in Table 32. The statistical results of the interrelationships between awareness, reported behaviour, and dietary intake of fat and fiber are found in Figure 10.

Table 32: Relationship of Awareness, Reported Behaviour, and Dietary Intake with Demographic Variables

	Fat				Fiber			
	Age	Education	Income	Sex	Age	Education	Income	Sex
Awareness				*				
Reported Behaviour	*	*	*	*	*			*
Dietary Intake	*			*	-	-		

* Statistically Significant at $p < 0.01$

- Statistical Test not completed



* Statistically Significant at $p < 0.01$

Figure 10: Interrelationships of Awareness, Reported Behaviour and Dietary Intake

5.0 Discussion

The results of the current secondary analysis will be compared with the published literature and discussed below.

5.1 Sample Population

The sample population represented a wide range of age, income, and education levels (Figures 3-5). A larger percentage of the sample was in the older population group (56.7%). Sample weights were applied prior to the analyses to give a better representation to all age groups and thus decrease the over representation of the older population group in the sample.

Approximately 19% of the population had completed a university education (Figure 5). This was similar to census data collected in 1996 stating that approximately 22% of those living in St. John's had completed university (Statistics Canada, 1998). The percentage of respondents in the high income adequacy group was approximately 41%. Segovia, Edwards, and Bartlett (1996) used a similar scale for income adequacy for the Newfoundland Health for the Year 2000 Project. The percentage of participants living in St. John's in a similar income adequacy group to this study was 46.2%.

5.2 Awareness

This study used closed-ended questions for the awareness of fat and fiber, however several research studies have been conducted using open-ended questions (Avis, McKinley,

& Smith, 1990; Frank, Winkleby, Fortmann, & Farquhar, 1993; Rushworth et al., 1990). Frank and his associates (1993) in the Stanford Five City Project found that open-ended questions provided more conservative measures of respondents' awareness than did direct questions. Less than a third of the respondents in Franks study (1993) identified the consumption of high-fat foods as constituting a cardiovascular risk factor. Similarly, only 9% of respondents in the same study mentioned fiber as reducing CVD risk in an open ended question (Frank et al., 1993).

Rushworth (1990) also found that approximately 9% of respondents reported that reducing their dietary fat intake would reduce their risk of CVD. These low percentages may be a function of the use of open-ended questions. The current study found that a higher percentage of respondents (76.5%) agreed that lowering the fat in one's diet would decrease their risk of heart disease as compared to Frank (1993) and Rushworth (1990). It is difficult to know whether the current study using closed-ended questions overestimated, or if those using open-ended questions underestimated the knowledge of the respondents.

5.2.1 Relationship of Awareness of Fat with Awareness of Fiber

There was a remarkable difference in respondents' answers to the awareness of fat and fiber questions. Figure 6 illustrates that respondents reported a greater awareness of the beneficial effects of lower fat intake in the prevention of heart disease compared to that of fiber. A larger number of respondents (19.6%) reported little or no effect for the fiber awareness question as compared to 2.2% for the awareness of fat question. This data was

supported by Frank and colleagues (1993) whose research suggests that there was a greater awareness of the link between dietary fat and CVD as compared to the link between dietary fiber and CVD. The greater awareness of the link between heart disease and dietary fat intake may be due to the massive media and health campaigns in the last 20 years focusing on fat and its relationship with the development of CVD (Mela, 1994).

5.2.2 Awareness of Fat

Results from the awareness question versus each demographic variable showed sex to be the only variable significantly associated with the awareness of fat (Table 5 and 32). A larger percentage of female respondents answered "large effect" for the awareness of fat as compared to males. Rushworth et al (1990) in Australia and Avis et al (1990) in the United States also reported that women demonstrated greater awareness regarding the link between dietary fat intake and CVD as compared to men.

Men are at greater risk for CVD and are generally less aware of what they can do to prevent heart disease (Heart and Stroke Foundation of Canada, 1994). It has been suggested that special attempts should be made to reach this particular population group (Glanz et al., 1994). Prevention research clearly needs to continue exploring ways to educate people about their risks for CVD and to help them adopt healthy behaviours (Avis, McKinley, & Smith, 1990). A possible reason why women demonstrate a greater awareness as discussed by Avis and colleagues (1990) is that women are more likely to be involved in food shopping and preparation.

5.2.3 Awareness of Fiber.

No variables tested were found to be associated with the awareness of fiber. One possible reason why there was no association was due to the low number of respondents (44.7%) reporting that eating more high fiber foods would have a large effect in preventing heart disease. Awareness was generally low throughout the entire study population.

Little research has been done in this area. The research studies conducted to date have asked open-ended questions pertaining to the risk factors of CVD and thus fiber was not stated as a specific risk factor for developing CVD by respondents (Avis, McKinley, & Smith, 1990; Rushworth et al., 1990). In Frank's study (1993), fiber was identified as a specific cardiovascular risk factor however no demographic variables were tested for an association.

5.3 Reported Behaviour

Respondents were asked in the current study if they were avoiding foods because of the fat content and/or choosing foods because of the fiber content. Although respondents may believe that they are avoiding foods because of the fat content and choosing foods because of the fiber content, this does not necessarily mean that they are actually making behavioural changes. The difference between what people believe and do has been confirmed by recent research studies (Greene and Rossi, 1998; Schwartz, 1994).

The responses to the questions used for reported behaviour in this study may be biased by social desirability. Social desirability means that specific population groups may

report that they are choosing or avoiding foods because of the fat and fiber content just because they know or are aware that it is important to do so. The current study supports this as more respondents (74.1%) reported that they were avoiding foods because of the fat content compared to 48.4% who reported they were choosing foods because of the fiber content. Research has shown that educated and older respondents may indicate the correct response without actually making behavioural change (Ferrini, Edelstein, & Barrett-Connor, 1994).

5.3.1 Relationship of Reported Behaviour of Avoiding Fat with Reported Behaviour of Choosing Fiber

Current research indicates that people have more concern to avoid foods because of the fat content as compared to choosing foods because of the fiber content (Schwartz, 1994). The current study supports this finding; approximately 74% of the sample population reported that they were avoiding foods because of the fat content compared to only 48% who were choosing foods because of the fiber content (Figure 7). The importance consumers place on increasing fiber, a complex carbohydrate, in the diet remains relatively low, although this is a nutrient that is recommended to partially take the place of excess fat (Reid, Conrad, and Hendricks, 1996).

5.3.2 Reported Behaviour of Avoiding Fat

Age, education, income, and sex were all found to be significantly associated with

the reported behaviour of avoiding foods because of the fat content. Citing the avoidance of foods because of the fat content was related to being older, having a higher income, having a higher education and being female. Older participants probably had a greater reason to avoid foods because of the fat content due to their increased risk of medical conditions such as CVD (Heart and Stroke Foundation of Canada, 1994). Ferrini and associates (1994) found that the presence of risk factors for CVD among 50-69 year old adults was generally associated with positive reports of alterations in the diet such as lowering the fat intake.

Auld and his colleagues (2000), in a mail out questionnaire, found that those who completed at least some college education were more likely to report healthful eating practices like lowering their dietary fat intake as compared to other respondents. It is possible that dietary change for the promotion of health is not a priority for persons with comparatively less education, who may have more pressing wants (Harnack et al., 1997). A study by Reid, Conrad, and Hendricks (1996) showed that the degree of concern for dietary fat intake was highest among women and those with a high income. Monneuse, Bellisle, and Koppert (1997) and the current study also showed that a higher proportion of women than men report that they are avoiding foods because of the fat content. A possible reason why women are more likely to report positive behavioural changes like lowering the fat in their diet than men, has been attributed to women's more positive health beliefs and greater health knowledge (Avis, McKinlay, and Smith, 1990; Farrow, Charney, and Lewis, 1990). A smaller percentage of respondents from the low (58.7%) and middle (68.5%)income groups stated they were avoiding foods because of the fat content (Table 12). This may be due to

the many social issues and problems which they face daily. Their concern for purchasing enough food for example, may be greater than their concern for the nutritional content of specific food choices (Canadian Institute for Advanced Research, 1991).

5.3.3 Reported Behaviour of Choosing Fiber

Age and sex were found to be significantly associated with the reported behaviour of choosing foods because of the fiber content as is shown in Tables 14 and 17. A larger percentage of the older population and females reported that they were choosing foods because of the fiber content. The older population may be concerned with increasing their dietary fiber intake because of their increased risk for many disease conditions, not just CVD (Ferrini, Edelstein, & Barrett-Connor, 1994). Research has shown other health benefits of consuming a high fiber diet such as reduced blood pressure, enhanced weight control, better glycemic control, reduced risk of certain forms of cancer, and improved gastrointestinal function (Anderson, Smith, & Gustafson, 1994).

The statistical association of age with reported behaviour of choosing fiber may also be due a social desirability bias. Ferrini and associates (1994) also found that older respondents may report a behavioural change like increasing their dietary fiber intake because they know it is important to do so.

Monneuse, Bellisle, Koppert (1997) in France also found sex to be significantly associated with reported behaviour of choosing fiber. Approximately 40% of females 18-30 years old reported that they were making an effort to eat more high fiber foods in their diet

as compared to 19% of males.

5.4 Dietary Intake

Dietary intakes of fat and fiber were obtained via the food frequency questionnaire.

5.4.1 Dietary Intake of Fat

The frequency distribution for dietary intake of fat for the sample population is shown in Figure 8. A large percentage (53.1%) of the sample population had a frequency score between 31 and 45, in the moderate category of fat intake. This score would represent a monthly intake of 15-120 servings of any combination of high fat foods or an approximate weekly intake of 4-30 servings of high fat foods. It is possible that other foods containing fat could have been consumed which were not mentioned in the current food frequency questionnaire. It is likely that subjects consumed foods with less than four grams of fat per serving. Therefore subjects did consume fat beyond that provided to the diet by high fat foods. A subjective analysis would imply that respondents categorized in the moderate fat category, could indeed have high total intakes of dietary fat.

The Chi-Square analysis showed dietary intake of fat to be significantly associated with age and sex (Tables 18 and 21). Approximately 32% of the older population group were categorized in the low dietary intake of fat compared to 22% of the younger population group. The current results were consistent with data collected from the Manitoba Nutrition Survey. Sevenhuysen et al., (1993) found that the seniors (age 65-74 years) ate significantly

less fat than either of the younger age groups based on data from that province. One reason why older people may consume fewer foods high in fat is because of their increased risk of medical conditions related to a high fat diet (Heart and Stroke Foundation of Canada, 1994).

A larger percentage of males (25.3%) was categorized in the high dietary intake of fat as compared to females (12.5%) (Table 21). This is supported by the results of the Nova Scotia and Manitoba Nutrition Surveys. Both studies showed that fat intakes were significantly higher for men than for women in all age groups tested (Nova Scotia Heart Health Program, 1993: Sevenhuysen et al., 1993). Differences in fat intake might be explained partly by the fact that men have larger total energy intakes compared to women (Sevenhuysen et al., 1993). Research by Glanz and colleagues (1994) also supported the results from the current study. Female gender and being older were significantly associated with the more desirable dietary intake of less fat.

5.4.2 Dietary Intake of Fiber

The frequency distribution for dietary intake of fiber for the sample population is shown in Figure 9. Approximately 53% of respondents were categorized in the moderate category of fiber intake (score range 25-36). This would represent a monthly intake of 12-96 servings of any combination of high fiber foods or a weekly intake of 3-24 servings of high fiber foods. It was possible that other fiber containing foods could have been consumed which were not included in the food frequency questionnaire. It is also possible that dietary fiber was provided by foods consumed which contained less than 0.5 grams of fiber per

serving.

Nutrition recommendations for dietary fiber which were developed by health organizations in the United States and other countries state that the adult dietary fiber intake should range from 20-35 grams per day (United States Department of Health and Human Services, 1990). Canada's Food Guide for healthy eating recommends 5-10 servings of fruits and vegetables per day (Health Canada, 1992). The approximate fiber content of most fruits and vegetables as a group is 2 grams per serving (Anderson, Smith, & Gustafson, 1994). Based on the quantitative recommendation and Canada's Food Guide recommendation, respondents categorized in the moderate fiber intake, therefore appear to be consuming a relatively low intake of dietary fiber. Similarly, respondents in the high fiber category may not be meeting their daily fiber recommendations.

The current findings on the consumption of dietary fiber is supported by recent provincial nutrition surveys in Canada which suggest that the fiber intake of a significant proportion of Canadian adults is below the general recommended range. Approximately 50% of Ontario residents 20-44 years of age consumed less than 15 grams of fiber per day (Ontario Ministry of Health, 1992). The average fiber intake in Nova Scotia was 13 grams per day (Nova Scotia Heart Health Program, 1993).

The association between dietary intake of fiber with age and education was not studied using the Chi Square test because of the relatively low number of respondents in the category of high dietary fiber intake. Even though test statistics were limited in the current study, the Nova Scotia nutrition survey showed that dietary fiber consumption increased with

age, with 65-74 year olds having the highest intake of all subjects tested (Nova Scotia Heart Health Program, 1993).

Neither income nor sex was statistically associated with dietary intake of fiber (Tables 24 and 25). Glanz and colleagues (1994) did see an association between dietary fiber intake and sex. Females had a higher dietary intake of fiber. This could be due to the extensive 88-item food frequency questionnaire used in Glanz's study compared to the 12-item food frequency questionnaire used in the current study. Results of the Nova Scotia Nutrition Survey also suggested that women in all age groups consumed more fiber than did similarly aged men (Nova Scotia Heart Health Program, 1993). Information from both the food frequency questionnaire and the 24 hour recall was used for data analyses of dietary intake of fiber in the Nova Scotia Survey.

5.5 Relationship of Awareness with Reported Behaviour

There was no significant relationship detected between the awareness of fat as a risk factor for CVD and reported behaviour of avoiding foods because of their fat content as is shown in Table 26. This suggests that being aware that a factor puts one at risk of a disease state does not necessarily mean that one will behave in a particular manner.

This is supported by Drummond and colleagues (1996) who report that there are three main barriers for consumers to lower their intake of dietary fat. First, consumers may lack the necessary knowledge of the need to decrease their fat intake. Or if they have the knowledge they may not believe it is relevant to them personally. Second, consumers may,

even if they have the knowledge, have negative attitudes towards cutting down on fatty foods. Third, many consumers, even with the appropriate knowledge and a positive attitude, are unlikely to implement a dietary change which is difficult to adhere to in practice due to a higher cost or lower palatability.

An association was found with the awareness that the consumption of dietary fiber is associated with a decreased risk of developing some disease states such as CVD and the reported behaviour of choosing foods because of their fiber content (Table 27). Respondents (56.2%) who reported a higher awareness, answered yes to choosing foods because of the fiber content. Therefore, respondents who claim to be aware of the association between fiber and heart disease, report that they are choosing foods because of the fiber content. This positive association, however does not determine that they are actually consuming a high fiber diet. Reported behaviour is the respondents' general opinion of what they think that they are doing. It may not be what they are actually doing.

5.6 Relationship of Reported Behaviour with Dietary Intake

There was a significant association noted for reported behaviour of avoiding fat and dietary intake of fat (Table 28). This suggests that respondents who report that they are avoiding foods because of the fat content are generally categorized in the subject group with a low dietary intake of fat. Similar findings were found with the relationship between reported behaviour of choosing fiber and dietary intake of fiber (Table 29).

Some previous research has shown a discrepancy between reported behaviour and

actual dietary behaviour suggesting that often there is a difference between what people say they are doing and what they are actually doing (Greene and Rossi, 1998; Buttris, 1997; Paisley, Lloyd, Sparks, Phil, and Mela, 1995; Paisley, Lloyd, and Mela, 1993). One reason for the inconsistency between reported behaviour and actual dietary behaviour could be due to the lack of knowledge about the "hidden fats" in foods such as pastries, snacks, and fast foods (Brug et al., 1994). Paisley, Lloyd, Sparks, Phil, and Mela (1995) reported that many people currently on a high fat diet do not feel the need to reduce their fat intake because of a poor conception of their actual intake. The biased self reported dietary intake of fat was also found by Brug et al. (1994) among the Dutch population. They noted that although approximately 80 % of the Dutch population had a diet which had a fat content exceeding the recommended intakes, less than 10% of their subjects actually rated their fat consumption as being too high.

The discrepancy between the current results and previous studies could be due to the specific measurement scale used to assess dietary intake of fat and fiber. Paisley and associates (1993) used a 92 item food frequency questionnaire to assess dietary intake of fat. As discussed previously, respondents categorized in the moderate intake of fat may actually be consuming a high fat diet. Those in the moderate category of fiber may be consuming a low fiber diet.

5.7 Relationship of Awareness with Dietary Intake

There was no significant association detected between respondents' awareness of the

link between dietary fat and heart disease and their dietary intake of fat (Table 30). Therefore awareness alone does not appear to determine if respondents are consuming lower fat diets. This is supported by previous research which indicates that even those aware of the association of dietary fat with CVD, may not be reducing the fat content of their diets (Kristal et al., 1990). Therefore, knowledge alone does not determine behaviour change (Drummond et al., 1995). Heimendinger and Van Duyn (1995) also reported that awareness of the need for dietary change is necessary, but not sufficient, to change dietary behaviour in the desired direction.

The analysis of awareness of fiber as a CVD risk factor with dietary intake of fiber also showed no significant association. As for dietary fat, knowledge of the link between fiber and heart disease did not appear to change the dietary intake of fiber by our subjects. It has been assumed by some that once people are aware of the importance of diet on specific diseases, that their behaviour will improve but there is research to suggest the contrary (Drummond, Kirk, and Looy, 1996).

5.8 Benefits and Limitations of the Study

There were several advantages and disadvantages of using data from the Newfoundland and Labrador Nutrition Survey in this secondary analysis. One advantage was that the selection criteria from which the sample was taken were reliable. A stratified random sample was drawn from the MCP (Medical Care Plan) files to obtain the sample population. The large sample population also provided a good representation of respondents

from various age groups, income levels, and education levels. Another advantage was that the data were collected during both the spring and fall to account for seasonal differences in food intake.

Other benefits of using data from the Newfoundland and Labrador Nutrition Survey included the following: interviewers were provided with a ten day intensive training session to ensure accurate recording of food data and consistency in interviewing techniques; a quality control supervisor was responsible for coordinating and supervising the data collection and quality control procedures during the survey; and face to face interviews were conducted to allow for the use of validated three dimensional food models. Buzzard (1998) reports intensive training of the dietary interviewer is critical for obtaining accurate and complete dietary recalls. The interviewer's ability to ask questions in a nonjudgemental manner, to maintain a neutral attitude toward all responses, and to avoid asking questions in a manner that might influence the subject's responses are important factors in obtaining complete and accurate information (Buzzard, 1998)

There were also some disadvantages to using data from the nutrition survey. The current study was a secondary analysis, therefore the researcher was limited to using data obtained from the Newfoundland and Labrador Nutrition Survey. For instance, only the existing food frequency questionnaire to assess a general dietary intake of certain foods high in fat and fiber was available. Therefore, the estimate of dietary intake in the current study considers only some foods contributing these nutrients and not all. It was not possible to express dietary fat and fiber intake in grams or percentage of total calories. Therefore, no

absolute comparisons between fat and fiber scores and dietary recommendations could be made. Brug and associates (1994) also found this to be a limitation in their study when they used a 25-item food frequency questionnaire to assess fat intake. However, the food frequency questionnaire, the measurement tool used to analyze dietary intake, is generally recognized as a practical and acceptable way to assess food consumption in large population studies such as the current one (Brug et al., 1994; Willett, 1998; Willett et al., 1985).

The researcher was also limited in the number of high fiber food items used in the food frequency questionnaire. The main goal of the food frequency questionnaire of the Newfoundland and Labrador Nutrition Survey was to focus on the nutritional intakes and dietary patterns of fat. Some foods potentially high in fiber such as fruits and whole grain cereals were not included in the food frequency questionnaire in the current study as they were low in fat content.

Fiber, however was included in the current secondary analysis for several reasons. Considering that the current literature supports the importance that fiber plays in the prevention and treatment of CVD and that there were some high fiber foods such as vegetables, beans, and whole wheat bread included on the food frequency, it was decided to include fiber in this secondary analysis. The omission of data on some grain products may not have a large negative effect upon the findings of this study as earlier studies by Gibson, Chao, Smit-Vanderkooy, & Peterson (1987) showed that fiber intakes were related more to vegetable consumption than to grain products. The current study used 10 commonly consumed vegetables in the food frequency questionnaire.

There were several advantages and disadvantages of using the food frequency questionnaire for the analysis of dietary intake in the current study. The semi-quantitative type of questionnaire collected information on individualized portion sizes for each food item and all relevant cooking and food preparation practices. One advantage of using this type of food frequency questionnaire was that it was designed to assess usual food intake in as much detail as possible (Sempos. 1992).

A disadvantage of using the food frequency questionnaire was the problem inherent in self reported food intake. Respondents may under report their intake of foods high in fat because they know it is important to limit foods high in fat . They may over report their intake of high fiber foods like vegetables if they know that their consumption should be high (Sempos, 1992). It may also be difficult for respondents to remember how much was consumed over a 30 day period even with the help provided by the interviewer.

5.9 Implications and Recommendations

It appears that the message to reduce fat intake has registered in the minds of consumers. The great majority of respondents are aware that reductions in fat intake would be beneficial for the prevention of CVD. The message on fiber, however has not been as effective. Nutrition educators should participate in media and public campaigns to increase general awareness of the link between CVD prevention and the consumption of dietary fiber. A positive approach to healthy eating should be stressed with emphasis on consuming more high fiber foods and choosing low fat foods.

Specific population groups should be targeted to educate the importance of making healthier dietary changes. Nutrition programs need to focus on educating males and younger population groups with strategies of choosing lower fat and higher fiber food choices.

The current study shows that respondents who are reporting that they are avoiding/choosing foods because of the fat/fiber content are generally consuming a low fat and a high fiber diet. Recent heart health campaigns may have improved consumers knowledge of the hidden fats in foods and provided a better understanding in label reading.

As shown in the current study, awareness does not necessarily determine healthier diets. Nutrition educators must address the barriers to behavioural change to assist consumers in making better food choices. Health education programs need to go beyond just imparting knowledge and increase their emphasis on actual behaviour change (Avis et al., 1990).

Educators should use the Stages of Change Model when developing educational programs and materials. Tailored nutrition messages based on the Stages of Change Model and good communication are important. It is essential to keep the message simple, without distorting the facts and above all, to make it relevant, realistic, meaningful, and practical for the individual. Educators must provide individuals with an ability to translate information into practical information about which foods to choose to ensure a balanced and healthy diet (Buttriss, 1997).

Respondents in the current study are generally not meeting the Nutrition Recommendations set for Canadians for dietary fat and fiber. Initiatives and

recommendations suggested here will move nutrition educators ahead to more effective strategies for getting consumers to reduce their dietary fat intake and increase their dietary fiber intake.

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Appendix A:
Standardized CVD Mortality Rates for Males and Females

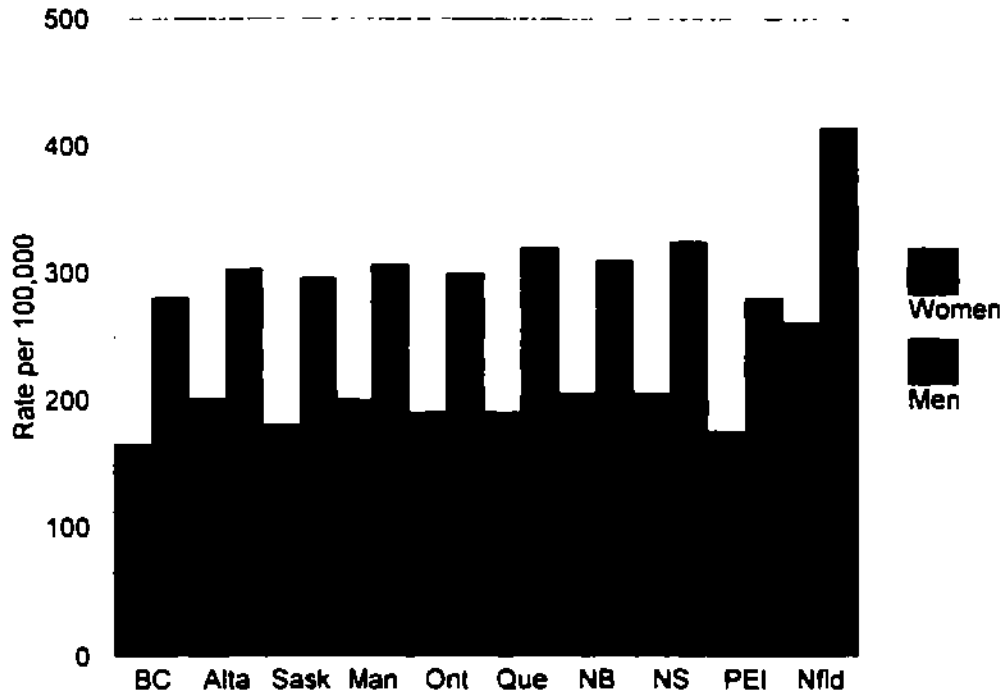

Figure A1: Standardized CVD Mortality Rates per 100,000 by Sex and Province, Canada, 1997

Source: The Changing Face of Heart Diease and Stroke in Canada 2000.

Appendix B:
Population and Dwelling Counts for Metropolitan St. John's

POPULATION AND DWELLING COUNTS ST. JOHN'S CMA CENSUS OF CANADA, 1996[1]

Community	Population				Dwellings	Land Area (km^2)	Population Density per km^2
	1991	1996	% Change	Actual Gain (Loss)	1996	1996	1996
Bauline	392	380	-3.1	(12)	119	16.42	23.1
Bay Bulls	1065	1063	-0.2	(2)	336	30.58	34.8
Conception Bay South	17590	19265	9.5	1675	6250	59.40	324.3
Flatrock	1044	1087	4.1	43	334	18.43	59.0
Logy Bay- Middle Cove-Outter Cove	1882	1881	-0.1	(1)	583	17.60	106.9
Mount Pearl	23676	25519	7.8	1843	8425	15.06	1649.5
Paradise	7358	7960	8.2	602	2551	27.83	286.0
Portugal Cove-St. Philips	5459	5773	5.8	314	1864	56.43	102.3
Pouch Cove	1978	1885	-4.7	93	623	58.18	32.4
St. John's	104659	101936	-2.6	(2723)	37773	431.75	236.1
Torbay	4707	5230	11.1	523	1659	36.04	145.1
Witless Bay	1064	1118	5.1	54	336	17.66	63.3
Total (St. John's CMA)	170874	173097	1.3	2223	61958	799.68	220.38

[1] Information obtained from Statistics Canada

Appendix C:
Awareness Question for Fat and Fiber

FORM D

Identifier # | | | | | | |

NEWFOUNDLAND & LABRADOR NUTRITION SURVEY

NUTRITION AND HEALTH QUESTIONNAIRE

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

PART 1

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

Appendix D:
Food Frequency Questionnaire

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/W	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 ½ CR-L, T-H		
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 ½ cup (w/o shell)		
14 - cooked other ways				10 units MO-M (w/o shell)		

FOOD	FREQUENCY			PORTION SIZE		COMMENTS
	FURTHER FOOD DESCRIPTION(S)	#	DAY/D WEEK/W MONTH/W	REFERENCE PORTION MODEL	HOW MUCH/ HOW ?MANY	
15 Poultry - fried				PC-S		
16 -cooked other ways				PC-S		
17 Beef and Veal - steaks, roast, stews and other cuts				PC-S		
18 -hamburgers				PC-S		
19 - other ground beef				PC-S		
20 Liver (all types)				PC-S		
21 Lamb and Mutton - roast, chops and other cuts				PC-S		
22 Pork and Ham - roast, chops and other cuts				PC-S		
23 -bacon				1 STRIP		
24 Wild game -large animals				PC-S		
25 - small animals				PC-S		
26 - wild birds				PC-S		
27 Seal or whale				PC-S		
28 Beans - boiled or baked				MO-M		
29 Weiners or Sausages				1 UNIT		
30 Bologna				1 CR-L, T-1		
31 Luncheon meats				1 SLICE		
32 Salt meat, riblets				PC-S		
33 Pizza				1 SLICE		
34 Cheese (more than 24% b f)				1 SLICE or 1/3 PC-S		
35 Light Cheese (10-24% b f)				1 SLICE or 2 TBL		
36 Cottage Cheese or any cheese (less than 10% b f)				MO-S		
37 Eggs or egg dishes				1 EGG		

Appendix E:
Demographic Profile Form

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, include 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 Nursing's training
07	☐	Completed Community College, Technical College, or Nursing'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 _____)

Identifier # | | | | | | |

4. What is your current marital status? Are you...

01	☐	Single (Never Married)?
02	☐	Married (and not separated), or living common law?
03	☐	Separated?
04	☐	Divorced?
05	☐	Widowed?

5. For statistical purposes only, we need to know your best estimate of the total income, before taxes, of all household members last year (1995). Could you please tell me from the card which letter applies to your total household income?

A

B

C

D

E

F

G

H

I

Appendix F:
Reported Behaviour of Avoiding Fat and Choosing Fiber

Identifier # | | | | | | |

Part IV. This section deals with WHY you choose the foods that you eat. *(Briefly probe to confirm some action is being taken.) Please check (✓) one or more when relevant.*

ARE YOU **CHOOSING OR AVOIDING** FOODS BECAUSE YOU ARE CONCERNED ABOUT		
193		Maintaining or improving your health?
194		Heart Disease?
195		Cancer?
196		Osteoporosis (brittle bones)?
197		High Blood Pressure?
198		Weight gain?
ARE YOU **CHOOSING** TO EAT FOODS OR TYPES OF FOODS BECAUSE OF		
199		the nutrients they contain?
200		the unsaturated fat content?
201		the fibre content?
ARE YOU **AVOIDING** FOODS OR TYPES OF FOODS BECAUSE OF		
202		the fat content?
203		the salt content?
204		the cholesterol content?
205		the sugar content?
206		the saturated fat content?
ASK **ONLY** IF SUBJECT HAS NOT MENTIONED MEAT.		
207		Are you a vegetarian?
ARE YOU FOLLOWING ANY SPECIAL DIET?		
208	☐ Yes (Specify)_____ ☐ No (Go to question # 210)	
WAS THIS SPECIAL DIET PRESCRIBED BY A DOCTOR, DIETITIAN OR OTHER HEALTH PROFESSIONALS?		
209	Doctor	☐ Yes ☐ No ☐ Refused
210	Dietitian	☐ Yes ☐ No ☐ Refused
211	Other health professionals	☐ Yes (Specify)_____ ☐ No ☐ Refused

Appendix G:
Standard Portion Sizes

Standard Portion Models

Volume Models Name	Model Code	Volume Marked
CUPS		
Mug	MUG	8 F-OZ
Measuring cup	CUP	8 F-OZ
BOWLS		
Small Bowl	BO-S	3.5 F-OZ
Medium Bowl	BO-M	8 F-OZ
Large Bowl	BO-L	11 F-OZ
MOUNDS		
Small	MO-S	1/4 cup
Medium	MO-M	½ cup
Large	MO-L	1 cup
Extra Large	MO-XL	2 cups
Jombo	MO-J	3 cups
MEASURING SPOONS		
Teaspoon	TSP	5 ml
Tablespoon	TBL	15 ml

Volume Models Name	Model Code	Dimensions
CIRCLES		
Small	CR-S	2 inch
Medium	CR-M	3 inch
Large	CR-L	4 inch
Extra Large	CR-XL	5 inch
Jumbo	CR-J	6 inch
RECTANGULAR PIECES		
Extra Small	PC-XS	1 3/8" X 1" X 1/4"
Small	PC-S	3" X 2" X 3/4"
Medium	PC-M	2 1/2" X 2 1/2" X 1"
Large	PC-L	4" X 3" X 3/4"
Extra Large	PC-XL	4 1/2" X 3" X 1 3/4"

Appendix H:
Ethical Approval Letters

Memorial
University of Newfoundland

Human Investigation Committee
Research and Graduate Studies
Faculty of Medicine
The Health Sciences Centre

1998 04 15

Reference #98.75

Ms. Kelly Maloney
10 Conway Crescent
St. John's, NF
A1A 2A9

Dear Ms. Maloney:

At a meeting held on **April 9, 1998**, the Human Investigation Committee reviewed your application entitled "**Dietary Awareness and Self Reported Intake of Fat and Fiber as a Cardiovascular Risk in Metropolitan St. John's. A Secondary Analysis of Nutrition NF and Labrador**" and granted full approval.

We take this opportunity to wish you every success with your research study.

Sincerely,

H.B. Younghusband, PhD
Chairman
Human Investigation Committee

HBY\jglo

c Dr. K.M.W. Keough, Vice-President (Research)
Dr. E. Parsons, Vice-President, Medical Services, HCC

Memorial
University of Newfoundland
Department of Psychology

December 11, 1995

TO: Barbara Roebothan, Biochemistry

FROM: A. Liddell, Chairperson
Faculty of Science Ethics Committee

SUBJECT: Research Proposal

The Ethics Committee of the Faculty of Science has reviewed your research proposal titled: "Nutrition Newfoundland and Labrador." It is our view that the procedures you describe meet the requirements for ethically acceptable research with human subjects. However, our approval is subject to obtaining approval from MCP to access their files as well as written permission to use the Nova Scotia Survey Questionnaire. The approved application forms are enclosed. A copy of those forms should be presented if and when you apply for authorization to pay subjects.

Andrée Liddell
Professor

AL:bmn

encl.

cc: Dr. G. Martin
Head
Department of Psychology

Dr. G. Herzberg
Head
Department of Biochemistry

Appendix I:
Preservation of Confidentiality Statement

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 _____ day of _____, 1996.

WITNESSED BY:

_____
(Notary, Justice of the Peace, Lawyer)

SIGNED BY:

_____