PREVALENCE OF CARDIOVASCULAR DISEASE RISK FACTORS IN YOUNG NEWFOUNDLAND AND LABRADOR ADULTS IN RURAL AND URBAN COMMUNITIES

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PREVALENCE OF CARDIOVASCULAR DISEASE RISK FACTORS IN YOUNG NEWFOUNDLAND AND LABRADOR ADULTS LIVING IN RURAL AND URBAN COMMUNITIES

by

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ABSTRACT

Newfoundland and Labrador has a higher rate of cardiovascular disease (CVD) than any other province in Canada. Many factors have been identified as being associated with a risk of developing CVD yet their presence has not been well studied in young adults and in urban versus rural residents. A group of 540 males and females 18-34 years residing in either rural or urban Newfoundland and Labrador were studied for education level, household income, cigarette smoking, physical activity and body size. Both education and household income were found to be significantly higher in urban as compared to rural residents. No difference was noted between the number of regular smokers in the two community groups. In regards to body size, no difference was noted between BMI levels of the two groups, however more female rural residents had a waist circumference above the accepted cut-off (32.5% vs. 17.0%). A difference was noted in physical activity at work with more rural residents than urban residents engaged in heavy labour (24.5% vs. 6.6%) and more urban residents than rural residents at sedentary jobs (22.7% vs. 9.9%). Young adults in both rural and urban centers experience modifiable risk factors. Prevention programs should be focused on young adults, especially those residing in rural areas.

TABLE OF CONTENTS

	ACKNOWLEDGEMENTS	i
	LIST OF FIGURES	ii
	LIST OF TABLES	iii
1.0.	CHAPTER I – LITERATURE REVIEW	1
	1.1. Cardiovascular Disease in Canada	1
	1.2. Factors which Influence the Risk of Developing Cardiovascular Disease	5
	1.2.1. Age	7
	1.2.2. Gender	9
	1.2.3. Family History	11
	1.2.4. Excess Body Fat	12
	1.2.5. Distribution of Body Fat	15
	1.2.6. Physical Activity	18
	1.2.7. Cigarette Smoking	22
	1.2.8. Others	23
	1.2.8.1. Socioeconomic Status	24
	1.2.8.1.1.Education	25
	1.2.8.2.2.Income	26
	1.2.8.2. Area of Residence	27
	1.3. Nutrition Newfoundland and Labrador	30
2.0.	CHAPTER II – AIM OF STUDY	32
	2.1. Rationale	32
	2.2. Purpose	34
	2.3. Goal and Objectives	34
3.0.	CHAPTER III – METHODOOGY	36
	3.1. Study Population	36

3.2. Sample Design 36

3.3. Setting 37

3.4. Source of Data 37

3.5. Ethical Approval 38

3.6. Variables 38
3.6.1. Non-modifiable Risk Factors 38
3.6.2. Modifiable Risk Factors 39
3.6.2.1. Body Fat 39
3.6.2.1.1. Body Mass Index 39
3.6.2.1.2. Abdominal Adipose Tissue 40
3.6.2.2. Physical Activity 41
3.6.2.2.1. Physical Activity at Work 41
3.6.2.2.2. Physical Activity during Leisure Time 42
3.6.2.3. Cigarette Smoking 42

3.6.3. Others 43
3.6.3.1. Education 43
3.6.3.2. Household Income 44

3.7. Data Analysis 44

4. CHAPTER IV – RESULTS 49

4.1. Introduction of Results 49

4.2. Response Rate 49

4.3. Sociodemographic and Socioeconomic Characteristics of the Overall Study Sample 50

4.4. Prevalence of Factors that are Associated with the Development of CVD in the Study Sample 62
4.4.1. Body Fat 62
4.4.1.1. Body Mass Index 62
4.4.1.2. Abdominal Adipose Tissue 66
4.4.2. Physical Activity 71
4.4.2.1. Physical Activity at Work 71
4.4.2.2. Physical Activity during Leisure Time 74
4.4.2.2.1. Lower Intensity 74
4.4.2.2.2. Higher Intensity 80

4.4.3. Smoking Habits 86

4.5. Relationship between Cardiovascular Disease Risk Factors and Area of Residence 92
4.5.1. Body Fat and Area of Residence 92
4.5.1.1 Body Mass Index 92
4.5.1.2 Waist Circumference 92
4.5.2. Physical Activity and Area of Residence 96
4.5.2.1. Physical Activity at Work 96
4.5.2.2. Physical Activity during Leisure Time 96
4.5.2.2.1. Lower Intensity 98
4.5.2.2.2. Higher Intensity 98
4.5.3. Smoking Habits and Area of Residence 103

4.6. Effect of Socioeconomic Factors and Risk of Development of Cardiovascular Disease 103
4.6.1. Body Fat 103
4.6.2. Physical Activity 107
4.6.2.1. Physical Activity at Work 108
4.6.2.2. Physical Activity during Leisure Time 108
4.6.2.2.1. Lower Intensity 108
4.6.2.2.2. Higher Intensity 111
4.6.3. Smoking Habits 115

5. CHAPTER V – DISCUSSSION 117

5.1. Introduction of Discussion 117
5.1.1. Nova Scotia Nutrition Survey 117
5.1.2. Canadian Heart Health Survey 118

5.2. Response Rate 119

5.3. Characteristics of Study Sample 122

5.4. Prevalence of Cardiovascular Disease Risk Factors of Sample Study 126
5.4.1. Body Size 127
5.4.2. Physical Activity 130
5.4.3. Cigarette Smoking 132

5.5. Prevalence of CVD risk factors of Urban and Rural Residents 134
5.5.1. Body Size 134
5.5.2. Physical Activity 135
5.5.3. Cigarette Smoking 136

5.6. **Influence of Age, Gender, Area of Residence and Education and Household Income on the Presence of CVD Risk Factors** 137

5.7. **Limitations of the Study** 139

6. CHAPTER VI – **CONCLUSION** 141

REFERENCES 144

APPENDICES 155

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LIST OF FIGURES

Figure		Page
1	Age Distribution of Overall Study Sample	52
2	Age Distribution of Young Adult Rural Residents	53
3	Age Distribution of Young Adult Urban Residents	54
4	Gender Distribution of Overall Study Sample	55
5	Gender Distribution of Young Adult Rural Residents	56
6	Gender Distribution of Young Adult Urban Residents	57
7	Distribution of Education Level of Overall Study Sample	58
8	Distribution of Education Level of Study Sample by Area of Residence	59
9	Distribution of Female Study Sample by Waist Circumference	67
10	Distribution of Male Study Sample by Waist Circumference	68
11	Number of Cigarettes Smoked per Day by Regular Smokers	87

LIST OF TABLES

Table		Page
1	Number and Percent of Deaths due to Cardiovascular Diseases of Males in Canada	3
2	Number and Percent of Deaths due to Cardiovascular Diseases of Females in Canada	4
3	Age-Specific Mortality Rates per 100,000 All Cardiovascular Diseases, Males and Females, in Canada, 1995	8
4	Selection Factors for Sample Selection in Nutrition Newfoundland and Labrador Survey	46
5	Response Rates of Study Sample by Age and Gender from Total Sample Drawn	51
6	Number and Percentage of Study Sample by Household Income Level and Area of Residence	60
7	Number and Percentage of Study Sample by Age Groups and Body Mass Index Categories	63
8	Number and Percentage of Study Sample by Gender and Body Mass Index Categories	64
9	Number and Percentage of Female Study Sample by Age and Waist Circumference Cut-Offs	69
10	Number and Percentage of Male Study Sample by Age and Waist Circumference Cut-Offs	71
11	Number and Percentage of Study Sample by Age and Physical Activity at Work	72
12	Number and Percentage of Study Sample by Gender and Physical Activity at Work	73
13	Number and Percentage of Study Sample by Age and Frequency of Lower Intensity Leisure Time Physical Activities	75

14 Number and Percentage of Study Sample by Gender and Frequency of Lower Intensity Leisure Time Physical Activities 76

15 Number and Percentage of Study Subjects by Age and Duration of Lower Intensity Leisure Time Physical Activities 78

16 Number and Percentage of Study Sample by Gender and Duration of Lower Intensity Leisure Time Physical Activities 79

17 Number and Percentage of Study Sample by Age and Frequency of Higher Intensity Leisure Time Physical Activities 81

18 Number and Percentage of Study Sample by Gender and Frequency of Higher Intensity Leisure Time Physical Activities 82

19 Number and Percentage of Study Sample by Age and Duration of Higher Intensity Leisure Time Physical Activities 84

20 Number and Percentage of Study Sample by Gender and Duration of Higher Intensity Leisure Time Physical Activities 85

21 Number and Percentage of Study Sample by Age and Smoking Habits 88

22 Number and Percentage of Study Sample by Gender and Smoking Habits 89

23 Number of Regular Smokers by Age and Average Number of Cigarettes Smoked per Day 90

24 Number of Regular Smokers by Gender and Average Number of Cigarettes Smoked per Day 91

25 Number and Percentage of Study Sample by Area of Residence and Body Mass Index Categories 93

26 Number and Percentage of Female Study Sample by Area of Residence and Waist Circumference Cut-offs 94

27 Number and Percentage of Male Study Sample by Area of Residence and Waist Circumference Cut-offs 95

28 Number and Percentage of Study Sample by Area of Residence and Level of Physical Activity at Work 97

29 Number and Percentage of Study Sample by Area of Residence and Frequency of Lower Intensity Leisure Time Physical Activities 99

30 Number and Percentage of Study Sample by Area of Residence and Duration of Lower Intensity Leisure Time Physical Activities 100

31 Number and Percentage of Study Sample by Area of Residence and Frequency of Higher Intensity Leisure Time Physical Activities 101

32 Number and Percentage of Study Sample by Area of Residence and Duration of Higher Intensity Leisure Time Physical Activities 102

33 Number and Percentage of Study Sample by Area of Residence and Smoking Habits 104

34 Number and Percentage of Study Sample by Area of Residence and Average Number of Cigarettes Smoked per Day 105

35 Ordinal Logistic Regression of Study Sample by Body Mass Index and Demographic Variables 106

36 Ordinal Logistic Regression of Study Sample by Physical Activity at Work and Demographic Variables 109

37 Ordinal Logistic Regression of Study Sample by Frequency of Lower Intensity Leisure Time Physical Activities with Demographic Variables 110

38 Ordinal Logistic Regression of Study Sample by Duration of Lower Intensity Leisure Time Physical Activities with Demographic Variables 112

39 Ordinal Logistic Regression of Study Sample by Frequency of Higher Intensity Leisure Time Physical Activities with Demographic Variables 113

40 Ordinal Logistic Regression of Study Sample by Duration of Higher Intensity Leisure Time Physical Activities with Demographic Variables 114

41 Binary Logistic Regression of Study Sample by Smoking Habits with Demographic Variables 116

CHAPTER I

LITERATURE REVIEW

1.1. Cardiovascular Disease in Canada

Cardiovascular disease (CVD) refers to all diseases of the heart and blood vessels (American Dietetic Association, 1990). This includes cerebrovascular disease, congestive heart disease, angina pectoris, artherosclerosis, arrthymia, and myocardial infarction (Health Canada, 1995). Cerebrovascular disease refers to any disorder of the blood vessels of the brain. Congestive heart disease, another form of CVD, results when there is insufficient blood flow, leading to an accumulation of blood within an organ and heart failure. In the early stages of congestive heart failure, many people experience short episodes of inadequate blood flow. This often leads to chest pains and is known as angina pectoris (Vander, Sherman, & Luciano, 1994). Artherosclerosis is a disease characterized by thickening of the walls of the small arteries (Ridker, 1996). Arrthymia is a disorder characterized by a deviation from the normal rhythm of the heart (Vlay, 1996). Myocardial infarction results when there is death of a segment of the heart muscle due to insufficient blood flow. This causes an interruption of blood supply to the brain (Manson, Gaziano, Ridker, & Hennekens, 1996).

Cardiovascular disease (CVD) is the leading cause of mortality and a major cause of morbidity in Canadians (Maclean et al., 1992). As a result, a large amount of research and health promotion has been directed in recent years at decreasing the prevalence of CVD in Canada. In the 1980's, the federal and provincial governments organized a working group to address the issues surrounding CVD prevention in Canada. This lead to the development of a report entitled *Promoting Heart Health in Canada* (Federal-Provincial Working Group on the Prevention and Control of Cardiovascular Disease, 1992). In 1985, a number of surveys centered on the prevalence of CVD and its risk factors were carried out in many provinces throughout Canada. From here, provinces implemented their own heart health programs to decrease CVD (Health Canada, 1995). These initiatives contributed to the continuing decline of rates of CVD incidence. For instance, in 1992, 38% of all deaths in Canada were due to CVD (Health Canada, 1995). In 1995, 37% of deaths in Canada were due to CVD (Tables 1 and 2), (Heart and Stroke Foundation of Canada, 1997). Within Canada, Newfoundland and Labrador is the province with the highest level of CVD incidence for men and women, 317 and 294 per 100,000 population respectively (Heart and Stroke Foundation of Canada, 1997).

Cardiovascular disease is a major factor in the utilization of Canada's health services. In 1994/95, the total number of days patients stayed in the hospital in Canada due to cardiovascular disease events was 6,522,117. The National Hospital Mobidity data file from 1992 revealed that patients with CVD stayed an average of 12 days in the hospital compared to the average 10.8 days for all

Table 1: Number and Percent of Deaths due to Cardiovascular Diseases of Males in Canada, 1995

Age	*All Deaths*	*All CVD[1]*		*IHD[2]*		*AMI[3]*		*Stroke*	
		#	*% of All Deaths*	*#*	*% of All Deaths*	*#*	*% of All Deaths*	*#*	*% of All Deaths*
< 34	6896	255	3.7	68	1	38	0.6	45	0.7
35-44	4797	772	16.1	469	9.8	273	5.7	108	2.3
45-54	7426	2007	27	1447	19.5	828	11.2	208	2.8
55-64	13792	4664	33.8	3317	24.1	1993	14.5	465	3.4
65-74	27964	10412	37.2	6696	23.9	3673	13.1	1515	5.4
75-84	32487	13835	42.6	8127	25	4113	12.7	2530	7.8
85+	18034	8140	45.1	4209	23.3	1739	9.6	1715	9.5
All Ages	**111396**	**40085**	**36**	**24333**	**21.8**	**12657**	**11.4**	**6586**	**5.9**

1. All CVD = All Cardiovascular diseases
2. IHD = Ischemic heart disease
3. AMI = Acute myocardial infarction (heart attack)

SOURCE: Laboratory Center for Disease Control; Statistics Canada, 1997

Table 2: Number and Percent of Deaths due to Cardiovascular Diseases of Females in Canada, 1995

Age	*All Deaths*	*All CVD*[1]		*IHD*[2]		*AMI*[3]		*Stroke*	
		#	*% of All Deaths*	*#*	*% of All Deaths*	*#*	*% of All Deaths*	*#*	*% of All Deaths*
< 34	3311	188	5.7	29	0.9	15	0.5	49	1.5
35-44	2350	268	11.4	98	4.2	56	2.4	77	3.3
45-54	4539	715	15.8	340	7.5	195	4.3	191	4.2
55-64	8117	1888	23.3	1073	13.2	644	7.9	353	4.3
65-74	18398	5988	32.5	3357	18.2	1960	10.7	1172	6.4
75-84	30134	13332	44.2	7014	23.3	3692	12.3	3066	10.2
85+	32488	16644	51.2	7821	24.1	2995	9.2	4043	12.4
All Ages	**99337**	**39023**	**39.3**	**19732**	**19.9**	**9557**	**9.6**	**8951**	**9**

1. All CVD = All Cardiovascular diseases
2. IHD = Ischemic heart disease
3. AMI = Acute myocardial infarction (heart attack)

SOURCE: Laboratory Center for Disease Control; Statistics Canada, 1997

diseases (Heart and Stroke Foundation of Canada, 1997). CVD was responsible for a higher rate of dispensed prescriptions (12.8%) than any other disease in Canada in 1993/94 (Statistics Canada, Health Statistics Division, 1996). Furthermore, in 1994, 9.9% of visits made to physicians were due to CVD (Heart and Stroke Foundation of Canada, 1997).

Cardiovascular disease has a large economic impact in Canada. In 1995, CVD accounted for $7.3 billion or 17% of the total direct cost of illness (Heart and Stroke Foundation of Canada, 1997). That was the highest recorded for any disease. Direct costs include hospital expenditures, medical care, drugs and research. Indirect costs such as the loss of productivity due to illness or disability or the loss of earnings due to premature death also play a role in the economic burden of cardiovascular disease (Rice, Hodgson & Kopstein, 1985). This is greater than indirect cost due to injuries, cancer or respiratory diseases individually (Heart and Stroke Foundation of Canada, 1997).

1.2. Factors which Influence the Risk of Developing Cardiovascular Disease

A number of studies using various scientific approaches such as animal models, clinical trials, epidemiological and observational studies have identified various factors as being associated with the risk of developing cardiovascular disease (American Dietetic Association, 1990). Risk factors are characteristics that have been primarily identified through prospective studies and are associated with an increased probability of developing some form of a disease (Thomas & Kannel, 1983).

Some studies have documented the synergistic effect of the presence of multiple risk factors on the development of CVD (Kannel & Gordon, 1973; Sharper et al., 1985; MacDonald et al., 1992). For instance, obesity can substantially increase the risk of heart disease when a person is already experiencing one other risk factor for cardiovascular disease (Wilhelmsen, 1990).

Risk factors of CVD have been categorized as non-modifiable and modifiable. Non-modifiable risk factors are personal characteristics that normally cannot be changed. These include age (Strong & Kelder, 1996), gender (Hanes, Weir & Sowers, 1996), family history (Thomas & Kannel, 1983), and hormonal factors (Wenger, 1996).

Modifiable risk factors are those which can be changed through individual behaviour or treatment. These include circulating levels of plasma lipids such as cholesterol and triglycerides (Reeder, et al., 1997), hypertension (National Health and Research Development Program, 1989), excess body weight (Hubert, Feinleib, McNamara & Castelli, 1983), physical inactivity (Powell, Thompson, Caspersen & Kendrick, 1987), cigarette smoking (Hoeymans, Smit, Verkieij & Kromhout, 1996), diabetes mellitus (Thomas & Kannel 1983), and stress (American Dietetic Association, 1990).

1.2.1. Age

Cardiovascular disease incidence increases with age (Heart and Stroke Foundation of Canada, 1997). Table 3 shows the relationship between death due to CVD and age-sex specific groups in Canada in 1995. Approximately thirty males and eleven females per 100,000 population between 35-44 years died due to CVD as compared to 3000 males and 2000 females per 100,000 population between 75-84 years.

In 1915, researchers proposed that atherosclerosis, a form of CVD, starts developing in childhood. This was due to the discovery of atheroscelerotic lesions in young autopsied patients. Atherosclerosis development was later identified in studies that discovered fatty streaks in autopsies of young adults from the Korean and Vietnam war (Strong & Kelder, 1996). These streaks lead to vascular atherosclerosis, which can eventually lead to CVD and mortality (Wattigney, Webber, Srinivasan & Berenson, 1995).

Similar studies have been conducted since then and have confirmed the relationship between atherosclerosis and childhood (Strong & Kelder, 1996). Newman et al. (1986) analyzed the relationship between risk factors of CVD and the presence of early atherosclerotic lesions in autopsies of persons from Bogalusa, Louisiana. This was a cross-sectional study conducted between 1973-1983 on 35 subjects between 2 to 24 years of age at the time of death. The risk factors considered were total blood cholesterol levels, serum triglyceride levels, low-density lipoprotein (LDL) cholesterol levels, high-density lipoprotein

Table 3: Age-Specific Mortality Rate, per 100,000, All Cardiovascular Diseases, Males and Females, in Canada, 1995

	Gender	Age					
		35-44	***45-54***	***55-64***	***65-74***	***75-84***	***85+***
IHD[1]	M	19	78	267	702	1825	4020
	F	4	19	85	296	1029	3163
AMI[2]	M	11	45	161	385	924	1662
	F	2	11	51	173	542	1251
Stroke	M	4	11	37	159	568	1639
	F	3	10	28	103	450	1688
Other CVD	M	8	19	71	231	714	2122
	F	4	10	36	129	477	2099
All CVD[3]	**M**	**31**	**109**	**376**	**1092**	**3107**	**7781**
	F	**11**	**39**	**149**	**528**	**1956**	**6950**

1. IHD = Ischemic heart disease
2. AMI = Acute myocardial infarction (heart attack)
3. All CVD = All cardiovascular diseases

Source: Laboratory Center for Disease Control; Statistics Canada, 1997

(HDL) cholesterol levels, very-low density lipoprotein (VLDL) cholesterol, blood pressure, obesity and cigarette smoking. Risk factor information was obtained from exploration studies in Louisiana. Newman's group revealed a positive correlation between VLDL cholesterol levels, mean systolic blood pressure and coronary artery fatty streaks. It was suggested that the prevention of CVD should begin in early life to prevent the progression of fatty streaks to fibrous plaques and eventually artherosclerosis.

1.2.2. Gender

In the past, CVD was looked upon as being more of a concern for men than for women (Wenger, 1996). This is mainly due to the lower risk of premature morbidity and mortality due to CVD in women (Kannel & Abbott, 1987). Considering all ages, CVD mortality rates in men and women are equal (Johansen, Nargundkar, Nair, Neutel & Wielgosz, 1991). In Canada in 1995, 40,091 men and 39,026 women died from CVD (Heart and Stroke Foundation of Canada, 1997).

Lower premature morbidity and mortality due to CVD in women is partly a result of women having a longer life expectancy as compared to men. Furthermore, there is a higher incidence of cardiovascular disease in women at an older age (Heart and Stroke Foundation of Canada, 1997). Research reveals that men, up to the age of 74, experience a two to five-times greater mortality rate from acute myocardial infarction (AMI) and ischemic heart disease (IHD) than women (Heart and Stroke Foundation of Canada, 1997). This may be explained by the effect of a woman's hormones on lipoprotein levels. It has been reported that women between the ages of 20 and 59 years have higher high-density lipoprotein (HDL) cholesterol levels than men of the same age group (Kannel, 1983). A number of studies have demonstrated an inverse relationship of HDL-cholesterol to CVD (Frick et al, 1987; Gordon & Rifkind, 1989). Women were also shown to have lower low-density lipoprotein (LDL) cholesterol levels, which is associated with a decreased risk of CVD (Heiss, Tamir & Davis, 1980). In both cases the opposite was true for men. However, after menopause, the LDL cholesterol levels of women were higher than those of men (Stevenson, Crook & Godslsland, 1993) and CVD rates increased dramatically in women after menopause (American Dietetic Association, 1990).

Even though the prevalence of CVD is similar for women and men, variations exist in the time trends of CVD incidence and mortality. Sytkowski, D'Agostino, Belanger and Kannel (1996) compared trends of cardiovascular disease incidence and mortality over a twenty-year period among men and women who were participants of the Framingham Heart Study and were between 50-59 years of age in 1950, 1960 and 1970. CVD incidence declined by twenty-one percent in women ($p < 0.01$) and six percent in men ($p<0.05$) from 1950 to 1970. This study also revealed differences of CVD risk factor time trends in males and females. Obesity, hypercholesterolemia and high blood pressure were significantly lower for females in 1970 as compared to females in 1950

($p < 0.001$). Furthermore, smoking and high blood pressure were significantly lower for males in 1970 as compared to males in 1950 ($p < 0.001$). It was concluded that declines in CVD incidence in the past twenty years in males and females could be due to declines in different CVD risk factors of males and females.

Research reveals that women suffer a greater degree of adverse outcomes from CVD than men. Morbidity due to myocardial infarctions, cardiac failure and stroke are higher in women as compared to men. Furthermore, over sixty percent of the female mortality rate due to coronary heart disease is not previously diagnosed (Wenger, 1996). Thus, efforts are now being made to increase public awareness of the complications experienced by women with CVD (Heart and Stroke Foundation of Canada, 1997).

1.2.3. Family History

It has been suggested that a family history positive for cardiovascular disease increases the risk of CVD development. Castro (1993) studied the interaction of a family history of CVD with the major risk factors of CVD. This was a case-control study in which 106 hospital cases and 106 hospital controls were matched for gender, age and area of residence (urban, rural). Information was collected on the family history of CVD, weight, height, lipid profile and blood pressure for every participant. An observed odds ratio of participants with CVD was computed and compared for those with and without a family history of CVD.

The odds ratio was 4.95. It was concluded that a family history of CVD is a risk factor for CVD.

Research also reveals that a family history of CVD may be predictive of blood lipid levels in young children. Moll et al (1983) studied the blood lipid profiles of 98 families in Rochester, Minnesota. A total of 850 first and second-degree relatives of 98 school children were involved in the study. The families were divided into three groups based on the children's total serum cholesterol levels; low, middle and high cholesterol levels. It was discovered that grandfathers of children in the high total serum cholesterol level group were at an increased risk of mortality by 2.5 times of those grandfathers of children in the low cholesterol group.

1.2.4. Excess Body Fat

There are a number of anthropometric measurements available to assess body weight. These include fat fold measurements, mid arm circumference, waist to hip ratio, and waist circumference (Whitney & Rolfes, 1996). Body mass index (BMI), a measure of general adiposity, is most often used to define overweight and obesity (Rabkin, et al., 1997). Body mass index is defined as weight in kilograms divided by height in meters squared (Wt/Ht^2). A BMI less than 20 may be associated with health problems in some people. A BMI between 20 and 25 is usually associated with low mortality and is considered to be appropriate for most people. A BMI between 25-27 may lead to health problems in some people while a value above 27 is associated with an increased risk of developing health problems in most people (Health and Welfare Canada, 1988). A BMI greater than 27 is often considered an indication of being overweight (Rabkin, et al, 1997).

Having excess body fat or being overweight has been frequently associated with a significant impairment of health (Burton & Foster, 1985). Many studies reveal an association between excess body fat and cardiovascular disease, diabetes mellitus, hypertension and some cancers (Macdonald, Reeder, Chen, & Despres, 1997). This may be due to the role that body fat plays in the development of hypertension and altered lipid profiles (Pi-Sunger, 1993). Results from the Framingham Study suggested that the degree of overweight was proportional to the rate of the development of cardiovascular disease. This longitudinal study revealed that for each standard deviation in relative weight gain, there was an increase in cardiovascular disease of 15 and 22 percent in men and women respectively (Kannel, D'Agostino & Cobb,1996).

Excess body fat also affects the development of CVD risk factors in children, adolescents and young adults (Dietz, 1998). Research reveals that obese children and adolescents often have increased blood lipids in the form of LDL-cholesterol and triglycerides and lowered HDL-cholesterol (Caprio et al., 1996). Many CVD consequences that develop during adulthood due to obesity are often preceded by health abnormalities that develop during childhood (Dietz, 1998).

Weight reduction has been demonstrated as being a benefit to obese children and adolescents in the lowering of high blood lipid values. Wabitsch et al (1994) examined the effect of weight loss during a weight loss program on the blood lipid levels of obese adolescent girls (n=116). The program lasted for 6 weeks and at the end of the program the participants lost an average of 8.5 kg. This weight loss was associated with a significant reduction in total cholesterol, LDL cholesterol and systolic and diastolic blood pressure.

Early research suggested that the younger the age of onset of excess body fat, the greater the likelihood of the development of manifestations of atherosclerosis (Rabkin, Mathewson & Hsu, 1977). However, more recent studies are unclear as to whether obesity during childhood is associated with the prevalence of adult obesity (Dietz, 1998). Guo, Roche, Chumlea, Gardner and Siervogel (1994) studied the effect of overweight children on overweight adults (BMI > 28 for men and BMI > 26 for women) at the age of 35 years. This study analyzed 555 children. It detected that the ability to predict overweight at 35 years increased from approximately 2% for children who were overweight at 1-6 years, to 5-10% for children who were obese at 10-14 years, to 8-57% for males and 6-35% for females at 18 years.

More studies are needed that concentrate on the long-term effects of childhood and adolescent obesity. More research is also needed on the likelihood that obesity will persist from childhood to adulthood and the effects of childhood obesity on the development of CVD in later life (Dietz, 1998).

It is well known that females have a higher percentage of body fat than males, even at the same body mass index levels (Krotkiewski, Bjorntorp, Sjostrom & Smith, 1983). Larger amounts of body fat in females are due to a higher percentage of adipose tissue in certain areas. Krotkiewski, Bjorntorp, Sjostrom and Smith (1983) studied the effect of obesity on metabolism in 930 obese males and females (BMI > 27). It was revealed that males with similar degrees of obesity had higher fasting glucose, insulin and triglyceride levels as compared to females. The study also revealed that males had higher systolic and diastolic blood pressures as compared to females with similar percentages of body fat.

The prevalence of obesity is high in Canada. The Canadian Heart Health Study conducted between 1986 -1992 revealed that 31% of Canadians were obese. Within Canada, Newfoundland has the highest level of obesity at 41% (Heart and Stroke Foundation of Canada, 1997).

1.2.5. Distribution of Body Fat

Recent studies suggest that body fat distribution as well as total body fat should be considered a risk factor for CVD development (Macdonald, Reeder, Chen, & Despres, 1997). Excess accumulation of adipose tissue in the abdominal region has been shown in some adults to be associated with an increased risk of CVD. This may be due to the disturbances in lipoprotein metabolism and plasma insulin-glucose homeostasis seen with excessive abdominal fat (Fujioka, Matsuzawa, Tokunaga & Tarui, 1987).

Central fat distribution also appears to be more of a concern for children and adolescents than total body fat. Freedman, Srinivasan, Harsha, Webber & Berenson (1989) examined body-fat distribution and lipid profiles in 361children aged 6-18 years who were living in Bogalusa, Louisiana. It was revealed that children with increased abdominal adipose tissue had an increased prevalence of high triglycerides and VLDL-cholesterol than those children without increased abdominal tissue. It was concluded that high levels of abdominal adipose tissue may aid to identify those at risk of hyperlipidemia development in later life.

A measurement of waist and hip circumferences is the most frequently used method at present to estimate abdominal adipose tissue (Pouliot et al., 1994). However, recent studies have revealed that the waist to hip circumference is imprecise and may confound relationships sought between abdominal adiposity and disease development (Dietz, 1998). Waist and hip circumferences cannot distinguish between visceral and subcutaneous adipose tissue in the abdominal region. Research has suggested that visceral adipose tissue is related to metabolic and homeostatic abnormalities more so than subcutaneous adipose tissue (Lemieux, Prud'homme, Bouchard, Tremblay & Despres, 1996). Thus, the amount and distribution of visceral adipose tissue may be more strongly correlated to cardiovascular disease than other types of adipose tissue (Pouliot et al., 1994).

Recent studies suggest that waist circumference alone may be an accurate measure of visceral adipose tissue (Seidell et al., 1987). Waist circumference has been shown to be well correlated with plasma lipoprotein levels, glucose tolerance, plasma insulin concentration and both systolic and diastolic blood pressure (Reeder et al., 1992).

It has been difficult to determine a cut off point for a waist circumference above which one has an increased risk of developing CVD. However, Lean, Han and Seidel (1998) conducted a cross-sectional study of 5887 men and 7081 women in Maastricht, Amsterdam and Doetinchem. The purpose of this study was to determine the relationship between waist circumference and health status (diabetes mellitus, CVD risk factors, low back pain, physical ability and respiratory insufficiency). Results from this study revealed that men who had a waist circumference greater than 102 centimeters had an increased risk of shortness of breath by an odds ratio of 3.1 (95% confidence interval (C.I.), 2.5-3.7), diabetes mellitus by 4.5 (95% CI, 3.6-5.0) and one major CVD risk factor by 4.2 (95% CI, 3.6-5.0). Women who had a waist circumference greater than 88 centimeters had an increased risk of shortness of breath by 2.7 times (95% CI, 2.3-3.1), diabetes mellitus by 3.8 times (95% CI, 1.9-7.3) and one major cardiovascular disease risk factor by 2.8 times (95% CI, 2.4-3.2). Thus, it was suggested that men with a waist circumference greater than 102cm and women with a waist circumference greater than 88cm have an increased risk of developing health problems.

1.2.6. Physical Activity

The preventive role that physical activity plays in cardiovascular disease is well known (Bernadet, 1995). This may be due to a causal relationship between being active and the development of plasma lipids, lipoproteins, apolipoproteins, and athersclerosis (Paffenbarger, Hyde, Wing & Steinmetz, 1984). Active individuals exhibit higher levels of HDL cholesterol and lower levels of plasma triglycerides and very low density lipoprotein (VLDL) cholesterol as compared to inactive individuals (Kannel & Sorlie, 1979). High levels of VLDL have been shown to be associated with the development of cardiovascular disease (Moll et al., 1983).

Early studies on physical activity were mainly concerned with occupational activity (Wilhelmsen, Tibblin, Aurrell, Bjure, Ekstrom-Jodal & Grimby, 1976). For instance, Paffenbarger and Hale (1975) investigated CVD mortality rates of 6351 longshoremen. These men were observed over a twenty-two year span. Physical activity levels were compared in accordance to work-years and categories of high, medium and low energy output. Coronary death rates in workers of a high level of physical activity were 26.9 per 10,000 work years while those workers of a medium and low level of physical activity were 46.3 and 49.0 per 10,000 work years respectively. It was concluded that high levels of physical activity performed on the job were of greater benefit for preventing coronary heart disease development than low levels of physical activity on the job.

As in most developed countries, Canada's society is moving towards more automation of job tasks. This requires people to work fewer hours and for more people to become involved in more sedentary occupations. Consequently, many recent studies of physical activity focus on cardiovascular disease and physical activity during leisure time. A study conducted by Haapanen's group in 1996 analyzed the level of cardiovascular disease mortality in 1,072 Finnish men aged 35-63 years. These subjects were followed for eleven years. After comparing mortality risk to specific leisure activities, it was shown that a sedentary man had an increased risk of CVD mortality more than three times that of a matched physically active man (Haapanen, Miilunpalo, Vuori, Oja & Pasanen, 1996). The study concluded that a low level of leisure physical activity was a risk factor for CVD mortality.

Physical activity associated with both occupation and leisure time has been found to have an effect on cardiovascular disease mortality. Salonen, Puska and Tuomilehto in 1982 conducted a longitudinal study (seven years) on over 7000 men and women in eastern Finland. The purpose of this study was to determine the effect of physical activity at work and during leisure time on risk of coronary heart disease. The variables considered were cigarette smoking, serum cholesterol, diastolic blood pressure, height, weight and age. Low physical activity at work was associated with an increased risk of acute myocardial infarction of 1.5% in men and 2.4% in women. Low physical activity during leisure time was significantly associated with an increased risk of death in men and women. It was concluded that both low levels physical activity at work and during leisure time affects the development of CVD.

Many studies have concluded that low levels of physical activity constitute a primary risk factor of cardiovascular disease (Blair et al., 1989; Paffenbarger, Hyde, Wing & Steinmetz, 1984). However, it has been difficult to conclude whether high levels of activity produce an added benefit to heart disease over moderate levels of activity. A recent report based on data collected from the Framingham Study revealed that high levels of physical activity did not produce an added benefit against cardiovascular disease risk over moderate levels of physical activity performed for the same period of time (Kiely, Wolf, Cupples, Beiser & Kannel, 1994).

In recent years, more and more Canadians of all ages are leading a more active lifestyle. Results from the 1995 Physical Activity Monitor revealed that 37% of Canadians over the age of eighteen are active compared to 21% in 1981. This study also revealed that in 1995, two in five Canadian adults were active enough to benefit cardiovascular health. Furthermore, one quarter were moderately active and another quarter of Canadians was somewhat active (Canadian Fitness and Lifestyle Research Institute, 1996). This study also showed trends in age, sex, socioeconomic status and community size. Generally, physical activity levels decreased with age. Less than half of the Canadian adults aged > 65 years were active as compared to Canadian adults aged 18-24 years. It was revealed that one in four Canadians above the age of 65 were active as compared to one in two Canadians between the ages of 18-24. Furthermore, overall, a higher percentage of men were active as compared to women. Physical activity was shown to increase with education and income levels. It was suggested that households who were receiving an income of over $60,000 a year had a higher education level and had the highest reported level of physical activity. In regards to community size, Canadians living in centers containing more than 75,000 people were more active than those Canadians residing in smaller community centers (Canadian Fitness and Lifestyle Research Institute, 1996).

A National Population Health Survey that took place in 1994/95 and again in 1996/97 also analyzed the level of leisure activity of Canadians. This study involved the participation of 20, 725 households that were randomly selected throughout Canada to be involved in an interview regarding their health status and sociodemographic information. These participants were 12 years of age and over. The results from this survey were different from those obtained from the 1995 Physical Activity Monitor. The NPHS reported that in 1996/97, 95% of the Canadian population aged 12 and older were involved in only light physical activity throughout the day. The level of leisure activity was based on energy expenditure by the participants in kcal/kg/day. It was also concluded that people with sedentary daily activities were more likely to be physically inactive in their leisure time (Statistics Canada, 1998).

Recommendations on the level of physical activity that is needed to benefit health are changing as more research findings become available. The U.S. Surgeon General's Report on Physical Activity in 1996 suggested that even moderate levels of physical activity on a regular basis can decrease the risk of cardiovascular disease (United States Department of Health and Human Services, 1996). It has been recommended that individuals who perform physical activity of moderate intensity or greater, every other day, are at a decreased risk of developing cardiovascular disease (Stephens & Craig, 1990).

One practical way to measure physical activity levels is through a questionnaire. An interviewer records the frequency of physical activity and later converts this into energy expenditure. This instrument is limited by the fact that it may be susceptible to subject bias, inaccuracy and deliberate falsification. Yet self-reporting of exercise behaviour has been reported to be a valid approach for determining the level of physical activity performed by study subjects (Godin, Jobin & Bouillon, 1986).

1.2.7. Cigarette Smoking

Research reveals a strong and consistent association between smoking and risk of cardiovascular disease (Hays, Hurt & Dale, 1996). Cigarette smoking has been known to have an association with increased heart rate, reduced estrogen levels in women (Hansen, Anderson & Von Eyben, 1993), low HDL cholesterol and high LDL cholesterol (Stamford et al., 1984).

Neaton and Wentworth in 1992 analyzed the association between risk factors and death from coronary heart disease and cigarette smoking in a cohort of over 300,000 men. After 12 years of follow-up, they discovered that smokers had a higher prevalence of elevated blood pressure (diastolic and systolic) and elevated serum cholesterol levels. They also had 20 times the CHD mortality rates of non-smoking men (Neaton & Wentworth, 1992).

The quantity of cigarette smoke that a person consumes also plays a role in the development of cardiovascular disease (Hays, Hurt & Dale, 1996). Kaufman, Helmrich & Rosenberg (1983) revealed that a person who smokes twenty-five or less cigarettes per day had a relative risk of 2.1 for developing nonfatal myocardial infarction. A smoker of forty-five cigarettes or more daily was shown to have a relative risk of 4.0.

In the 1986-92 Canadian Heart Health Surveys, smoking was reported as being the leading cause of heart disease in both men and women. Furthermore, this study revealed that Newfoundland and Labrador was the province with the highest prevalence of smoking at 36% (Health Canada, 1995).

1.2.8. Others

A number of factors outside of the major risks of cardiovascular disease may influence an individual's likelihood of developing CVD. These include socioeconomic status, environmental factors and area of residence.

1.2.8.1. Socioeconomic Status

Social class is a difficult concept to define yet attempts have been made to stratify societies into subgroups. Social class has become important to many epidemiological studies because of its identified association with health status (Inclen Multicentre Collaborative Group, 1994). Luoto, Pekkanen, Uutela and Tuomilehto (1994) conducted a cross sectional survey on over 4000 men and women to determine the effect of socioeconomic status on the risk of developing CVD. The risk factors considered included total blood cholesterol, HDL cholesterol, physical activity, blood pressure, body mass index and cigarette smoking. Socioeconomic status was determined by considering the education, income and occupation of the respondents. It was shown that those persons from lower levels of education, occupation and income had an increased risk of developing CVD. This may be explained by the fact that groups of low socioeconomic status have limited access to health services and the use of preventive health programs. It has also been reported that groups of low socioeconomic status differ from higher socioeconomic groups in regards to their level of health knowledge (Millar & Wigle, 1986). A Canadian health promotion survey conducted in 1985 on the socially and economically disadvantaged reported that persons of higher socioeconomic status have a greater degree of health knowledge and are more attentive towards smoking, hypertension and nutrition (Wilkins, 1988).

In most epidemiological studies, socioeconomic status is used as a confounding variable rather than a risk factor and it is often used to describe the sample population. The way social class is used in regards to the role it plays, and how it is statistically controlled can have an important consequence on the interpretation of study results (Liberatos, Link & Kelsey, 1988).

Socioeconomic status can be determined through the evaluation of any combination of factors such as education level, income, and/or occupation (Winkleby, Fortmann & Barrett, 1990). Occupation, as an indicator of social class, is difficult to interpret, largely due to its association with male oriented classifications (Luoto et al., 1994).

1.2.8.1.1. Education

Formal education has often been used as a single indicator of socioeconomic status. This is mainly due to its relationship with many lifestyle characteristics and the simplicity in obtaining pertinent information. Fairly accurate information is available on the attainment of formal education. As well, education is available to every member of society, regardless of income status (Liberatos et al., 1988).

A number of CVD studies have revealed that low education is associated with hypertension, cigarette smoking, hypercholesterolemia and CVD morbidity and mortality (Winkleby, Jatulis, Frank & Fortmann, 1992). Hoeymans, Smit, Verkleij and Kromhout (1996) studied the relationship between CVD risk factors and education levels of 36 000 men and women in the Netherlands. The risk factors considered were smoking, physical inactivity, hypertension, alcohol consumption, obesity and hypercholesterolemia. Except for alcohol consumption, a significant association was noted between all of the risk factors considered and education level. CVD risk factors were more prevalent in lower educated groups than in the higher educated groups.

In addition, it has been noted that persons with higher levels of education level often develop effective coping skills (Luoto et al., 1994). This often leads to an increased knowledge, willingness and compliance to lead healthy lifestyles (Millar & Wigle, 1986).

1.2.8.1.2. Income

Income is often used as a measure of socioeconomic status for determining its relationship with overall health. For instance, Lynch's group in 1996 measured the association between acute myocardial infarction, CVD mortality and income in over 2,000 Finnish men. The lower income categories as compared to higher income categories had age-adjusted relative risk of 2.66 (95% C.I. 1.25-5.66) and 4.34 (95% C.I. 1.95-9.66) for CVD mortality and myocardial infarction, respectively (Lynch, Kaplan, Cohen, Tuomilehto & Salonen, 1996).

Income has been shown to affect the nutritional quality of individual diets. Results from Statistics Canada's Family Expenditure Surveys revealed that individuals receiving low incomes have decreased dietary quality and quantity, thus affecting their overall health status (Travers, 1996). Furthermore, results from the 1990 Nova Scotia Nutrition Survey revealed that individuals residing in households with low incomes were more often underweight or overweight as compared to individuals residing in households with middle to high incomes (Nova Scotia Heart Health Program, 1993).

Income levels are age dependent. Income levels tend to increase with age. It has been reported that up to the age of 65 years, someone who is older is likely to earn more. Thus, one must analyze income levels within age groups for most accuracy (Liberatos et al., 1988).

When one is analyzing family income, it is vital that family size be considered. Furthermore, it has been recommended that one should consider using poverty index levels that are developed for the specific community in question, which consider family size and cost of living. This allows for a comparison in later years and for a comparison to other families of different sizes (Liberatos et al., 1988).

1.2.8.2. Area of Residence

It has been reported that in Canada, the geographic area in which one resides influences health status. Rural communities are often characterized by having residents with lower incomes, higher unemployment rates, lower educational levels and poorer housing as compared to matched urban residents (Bavington, 1994). Furthermore, studies have shown that rural residents have a shorter life expectancy, higher prevalence of long term disability, and shorter quality adjusted life expectancy than urban residents of the same country (Johnson, Ratner & Bottorff, 1995). There is also speculation that urban and rural centers differ in access to health services, adequate food supply and health knowledge (Millar & Wigle, 1986).

Verheij (1996) discussed two hypotheses to explain urban-rural variations in health. The first is the drift hypothesis that suggests a selection process to explaining ill health in certain areas. The selection process can be either direct or indirect. Direct selection results when a higher concentration of healthy people stay in certain areas and ill people leave (or ill people stay and healthy people leave). Indirect selection results when people with certain illnesses move to or from certain areas. This hypothesis suggests that urban-rural variations in health would not exist if past and present illnesses were considered in the analysis. The second hypothesis, the breeder hypothesis, suggests that people may be directly exposed to certain environmental factors, due to the area where they live. The breeder hypothesis also suggests that individual health behaviours may be influenced by the health-related activities of others that are residing in their area such as cigarette smoking.

Verheij (1996) reports that in order to fully understand the relationship between area of residence and health status, one must realize that all environments have positive and negative qualities and not everyone living in these areas are exposed to these positive and negative qualities equally. Individual variations exist and confounding variables should be considered.

Some studies have been performed on the regional health status of Canadians residing in general regions. For instance, reports from the Heart and Stroke Foundation in 1997 revealed that Newfoundland and Labrador had a higher rate of CVD than any other province in Canada. However, limited research has been performed on the health status of Canadians within each province and information on the health status of urban and rural communities is almost non-existent.

Segovia, Edwards and Bartlett are presently conducting an adult health survey that is concerned with medical care utilization and the health status of citizens in the province of Newfoundland and Labrador (Segovia, Edwards & Bartlett, 1996). The study sample represents five district community health boards: St. John's, Eastern, Central, Western and Northern. Initial findings suggested that residents of the Northern Community Health Board region, but no other board, was experiencing barriers in receiving health care. These barriers included the long distance between the average Northern resident and his/her physician but also the waiting time required to see a physician. This region also had the highest prevalence of not seeking medical attention when necessary. The Northern region of Newfoundland is truly rural and the only one of the five studied with no urban centers.

1.3. Nutrition Newfoundland and Labrador

In the fall and spring of 1996, a nutrition survey was conducted throughout Newfoundland and Labrador. This survey was planned and conducted by representatives from the province of Newfoundland and Labrador, Memorial University of Newfoundland, the Newfoundland and Labrador Heart Health Initiative and Health Canada. The goal of this survey was to collect nutritional data relevant to the health status of the residents of Newfoundland and Labrador. Interviewers recorded the dietary practices, the nutrient intakes and the nutritional knowledge and attitudes of Newfoundlanders and Labradorians. It is hoped that data from this survey will aid in the development of needed health related public education programs to help decrease the prevalence of chronic disease (Nutrition Newfoundland and Labrador, 1996).

The need for a provincial nutrition survey was identified by the Newfoundland Heart Health Survey of 1989. This study revealed that Newfoundland and Labrador had a high prevalence of nutrition related health problems such as hypertension and elevated blood cholesterol (Newfoundland Department of Health and National Health and Welfare, 1990). It was recommended that in order to deal with this problem that more information was needed on the dietary practices of residents of the province. This lead to the development of the Nutrition Newfoundland and Labrador study.

A stratified random sample of approximately two thousand non-institutionalized men and women, aged 18-74 years inclusive were visited in the study. One-third of the respondents were re-interviewed. In-home interviews were conducted in which twenty-four hour recall and food frequency, sociodemographic, nutritional knowledge and attitude questionnaires were administered. Height, weight, waist and hip circumference measurements were also taken.

The data obtained from this survey on young adults was used in the current study. This included those participants between the ages of 18-34 years, who agreed to be involved in the study and were living throughout Newfoundland and Labrador.

CHAPTER II

AIM OF STUDY

2.1. Rationale

Manifestations of CVD are not usually observed until the fourth decade of life or later (Wattigney, Webber, Srinivasan & Berenson, 1995). However, studies have suggested that risk factors of CVD disease may begin to develop in childhood and lead to adverse consequences in adulthood. Fatty streaks have been seen in the aortas of three-year-olds and in the coronary arteries of individuals in their second decade of life (Holman, McGill, Strong & Geer, 1958; Strong & McGill, 1962). Abnormalities that are developed in the early stages of life may lead to cardiovascular consequences related to adult obesity such as hypertension, and high LDL-cholesterol (Dietz, 1998). Furthermore, many lifestyle habits, such as physical inactivity, develop in early years and progress into adulthood. Thus, it is suspected that early identification of adverse levels of cardiovascular disease risk factors and altering lifestyle habits through education should aid in the prevention of CVD morbidity and mortality in the future (Wattigney, Webber, Srinivasan & Berenson, 1995).

The rationale for obtaining information on CVD risk factor status of young Newfoundland and Labrador adults is to also aid in enhancing the overall health and well being of young adults in Newfoundland and Labrador. For instance, if results from this survey reveal that a high percentage of young Newfoundland

and Labrador residents are regular smokers, efforts can be made to provide these individuals with more information on the health consequences of smoking. This could aid in the prevention of cancers and chronic lung disease in the future.

In order to gain insight into the health status of young adults living in Newfoundland and Labrador, individual and environmental characteristics should be considered. Health is not only influenced by lifestyle habits and behaviours but also by the geographic area in which one lives. Rural residents differ from their urban counterparts in regards to their ability to access health services, adequate food supplies and health knowledge (Millar & Wigle, 1986). Thus, it is expected that there is a difference in the health status of urban versus rural residents. Most research that has considered geographic area, used it as a framework to organize the study sample and overlooked its effect on health-related behaviours (Duncan, Jones & Moon, 1993). There has been limited investigation into the health status of residents living in urban versus rural communities in Newfoundland and Labrador. The Newfoundland Heart Health Study investigated the health status of particular regions throughout the province. A more recent study, the Adult Health Survey, is an on-going investigation into health care utilization and heath status of the different community health boards throughout the province (Segovia, Edwards & Bartlett, 1996). Considering the high prevalence of CVD in Newfoundland and Labrador and the fact that this disease has such a negative effect on our health care system, as well as on our economy (Heart and Stroke Foundation of Canada, 1997) it is vital that more investigation be conducted in this area.

It is anticipated that this study will identify a high-risk group of CVD incidence within the province, thus creating the need for some form of intervention. It is hoped that the acquisition of this information will aid in improving the overall health of Newfoundlanders and Labradorians. It will provide support for a public health approach that should be developed throughout the province to prevent and control CVD. It will also provide a basis for future studies focused on specific groups concerned with risk factors of CVD.

2.2. Purpose

The purpose of this study was to identify and characterize specific cardiovascular disease risk factors in young Newfoundland and Labrador adults aged 18 - 24 years and 25-34 years. This study also determined the prevalence of these risk factors in urban and rural communities.

2.3. Goal and Objectives

The goal of this research was three fold - to study data collected on 18-34 year olds (18-24 years and 25-34 years) who participated in the Nutrition Newfoundland and Labrador survey to describe the prevalence of specific cardiovascular disease risk factors in young adults living in Newfoundland and Labrador. A comparison was made to determine if these risk factors were more prevalent in those young adults in rural Newfoundland and Labrador versus those residing in urban centers throughout the province. Finally, a comparison was made to determine of an association existed between socioeconomic status and risk factors of CVD development. This was accomplished by meeting the following objectives:

- Identify the prevalence of specific CVD risk factors in young adults residing in the province of Newfoundland and Labrador.
- Compare indicators of body fat (body mass index and waist circumference) of young adults living in rural versus urban areas.
- Compare self-reported physical activity levels of young adults living in rural versus urban areas.
- Compare cigarette-smoking habits of young adults living in rural versus urban areas.
- Compare educational attainment levels of young adults living in rural versus urban areas.
- Compare household income levels of young adults living in rural versus urban areas.
- Study the associations of education and household income with specific risk factors of cardiovascular disease.

CHAPTER III

METHODOLOGY

3.1. Study Population

All residents of the province of Newfoundland and Labrador between the ages of 18-24 years inclusive and 25-34 years inclusive, excluding those living on Indian Reservations, military camps and in institutions and were interviewed for the Nutrition Newfoundland and Labrador Survey were selected for this study. This sample population was actually two subgroups of the 1928 subjects questioned in the larger survey, Nutrition Newfoundland and Labrador, with subjects aged 18-74 years inclusive.

3.2. Sample Design

Subjects for the Nutrition Newfoundland and Labrador Survey were selected by a stratified, probability sample design developed by Statistics Canada. This sampling design selected independent samples for two seasons. The sample was representative of all urban and rural areas throughout the province. Data collection was conducted on weekdays and weekends (Nargundkar, 1996).

The Newfoundland and Labrador Health Insurance Register File (NLHIRF or MCP files) was used to select samples for the survey. The NLHIRF contains the names, addresses, age and gender of all Newfoundland and Labrador residents.

3.3. Setting

The survey was conducted in eleven selected areas throughout Newfoundland and Labrador. These population centers were originally designated as large populations of 10,000 or more, medium populations between 4,000 and 10,000 and rural populations of less than 4,000. There was a small number of respondents in the medium sized and rural population centers. Therefore these were grouped together for the purposes of this project. As a result, the sample was divided into urban and rural centers (original medium plus original rural). Urban centers included St. John's, Mount Pearl, Corner Brook, Gander, Grand Falls/Windsor and Labrador City. Rural centers included Stephenville, Carbonear, Bonavista, Census District - 1, and Census District - 4 (Appendix A).

3.4. Source of Data

Data analyzed in this study was taken from that collected for the Nutrition Newfoundland and Labrador Survey. The data from two questionnaire forms, Nutrition and Health Questionnaire and Demographic Profile, were used for this study (Appendices B and C). These forms were selected since they contained information pertaining to risk factors of cardiovascular disease. The Nutrition and Health Questionnaire enabled the researcher to collect information on smoking and physical activity levels of the subjects. The Demographic Profile contained information on the income, education, weight, height, and waist circumference of the study sample. Data was collected in 1996 throughout all seasons (spring/summer and fall/winter). The data was collected in person by trained interviewers.

3.5. Ethical Approval

The Nutrition Newfoundland and Labrador Survey obtained approval from the Memorial University Faculty of Science Human Investigation Committee prior to subject selection and interviewing. The researcher obtained ethical approval from the Memorial University Faculty of Medicine Human Investigation Committee to review this survey (Appendix D). The researcher, prior to review of the Nutrition Newfoundland and Labrador Survey, also completed a confidentiality form in the presence of a notary (Appendix E).

3.6. Variables

Both non-modifiable and modifiable factors associated with an increased risk of developing cardiovascular disease were analyzed in this study.

3.6.1. Non-modifiable Risk Factors

The non-modifiable risk factors that were analyzed included age and gender. Subjects, male and female, aged 18-24 years inclusive and 25-34 years inclusive who were studied in the Nutrition Newfoundland and Labrador survey were selected for this study.

3.6.2. Modifiable Risk Factors

The modifiable risk factors of CVD that were investigated included indicators of body fat (body mass index and abdominal adipose tissue), physical activity and cigarette smoking.

3.6.2.1. Body Fat - A person's body fat can be suggested by a number of anthropometric measurements and/or indices such as the body mass index (BMI) and the waist circumference.

3.6.2.1.1. Body Mass Index - The BMI is an index that is based on a person's weight in relation to their height. During interviews conducted as part of Nutrition Newfoundland and Labrador, a trained interviewer in a room with a non-carpeted floor measured respondents' weights. A regularly calibrated spring scale was used. The participants were asked to remove their footwear, heavy clothing and items in their pockets such as change and wallets. Measurements were taken to the nearest 0.1 kilogram and were recorded on the demographic profile form, (Appendix C, question 6).

Respondents' heights were measured with a flexible, locking measuring tape, a stainless steel foot-plate, and a right-angled square headboard made specifically for this study. The participants were asked to remove their shoes and stand erect, with their arms crossed in front of their chest, their feet together and their heels and the back of their heads against the wall. The longer arm of the set square headboard was placed on the participant's head, while depressing the hair. The participant was asked to look straight ahead, to stand as tall as possible and to take small breaths while the measurement was taken. The measurement was rounded to the nearest one centimeter and was recorded in the demographic profile form (Appendix C, question 7).

Body Mass Index (BMI) levels were calculated by dividing weight (kg) by height (meters) squared. A body mass index less than 20 is considered to be associated with health problems in some people, a BMI greater than 20 and less than 25 is associated with low mortality and is considered a good weight for most people. A BMI greater than 25 and less than 27 may be associated with health problems in some people. A BMI greater than 27 is associated with an increased risk of developing health problems (Health and Welfare Canada, 1988).

3.6.2.1.2. Abdominal Adipose Tissue – The researcher analyzed the waist circumferences of subjects questioned in the survey in order to estimate the degree of abdominal adiposity.

During in person interviews, subjects were asked to remove belts and heavy clothing and/or lift-up their T-shirts. Subjects were asked to stand erect in a relaxed manner and to cross their arms in front of their chest. Interviewers placed a Lufkin executive diameter measuring tape horizontally at the point of noticeable narrowing of the subject's waist as the person inhaled. The tape was then placed in the recording position and a measurement was made at the end of the subject's normal expiration. In some instances, a waist circumference was not able to be determined. The interviewer would then take a measurement between the person's ribs and iliac crest. This measurement was recorded to the nearest one centimeter in the demographic profile form (Appendix C, question 8).

A waist circumference greater or equal to 102 centimeters (cm) in men and a waist circumference greater or equal to 88 cm in women has been shown to be negatively associated with health status (Lean, Han & Seidell, 1998).

3.6.2.2. Physical Activity – The level of physical activity that was performed by the study subjects was determined by considering both the exercise that they performed during work and leisure time.

3.6.2.2.1. Physical Activity at Work - The subjects that were interviewed were asked how much movement they performed at work. Examples of occupations with varying amounts and types of movement were provided to the interviewee to aid him/her in making an estimation (Appendix B, question 9). The researcher grouped the responses into four levels of physical activity in accordance to categories suggested by the Framingham Study (Kannel & Sorlie, 1979).

- **Sedentary** - Work is mainly sitting. e.g.: secretary.
- **Slight** - Walk/move a lot, no lifting. e.g.: light housework.
- **Moderate** - Walk and carry a lot. e.g.: carpentry.
- **Heavy** - Heavy physical labor. e.g.: forestry.

3.6.2.2.2. Physical Activity during Leisure Time – Physical activity during leisure time was addressed by the survey in two ways. The subjects were asked the number of times (frequency) and the length of time (duration) they spent at performing leisure physical activities that did not require their heart to beat rapidly (lower intensity) (Appendix B, questions 10, 11 and 12). The participants were also asked the number of times (frequency) and the length of time (duration) they spent at performing leisure time physical activities that required their heart to beat rapidly (higher intensity) (Appendix B, questions 13, 14 and 15). From these questions, the researcher grouped the responses into frequency and duration of lower and higher intensity physical activities performed during leisure time.

- **Frequency** - none, three times weekly, more than three times weekly.
- **Duration** - 0 minutes, less than 20 minutes, 20-29 minutes, 30 minutes or more.

Due to the wording of the questions, the researcher was unable to determine if subjects performed sedentary, slight, moderate or heavy forms of leisure physical activity. However, the researcher was able to categorize them as two levels of intensity. As a result, the researcher considered the responses to frequency and duration of physical activity performed in questions 10 through 15 as lower and higher levels of intensity.

3.6.2.3. Cigarette Smoking – Subjects of the Nutrition Newfoundland and Labrador Survey were asked if they presently smoked cigarettes (Appendix B, question 17). If participants answered yes to question 17 they were asked if they smoked cigarettes everyday and the number of cigarettes they smoked everyday (Appendix B, questions 18 and 19). From these questions, the researcher analyzed the smoking habits of subjects in two ways. The researcher computed number of subjects who were regular smokers and the actual number of cigarettes that were smoked by each subject per day. A regular smoker was considered someone who smoked at least one cigarette a day. The information from the nutrition survey related to smoking was self-reported. Research reveals that the validity of self-reported cigarette smoking is high if the information is obtained by in-person interviews (Bowlin, Morrill, Nafziger, Lewis & Pearson, 1996).

3.6.3. Others

Other factors that may affect the development of CVD that were analyzed included education and household income.

3.6.3.1. Education - Survey respondents were asked to confirm the highest level of education that they had attained (Appendix C, question 3). The education levels used were defined as follows:

- **Elementary**- no schooling, elementary schooling or some high school.
- **High School** - high school diploma.
- **Community College** - some community college or community college completion.
- **University** - some university or university completion.

3.6.3.2. Household Income – During in-person interviews, participants of the Nutrition Newfoundland and Labrador Survey were shown a table of household income categories by the interviewers. They were asked to point to the income level that they fell into. The household income levels used were as follows: A = less than $5,000, B = $5,000-10,000, C = $10,001-$20,000, D = $20,001-$30,000, E= $30,001-$40,000, F = $40,001-$50,000, G = $50,001-$60,000, H = $60,001 or more, and I= do not know (Appendix C, question 5).

The researcher grouped these household income levels into categories defined by Wilkins (1995) and modified by Alison Edwards (personal communication, September, 1997). These household income categories were defined in relation to reported household income, household size and low income cutoffs of residents of Newfoundland and Labrador (Appendix F for further details).

3.7. Data Analysis

This study was a secondary analysis of data collected the Nutrition Newfoundland and Labrador Survey. The researcher used the following software packages for data entry and analysis: SPSS 9.0, and Minitab 12.

The researcher calculated sampling weights (adjusted and unadjusted) prior to data analysis. These sampling weights were adjusted for age, sex and area distribution of the province of Newfoundland and Labrador. This weighting was necessary in order to prevent over-representation of particular geographical areas, seasons, ages and genders. The following formulae were used to calculate sampling weights.

Unadjusted Sampling Weights: $W^*_{sfai} = \propto_a (N_{sai}/m_{sfai})$

W^*_{sfai} - unadjusted sampling weight for person who responded in season "s", to the survey component "f", from area "a", and age-sex group "i" .

$\propto_a$ - selection factor for area "a" (Table 4).

N_{sai} - total number of persons on NHIRF in season "s", area "a" and age-sex group "i".

m_{sfai} - number of persons who responded in season "s", survey component "f", from area "a", and age-sex group "i" to survey.

s - season where s = 1 or 2 (1 = spring, 2 = fall).

f - component: f = 1 for first interview, f = 2 for second interview (a second interview was conducted for 1/3 first interview responses only).

a - selected area, a = 1 to 11 for eleven areas selected for the sampling frame (Table 4).

i - age-sex group, i = 1 to 12 (1 = 18-24 yr. male, 2 = 25-34 yr. male, 3 = 35-44 yr. male, 4 = 45-54 yr. male, 5 = 55-64 yr. male, 6 = 65-74 yr. male, 7 = 18-24 yr. female, 8 = 25-34 yr. female, 9 = 35-44 yr. female, 10 = 45-54 yr female, 11 = 55-64 yr. female, 12 = 65-74 yr. female).

The results of the unadjusted sampling weights were used to compute adjusted sampling weights.

Adjusted Sampling Weights: $W_{sfai} = (P_{ai}/N_{sai})\, W^*_{sfai}$

P_{ai} - total number of persons in area "a" and age-sex group "i" according to the 1996 Census of Population.

Table 4: Selection Factors for Sample Selection in Nutrition Newfoundland and Labrador Survey

Large Population Centers	Area (a)	Selection Factors $\propto_a$
St. John's	1	1
Mount Pearl	2	1
Corner Brook	3	1
Gander	4	1
Grand Falls-Windsor	5	1
Labrador City-Wabush	6	1
Medium Size Towns		**Selection Factors**
Stephenville – Stephenville Crossing	7	2.23
Carbonear	8	4.15
Bonavista	9	4.98
Rural Areas		**Selection Factors**
Census Division 1	10	1.49
Census Division 4	11	10.07

Data was analyzed to suggest the frequency of specified risk factors of CVD of the entire study population. This was accomplished by computing frequencies, medians and standard deviations.

Statistical analysis was carried out to measure the degree of association between the presence of CVD risk factors in different age groups (18-24 year olds versus 25-34 year olds), in different genders (males versus females) and in different areas of residence (rural versus urban). This was accomplished by conducting chi-square analyses and t-tests for independent means. Chi square analysis is a nonparametric test that is used to measure the degree of association between two variables that are categorical. Chi-square analysis can be used with more than one group and compares the actual number in each group with the expected number. The t-test for independent means measures the difference between the means of two groups of interval or ratio data (Munro & Page, 1993).

The researcher also determined whether associations existed between socioeconomic variables and risk factor variables of CVD. This was accomplished by logistic regression. Logistic regression investigates the relationship between a response variable and one or more predictor variables to find the best fit of the model. Logistic regression uses categorical variables. Within the logistic regression analysis the researcher is given the option to perform the G-test and Goodness-of-Fit tests. The G test tests the null hypothesis that all coefficients associated with the predictor equals zero or the predictors are not significant. The Goodness-of-Fit tests and in this case Pearson and Deviance suggests the ability of the model to fit the data adequately. An insignificant result suggests the model is a good fit (Minitab, 1996).

If a statistical test was used in the analysis of tabulated data, that test is indicated on the appropriate table. When weighted analysis was used it is also indicated on the table. The level of significance used for all tests was $p \leq 0.05$ (Daniel, 1995).

CHAPTER IV

RESULTS

4.1. Introduction of Results

The findings obtained from this study will be presented here in detail. Some questions in the survey were not answered by the entire sample. The results of this analysis are presented as the actual number of participants that responded to the survey (n) as well as a percentage (%) out of the total that did respond to the study. The results of the study are presented in four ways. First an overview is given of the sociodemographic and socioeconomic characteristics of the study sample. The prevalence of risk factors of cardiovascular disease experienced by the study sample is then determined and a comparison is made by age and gender. A comparison of the risk factors of cardiovascular disease and area of residence is evaluated. Finally, the effect of education and household income on risk factors of cardiovascular disease is analyzed.

4.2. Response Rate

During sample selection, 4,233 names were drawn from Newfoundland Medical Insurance files (MCP). These names were drawn in accordance with selection factors that were designated for each age, gender, region and season. From the names that were drawn from the insurance files, 2,241 were between the ages of 18 and 34, 1524 were located, 476 were ineligible and 540 interviews were obtained. Of those who were contacted and were eligible to participate, 48% refused (42% of females and 55% of males) (Table 5).

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 person was also ineligible if she was pregnant at the time of the survey.

A response rate of 52% was obtained for the entire study sample of 18-34 year olds (Newfoundland Department of Health and National Health and Welfare, 1990; Nova Scotia Heart Health Program, 1993). A higher percentage of young adult females (57%) responded to the survey as compared to young adult males (43%).

4.3. Sociodemographic and Socioeconomic Characteristics of the Overall Study Sample

The age, gender, education and household income of the total study sample as well as by area of residence are presented in Figures 1-8 and Table 6. Figure 1 portrays the age distribution of the overall study sample. Of the 540 participants, 261 were 18-24 years old and 279 were 25-34 years old. Figure 2 illustrates the age distribution of study sample by rural area of residence. Of the 235 participants from rural areas, 96 were 18-24 years old and 139 were 25-34 years old. Figure 3 illustrates the age distribution of urban residents. Of the 305 participants from urban areas, 133 were 18-24 years old and 172 were 25-34 years old.

Table 5: Response Rates of Study Sample by Age and Gender from Total Sample Drawn

	Female		Male		Total
	18-24	25-34	18-24	25-34	
# Drawn from file[a]	550	569	557	565	2241
# Located	368	400	369	387	1524
# Ineligible[b]	103	131	122	120	476
# Eligible Located[c]	265	269	247	269	1048
# Interviews Completed from Eligible Located	152	157	109	122	540
% Interviews Completed from Eligible Located[d]	57.3	58.4	44.1	45.7	51.5

a Total number of names drawn between ages 18-34 years from a sample of 4,223 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.

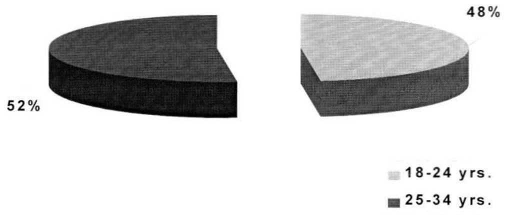

Figure 1: Age Distribution of Overall Study Sample (n = 540)

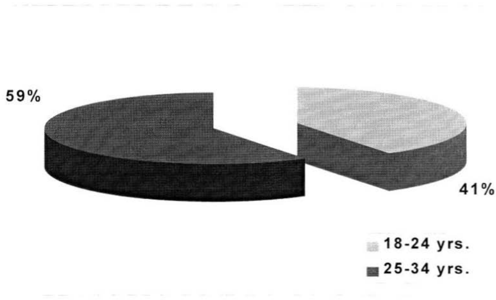

Figure 2: Age Distribution of Young Adult Rural Residents (n = 235)

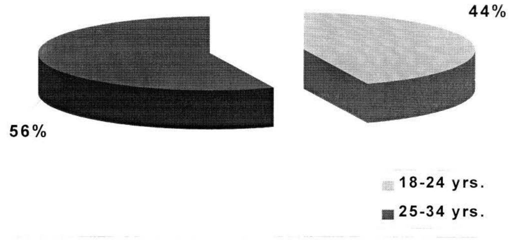

Figure 3: Age Distribution of Young Adult Urban Residents (n = 305)

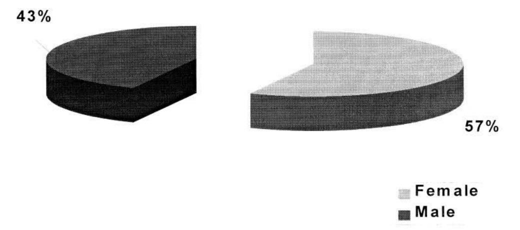

Figure 4: Gender Distribution of Overall Study Sample (n = 540)

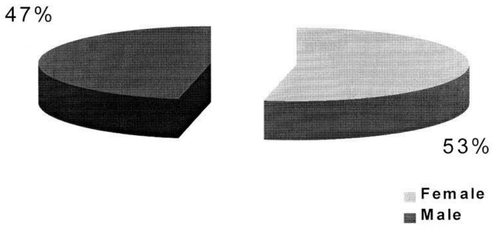

Figure 5: Gender Distribution of Young Adult Rural Residents (n = 235)

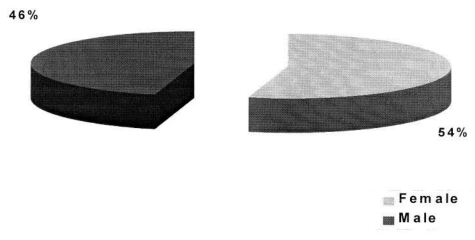

Figure 6: Gender Distribution of Young Adult Urban Residents (n = 305)

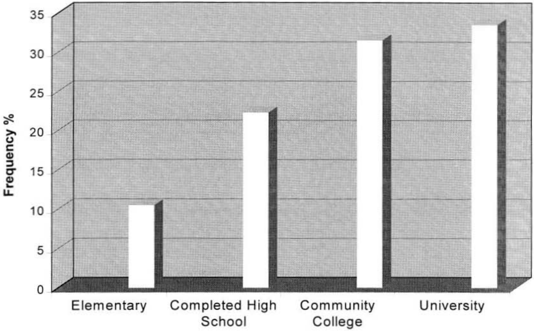

Figure 7: Distribution of Education Level of Overall Study Sample (n = 540)

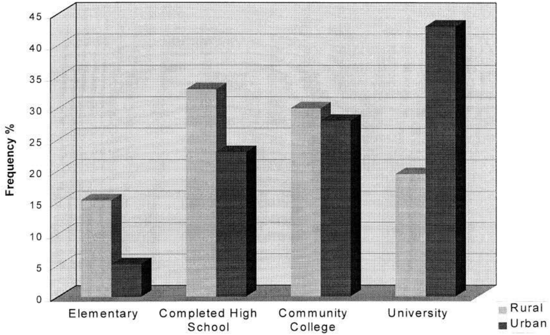

Figure 8: Distribution of Education Level of Study Sample by Area of Residence (n=540)

Table 6. Number and Percentage of Study Sample by Household Income Level and Area of Residence

HOUSEHOLD INCOME LEVEL[a]	RURAL		URBAN		TOTAL	
	n	%	n	%	n	%
Lower	78	33.2	65	21.3	143	26.5
Middle	65	27.7	87	28.5	152	28.1
Higher	48	20.4	118	38.7	166	30.7
Do not know	38	16.2	31	10.1	69	12.8
Refusal	6	2.6	4	1.3	10	1.9
Total	**235**	**100**	**305**	**100**	**540**	**100**

[a]Refer to Appendix F for details regarding household income levels

Figure 4 illustrates the gender distribution of the overall study sample. A larger number of females (309 of 540) responded to the survey than males (231 of 540). Figure 5 shows gender distribution by rural area of residence. A larger number of young adult females (125 of 235) responded to the survey than young adult males (110 of 235) in the rural areas. Figure 6 reveals the gender distribution of the study sample by urban area of residence. A larger number of young adult females (166 of 305) also responded to the survey than young adult males (139 of 305) in urban areas.

Figure 7 illustrates the educational attainment of the overall study sample. Respondents having a university level of education comprised the largest percentage of the sample. Out of the total 540 subjects, 194 stated that they had acquired at least a university education. One hundred and sixty-six of the respondents claimed to have completed community college and a further 123 received a high school diploma but achieved no further formal education. Respondents having an elementary level of education comprised the smallest subgroup of the study sample (57 of 540). Figure 8 reveals educational attainment by area of residence. Of the 235 rural residents, 36 attained an elementary education and of the 305 young adult urban residents, 16 attained an elementary level of education. Less than 20% of the rural residents attained at least a university education versus 43% of the young urban adults.

Household incomes of the total study sample are presented in Table 6. Although 10 subjects refused to answer the question and 69 were unable to do so (unaware of their household income), 461 subjects did make an estimate of their household income. More of the respondents received a higher level of household income as compared to the middle and lower levels. Household income of the study sample by area of residence is also presented in Table 6. More of the rural residents received a lower level of household income as compared to the middle and higher levels. More urban received middle to higher levels of household income as compared to lower levels.

4.4. Prevalence of Factors that are Associated with the Development of Cardiovascular Disease in the Study Sample

Results pertaining to body fat, physical activity levels and smoking habits of the study sample will be presented here in detail. Each of these factors were presented by age and gender of the study sample. Sampling weights were utilized to obtain the statistical testing results for each of the comparisons performed as well as the percentages. Subjects that did not answer particular questions of the Nutrition Newfoundland and Labrador survey were excluded from the analysis.

4.4.1. Body Fat

Both BMI and waist circumference were taken as indicators of body fat.

4.4.1.1. Body Mass Index

BMI, an indicator of body fat, is presented for all subjects (Table 7), for the two age groups (Table 7) and for males versus females (Table 8). The chi-square statistic

Table 7. Number and Percentage of Study Sample by Age Groups and Body Mass Index Categories

Body Mass Index[a]	Age				Total	
	18-24 yrs		25-34 yrs			
	n	%[b]	n	%[b]	n	%[b]
BMI ≤ 20	27	8.6	13	5.1	40	6.6
20< BMI <25	121	55.4	90	32.0	211	42.1
25≤ BMI<27	29	9.0	49	20.7	78	15.7
BMI ≥ 27	76	27.0	113	42.2	189	35.7
Subtotal	**253**	**100**	**265**	**100**	**518**	**100**
Refusal	7	-	12	-	19	-
Not Answered	1	-	2	-	3	-
Total	**261**	-	**279**	-	**540**	-

$\chi^2 = 38.055^b$ df = 3 p = < 0.0001

[a]BMI ≤ 20, associated with health problems in some people; 20 < BMI < 25, associated with low mortality and is considered a good weight for most people; 25 ≤ BMI < 27, may lead to health problems in some people; BMI ≥ 27, associated with increased risk of developing health problems (Health and Welfare Canada, 1988).

[b]Weighted percentages were used to complete statistical testing

Table 8. Number and Percentage of Study Sample by Gender and Body Mass Index Categories

Body Mass Index[a]	Gender			
	Male		Female	
	n	%[b]	n	%[b]
BMI $\leq$ 20	15	7.4	25	5.5
20 < BMI < 25	82	34.3	129	49.1
25 $\leq$ BMI < 27	42	19.8	36	12.1
BMI $\geq$ 27	85	38.4	104	33.3
Subtotal	**224**	**100**	**294**	**100**
Refusal	5	-	14	-
Not Answered	2	-	1	-
Total	**231**	-	**309**	-

χ^2 = 13.240[b] df = 3 p = 0.004

[a]BMI $\leq$ 20, associated with health problems in some people; 20 < BMI < 25, associated with low mortality and is considered a good weight for most people; 25 $\leq$ BMI < 27, may lead to health problems in some people; BMI $\geq$ 27, associated with increased risk of developing health problems (Health and Welfare Canada, 1988).

[b]Weighted percentages were used to complete statistical testing

was used to determine whether a significant association existed between age and BMI or gender and BMI.

According to Table 7, 42 percent of the total respondents had a body mass index between 20 and 25. Approximately 36 percent of the subjects had a BMI greater than or equal to 27 while much smaller proportions of the sample population had BMI values between 25 and 27 and less than or equal to 20.

Table 7 also reveals the body mass index levels of the sample in relation to age. A significant association was noted between BMI and age ($p < 0.0001$). Approximately 55 percent of 18-24 year olds and 32 percent of 25-34 year olds had a BMI associated with a healthy weight ($20 < BMI < 25$). Approximately 27 percent of 18-24 year old respondents and 42 percent of 25-34 year old respondents had a BMI associated with an increased risk of disease development ($BMI \geq 27$).

Table 8 illustrates the body mass indices of male and female respondents. A significant relationship was noted between BMI and gender ($p=0.004$). Almost 34 percent of males and 49 percent of females had a BMI between 20 and 25. Approximately 38 percent of males and 33 percent of females had a BMI greater than or equal to 27. A small percentage of males and females had a BMI between 25 and 27 and an even smaller percentage of males and females had a BMI less than 20.

4.4.1.2. Abdominal Adipose Tissue

The waist circumference distribution of female and male respondents is presented in Figures 9 and 10. The mean waist circumference of the female study sample was 80.1 centimeters (cm) with a range of 55 cm – 135 cm and a standard deviation of 13.5. The mean waist circumference of the male study sample was 89.5 cm with a range of 40 cm – 135 cm and a standard deviation of 12.5.

The total percentage of females and males whose waist circumferences were above and below the recommended cut-offs is presented in Tables 9 and 10. Females are considered to have an increased risk of metabolic disturbances if they have a waist circumference greater or equal to 88 cm. Males are considered to have an increased risk of metabolic disturbances if they have a waist circumference greater or equal to 103 cm (Lean, Han & Seidell, 1998). A small percentage of young adult female and male respondents had a waist circumference that was more than the recommended cut-offs.

The chi square statistic was used to measure if age was associated with being less than or greater than the waist circumference cut-off within the same sex group (Tables 9 & 10). A significant association was present between age and waist circumference cut-offs for females ($p = 0.004$). A higher percentage of 25-34 year old (30%) females had a waist circumference greater than the recommended cut-off as compared to 18-24 year old females (15%) (Table 9). However, a significant association was not noted between age in males and being above the recommended waist circumference cut-offs ($p=0.407$) (Table 10)

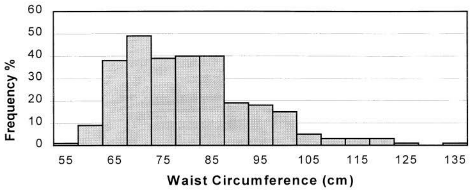

Figure 9: Distribution of Female Study Sample by Waist Circumference (n = 309)

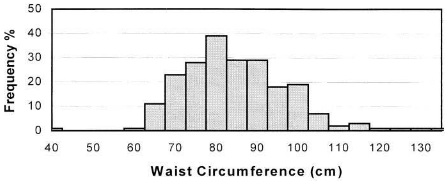

Figure 10: Distribution of Male Study Sample by Waist Circumference (n = 231)

Table 9. Number and Percentage of Female Study Sample by Age and Waist Circumference Cut-Offs

Waist Circumference Cut-Offs[a]	Age				Total	
	18-24 yrs		25-34 yrs			
	n	**%[b]**	**n**	**%[b]**	**n**	**%[b]**
< 88 cm	122	84.6	113	69.5	235	82.7
$\geq$ 88 cm	19	15.4	30	30.5	49	17.3
Subtotal	**141**	**100**	**143**	**100**	**284**	**100**
Refusal	10	-	14	-	24	-
Not Answered	1	-	-	-	1	-
Total	**152**	-	**157**	-	**309**	-

$\chi^2 = 8.246^b$ df = 1 p = 0.004

[a]Waist Circumference Cut-offs from: Lean, M.E.J., Han, T.S., Seidell, J.C. (1998). Impairment of health and quality of life in people with large waist circumference. The Lancet, 351, 853-856.

[b]Weighted percentages were used to complete statistical testing

Table 10. Number and Percentage of Male Study Sample by Age and Waist Circumference Cut-Offs

Waist Circumference Cut-Offs[a]	Age				Total	
	18-24 yrs		25-34 yrs			
	n	%[b]	n	%[b]	n	%[b]
< 102 cm	93	82.1	99	77.6	192	90.1
≥ 102 cm	9	17.9	12	22.4	21	9.9
Subtotal	**102**	**100**	**111**	**100**	**213**	**100**
Refusal	7	-	9	-	16	-
Not Answered	-	-	2	-	2	-
Total	**109**	-	**122**	-	**231**	-

$\chi^2 = 0.688^b$ df = 1 p = 0.407

[a]Waist Circumference Cut-offs from: Lean, M.E.J., Han, T.S., Seidell, J.C. (1998). Impairment of health and quality of life in people with large waist circumference. The Lancet, 351, 853-856.

[b]Weighted percentages were used to complete statistical testing

4.4.2. Physical Activity

The level of physical activity performed by the research subjects was determined by analyzing the type of physical activity they performed at work as well as the frequency and duration of lower and higher intensity leisure time physical activities.

4.4.2.1. Physical Activity at Work

According to Table 11, most respondents performed a slight or moderate level of physical activity at work. Approximately 36% of subjects performed slight levels and 33% of subjects performed moderate levels of physical activity at work. Smaller percentages of all young adults (18-24 yrs. and 25-34 yrs.) from the study performed sedentary and heavy physical activity at work.

Chi square analysis was performed to determine the relationship between physical activity at work with age and gender. No significant relationship existed between physical activity at work and age ($p=0.831$) (Table 11). However, a significant relationship existed between gender and physical activity at work ($p < 0.0001$). Table 12 reveals that a higher percentage of males performed moderate to heavy levels of physical activity at work as compared to females (35.8% + 26% = 61.8% versus 30.7% + 4.5% = 35.2%). A higher percentage of females performed slight and sedentary levels of physical activity at work as compared to males (45.9% + 19.0% = 64.9% versus 23.2% + 15.0% = 38.2%).

Table 11. Number and Percentage of Study Sample by Age and Physical Activity at Work

Physical Activity at Work[a]	Age				Total	
	18-24 yrs		25-34 yrs			
	n	%[b]	n	%[b]	n	%[b]
Heavy	30	13.2	30	15.0	60	14.2
Moderate	79	32.0	89	33.9	168	33.1
Slight	113	36.4	109	34.9	222	35.5
Sedentary	39	18.4	49	16.3	88	17.2.
Subtotal	**261**	**100**	**277**	**100**	**538**	**100**
Refusal	-	-	-	-	-	-
Not Answered	-	-	2	-	2	-
Total	**261**	-	**279**	-	**540**	-

$\chi^2 = 0.879^b$ df = 3 p = 0.831

[a]Heavy – heavy physical labor, e.g. forestry, moderate – walk and carry a lot, e.g. carpentry, slight – walk/move a lot, no lifting, e.g. light housework, sedentary – work is mainly sitting, e.g. secretary (Appendix B).

[b]Weighted percentages were used to complete statistical testing

Table 12. Number and Percentage of Study Sample by Gender and Physical Activity at Work

Physical Activity at Work[a]	Gender			
	Female		Male	
	n	%[b]	n	%[b]
Heavy	11	4.5	49	26.0
Moderate	91	30.7	77	35.8
Slight	152	45.9	70	23.2
Sedentary	55	19.0	33	15.0
Subtotal	**309**	**100**	**229**	**100**
Refusal	-	-	-	-
Not answered	-	-	2	-
Total	**309**	-	**231**	-

$\chi^2 = 64.530^b$ df = 3 $p < 0.0001$

[a]Heavy – heavy physical labor, e.g. forestry, moderate – walk and carry a lot, e.g. carpentry, slight – walk/move a lot, no lifting, e.g. light housework, sedentary work is mainly sitting, e.g. secretary (Appendix B).

[b]Weighted percentages were used to complete statistical analysis

4.4.2.2. Physical Activity during Leisure Time

Both the duration and frequency of lower and higher intensity leisure time physical activities were analyzed in this study.

4.4.2.2.1. Lower Intensity

Approximately 13% of the total respondents reported that they spent no time participating in lower intensity physical activity during leisure time – activity that did not require their heart to beat rapidly (Table 13). Fifty-nine percent of subjects reported that they participated in lower intensity leisure time physical activities more than three times per week. The effect of age of study sample on frequency of lower intensity leisure time physical activities was also examined and presented in Table 13. Chi-square analysis was used to determine if a relationship existed between frequency of leisure physical activity and age. A significant difference was not noted ($p=0.089$).

The relationship between gender of study sample and frequency of lower intensity leisure time physical activities was also examined and is presented in Table 14. Chi-square analysis was used to determine if a relationship existed between frequency of lower intensity leisure time physical activities and gender. A significant relationship was noted ($p < 0.0001$). Approximately seven percent of female respondents reported that they spent no time participating in lower intensity leisure time physical activities versus 21 percent of male respondents (Table 14). Approximately 67 percent of female subjects and 50 percent of male subjects reported that they spent

Table 13. Number and Percentage of Study Sample by Age and Frequency of Lower Intensity Leisure Time Physical Activities

Frequency of Physical Activity	Age				Total	
	18-24 yrs		25-34 yrs			
	n	%[a]	n	%[a]	n	%[a]
0 time per week	44	16.7	35	10.4	79	13.1
< 3 times per week	41	12.3	36	13.0	77	12.7
3 times per week	37	11.8	53	17.3	90	15.0
> 3 times per week	139	59.2	153	59.3	292	59.3
Subtotal	**261**	**100**	**277**	**100**	**538**	**100**
Refusal	-	-	-	-	-	-
Not Answered	-	-	2	-	2	-
Total	**261**	-	**279**	-	**540**	-

$\chi^2 = 6.527^a$ df = 3 p = 0.089

[a]Weighted percentages were used to complete statistical analysis

Table 14: Number and Percentage of Study Sample by Gender and Frequency of Lower Intensity Leisure Time Physical Activities

Frequency of Physical Activity	Gender			
	Female		Male	
	n	%[a]	n	%[a]
0 time	25	6.5	54	21.1
< 3 times per week	44	11.3	33	14.6
3 times per week	57	15.1	33	14.6
> 3 times per week	183	67.0	109	49.6
Subtotal	**309**	**100**	**229**	**100**
Refusal	-	-	-	-
Not Answered	-	-	2	-
Total	**309**	-	**231**	-

$\chi^2 = 25.516$ df = 3 $p < 0.0001$[a]

[a]Weighted percentages were used to complete statistical testing

more than three times per week participating in lower intensity leisure time physical activities (Table 14).

In regards to duration of leisure time physical activity, approximately 13% of total respondents reported that they spent no time at performing lower intensity leisure time physical activities (Table 15). Seventy-seven percent of total respondents reported that they spent at least 30 minutes performing lower intensity leisure time physical activities (Table 15). The relationship between age and duration of lower intensity leisure time physical activities is also presented in Table 15. A significant relationship was noted ($p = 0.006$). Approximately 16% of 18-24 year olds and 10% of 25-34 year olds spent no time at lower intensity leisure time physical activities. While 10% of 18-24 year olds and 4.8% of 25-34 year olds spent 20 – 29 minutes at lower intensity leisure time physical activities.

The relationship between gender of study sample and duration of lower intensity leisure time physical activities was presented in Table 16. According to chi-square analysis, a significant relationship was present ($p < 0.0001$). Approximately 50% of females and 21% of males spent no time at performing lower intensity leisure time physical activities. Furthermore, 43% of female and 72% of male respondents reported that they spent at least 30 minute intervals when they were performing lower intensity leisure time physical activities.

Table 15: Number and Percentage of Study Sample by Age and Duration of Lower Intensity Leisure Time Physical Activities

Duration of Physical Activity	Age				Total	
	18-24 yrs		25-34 yrs			
	n	%[a]	n	%[a]	n	%[a]
0 time	44	16.7	35	10.3	79	13.1
< 20 minutes	9	2.6	11	3.5	20	3.1
20-29 minutes	18	10.5	16	4.8	34	7.2
≥ 30 minutes	189	70.2	216	81.4	405	76.6
Subtotal	**260**	**100**	**278**	**100**	**538**	**100**
Refusal	-	-	-	-	-	-
Not Answered	1	-	1	-	2	-
Total	**261**	-	**279**	-	**540**	-

$\chi^2 = 12.519^a$ df = 3 p = 0.006

[a]Weighted percentages were used to complete statistical testing

Table 16: Number and Percentage of Study Sample by Gender and Duration of Lower Intensity Leisure Time Physical Activities

Duration of Physical Activity	Gender			
	Female		Male	
	n	%[a]	n	%[a]
0 minutes	156	50.6	74	20.9
< 20 minutes	6	1.9	5	1.6
20 – 29 minutes	13	4.2	6	6.0
≥ 30 minutes	133	43.2	145	71.5
Subtotal	**308**	**100**	**230**	**100**
Refusal	-	-	-	-
Not Answered	1	-	1	-
Total	**309**	-	**231**	-

$\chi^2 = 26.828^a$ df = 3 $p < 0.0001$

[a]Weighted percentages were used to complete statistical testing

4.4.2.2.2. Higher Intensity

In regards to frequency, approximately 45% of total respondents reported spending no time performing leisure physical activities that required their heart to beat rapidly. However, 27% of total respondents reported that they spent more than 3 times a week performing higher intensity leisure physical activities (Table 17).

Chi-square analysis was performed to determine the relationship between frequency of leisure time physical activity and age (Table 17). A significant relationship existed between frequency of higher intensity leisure time physical activities and age ($p=0.001$). Approximately 36% of 18-24 year olds and 53% of 25-34 year olds spent no time at performing higher intensity leisure time physical activities. Furthermore, 31% of 18-24 year olds and 25% of 25-34 year olds spent more than three times per week at higher intensity physical activities.

Table 18 presents the frequency of higher intensity physical activities during leisure time by gender. A significant relationship was also present between frequency of leisure time physical activities that required the heart to beat rapidly and gender ($p<0.0001$). Approximately 55% of female respondents and 34% of male respondents reported spending no time at performing higher intensity leisure physical activities. Furthermore, 20% of females and 36% of males reported performing higher intensity leisure physical activities more than three times per week.

Table 17. Number and Percentage of Study Sample by Age and Frequency of Higher Intensity Leisure Time Physical Activities

Frequency of Physical Activity	Age				Total	
	18-24 yrs		25-34 yrs			
	n	%[a]	n	%[a]	n	%[a]
0 time per week	91	35.7	139	52.6	230	45.4
< 3 times per week	48	15.9	43	12.3	91	13.8
3 times per week	45	17.6	38	10.6	83	13.6
> 3 times per week	76	30.8	58	24.5	134	27.2
Subtotal	**260**	**100**	**278**	**100**	**538**	**100**
Refusal	-	-	-	-		-
Not Answered	1	-	1	-	2	-
Total	**261**	**100**	**279**	**100**	**540**	**100**

χ^2 = 16.085 df = 3 p = 0.001[a]

[a]Weighted percentages were used to complete statistical testing

Table 18. Number and Percentage of Study Sample by Gender and Frequency of Higher Intensity Leisure Time Physical Activities

Frequency of Physical Activity	Gender			
	Female		Male	
	n	%[a]	n	%[a]
0 time	156	54.8	74	34.3
< 3 times	45	10.0	46	18.5
3 times	49	15.5	34	11.3
> 3 times	58	19.7	76	35.9
Subtotal	**308**	**100**	**230**	**100**
Refusal	-	-	-	-
Not Answered	1	-	1	-
Total	**309**	-	**231**	-

$\chi^2 = 34.198^a$ df = 3 $p < 0.0001$

[a]Weighted percentages were used to complete statistical testing

The length of time that respondents spent performing higher intensity leisure time physical activities is shown in Table 19. About 45 percent spent 0 minutes performing physical activity during leisure time. Approximately 49% of respondents spent at least thirty-minute intervals while performing higher intensity leisure time physical activities.

Chi-square analysis was used to determine whether a relationship existed between age of respondents and duration of higher intensity physical activities performed during leisure time. A significant relationship exits between duration of higher intensity leisure time physical activities and age (Table 19). Table 19 illustrates that 36 percent of 18-24 year olds and 53 percent of 25-34 year olds spent no time at performing higher intensity leisure time activities. Furthermore, 60% of 18-24 year olds and 42% of 25-34 year olds performed 30 minutes or more of leisure physical activities that required their heart to beat faster.

Data on gender of subject and duration of higher intensity leisure time physical activities are presented in Table 20. Chi-square analysis was used and a significant association was detected ($p<0.0001$). Table 20 reveals that 55% of females and 34% of males spent no time performing higher intensity physical activities during leisure time. Furthermore, a larger percentage of males performed leisure time physical activities that required the heart to beat rapidly for greater or equal to 30 minutes per episode as compared to females (62% versus 38%).

Table 19: Number and Percentage of Study Sample by Age and Duration of Higher Intensity Leisure Time Physical Activities

Duration of Physical Activity	Age				Total	
	18-24 yrs		25-34 yrs			
	n	%[a]	n	%[a]	n	%[a]
0 time	91	35.5	139	52.6	230	45.4
< 20 minutes	7	2.2	4	1.6	11	1.9
20-29 minutes	8	2.6	11	3.9	19	3.3
≥ 30 minutes	154	59.6	124	41.9	278	49.5
Subtotal	**260**	**100**	**278**	**100**	**538**	**100**
Refusal	-	-	-	-	-	-
Not Answered	1	-	1	-	2	-
Total	**261**	-	**279**	-	**540**	-

$\chi^2 = 17.604^a$ df = 3 p = 0.001

[a]Weighted percentages were used to complete statistical testing

Table 20. Number and Percentage of Study Sample by Gender and Duration of Higher Intensity Leisure Time Physical Activities

Duration of Physical Activity	Gender			
	Female		Male	
	n	%[a]	n	%[a]
0 minutes	156	55.0	74	34.3
< 20 minutes	6	2.8	5	0.8
20 – 29 minutes	13	4.2	6	2.4
≥ 30 minutes	133	38.1	145	62.5
Subtotal	**308**	**100**	**230**	**100**
Refusal	-	-	-	-
Not Answered	1	-	1	-
Total	**309**	-	**231**	-

$\chi^2 = 32.745^a$ df = 3 $p < 0.0001$

[a]Weighted percentages were used to complete statistical testing

4.4.3. Smoking Habits

The smoking habits of the study sample were studied in two ways, the actual number of cigarettes smoked per day by regular smokers as well as the number of regular smokers. The median number of cigarettes smoked per day by regular smokers was 14 with a range of 1-40 (Figure 11).

Table 21 illustrates that there were a larger percentage of non-smokers in the total study sample than there were regular smokers. A comparison between number of regular smokers and age is also presented in Table 21 by performing chi-square analysis. No significant relationship was observed between the number of regular smokers and age (p=0.17).

A comparison was also made between number of regular smokers and gender (Table 22). No significant relationship existed between the number of regular smokers and gender (p=0.782).

The total number of cigarettes consumed per day by regular smokers was compared by age and gender (Table 23 and Table 24). To complete this analysis the t-test of independent means was used. A significant difference was present between average smoking number and age (p=0.002). An average of 12 cigarettes a day were consumed by 18-24 year old regular smokers and an average of 16 cigarettes a day were consumed by 25-34 year old regular smokers. Young adult females consumed an average of 13 cigarettes per day and young adult males (regular smokers) consumed an average of 15 cigarettes per day. This difference was also

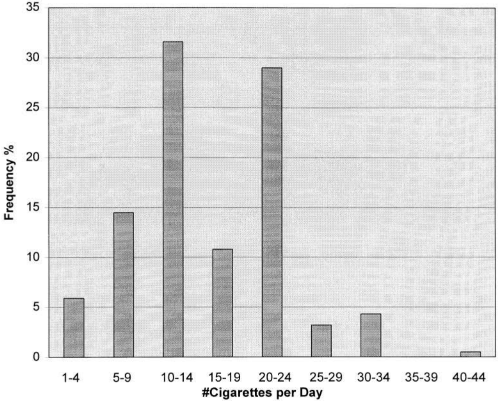

Figure 11: Number of Cigarettes Smoked per Day by Regular Smokers[a]

[a]Regular smoker – at least one cigarette per day

Table 21: Number and Percentage of Study Sample by Age and Smoking Habits

Regular Smoker[a]	Age				Total	
	18-24 yrs		25-34 yrs			
	n	%[b]	n	%[b]	n	%[b]
Yes	83	36.7	104	42.6	187	40.1
No	177	63.3	173	57.4	350	59.6
Subtotal	**260**	**100**	**277**	**100**	**537**	**100**
Refusal	-	-	-	-	-	-
Not Answered	1	-	2	-	3	-
Total	**261**	-	**279**	-	**540**	**100**

$\chi^2 = 1.909$ df = 1 p = 0.167[b]

[a]Regular smoker – at least one cigarette per day

[b]Weighted percentages were used to complete statistical testing

Table 22. Number and Percentage of Study Sample by Gender and Smoking Habits

Regular Smoker[a]	Gender			
	Female		Male	
	n	%[b]	n	%[b]
Yes	103	40.7	87	39.5
No	205	59.3	142	60.5
Subtotal	**308**	**100**	**229**	**100**
Refusal	-	-	-	-
Not Answered	1	-	2	-
Total	**309**	-	**231**	-

$\chi^2 = .077$ df = 1 p = 0.782[b]

[a]Regular smoker – at least one cigarette per day

[b]Weighted percentages were used to complete statistical testing

Table 23: Number of Regular Smokers by Age and Average Number of Cigarettes Smoked per Day

Age	n	Mean	Standard Deviation
18-24 yrs	83	12.37	6.18
25-34 yrs	103	15.56	7.42

$t^a = -3.136$ $p = 0.002$

[a]Adjusted weights were used

Table 24: Number of Regular Smokers by Gender and Average Number of Cigarettes Smoked per Day

Gender	n	Mean	Standard Deviation
Female	103	13.0	6.43
Male	83	15.5	7.58

$t^a = -2.465$ $p = 0.015$

[a]Adjusted weights were used

statistically significant (Table 24).

4.5. Relationship between Cardiovascular Disease Risk Factors and Area of Residence

The researcher determined the association between indicators of body fat, physical activity and cigarette smoking with area of residence. This was accomplished by performing chi-square analyses.

4.5.1. Body Fat and Area of Residence

Data relating to body fat of subjects is presented as body mass index and waist circumference.

4.5.1.1. Body Mass Index

Table 25 reveals that the body mass index levels of urban and rural residents were similar. According to the chi-square test, no significant relationship was present between area of residence and BMI levels (p=0.511). However, a slightly higher percentage of residents with a BMI greater than 27 were living in rural areas (39%) as compared to urban areas (33%).

4.5.1.2. Waist Circumference

The waist circumference cut-offs by gender and area of residence are presented in Tables 26 and 27. According to chi-square analysis, a higher percentage of female rural respondents had a waist circumference above the standard as compared to

Table 25. Number and Percentage of Study Sample by Area of Residence and Body Mass Index Categories

Body Mass Index	Rural		Urban	
	n	%[a]	n	%[a]
BMI ≤ 20	12	5.4	28	7.5
20 < BMI <25	79	41.4	132	42.5
25 ≤ BMI ≤ 27	34	14.4	44	16.7
BMI >27	80	38.7	109	33.3
Subtotal	**205**	**100**	**313**	**100**
Refusal	7	-	12	-
Not Answered	2	-	1	-
Total	**214**	-	**326**	-

$\chi^2 = 2.309^a$ df = 3 p = 0.511

[a]Weighted percentages were used to complete statistical analysis

Table 26. Number and Percentage of Female Study Sample by Area of Residence and Waist Circumference Cut-offs

Waist Circumference Cut-Offs	Rural		Urban	
	n	%[a]	n	%[a]
< 88cm	77	67.5	159	83.0
$\geq$88 cm	30	32.5	18	17.0
Subtotal	**107**	**100**	**177**	**100**
Refusals	10	-	14	-
Not Answered	1	-	-	-
Total	**118**	**100**	**191**	**100**

$\chi^2 = 8.664^a$ df = 1 p = 0.003

[a]Adjusted percentages were used to complete statistical testing

Table 27. Number and Percentage of Male Study Sample by Area of Residence and Waist Circumference Cut-offs

Waist Circumference Cut-Offs	Rural n	Rural %[a]	Urban n	Urban %[a]
< 102cm	79	77.2	113	81.4
≥ 102 cm	9	22.8	12	18.6
Subtotal	**88**	**100**	**125**	**100**
Refusals	7	-	9	-
Not Answered	1	-	1	-
Total	**96**	-	**135**	-

$\chi^2 = 0.605^a$ df = 1 p = 0.437

[a]Adjusted percentages were used to complete statistical testing

female urban respondents ($p = 0.003$). No significant difference was found between area of residence and waist circumference cut-off of males ($p=0.437$).

4.5.2. Physical Activity and Area of Residence

The level of physical activity performed by urban and rural residents is presented as the exercise performed at work and during leisure time. The level of physical activity performed during leisure time is divided into frequency and duration of lower and higher intensity leisure time physical activities.

4.5.2.1. Physical Activity at Work

A significant relationship existed between level of physical activity at work and area of residence according to the ordinal logistic analysis of data presented in Table 28 ($p < 0.0001$). Rural residents performed more moderate and heavy levels of physical activity at work in comparison to urban residents (38.6% + 24.5% = 63.1% versus 28.9% + 6.6% = 35.5% respectively).

4.5.2.2. Physical Activity during Leisure Time

Physical activity during leisure time was analyzed twofold - by the frequency and duration of leisure time physical activities that do not require the heart to beat fast (lower intensity) and by the frequency and duration of leisure time physical activities that do require the heart to beat faster (higher intensity).

Table 28. Number and Percentage of Study Sample by Area of Residence and Level of Physical Activity at Work

Physical Activity at Work	Rural		Urban	
	n	%[a]	n	%[a]
Heavy	41	24.5	19	6.6
Moderate	76	38.6	92	28.9
Slight	77	27.0	145	41.8
Sedentary	19	9.9	69	22.7
Subtotal	**213**	**100**	**325**	**100**
Refusal	-	-	-	-
Not answered	1	-	1	-
Total	**214**	-	**326**	-

$\chi^2 = 53.915^a$ df = 3 $p < 0.0001$

[a]Weighted percentages were used to complete statistical testing

4.5.2.2.1. Lower Intensity

According to chi-square analysis, area of residence had no significant association with frequency of lower intensity leisure time physical activities (p=0.147) (Table 29). However, a slightly higher percentage of rural residents (64%) reported spending more than three times per week at lower intensity leisure physical activities versus urban residents (55%). Area of residence also showed no association with duration of lower intensity leisure physical activities (p=0.286) (Table 30).

4.5.2.2.2. Higher Intensity

According to chi-square analysis, area of residence had no association with frequency of higher intensity leisure time physical activities (p=0.05) (Table 31). However, a slightly higher percentage of respondents from rural areas (32%) reported that they spent more than three times a week performing higher intensity leisure physical activities in comparison to respondents from urban areas (24%).

Table 32 shows the relationship between area of residence and duration of higher intensity physical activities during leisure time. Chi-square analysis revealed that there was no significant relationship between area of residence and duration of higher intensity leisure time physical activity (p=0.110).

Table 29. Number and Percentage of Study Sample by Area of Residence and Frequency of Lower Intensity Leisure Time Physical Activities

Frequency of Physical Activity	Rural		Urban	
	n	%[a]	n	%[a]
0 times	36	12.9	43	13.2
< 3 times/week	25	9.9	52	14.9
3 times/week	28	12.9	62	16.5
> 3 times/week	124	64.2	168	55.4
Subtotal	**213**	**100**	**325**	**100**
Refusal	-	-	-	-
Not answered	1	-	1	-
Total	**214**	-	**326**	-

$\chi^2 = 5.357$ df = 3 p = 0.147[a]

[a]Weighted percentages were used to complete statistical testing

Table 30. Number and Percentage of Study Sample by Area of Residence and Duration of Lower Intensity Leisure Time Physical Activities

Duration of Physical Activity	Rural		Urban	
	n	%[a]	n	%[a]
0 minutes	36	12.8	43	13.2
< 20 minutes	10	2.6	10	3.6
20-29 minutes	17	9.4	17	5.3
> 30 minutes	150	75.2	255	77.9
Subtotal	**213**	**100**	**325**	**100**
Refusal	-	-	-	-
Not answered	1	-	1	-
Total	**214**	-	**326**	-

$\chi^2 = 3.781^a$ df = 3   p = 0.286

[a]Weighted percentages were used to complete statistical testing

Table 31. Number and Percentage of Study Sample by Area of Residence and Frequency of Higher Intensity Leisure Time Physical Activities

Frequency of Physical Activity	Rural		Urban	
	n	%[a]	n	%[a]
0 times	87	46.4	143	44.4
< 3 times/week	33	10.6	58	16.4
3 times/week	33	11.5	50	15.5
> 3 times/week	60	31.5	74	23.7
Subtotal	**213**	**100**	**325**	**100**
Refusal	-	-	-	-
Not answered	1	-	1	-
Total	**214**	-	**326**	-

$\chi^2 = 7.832^a$ df = 3 p = 0.05

[a]Weighted percentages were used to complete statistical testing

Table 32. Number and Percentage of Study Subjects by Area of Residence and Duration of Higher Intensity Leisure Time Physical Activities

Duration of Leisure Physical Activity	Rural		Urban	
	n	%[a]	n	%[a]
0 minutes	87	46.4	143	44.6
< 20 minutes	7	3.4	4	0.7
20-29 minutes	9	3.0	10	3.6
> 30 minutes	110	47.2	168	51.2
Subtotal	**213**	**100**	**325**	**100**
Refusal	-	-	-	-
Not answered	1	-	1	-
Total	**214**	-	**326**	-

$\chi^2 = 6.039^a$ df = 3 p = 0.110

[a]Weighted percentages were used to complete statistical testing

4.5.3. Smoking Habits and Area of Residence

Data presented in Table 33 on the smoking habits of rural and urban residents was analyzed by the chi-square test. No relationship existed between being a regular smoker and living in a rural or urban community (p=0.208).

The t-test of independent means was performed to determine the relationship between area of residence and actual smoking number (Table 34). No significant relationship was detected between the actual number of cigarettes smoked per day by regular smokers and area of residence (p=0.164).

4.6. Effect of Socioeconomic Factors on Risk of Development of Cardiovascular Disease

Logistic regression analysis was performed to determine if a relationship existed between education and household income and the prevalence of cardiovascular risk factors, age, gender and area of residence of the study subjects.

4.6.1. Body Fat

Ordinal logistic regression was computed to determine the relationship between body mass index with age, gender, education and household income. The results of this analysis are presented in Table 35. Since the independent variables are categorical, one category in each of the independent variables is used as a reference to create a comparison amongst the other categories within the same variable.

Table 33. Number and Percentage of Study Sample by Area of Residence and Smoking Habits

Regular Smoker[a]	Rural		Urban	
	n	%[b]	n	%[b]
Yes	75	43.0	112	37.6
No	139	57.0	214	62.4
Total	**214**	**100**	**326**	**100**

$\chi^2 = 1.582^b$ df = 1 p = 0.208

[a]Regular smoker – at least 1 cigarette/day

[b]Weighted percentages were used to complete statistical testing

Table 34: Number of Regular Smokers by Area of Residence and Average Number of Cigarettes Smoked per day

Area of Residence	n	Mean	Standard Deviation
Rural	99	15.3	8.35
Urban	114	13.9	6.94

$t^a = -1.397$ $p = 0.164$

[a]Adjusted weights were used

Table 35: Ordinal Logistic Regression of Study Sample by Body Mass Index with Demographic Variables[a]

Variable	Coefficient	Standard Deviation	Z value	p value	Odds Ratio
Constant (BMI $\leq$ 20)	-2.7041	0.3986	-6.78	<0.001	-
Constant (20<BMI>25)	-0.1504	0.3624	-0.42	0.678	-
Constant (25$\leq$ BMI>27)	0.4887	0.3631	1.35	0.178	-
Age (25-34 yrs.)	-0.5499	0.1856	-2.96	0.003	0.58
Gender (Male)	-0.2585	0.1878	1.38	0.169	1.30
Area (Urban)	-0.1303	0.1925	-0.68	0.499	0.88
Education Level					
High School	0.2242	0.3711	0.60	0.546	1.25
Community College	-0.0243	0.3565	-0.07	0.946	0.98
University	0.3234	0.3590	0.90	0.368	1.38
Household Income					
Middle	0.2287	0.2452	0.93	0.351	1.26
Higher	0.0601	0.2427	0.25	0.805	1.06

Test that all slopes are zero: G = 17.192 df = 8 p = 0.028

Total sample size analyzed = 518

Goodness of Fit Tests

Method	Chi-square	df	p value
Pearson	315.14	244	0.001
Deviance	292.48	244	0.018

[a]Adjusted weights were used

Thus, the 18-24 year old subgroup, the female subgroup and the rural resident subgroup is used as a comparison with the 25-34 year old subgroup, the male subgroup and the urban resident subgroup respectively. Furthermore, the elementary level of education is used as a comparison with the other levels of education and lower household income is used as a comparison with the other levels of household income.

The results from the Goodness-of-Fit Tests suggests that the model does not fit the data adequately since a p-value from the Pearson test was 0.001 and a p-value from the Deviance test was 0.018 (Table 35). The results from the logistic regression table also revealed a p-value of 0.028 from the G-test. This suggests that at least one of the coefficients was significantly different from zero. It was revealed that the age of the study subjects was the only variable that had a significant association with body mass index (p=0.003) (Table 35).

4.6.2. Physical Activity

Ordinal logistic regression was computed to determine the relationship between physical activity at work with age, gender, area, education and household income. Ordinal logistic regression was also computed to determine the relationship between duration and frequency of leisure time physical activity.

4.6.2.1. Physical Activity at Work

The results of ordinal logistic regression can be observed in Table 36. In regards to the overall fit of the model, the Pearson chi-square test (Goodness-of Fit Test) determined a p value of 0.081 and the Deviance test revealed a p-value of 0.096. This reveals that the model fit the data adequately. The results from the G tests revealed a p-value of < 0.0001. This suggests that at least one of the coefficients tested had an affect on physical activity at work or added to the fit of the model. It appears that gender, area and education contributed to the fit of the model.

4.6.2.2. Physical Activity during Leisure Time

Ordinal Logistic Regression was calculated for both lower and higher intensity levels of leisure time physical activity.

4.6.2.2.1. Lower Intensity

The relationship between frequency of lower intensity physical activity during leisure time and age, gender, area of residence, education and household income can be observed in Table 37. On the basis of the overall fit of the model, a p-value of 0.89 was obtained from the Pearson test and a p-value of 0.535 was obtained from the Deviance test. This revealed that the data fit the model adequately. The results from the G-test suggested that at least one of the coefficients was not equal to zero. (p < 0.0001). This may be explained by a significant relationship between age, gender, area of residence, education and household income and duration of lower intensity physical activity.

Table 36: Ordinal Logistic Regression of Study Sample by Physical Activity at Work with Demographic Variables[a]

Variable	Coefficient	Standard Deviation	Z value	p value	Odds Ratio
Constant (Heavy)	-1.6159	0.4423	-3.65	<0.001	-
Constant (Moderate)	0.3677	0.4332	0.85	0.396	-
Constant (Slight)	2.3676	0.4470	5.30	<0.001	-
Age (25-34 yrs.)	-0.0055	0.1805	-0.03	0.976	0.99
Gender (Male)	0.7439	0.1865	3.99	<0.001	2.10
Area (Urban)	-0.8707	0.1922	-4.53	<0.001	0.42
Education Level					
High School	0.2608	0.3618	0.72	0.471	1.30
Community College	-0.4882	0.3477	-1.40	0.160	0.61
University	-0.7382	0.3522	-2.10	0.036	0.48
Household Income					
Middle	-0.0117	0.2368	-0.05	0.961	0.99
Higher	-0.0064	0.2369	-0.03	0.978	0.99

Test that all slopes are zero: G = 64.050 df = 8 p value < 0.0001

Total sample size analyzed = 437

Goodness of Fit Tests

Method	Chi-square	df	p value
Pearson	278.652	247	0.081
Deviance	276.390	247	0.096

[a]Adjusted weights were used

Table 37: Ordinal Logistic Regression of Study Sample by Frequency of Lower Intensity Leisure Time Physical Activities with Demographic Variables[a]

Variable	Coefficient	Standard Deviation	Z value	p value	Odds Ratio
Constant(0 time)	-1.5613	0.3814	-4.09	<0.001	-
Constant(<3 times/wk)	-0.7019	0.3741	-1.88	0.061	-
Constant(3 times/wk)	0.0752	0.3727	0.20	0.840	-
Age (25-34 yrs.)	-0.4934	0.1884	-2.62	0.009	0.61
Gender (Male)	0.6661	0.1903	-3.50	<0.001	0.51
Area (Urban	-0.1201	0.1971	-0.61	0.542	1.13
Education Level					
High School	0.0574	0.3776	0.15	0.879	1.06
Community College	-0.3425	0.3682	-0.93	0.352	0.71
University	-0.2654	0.3678	-0.72	0.471	0.77
Household Income					
Middle	0.5894	0.2585	2.28	0.023	1.80
Higher	1.0336	0.2586	4.00	<0.001	2.81

Test that all slopes are zero: G = 40.893 df = 8 p value < 0.0001

Total sample size analyzed = 437

Goodness of Fit Tests

Method	Chi-square	df	p value
Pearson	219.786	247	0.893
Deviance	244.367	247	0.535

[a]Adjusted weights were used

In regards to duration of lower intensity physical activity during leisure time (Table 38), the data fit the model adequately (refer to Goodness-of-Fit Tests). Furthermore, a p-value of < 0.0001 was obtained from the G test revealing that at least one of the coefficients did not equal zero. Gender, area, age and household income were suggested to have a significant relationship with duration of lower intensity physical activity.

4.6.2.2.2. Higher Intensity

The results of ordinal logistic regression in regards to the frequency of higher intensity leisure physical activities can be observed in Table 39. On the basis of the overall fit of the model, the Pearson chi-square tests revealed that the data fit the model adequately. The Deviance test obtained a p-value of 0.001 suggesting that the model was not a good fit. Furthermore, the G test obtained a p-value of <0.0001. This suggested that at least one of the coefficients did not equal zero. This can be observed by a significant relationship between age, gender, area and household income.

The effect of demographic variables on duration of higher intensity leisure time physical activities can be observed in Table 40. In accordance to the Goodness-of-Fit tests the model fit the data adequately. A p-value of 0.445 was obtained from the Pearson chi-square test and a p-value of 0.988 was obtained from the Deviance test. The G test obtained a p-value of <0.0001. This suggests that at least one of the

Table 38: Ordinal Logistic Regression of Study Sample by Duration of Lower Intensity Leisure Time Physical Activities with Demographic Variables[a]

Variable	Coefficient	Standard Deviation	Z value	p value	Odds Ratio
Constant(0 min.)	-1.825	0.3250	-5.26	<0.001	-
Constant(< 20min.)	-1.5417	0.3205	-4.81	<0.001	-
Constant(20-29min.)	-1.1416	0.3159	-3.61	<0.001	-
Age (25-34 yrs.)	-0.5955	0.222	-2.68	0.007	0.55
Gender (Male)	-0.7072	0.2223	-3.18	0.001	0.49
Area (Urban)	0.6639	0.2284	2.91	0.004	1.94
Education Level					
High School	0.6735	0.4576	1.47	0.141	1.96
Community College	-0.0059	0.4559	-0.01	0.990	0.99
University	0.1536	0.4513	0.34	0.734	1.17
Household Income					
Middle	0.5470	0.3080	1.78	0.076	1.73
Higher	0.8699	0.2998	2.90	0.004	2.39

Test that all slopes are zero: G = 33.969 df = 8 P value < 0.0001

Total sample size analyzed = 435

Goodness of Fit Tests

Method	Chi-square	df	p
Pearson	70.017	64	0.283
Deviance	73.767	64	0.189

[a]Adjusted weights were used

Table 39: Ordinal Logistic Regression of Study Sample by Frequency of Higher Intensity Leisure Time Physical Activities with Demographic Variables[a]

Variable	Coefficient	Standard Deviation	Z value	p value	Odds Ratio
Constant(0 time)	-0.0637	0.3677	-0.17	0.862	-
Constant(<3times/wk)	0.6931	0.3691	1.88	0.060	-
Constant(3 times/wk)	1.4389	0.3737	3.85	<0.001	-
Age (25-34 yrs.)	0.6658	0.1836	3.63	<0.001	1.95
Gender (Male)	-0.6069	0.1853	-3.28	0.001	0.55
Area (Urban)	0.5163	0.1919	2.69	0.007	1.68
Education Level					
High School	-0.1103	0.3750	-0.29	0.769	0.90
Community College	-0.1040	0.3608	-0.29	0.773	0.90
University	-0.4495	0.3622	-1.24	0.215	0.64
Household Income					
Middle	-0.5995	0.2446	-2.45	0.014	0.55
Higher	-0.9480	0.2458	-3.86	0.000	0.39

Test that all slopes are zero: G = 58.085 df = 8 p value < 0.0001

Total sample size analyzed = 435

Goodness of Fit Test

Method	Chi-square	df	p value
Pearson	268.983	247	0.161
Deviance	296.344	247	0.017

[a]Adjusted weights were used

Table 40: Ordinal Logistic Regression of Study Sample by Duration of Higher Intensity Leisure Time Physical Activities with Demographic Variables[a].

Variable	Coefficient	Standard Deviation	Z value	p value	Odds Ratio
Constant (0 time)	-0.1609	0.3953	-0.41	0.684	-
Constant (< 20min.)	-0.0749	0.3953	-0.19	0.850	-
Constant (20-29min.)	0.1168	0.3953	0.30	0.768	-
Age (25-34 yrs.)	0.7131	0.2038	3.47	0.001	2.04
Gender (Male)	-0.7417	0.2071	-3.58	<0.001	2.10
Area (Urban)	0.3900	0.2152	-1.81	0.070	0.68
Education Level					
High School	-0.0480	0.4068	0.12	0.906	1.05
Community College	-0.0270	0.3901	0.07	0.945	1.03
University	-0.5474	0.3963	-1.38	0.167	0.58
Household Income					
Middle	-0.7728	0.2649	-2.92	0.004	0.46
Higher	-1.0952	0.2695	-4.06	<0.001	0.33

Test that all slopes are zero: G = 64.042 df = 8 p value < 0.0001

Total sample size analyzed = 435

Goodness of Fit Tests

Method	Chi-Square	df	p value
Pearson	249.418	247	0.445
Deviance	199.736	247	0.988

[a]Adjusted weights were used

variables within the model had a significant association with duration of higher intensity leisure time physical activity.

4.6.3. Smoking Habits

Binary logistic regression was conducted to determine the relationship between regular smokers and age, gender, area or residence, education and household income (Table 41). On the basis of the overall model, the data do not fit adequately since a p-value of 0.04 was obtained for the Pearson chi-square test and a p-value of 0.002 was obtained for the Deviance chi-square test. However, a p-value of <0.001 was obtained from the G test suggesting that at least one of the coefficients was not equal to zero. This reveals that at least one of the variables and in this case education had a significant association with regular smokers.

Table 41: Binary Logistic Regression of Study Sample by Smoking Habits with Demographic Variables[a].

Variable	Coefficient	Standard Deviation	Z value	p value	Odds Ratio
Constant (Non-smokers)	0.6997	0.4023	1.74	0.082	-
Age (18-24 yrs.)	0.1950	0.2180	0.89	0.371	1.22
Gender (Male)	-0.2200	0.2217	-0.99	0.321	0.80
Area (Urban)	0.3140	0.2280	-1.38	0.168	0.73
Education Level					
High School	-0.1819	0.4003	-0.45	0.650	0.83
Community College	-0.7551	0.3867	-1.95	0.051	0.47
University	-1.7677	0.4100	-4.31	<0.001	0.17
Household Income					
Middle	-0.5185	0.2787	-1.86	0.063	0.60
Higher	-0.3663	0.2777	-1.32	0.187	0.69

Test that all slopes are zero: G = 51.455 df = 8 p value < 0.0001

Total sample size analyzed = 437

Goodness of Fit Tests

Method	Chi-square	df	p value
Pearson	100.076	77	0.040
Deviance	116.814	77	0.002

[a]Adjusted weights were used

CHAPTER V

DISCUSSION

5.1. Introduction of Discussion

This discussion provides an evaluation of the results obtained from the research study. This was accomplished through a comparison of the results of the research study with those of other research papers that discuss similar studies of interest. This discussion will also provide a comparison of the results of the research study with those obtained from the Nova Scotia Nutrition Survey and the Canadian Heart Health Survey.

5.1.1. Nova Scotia Nutrition Survey

The Nova Scotia Nutrition Survey was conducted in the spring and fall of 1990. The Newfoundland and Labrador Nutrition study came about as a result of the Nova Scotia Heart Health Survey and the Newfoundland and Labrador Heart Health Survey. These latter surveys revealed that most Nova Scotia and Newfoundland residents lacked an understanding of the importance of a healthy diet. Furthermore, there was a high prevalence of risk factors of CVD that were related to diet such as hypercholesterolemia, hypertension and obesity. The results from these two surveys suggested a need for an in-depth look into the nutritional status and healthy eating habits of Nova Scotia and Newfoundland residents (Nova Scotia Heart Health Program, 1993; Newfoundland Department of Health and National Health and Welfare, 1990).

The aim of the Nova Scotia Nutrition Survey was to conduct an extensive food consumption survey to determine the dietary habits, nutrient intakes and nutritional attitudes and knowledge of residents of Nova Scotia. It was anticipated that the Nova Scotia Nutrition Survey would act as a model for the development and implementation of other nutrition surveys conducted in provinces throughout Canada. As a result, the protocol of the Nova Scotia Nutrition Survey was utilized to design and implement the Newfoundland and Labrador Nutrition Survey (Nova Scotia Heart Health Program, 1993).

The final report of the Nova Scotia Nutrition Survey combined findings on all young adults and presented the data on 18-34 year olds. Therefore, when the results of the Nova Scotia Nutrition Survey and the Newfoundland and Labrador Nutrition Survey are compared, the researcher will consider the results of the entire study sample (18-24 and 25-34 year olds combined) of the Newfoundland and Labrador study.

5.1.2. Canadian Heart Health Initiative

Nine Canadian provincial Heart Health Surveys were conducted between 1986 and 1992. The purpose of these surveys was to determine the prevalence of CVD risk factors and the level of CVD knowledge of Canadians. The results from these surveys were compiled and an epidemiological and CVD risk database was developed to allow for the dissemination of information for health promotion programs throughout Canada (Maclean et al., 1992).

These surveys analyzed the health status of 18-74 year old non-institutionalized male and female citizens of Canada. The surveys obtained information on the attitudes, health-related knowledge and CVD risk factor prevalence of Canadians. This information was obtained by conducting in-home interviews in which blood pressure measures, blood samples and anthropometric measures were taken.

The results from the Canadian Heart Health Survey were reported by individual provinces, regions and total health status's of Canadians. As a result, a comparison of the health status of young adults aged 18-34 years who participated in the Newfoundland and Labrador Nutrition survey will be compared with the health status of young Canadian adults aged 18-34 years and with particular regions and provinces where it is applicable.

5.2. Response Rate

The response rate of this study was calculated as in the Nova Scotia Nutrition Survey and the Newfoundland and Labrador Heart Health Survey (Newfoundland Department of Health and National Health and Welfare, 1990; Nova Scotia Heart Health Program, 1993). Fifty-seven percent of males aged 18-34 years who were located and 68% of females aged 18-34 years who were located, participated in all aspects of the Newfoundland Heart Health Survey. A slightly lower response rate was obtained in the Newfoundland and Labrador Nutrition

Survey. The overall response rate of the subgroup was 52%. Furthermore, 44% of 18-24 year old males, 46% of 25-34 year old males, 57% of 18-24 year old females and 58% of 25-34 year old females who were located participated in the Newfoundland and Labrador Nutrition Survey.

The Newfoundland and Labrador medical insurance register was utilized as a sampling frame for the Newfoundland and Labrador Nutrition Survey. It contains the names, addresses, and dates of births of every resident of Newfoundland and Labrador who is covered by the provincial health care system. However, this register has no systematic method to delete individuals from the register who have died or moved away from the province. Thus, approximately fifty percent of the addresses in the file are out-of-date (Nargundkar, 1996). This contributed substantially to the high number of ineligible subjects. Interviewers of the Nutrition Newfoundland and Labrador Survey would categorize a person as ineligible if they contacted the subject's original place of residence and were informed that they no longer resided there. If the addresses contained in the medical insurance register were accurate a lower number of ineligible subjects would have been obtained. As well, the total response rate would have been higher since subjects would have been selected from the files that did reside in Newfoundland and Labrador.

Another factor contributing to the relatively low response could be the age of the subjects. Studies have demonstrated that the probability of locating subjects is higher for older than younger aged groups. Eastwood, Gregor, Maclean and

Wolf (1996) assessed participation rates, response bias and CVD risk factor estimates from two cardiovascular surveys (Nova Scotia Heart Health Survey and the MONICA Survey). Eastwood's group revealed that the probability of locating a subject increased with age. The study showed a probability of 0.39 for locating individuals in the 25-35 year old category and a probability of 0.65 for locating individuals in the 55-64 year old category. Research suggests that this may be a result of a more transient lifestyle being exhibited by younger age groups (Travers, 1996).

Bias may have been introduced as some studies reveal respondents of surveys are usually healthier and lead healthier lifestyles than non-respondents of surveys (Criqui, Barrett-Connor & Austin, 1978). Considering the fact that this was a nutrition survey, it might be assumed that participants who were more concerned or interested in their health status participated in the survey more than others who were not as concerned about their health status.

Approximately 80% of young adults (18-34 yrs.) located for the Nova Scotia Nutrition Survey participated in the study. This was slightly higher than the response rate of the Newfoundland and Labrador Nutrition Survey. It was suspected that the response rates of the Nova Scotia Nutrition Survey would be higher than those of the Newfoundland Survey since the Nova Scotia Medical Services Insurance Plan file is out-of-date by only 25% (Maclean, et al., 1992).

5.3. Characteristics of the Study Sample

The study sample for the Nutrition Newfoundland and Labrador Survey included non-institutionalized males and females between the ages of 18-24 years and 25-34 years. Figure 1 reveals that there was a higher number of respondents who were in the 25-34 year old category as compared to the 18-24 year old category. This was true for both rural and urban areas (Figures 2 and 3). This population trend may be explained by the fact that there was a higher number of 25-34 year olds (85,040) living in Newfoundland in 1996 as compared to 18-24 year olds (61,150) (Statistics Canada, 1998).

Figure 4 shows that there was a larger number of young female adult respondents versus young male adult respondents. This population distribution was also present in both rural and urban areas (Figures 5 and 6). According to the 1996 Census, a higher number of females, aged 18 – 34 years (74,180), was living in Newfoundland and Labrador in 1996 as compared to males, aged 18-34 years (72,015) (Statistics Canada, 1998).

Data collection of the Newfoundland and Labrador survey allowed for seasonal variation and interviews were conducted seven days a week. This provided an equal opportunity for all individuals who were selected to participate in the survey. However, there were a higher percentage of males as compared to females who were employed outside the household. Reports from the Newfoundland and Labrador Centre for Health Information (1998) reveals that 145,680 males and 112,850 females were employed in Newfoundland and

Labrador in 1991. Even though the interviewers of the Nutrition Newfoundland and Labrador Survey conducted surveys during any time of the day and night it is appropriate to suggest that females had a better opportunity to participate in the survey than males since they were available more often.

This trend was also observed in the Nova Scotia Nutrition Survey. There were a slightly larger number of young female respondents as compared to young male respondents. However, according to the 1996 Census, there were also a larger number of 18-34 year old females (113, 669) living in Nova Scotia in comparison to 18-34 year old males (110, 435) (Statistics Canada, 1998).

The most commonly reported level of education attained by the overall study sample was university (Figure 7). A small proportion of the population attained only an elementary level of education. Young adults living in rural areas were less likely to have post secondary education such as university (Figure 8). Most young adults who are receiving post secondary education are residing in urban areas such as St. John's, Grand Falls and Corner Brook (Figure 8) due to the fact that most educational institutions that provide post secondary instruction are found in these centers.

Typically, the Newfoundland and Labrador population has lower education attainment than the rest of Canada. In 1994/95, 35% of Newfoundlanders and Labradorians had attained some secondary education (highest level of education obtained) as compared to 24.2% of the Canadian population. Furthermore, 4.6% of residents of Newfoundland and Labrador and 9.2% of residents of Canada had a Bachelor degree (Newfoundland and Labrador Centre for Health Information, 1998). When comparing the educational attainment of Newfoundland residents in 1994, the results of the educational attainment of participants of the Newfoundland and Labrador Nutrition Survey were higher than expected. Possibly higher educated residents of Newfoundland and Labrador were more likely to respond to the Nutrition Survey.

Millar and Wigle (1986) reported that individuals with a high level of educational attainment have a decreased risk of CVD development. Research suggests that less educated groups have an increased prevalence of hypertension, cigarette smoking and hypercholesterolemia (Winkleby, Jatulis, Frank & Fortmann, 1992). Education level does not appear to be associated with the presence of CVD risk factors in this study.

The education levels of young adult respondents of the Newfoundland and Labrador Nutrition Study cannot be compared to young adult respondents of the Nova Scotia Nutrition Survey and the Canadian Heart Health Surveys. This is because only the educational attainment of the entire study population of the Nova Scotia and Canadian Heart Health study was reported rather than the educational attainment of young adults.

The most commonly reported level of household income received by young adults of the overall study sample was medium (Table 6). This result was not expected since Newfoundland and Labrador has a higher percentage of low-income families than the average Canadian family (Neville, Buehler, James &

Edwards, 1994). Furthermore, there is a high unemployment rate for young adults living in Newfoundland and Labrador. In 1996, 29% of 15-24 year old and 20% of 25-34 year old Newfoundland and Labrador residents were unemployed. As compared to the national average, 16.1% of 15-24 year old and 9.9% of 25-34 year old Canadians in 1996 were unemployed (Statistics Canada, 1998). However, the source of household income of participants of the Newfoundland and Labrador Survey was not investigated, nor was it asked if the participants were the primary source of income for the household. If an 18-year-old living at home was interviewed and not employed yet his/her parent(s) were receiving a high level of income, that individual would have been categorized as having a high household income.

In regards to area of residence, a higher number of urban residents were more likely to receive a higher level of household income as compared to rural residents living in Newfoundland and Labrador (Table 6). This may be because many rural residents have seasonally based jobs (commercial fishery) while urban residents are typically employed year round. Results from the Adult Health Survey in 1995 revealed that 53% of St. John's residents were employed year round as compared to 27.8% of Newfoundland residents living in areas overseen by the Northern community health board (mainly rural areas) (Segovia, Edwards & Bartlett, 1996).

Research suggests that individuals receiving lower incomes have an increased risk for CVD mortality as compared to their higher income counterparts (Lynch, Kaplan, Cohen, Tuomilehto & Salonen, 1996). However, the researcher was unable to investigate the incomes of each individual participant. Thus, the income of non-participating individuals living at the participant's place of residence may have had an effect on the household income variable.

Household income levels of respondents of the Nova Scotia Nutrition Survey were also determined by considering total household incomes. Unfortunately, the household income of the entire population of the Nova Scotia Nutrition Survey was reported. Thus, the researcher was unable to compare the income levels of young adults studied in Newfoundland and Nova Scotia. This was also the case for the Canadian Heart Health Study.

As shown in Table 6 (total number of respondents in urban and rural areas), a higher percentage of urban residents participated in the Newfoundland and Labrador Nutrition Survey as compared to rural residents. This may be because it was easier to locate individuals living in the more populated areas. In certain rural communities interviewers were asked to interview individuals that were residing in a different community. As a result, interviewers may have encountered more difficulties in conducting interviews due to location, conflicting time schedules and travel logistics.

5.4. Prevalence of Cardiovascular Disease Risk Factors of the Study Sample

Cardiovascular disease is the leading cause of morbidity and mortality in Newfoundland and Labrador (Heart and Stroke Foundation of Canada, 1997).

There are a number of modifiable risk factors that affect the development of cardiovascular disease. These include body size, physical inactivity and cigarette smoking.

5.4.1. Body Size

Analyzing body size to determine the prevalence of excess body fat is vital in determining the risk of cardiovascular disease in a population. Research has shown excess body weight to be associated with an increased prevalence of hypertension, hyperlipidemia and diabetes mellitus (Reeder et al., 1992).

The researcher analyzed body mass index levels of young adults of the Newfoundland and Labrador Nutrition Survey to determine the prevalence of excess body fat. The results from the survey revealed that 36% of young Newfoundland and Labrador adults had a BMI greater than 27 (Table 7). Thus, 36% of the total study population had an increased risk of developing CVD and may have been overweight. Furthermore, a higher percentage of 25-34 year old participants (Table 7) and young adult male participants (Table 8) had a BMI greater than 27.

It was expected that a higher percentage of 25-34 year old participants of the Nutrition Newfoundland and Labrador study would have a BMI greater than 27 since research reveals that overweight increases with age. Reeder et al. (1992) studied weight distributions among participants of the Canadian Heart Health Study. It was revealed that mean BMI increased with age. For instance, the mean BMI of 18-24 year old males was 23.8 kg/m^2 and the mean BMI of 55-64 year old males was 26.5 kg/m^2. Reeder et al. (1997) also revealed that a higher percentage of young adult males (18-34 years) had a BMI between 27 and 29 as compared to young adult females (18-34 years). This gave support to the results from the Nutrition Newfoundland and Labrador Survey.

Similar trends were observed in young adults of the Nova Scotia Nutrition Survey. Thirty-eight percent of young adult participants of the Nova Scotia Nutrition Survey had a BMI greater than 27. Furthermore, a significantly higher percentage of males had a BMI greater than 27 as compared to females (Nova Scotia Heart Health Program, 1993).

Ostbye, Pomerleau, Speechley, Pederson and Speechley (1995) determined the prevalence of obesity (BMI $\geq$ 27) among participants aged 20-64 of the Ontario Health Survey of 1990. This survey revealed that approximately 15% of 20-24 year olds and 20% of 25-29 year olds were obese. These rates are lower than those observed in young Newfoundland and Labrador adults. The results from the Ontario Health Survey did conclude that weight gain increases with age and that there was a higher prevalence of obesity in male adults as compared to female adults. The results of the Ontario Health Survey are similar to those obtained from the Newfoundland and Labrador Nutrition Survey.

Another important consideration in analyzing body size is abdominal adipose tissue. Some researchers report central adipose tissue to be a greater predictor of metabolic disturbances than excess body fat (Reeder et al., 1992).

The researcher measured waist circumference as an indication of abdominal adipose tissue. A significant number of 25-34 year old females had a waist circumference associated with metabolic disturbances ($\geq$ 88 cm) (Table 9). This suggests that a higher percentage of 25-34 year old females were at an increased risk for CVD development as compared to their younger age counterparts.

Results from the analysis of abdominal adipose tissue also suggested that young male adult participants had a higher mean waist circumference as compared to young female adult participants of the Newfoundland and Labrador Nutrition Survey (Figures 9 and 10). Research reveals that on average males do have a larger waist circumference than females. Macdonald, Reeder, Chen, Despres and Canadian Heart Health Surveys Research Group (1997) analyzed the waist circumference distributions of participants of the Heart Health Surveys conducted in Quebec, Manitoba, Saskatchewan, Ontario and Alberta. They also discovered that men had a higher mean waist circumference than females.

The prevalence of obesity as suggested by the high number of participants with a BMI $\geq$ 27 and increased waist circumference suggests the need for increased public awareness of the importance of a healthy body weight.

5.4.2. Physical Activity

Physical inactivity is recognized as a major risk factor of cardiovascular disease. This may be due to a causal relationship between not being active and the development of plasma lipids, lipoproteins, apolipoprotein, and athersclerosis (Paffenbarger et al, 1984). Scientific research reveals that physical activity has a beneficial effect on serum cholesterol, body mass index, blood pressure and diabetes mellitus (United States Department of Health and Human Services, 1996).

Most young adults living in Newfoundland and Labrador perform slight to moderate levels of physical activity while at work (Table 11). The results from this study suggest that most young residents of the province of Newfoundland and Labrador perform a moderate level of physical activity at work. However, due to the wording of the question, the researcher was unable to determine if young adults were meeting the recommendation that individuals perform physical activity of moderate intensity or greater, every other day in order to decrease their risk of developing cardiovascular disease (Stephens & Craig, 1990).

No significant association was noted between the two age groups and physical activity at work (Table 11). As a result, one might assume that being in the 18-24-age category or being in the 25-34 year old category had no effect on the type of physical activity one performs at work.

A significant association was present between gender and physical activity at work (Table 12). Our results suggest that young adult males were more likely than young adult females to perform moderate to heavy physical activity at work. Females are more likely to perform slight to sedentary physical activity at work at this age. Males are more involved in occupations that require heavy physical labour such as construction, fishing and mining than women. For instance, in 1991, 4,145 males but only 350 females were involved in the mining (including milling), quarrying and oil well industries in Newfoundland and Labrador (Newfoundland and Labrador Centre for Health Information, 1998).

Due to the wording of the questions regarding leisure time physical activities in the Newfoundland and Labrador Nutrition Survey, the researcher was unable to estimate the percentage of the study population who participated at a moderate intensity or greater. However, the researcher was able to determine the percentage of young adults that performed lower and higher intensity physical activities during leisure time.

It was revealed that many young adults living in Newfoundland and Labrador spent no time performing higher intensity leisure physical activity (45%) but most of those who do exercise, exercised frequently (Table 17). Almost 27% of the total population surveyed, performed physical activities at least three times per week that required their heart to beat rapidly (Table 17). Similar results were observed for the duration of higher intensity physical activity during leisure time. Most young Newfoundland and Labrador adult participants of the study either spent a duration of 0 minutes or at least 30 minute intervals at physical activities during leisure time (Table 19). The results from this survey suggest that a large percentage of young Newfoundland and Labrador adult respondents of this nutrition survey were sedentary during leisure time.

Age and gender were shown to have a significant association on the frequency and duration of higher intensity leisure time physical activity (Tables 18 and 19). A trend was observed such that more 18-24 year olds versus 25-34 year olds and more young adult males versus young adult females engaged in higher intensity leisure physical activity more often. It may be appropriate to suggest 25-34 year old females could be at an increased risk of cardiovascular disease due to limited leisure time physical activity.

Results from this study reveal the need for continued health promotion programs that aim at increasing physical activity levels of young adult residents of Newfoundland and Labrador. If more exercise programs are incorporated for the younger aged groups it may help them to continue to exercise in their later years (Dennison, Strauss, Mellitis & Charney, 1988).

5.4.3. Cigarette Smoking

Cigarette smoking has been associated with an increased risk of CVD development (Hays, Hurt & Dale, 1996). Cigarette smoking has also been associated with increased heart rate, reduced estrogen levels (Hansen, Anderson & Von Eyben, 1993), low HDL cholesterol and high LDL cholesterol (Stamford et al., 1984).

A person was designated a regular smoker if they smoked at least one cigarette per day. Approximately 40% of young adults aged 18-34 years in the Nutrition Newfoundland and Labrador Survey were regular smokers (Table 21). This rate does not appear to change significantly with age or gender (Table 22). However, when the actual number of cigarettes smoked per day by regular smokers was analyzed by gender and age, it was revealed that males and 25- 34 year olds smoked a higher number of cigarettes in comparison to females and 18-24 year olds (Table 23 and 24).

Approximately 42% of young adults aged 18-34 years in the Nova Scotia survey were regular smokers in 1989. This reveals that the prevalence of young adults who are regular smokers was similar in both provinces. However, in 1994 the national average was 29% (Newfoundland and Labrador Center for Health Information, 1998). This reveals that young Newfoundland and Labrador adults have a high prevalence of cigarette smoking.

Similar cigarette smoking rates were observed in young adult participants of the Newfoundland and Labrador Heart Health Survey (39% of males and 44% of females aged 18-34 years). These results suggest that presently, smoking rates of young adults may not be declining in Newfoundland and Labrador. Young adult regular smokers between the ages of 18-24 are consuming fewer cigarettes per day in relation to young adult regular smokers between the ages of 25-34. However, the number of young adult regular smokers is staying the same. Thus, more initiatives need to be taken to decrease the number of cigarette smokers in this province. If more programs are not developed and these rates continue, the incidence of CVD will not improve in Newfoundland and Labrador.

5.5. Prevalence of CVD Risk factors of Urban and Rural Residents

Research reveals that geographic location; in particular, living in urban or rural areas affects one's health status. This is supported by the fact that rural residents are more likely to suffer long-term disabilities and have shorter quality-adjusted life expectancies (Johnson, Ratner & Bottorff, 1995). The researcher attempted to determine the effect of area of residence by analyzing the body size, physical activity and cigarette smoking habits of urban and rural residents.

5.5.1. Body Size

In regards to body size, the body mass index category of a respondent showed no association with his/her area of residence (Table 25). However, a slightly higher percentage of rural residents (39%) had a BMI greater than 27 as compared to urban residents (33%).

Reeder et al (1997) utilized results from the Canadian Heart Health survey to describe the association between obesity and living in rural versus urban areas in three regions of Canada: atlantic, central, and western. This study also revealed no significant difference between body mass indices of males and females living in rural and urban communities in the Atlantic provinces. The results for this study were taken from a sample of 18-74 year olds.

Living in urban and rural areas did affect abdominal adipose tissue distribution. Females living in rural areas were more likely to have a waist circumference greater than 88 cm versus females living in urban areas (Table 26). Thus, it appears that females living in rural areas may be at an increased risk of CVD and they should be informed about the health consequences or risks associated with inappropriate body sizes.

Living in an urban or rural area had no apparent association with the waist circumference of young adult males (Table 27). One might expect the waist circumference of males to be lower in rural areas since results suggest that they perform heavier levels of physical activity at work. Variables outside of the risk factors that were investigated in this study may play a role. These could include diet and stress.

5.5.2. Physical Activity

In regards to physical activity, differences were exhibited in the types of physical activity performed by rural and urban residents at work. Rural residents of Newfoundland and Labrador in the age range studied were more likely to perform heavy physical labour and were less likely to perform sedentary work as compared to urban residents (Table 28). A large percentage of people living in rural areas have occupations such as fishing, farming, woodcutting and mining. For instance, in 1991, 90 residents of St. John's (urban) were involved in the logging industry versus 1,755 in Central (mainly rural areas) Newfoundland (Newfoundland and Labrador Center of Health Information, 1998). These occupations often require individuals to be physically active.

A higher percentage of urban residents were more likely to have sedentary jobs since more businesses are present in urban areas. In 1991, 10,650 residents of St. John's had managerial positions versus 2,970 residents of central Newfoundland (Newfoundland and Labrador Centre of Health Information, 1998).

A significant difference was not exhibited between the frequency and duration of physical activity performed during leisure time and living in rural and urban areas (Tables 29,30,31 and 32). Thus, living in a rural or an urban area was seen to have no effect on the intensity, duration and frequency of physical activity performed during leisure time.

5.5.3. Cigarette Smoking

There were a similar number of young adult regular smokers detected in both rural and urban areas throughout Newfoundland and Labrador (Table 33). Results from this analysis also suggested that within the number of regular smokers, the quantity of cigarettes smoked in rural and urban areas was similar (Table 34). This suggests that both young adult, rural and urban residents of Newfoundland and Labrador have equal opportunities to develop health problems that are associated with cigarette smoking.

5.6. Influence of Age, Gender, Area of Residence, Education and Household Income on the Presence of CVD Risk Factors

The researcher considered education and household income to be confounding variables. Thus, logistic regression analysis was conducted to determine if education and household income had any effect on the prevalence of cardiovascular disease risk factors in young adults. In order to complete this analysis age, gender and area of residence was also considered.

In accordance to Table 35, the variables measured against body mass index did not provide a good fit for the model. The ordinal logistic regression table also revealed that there was no association between body mass index and (1) education and (2) household income. The table did reveal that age impacted body mass index, which was also revealed in earlier test of chi-square analysis.

A number of studies have suggested that a relationship does exist between education and body weight. Winkleby, Fortmann and Barrett (1990) studied the effect of education on risk factors for heart disease. This study was conducted on 3,349 individuals between the ages of 18 and 74 years. They revealed a significant relationship between body mass index and years of education. Increased education (greater than 16 years) was associated with a healthy BMI (20-25) and low education (less than 12 years) was associated with an unhealthy BMI (greater than 27). This situation does not exist in young adults studied in the Nutrition Newfoundland and Labrador Survey. As a result, it is suggested that education may not effect the prevalence of excess body fat of young adults living in Newfoundland and Labrador.

Table 36 suggested that education was associated with physical activity at work. Earlier studies (before the 1970's) have suggested an association between socioeconomic status and level of physical activity at work (Powell, Thompson, Caspersen & Kendrick, 1987). Table 36 also suggested that an association existed between physical activity at work and gender and area of residence. This was also suggested in earlier test of chi-square analysis.

In regards to leisure time physical activity, the variables under investigation appeared to be a good fit for all levels of intensity (Tables 37, 38,40) except for the frequency of higher intensity leisure time physical activity (Table 39). The results obtained from Table 39 were conflicting. This suggests that other confounding variables may need to be considered. However, in all cases, it was suggested that household income had a significant association with leisure time physical activity. This suggests that household income impacted the level of leisure time physical activity.

In regards to regular cigarette smokers, the binary logistic regression test suggested that the model used was not a good fit (Table 41). However, the G test revealed that at least one of the variables had a significant relationship with regular smokers. This was suggested by education level. Thus, the results from the regression analysis (Table 41) suggest that education may have a significant impact on risk factors of cardiovascular disease in Newfoundland and Labrador. The results from this analysis coincide with other research studies. Winkleby, Jatulis, Frank and Fortmann (1992) reported that education had a significant effect on smoking habits. It was suggested that lower education groups had a higher prevalence of cigarette smoking.

Table 41 also re-emphasized what was discovered in chi-square analysis of smoking habits and age, gender and area of residence. Binary logistic regression suggested that these variables had no association with smoking habits.

5.7. Limitations of the Study

There were limitations to this study. This study was a form of secondary analysis. As a result, the researcher was unable to develop questions that may have been more appropriate for the study at hand. For instance, it is well known that physical inactivity is a modifiable risk factor of CVD. However, the researcher was unable to determine adequately whether a person had performed sedentary, moderate or heavy levels of physical activity during leisure time.

During sample selection, community centers were randomly selected in relation to their population size. It was difficult to acquire interviews in some of the rural areas such as CD-1 due to transportation difficulties. As a result, a lower number of participants were obtained from the rural areas. This may have played a role in the results that were obtained regarding the comparison of area of residence and health status of the study population.

Residents living in rural areas throughout Newfoundland and Labrador often travel to the urban centers close to their area for medical and social reasons.

This along with the possible isolation of their community may influence the type of lifestyle they lead in regards to the type of food they consume, the amount of health information they obtain and the experiences they acquire.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

The present study clearly suggests that the development of CVD is a concern for young adults living in Newfoundland and Labrador. Results from this study identified the prevalence of considerable modifiable risk factors of CVD. It appears that future rates of CVD in Newfoundland and Labrador may remain high as a result of unhealthy lifestyle habits that have been occurring for many years.

A high percentage of young Newfoundland and Labrador adults have excess body fat. Most young adults lead a sedentary lifestyle during leisure time and a high percentage of young adults living in Newfoundland and Labrador are regular cigarette smokers. The results from the Newfoundland and Labrador Nutrition Survey reveal that the health status of young adults has not improved significantly since the report of the Newfoundland Heart Health Survey. A challenge still exists to reduce the prevalence of CVD risk factors in young adults.

Results obtained from the comparison of the health status of rural and urban residents were conflicting. Area of residence was not associated with excess body fat of males, leisure time physical activity and smoking habits. However, it was suggested that a higher percentage of females living in rural areas had excess abdominal adipose tissue. A larger percentage of rural residents performed heavy physical activity while at work as compared to urban residents. The education and household income levels of urban subjects were higher than those subjects living in rural areas. As a result, living in rural areas may increase the risk of developing CVD in young adult females. Residing in a rural area may have a positive effect on young adult males who may have higher physical activity.

Overall, it is vital that community development and community mobilization approaches be continued or even implemented that focus on risk factors of CVD. Many young adults in this province lead sedentary lifestyles and more health and fitness education programs are needed to focus on the needs of young adults. Physical activity needs to be emphasized more in the younger aged groups in order for it to become a part of their regular routine. Cigarette smoking continues to be an issue in this province. Thus, specific policies and education programs for cigarette smoking are needed that focus on young adults.

Results from this study also suggest that more extensive research needs to be conducted on the health status of young adults living in Newfoundland and Labrador. There may be areas that are not being investigated extensively that will provide the public with a better understanding of why this trend in CVD is continuing in Newfoundland and Labrador. It may be useful that individual surveys, be devised and conducted, concentrating on the health status if young Newfoundland and Labrador adults in specific regions and communities throughout the province. This study was an overview of specific cardiovascular disease risk factors of young adults in this province. Other CVD risk factors need to be studied as well. Other diseases and their causative factors need to be investigated in young adults as well as in urban versus rural areas.

On the basis of these findings, it is concluded that CVD is still an issue in this province. It suggests a need for more health promotion strategies that concentrate on the health status of young adults. Urban residents may adopt healthier lifestyle behaviors than those living in less populated areas throughout the province. Thus, it is vital that steps be taken to provide knowledge and assistance to rural areas on ways to achieve a healthy lifestyle.

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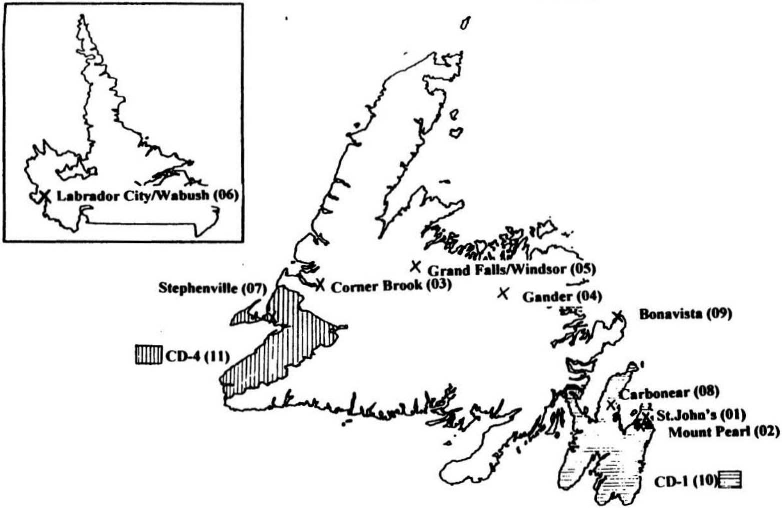
APPENDIX A

NUTRITION NEWFOUNDLAND AND LABRADOR
GEOGRAPHIC AREAS



APPENDIX B

FORM D

Identifier # |_|_|_|_|_|

NEWFOUNDLAND AND LABRADOR NUTRITION SURVEY

NUTRITION AND HEALTH QUESTIONNAIRE

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

PART I

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

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

Identifier # ☐☐☐☐☐☐

PART II

The next few questions are about physical exercise.

9 How do you describe your work? By work I mean paid and non-paid work. Which of the following best describes how you spend <u>most</u> of your work time. **(Check one only)**.

☐ My work is mainly sitting. I do not walk much during work, e.g. telephone operator, secretary.

☐ In my work I walk or move quite a lot, but I do not have to lift or carry heavy things, e.g. shop assistant, light housework.

☐ In my work I have to walk and carry a lot, climb staircases often or go uphill, e.g. carpentry, farm work, heavy housework.

☐ My work is heavy physical labour where I usually have to carry, lift heavy things, dig or shovel, e.g. forestry work, heavy farm work, warehouse work.

10 In your spare time, do you do any sport, physical activity, or work in which you are moving a lot, but your heart does not beat rapidly such as walking, house cleaning, or gardening?

Y☐ N☐ **(go to 13)**

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

DO NOT READ

☐ < 3 x per week

☐ 3 x per week

☐ > 3 x per week

Identifier # ☐☐☐☐☐☐

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

DO NOT READ

☐ < 20 minutes

☐ between 20 & 29 minutes

☐ 30 minutes or more

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

Y☐ N☐
(go to 16)

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

DO NOT READ

☐ < 3 x per week

☐ 3 x per week

☐ > 3 x per week

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

DO NOT READ

☐ < 20 minutes

☐ between 20 & 29 minutes

☐ 30 minutes or more

Identifier # ☐☐☐☐☐☐

The next few questions are about smoking.

16 Have you ever smoked cigarettes? Y☐ N☐
(go to 20)

17 At the present time do you smoke cigarettes? Y☐ N☐
(go to 20)

18 Do you usually smoke cigarettes every day? Y☐ N☐
(go to 20)

19 How many cigarettes do you smoke a day? ☐☐ cigarettes

20 Were you ever told by a doctor or other health care worker that your blood cholesterol was high? Y☐ N☐
(go to 23)

21 Are you now doing anything to lower your blood cholesterol? Y☐ N☐
(go to 23)

22 What are you doing to lower your blood cholesterol? **(DO NOT READ LIST. Check all that apply)**

- ☐ diet
- ☐ medications
- ☐ exercise program
- ☐ other (describe) ______________________________

Identifier # ☐☐☐☐☐☐

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

Y☐ N☐
(go to 26)

24 Are you now doing anything for your blood pressure?

Y☐ N☐
(go to 26)

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

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

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

Y☐ N☐
(go to 29)

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

Y☐ N☐
(go to 29)

Identifier # ☐☐☐☐☐☐

28. What are you doing for your diabetes, or high blood sugar? **(DO NOT READ LIST. Check all that apply)**.

- ☐ diet
- ☐ pills to lower blood sugar
- ☐ insulin
- ☐ exercise program
- ☐ other (describe) ____________________

PART III

Now I would like to talk a little about foods eaten in Newfoundland and Labrador.

29. During the past year, did you eat berries grown in Newfoundland and Labrador? (This includes berries in jams, preserves and pies)

Y☐ N☐
(go to 32)

30. What type or types of berries did you eat?

- blueberries ☐
- raspberries ☐
- bakeapples ☐
- partridgeberries ☐
- strawberries ☐
- others ☐

(specify) ____________
____

31. Last year, approximately how many gallons/litres of berries did your family eat?

____________ Gallons
____________ Litres

32. Do you or your family grow your own fruits and/or vegetables?

Y☐ N☐
(go to 34)

Identifier # ☐☐☐☐☐☐

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

Y☐ N☐

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

DO NOT READ

☐ < 1 x per week

☐ 1-2 x per week

☐ 3-4 x per week

☐ > 4 x per week

35 <u>SinceMay of 1995</u>, have you eaten any of the following game meats?

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

(If NO to all go to 38)

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

☐ More
☐ Same **(go to 38)**
☐ Less

Identifier # ☐☐☐☐☐☐

37 If you eat more or less game meat can you tell me why?

____
____
____

38 Did you eat more, about the same, or less fresh water fish, such as trout, this year as compared to five years ago?

- ☐ More
- ☐ Same **(go to 40)**
- ☐ Less

39 If you eat more or less fresh water fish, can you tell me why?

____
____
____

40 Did you eat more, about the same, or less salt water fish, such as cod, this year as compared to five years ago?

- ☐ More
- ☐ Same **(go to 42)**
- ☐ Less

41 If you eat more or less salt water fish, can you tell me why?

____
____
____

Identifier # ☐☐☐☐☐☐

PART IV

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

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

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

a. Problems with transportation.

Not at all ☐
A Little ☐
A Lot ☐

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

Not at all ☐
A Little ☐
A Lot ☐

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

Not at all ☐
A Little ☐
A Lot ☐

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

Not at all ☐
A Little ☐
A Lot ☐

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

Y☐ N☐

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

APPENDIX C

FORM E

Identifier # ☐☐☐☐☐☐

NEWFOUNDLAND & LABRADOR NUTRITION SURVEY

DEMOGRAPHIC PROFILE

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

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

☐☐

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

☐☐

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

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

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

NON-RESPONSE QUESTIONS

FORM A-2

Identifier # ☐☐☐☐☐☐

Non-response questions completed ☐ Yes ☐ No

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

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

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

☐ Yes ☐ No

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

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

DO NOT READ

☐ White Bread
☐ Molasses Raisin Bread
☐ Other_______________

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

☐ Yes ☐ No

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

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

DO NOT READ

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

---

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

☐ Yes ☐ No

4. Have you ever smoked cigarettes?

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

↓

At the present time do you smoke cigarettes?

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

↓

Do you usually smoke cigarettes every day?

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

↓

How many cigarettes do you smoke a day?

☐☐☐ Number ☐ Refused to answer

Identifier # ☐☐☐☐☐☐

6. **Weight used for calibration** ☐☐☐ . ☐ Kg

Weight on scale of calibration weight ☐☐☐ . ☐ Kg

Weight ☐☐☐ . ☐ **Kg** or ☐☐☐ **lb.**

Measured ☐

Self-reported ☐ ...**Reason** ________________

Refusal ☐

7. **Height** ☐☐☐ . ☐ cm **or** ☐ **feet** ☐☐ **inches**

Measured ☐

Self-reported ☐ ...**Reason** ______________________________

Refusal ☐

8. **Waist** ☐☐☐ . ☐ cm ☐☐☐ . ☐ cm | ☐☐☐ . ☐ cm

Refusal ☐

9. **Hips** ☐☐☐ . ☐ cm ☐☐☐ . ☐ cm | ☐☐☐ . ☐ cm

Refusal ☐

Acknowledgements: Alberta Nutrition Survey, 1994.
Canada's Health Promotion Survey, 1990.
Nova Scotia Nutrition Survey, 1990.
P.E.I. Nutrition Survey, 1995.

APPENDIX D

Memorial
University of Newfoundland

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

1998 03 18

Reference #98.59

Ms. Susan Kettle
c/o Community Health
Faculty of Medicine
Health Science Centre

Dear Ms. Kettle:

At a meeting held on **March 12, 1998**, your application entitled **"Prevalence of Cardiovascular Risk Factors in Young Newfoundland and Labrador Adults Living in Rural and Urban Communities. An Analysis of the Nutrition Newfoundland and Labrador Study Database"** was reviewed and approval granted.

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

St. John's, NF, Canada A1B 3V6 • Tel.: (709) 737-6974 • Fax: (709) 737-5033

APPENDIX E

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, Susan Kettle, 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 February 19th day of 19, 1998.

APPENDIX F

Household Income Levels of Residents of Newfoundland and Labrador

Level of Household Income in Newfoundland and Labrador

Household Income	*Household Size* 1	2	3	4	5
Lower	less than $14,999	less than $19,999	less than $19,999	less than $29,999	less than $29,999
Middle	$15,000 to $29,999	$20,000 to $39,999	$20,000 to $39,999	$30,000 to $49,999	$30,000 to $59,999
Higher	$30,000 or more	$40,000 or more	$40,000 or more	$50,000 or more	$60,000 or more

Russell Wilkins, Canadian Center for Health Information, Statistics Canada. In: 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 of Newfoundland, St. John's, 1996.