STUDY OF AMBULATORY PHYSICIAN UTILIZATION IN ST. JOHN'S, NEWFOUNDLAND

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STUDY OF AMBULATORY PHYSICIAN UTILIZATION IN ST. JOHN'S, NEWFOUNDLAND

By

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DEDICATION

To my late husband R. Garry Chard
who always supported my academic pursuits
and who would have been proud of
my completing this thesis.

ABSTRACT

The primary objective of this research was to study the demographic and socio-economic factors thought to influence the type and level of ambulatory visits by individuals 20 years and older residing in St. John's, Newfoundland, Canada. The data were derived from the Newfoundland Panel on Health and Medical Care, a provincial study involving some 12,000 residents from which a sub-sample of 2861 adults residing in St. John's was analysed. The study combined a cross sectional survey with a longitudinal panel for physician utilization during 1992-95.

A descriptive analysis of demographic variables (gender, age), socio-economic variables (education, income), and health status variables (self assessed health status and a number of chronic conditions) was conducted. Multivariate analysis was used to clarify the complex association between the selected variables and ambulatory physician utilization. Binary logistic regression techniques were first undertaken to predict the number of visits to both general practitioners and to specialists, and finally ordinal logistic regression was used to determine appropriate models for predicting the number of visits to general practitioners and specialists.

Study results were consistent with findings in similar studies. Females are almost twice as likely to have a high number of visits to general practitioners than males, utilization increases with age, individuals with low socio-economic status (SES) scores, poor health status, and more than one chronic condition visited general practitioners more frequently. Although such patterns of utilization were found to be similar to those of specialists, some differences were noted. The study concludes that age, gender, income, education, health status, and the presence of chronic conditions were deemed to be good predictors of

ambulatory physician utilization in the St. John's Institutional Board Region during the three year study period.

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CHAPTER 1: INTRODUCTION

1.1 Background

The Government of Newfoundland and Labrador currently expends approximately forty-four cents of every program dollar on health services. Translated that means in 2000-01 $1.3 billion dollars was devoted to health services for a population base of approximately half a million. A significant portion of the overall health budget relates to the provision of physician services to individuals through the provincial Medical Care Plan (MCP, Government of Newfoundland and Labrador, Budget 2000/01). This is in keeping with the Canada Health Act (1984) which provides for a comprehensive, national health insurance system for residents of all provinces.

Ambulatory medical care utilization, which includes visits by individuals to emergency and out-patient departments as well as to physicians offices, is of importance to the health research field and to policy makers alike. It is known that a number of factors, including demographic and socio-economic circumstances as well the health status of individuals, affect medical utilization rates to varying degrees. Medical utilization has been the subject of provincial, national and international research efforts for a number of decades and has contributed greatly to our understanding of the complex nature of health behaviors and patterns of medical care usage. However, despite these efforts much remains to be learned, particularly in the area of ambulatory medical utilization.

Do the social and economic circumstances of individuals influence the degree to which medical support is sought? To what extent do factors such as age, gender, education, income and health status influence how often an individual seeks such support? What impact does the presence of chronic conditions have on the volume and pattern of medical care? To

what degree do any or all of these factors associated with medical utilization impact upon visits to physicians?

In an attempt to answer these questions, a study was done of the utilization of medical care in ambulatory settings, by a panel of adults residing in the St. John's, Newfoundland Institutional Health Board area during 1992-95, as part of provincial study. The study analyzed the volume and pattern of utilization of 2831 individuals to general practitioners and specialists in the area as well as the factors associated with the visits.

1.2 Purpose of the Study

The overall purpose of this study was to utilize the data base created by the Segovia et al. study (1995) to assess the factors associated with ambulatory visits to general practitioners and specialists by adults 20 years and older in the St. John's Institutional Health Board area. Specifically, the study objectives include:

(i) description of the volume and type of medical care utilization during a three year period (1992-1995), taking into consideration demographic, socio-economic and health variables;

(ii) analysis of the factors associated with visits to general practitioners, general practitioners and specialists and specialists only; and

(iii) identification of possible policy implications associated with local medical utilization.

CHAPTER 2: LITERATURE REVIEW

Since the beginning of human civilization, individuals have, for different reasons, sought remedies for various ailments from those who purport to diagnose, cure, restore, alleviate or palliate. With the dawn of modern medicine, and particularly since the advent of medical care insurance programs, the complex nature of medical utilization is still not fully understood. A vast literature on the subject exists. Those aspects relevant to this study are reviewed below.

2.1 Medical Care Utilization

A significant body of health service research has been generated around the multidimensional and complex aspects of medical care utilization. Some of the major contributors include Greenlick et al. (1968), McKinley (1972), Anderson (1973), Hersey et al. (1975), Aday et al. (1980), Muller (1986) and more recently Roos et al. (1995), Hertzman et al. (1994), Tataryn et al. (1995) and Li (2000). Much of the earlier research focused on the socio-economic variables affecting medical utilization in the United States, particularly among select population groups, many of which did not possess comprehensive health insurance. Other studies have focused on health needs and used episodes of care to explore differences in medical care utilization, still others used behavior models to describe volume and patterns of medical care.

In Canada, where a comprehensive public health insurance system has existed since 1969, significant research has also analyzed medical care utilization patterns. Beck (1973) was one of the first researchers in Canada to consider the effects of public insurance and its relationship to access medical care in the province of Saskatchewan. Siemiatycki et al. (1980) also analyzed the effects of social class differences and the use of physician services

in Quebec. Broyles et al. (1983) used a 1978-79 Canada Health Survey to analyze medical care utilization related to hospital use. Manga et al. (1987) also used data from the same Canada Health Survey to study the relationship between medical need, socio-demographic and economic factors in determining the use or non-use of hospital care and the volume of medical care consumed.

Far less research effort has been devoted to medical care utilization in ambulatory settings. In the United States Moscovice (1977), using episodes of care, developed a methodological framework to help analyze the use of medical resources in ambulatory settings with a view to understanding why variations in treatment patterns exist. Kronenfield (1980), using a behavioral utilization model, studied sources of ambulatory care and ambulatory care utilization as well as social, demographic and health information to explain patterns of ambulatory care utilization. More recently, utilization studies have used administrative data banks, a system used to pay fee-for-service physicians, to conduct additional research [Siemiatycki (1980), Tataryn et al. (1995) Mc Isaac et al. (1997), Roos et al. (1999), and Li (2000)].

2.2 Demographic and Socio-economic (SES) Considerations

Physician contact has long been attributed to a number of demographic and socio-economic determinants including age, gender, education and income. The relationship between these determinants and medical care utilization has not been fully explained and continues to be the focus of research efforts. Anderson (1973) reported that a multiciplicity of studies have demonstrated that variation in utilization behavior could be related to age, sex, education, SES statistics and income. For the purposes of this study, literature dealing with the relationship between medical utilization and the SES variables of age, gender,

education and income is reviewed as well as literature dealing with health status and the presence of some chronic conditions.

2.2.1 Age and Medical Utilization

Aday, Anderson and Fleming (1980) found that the elderly receive more care (with the exception of dental care) than any other age group and that the amount of medical care they receive relative to the rest of the population has been increasing over time. These researchers also note that the number of visits by adults increases with age and that women average more visits to a physician. Broyles et al. (1983) noted that the absence of the significant influence of age on the tendency to use care might be reported as an anomologous finding. Their contention is that age is usually regarded as a surrogate for medical need, and normally it is expected to exert a positive and significant influence on the use of service. Tataryn et al. (1995) found that residents 75 years and older made twice as many ambulatory visits to physicians than younger adults. They also noted that in every age group urban residents in Manitoba, Canada, were somewhat more likely to make at least one physician visit, with differences up to 10% for males and females 0-14 years of age. Majeed et al. (1995), in discussing night medical utilization rates in a British practice, found significant positive correlations between annual night visiting rates and the percentage of the practice population aged 5 years or less and 5-14 years. Findings for this study are consistent with previous studies which indicated that children accounted for a large proportion of out-of-hours workload.

2.2.2 Gender

In Anderson's (1973) model of utilization, sex is an immutable factor. Verbruggee (1982) posed the paradox that, despite a lower mortality rate, women reported more acute

illnesses and used physicians services by visit or telephone contact more frequently than men. Broyles et al. (1983) reported that females age 20-44 years exhibited a greater tendency to use medical service than their male counterparts. This finding can be attributed primarily to maternity care needs. They also concluded that older males exhibited a greater propensity to seek treatment than their female counterparts and that this was likely attributable to life-styles and occupational factors. In addition, these researchers noted that married, separated, divorced or widowed individuals exhibited a greater tendency to seek treatment than a single person. Kronenfeld (1980) found that most surveys show that women use more care than men and that older people use more than younger people, although very young children 1-5 years use as much as individuals aged 65 and over. Kronenfeld also noted that if illness levels are controlled, age, race and education are not important predictors of physician utilization. Muller (1984) showed both similarities and differences in response to utilization by working men and women when compared across such factors as marital dislocation, family illness and single parent status. Working men, he contends, are more affected by a sick spouse than by a sick child, and working men are affected more by a sick spouse than are working women. McDonough et al. (1999) found no gender differences in the effects of respondents' SES positions on their mortality risk.

2.2.3 Education and Medical Utilization

Anderson (1973) reviewed a large number of studies linking income to education and noted that race and educational levels continue to be strongly associated with utilization of health services. Anderson and Aday (1978) reported educational levels have two, relatively small yet contradictory effects on medical utilization. In the first instance, a direct effect is reported which shows that highly educated individuals tend to use health services to a greater extent. However, an indirect effect is also noted and illustrates that those with higher

education experience less illness and consequently require fewer physician visits. Anderson et al. (1980) reported that college-educated persons are most likely to seek an examination for preventative purposes. They also found that individuals achieving less than high school education are most likely to visit a physician for specific illnesses.

Kronenfeld (1980) found that education is an important predisposing social structure determinant that exhibits a positive relationship with physician utilization. However, as previously stated she reports that, controlling for illnesses, age, race and education are not important predictors of physician utilization. Evans et al. (1994) note that there are specific social factors--in particular high levels of maternal education--that seem consistently to be associated with good population health even at low levels of average income. They conclude that educational levels, measured by the highest level of schooling attained, are determined early in life and remains more or less constant for decades to come. More recent research by Enterline et al., (1996) and Mc Issac et al. (1997) reports that higher levels of education and household income continue to align with relatively greater use of specialist physician services.

2.2.4 Income and Medical Utilization

A vast amount of research focusing on income and its relationship to medical care utilization exists. Beck (1973) reports that the relationship between income class and use of medical care is complex and involves more than the presence of purchasing power to acquire service. He suggests that while experience with medicare in Saskatchewan, Canada was increasing, disparity in accessibility to service appeared to vary directly with income class; that is, the higher the income class the greater the contact with physicians. Anderson (1980) reported that a large number of studies link income to education even when cost-barriers are

removed and that differences in utilization among various groups within a US population still exist. He cited several studies which demonstrated social class related differences, even under pre-paid insurance plans, and noted that even the National Health Service in England has apparently been unable to eliminate social class related differences in utilization.

Bice and Associates (cited in Anderson, 1973) present data from the U.S National Health Survey indicating that when health status is taken into account among different income groups, differences persist only among children and adults who experience the most severe level of disabilities. Aday et al. (1980) report that trends over time suggest that low income populations have made great strides in reducing utilization inequities they have traditionally experienced compared with the rest of the population. The authors, however, note that low income children still appear less likely to visit physicians and that low income expectant mothers tend to obtain pre-natal physician care later in pregnancy.

Broyles et al. (1983) reported that their study results were consistent with the contention that the medicare program in Canada has resulted in an equitable distribution of physician services. They cite a recent analysis of the Medicare program in Ontario, Canada, by Manga which indicated that family income has been eliminated as an important determinant of medical care use. Broyles et al. (1993) also noted that white-collar workers exhibited a significantly greater tendency to use care during the year than unemployed persons, while occupational status of blue-collar workers failed to contribute to the discrimination. They also reported that poor persons used significantly more care than individuals earning a high income. Birch et al. (1993), in analyzing family physician services found that the additional propensity of the more prosperous groups in the population was not associated with any advantage in terms of greater use of those services, even after

controlling for levels of health services. They also note, however, that utilization within groups of the population with similar levels of health status was associated with other non-price barriers, such as education.

Jin et al. (1995) reported an association between unemployment (income) and a greater risk of morbidity both at the individual and population health level, and a greater risk of mortality at the population level. Roos and Mustard (1997) found that, overall individuals from low income families have higher rates of contact with physicians than those individuals from high income households, although contact rates do not vary as markedly as might be expected given the health status differences among income groups. These researchers noted in the 1994 National Population Health Study that after adjusting for age, 68% of Canadian women in the highest income households reported their health status to be excellent or very good compared with 61% of those in the upper middle groups and 39% in the lowest income groups. Statistics Canada (1994) also provides additional evidence of a strong and consistent gradient across income categories in relation to indicators of need for specialist care. Across 10 of 13 types of problems assessed, the lowest income groups reported the most problems and the upper income groups, the least. Roos and Mustard (1997) found activity limitation reports ranged from 25 percent of individuals in the lowest income groups to seven percent of those in the highest. Kawachi and Kennedy (1999) found the relationship between income and health to be well established, that is the higher an individual's income is the greater the impacts on medical care services will be.

2.3 Health Status and Medical Utilization

Health status refers to the level of general health and well-being, the capacity to function, the existence of disease or health problems, causes of death, and length of life

(Report on the Health of Canadians, 1996). Health status indicators can be derived from such methods as registrations of births and deaths, records of hospitalizations, surveillance systems, visits to physicians and surveys. A number of authors have indicated concern regarding measurement instruments for health status including Bergner (1985, 1987), Patrick and Erickson (1993), and Young (1998). Hertzman et al. (1994) found that higher SES variables, however measured, seem to be associated with better health. They contend there are virtually no examples of societies in which the overall health status is (or was) inversely related to wealth, income or social class.

Evans et al. (1994) citing Caldwell (1986) indicate that there are strong cross national correlations between health and wealth with certain societies achieving aggregate health status measures that are much higher than their income levels would predict, while others are lower. More recently, measurement instruments appear to focus on individual and population health approaches. Roos et al. (1997) report that health status, mediated by individual responses, has an impact on medical utilization. These researchers evaluated differences in health status across socio-economic groups in Manitoba, Canada, and assessed, according to need, the levels of use among hospitals and physicians. They found that across 6 of the 14 mortality measures there was more than a two fold difference in rates, indicating that the level of health among Winnipeg, Manitoba, residents declined with their socio-economic status, but specialist physicians do not provide more care to those of higher than lower health status.

2.3.1 Chronic Diseases and Conditions and Medical Utilization

According to the Second Report on the Health of Canadians (1999), chronic diseases/conditions refer to a wide range of health problems, such as heart disease, cancer,

injuries, mental illness, diabetes, arthritis, and allergies. These conditions may be of long duration, and a complete cure for some may never be attainable. The report notes that while such chronicity can occur at any age, it is likely they are present among the older age group. Hertzman et al. (1994) identified the age of 75 years where health status is often determined by the late and usually less specific effects of more than one chronic degenerative disease processes, leading to multiple organ system involvement. Thus, the presence of chronicity contributes to utilization. Tomiak et al. (1998) found that the consumption of health care resources, or the risk of health care use, increased significantly as the number of chronic conditions and the severity of disabilities increased. Roos et al. (1999) found that people who had more complex medical conditions made more contact with physicians, but after controlling for this and other key characteristics, the patient's primary care physician and patient recall rate were strong influences on how frequently visits were made.

In conclusion, it appears that based on these literature findings, it is expected that the results of this study will generally correlate with those of other researchers who have studied similar factors influencing the medical care utilization.

CHAPTER 3: DESIGN AND ETHICAL CONSIDERATIONS

3.1 Introduction

This study involved a secondary analysis of data from the Newfoundland Panel on Health and Medical Care (NPHMC). This study provided medical utilization data for adults for the years 1992/93 to 1994/95 for the island portion of the Province of Newfoundland, Canada. The primary purpose of the study was to examine the factors in the St. John's Institutional Health Board Area that were thought to influence both the volume and type of ambulatory consultation to physicians prior to the restructuring of the province's health care system. This restructuring, commencing in 1994, began a process which, for the first time, saw health services being delivered by both community and institutional boards at a regional level, rather than centralized within the provincial government.

3.2 Design

The design of this study combines a cross-sectional health survey with a longitudinal panel for physicians' utilization over a three-year period. The NPHMC was a population-based study which included: (i) a health survey on a sample of households, and (ii) a longitudinal utilization (7 year panel) including all subjects who provided written consent for access to Medical Care Plan (MCP) Commission and medical care utilization databases. For this study, a sub-sample of the larger provincial study was used and included only St. John's respondents who participated in the Newfoundland Panel on Health and Medical Care (NPHMC). The St. John's region was selected for the study as it is the region which contains the tertiary care center and thus the most medical care resources, including hospital beds and physicians. As such, it may be considered as providing the most efficient response to the needs of the population. As a consequence, all residents of the region have access to the same level of resources and this in turn simplifies the design. In addition, all physicians

in the St. John's region are remunerated on a fee-for-service basis; consequently, all physicians submit claims to MCP. This does not occur in areas of the province outside St. John's, where a significant proportion of general practitioners are salaried and thus do not submit claims to MCP. The Adult Health Survey (1995) collected health data through telephone interviews on approximately 12,000 subjects over the age of 20 years. The Medical Care Utilization Study (1997) collected clinical data from a sub-sample of the Adult Health Survey.

The null hypotheses is:

1. There is no association between demographic variables, socio-economic variables, health status and chronic conditions on the one hand, and the type and level of medical care utilization on the other, for ambulatory consultations to physicians.

3.3 Ethical Considerations

As explained in the Newfoundland Adult Survey, 1995-Methodology and Descriptive Results (Segovia, 1996), approval to conduct this study was granted by the Human Investigations Committee (HIC), Faculty of Medicine, Memorial University of Newfoundland. Respondents to the survey provided verbal consent to the survey and written consent to link their survey data to the medical care data captured by the Medical Care Commission (MCP).

All personal identifiers were eliminated prior to being entered in the analysis files. No identifying patient information was used in producing documents or reports based on the data collected. The process of consent for the usage of medical care information was in

compliance with provincial legislation (Newfoundland, Canada) and approved by the then Minister of Health.

CHAPTER 4: METHODOLOGY

4.1 Introduction

While medical care utilization is a complex and dynamic phenomenon involving numerous factors, this study concerned itself with a selected number of variables to explain the association of ambulatory care visits to general practitioners and specialists by 2,831 individuals residing in St. John's, Newfoundland over the 3 year period 1992 to 1995. Each of the variables studied are listed and described.

4.2 Data Collection

The data file contained 2,831 subjects, 20 years and older, residing in St. John's, Newfoundland, Canada , during a three year period 1992-95. Individuals in the sample study were served by the St. John's Institutional Health Board, by general practitioners, and by specialists on a fee-for-service basis. All individuals were permanent residents of the province who, like all other Canadians, receive universal health insurance coverage.

The two sample data files used for this study were generated from the NPHMC. One file contained the St. John's data related to the adult health survey of 1995 and the other contained medical utilization data in the St. John's area as per the 1997 study, obtained by record linkage to a computerized data base of physician claims.

The Adult Health Survey (1995) collected data on demographic and socio-economic variables, health status and lifestyle practices which were collected in a cross-sectional telephone survey. A single stage cluster (household) sample of the island portion of the province was chosen with residents selected through random digit dialing. The survey had an 84.8% response rate resulting in a total of 11,797 residents providing data for the study.

Consent to use MCP data to link the survey data with medical care utilization was subsequently provided by 78.5% (9,237) of those responding to the cross-section component of the study. This group comprised the medical utilization sub-sample. The St. John's sub-sample consisted of 2,831 subjects. The sample is representative of the overall St. John's population.

Selected demographic, socio-economic, and health status variables, including gender, age, education, income, health status, and chronic conditions were cross tabulated with physician utilization data by level and type for the three year study period.

4.3 Definition and Description of Variables

1. Demographic: Age and Gender

Individuals 20 years and older comprise the sample. The sample was grouped into six distinct categories and include: (1) 20-29 years; (2) 30-39 years; (3) 40-49 years; (4) 50-59 years; (5) 60-69 years, and (6) 70+ years.

2. Socio-economic

(a) Educational Status

Educational levels of the highest level of schooling attained are categorized into five groupings and include: (1) less than high school; (2) high school; (3) trades school diploma; (4) university - no degree; and (5) university - with degree.

(b) Income Adequacy

The Income Adequacy variable was computed using total household income, the number of individuals in a household, and the low income cut off points (LICOs), according

to the Canada Census methodology. Statistics Canada, low income cut-offs for 1994 (1986 base), for community size for 30,000 - 99,999 persons is $13,282 for a family size of 1, on the lowest end, and $33,609 for a 7+ member family on the highest end. Income status was grouped in five categories: (1) very low; (2) low; (3) lower middle; (4) upper middle; and (5) high.

3. Health Status (HSTAT)

Determination of health status in the sample was obtained by way of self-assessed health status, where individuals were asked to rate their own general health and well-being using a specific scale. HSTAT is grouped into four categories: (1) excellent; (2) good; (3) fair; and, (4) poor.

4. Chronic Conditions

Chronic conditions include those conditions, as per the Adult Health Survey (1995), which had been present for three months or more, and include some 26 conditions such as Arthritis, Diabetes, Cancer, Asthma, Epilepsy, High Blood Pressure and Mental Illness. The number of chronic conditions reported by individual respondents is grouped in four categories and include: (1) zero; (2) one; (3) two; and (4) three or more.

5. Physician Utilization

Physician utilization captures both the type and level of visits made by individuals to physicians during the study period. With respect to the type of visit, four specific categories exist: (1) general practitioner visits only; (2) specialist only; (3) general practitioner and specialist; and (4) neither. Level (number) of visits is grouped in six

categories: (1) no visits; (2) 1-5 visits; (3) 6-20 visits; (4) 21-40 visits; (5) 41-60 visits, and (6) 61+ visits.

CHAPTER 5: RESULTS

5.1 Comparisons of Selected Variables Between Study Groups

Table 1 presents the comparison of select variables for the Newfoundland Panel on Health and Medical Care (NPHMC), the NPHMC - St. John's Health and Community Service Region, represented by the Health Care Corporation of St. John's (HCCSJ), (NPHMC HCCSJ) and those respondents of the NPHMC HCCSJ who provided written consent to link their survey data to medical care data bases (NPHMC HCCSJ MCP). Of the total of 11,789 subjects interviewed for the NPHMC, medical data was obtained on 8,219 subjects (69.7%). In the HCCSJ region there were 3,821 subjects participating in the NPHMC, of which medical data was obtained on 2,831 (74.1%).

Findings indicate that there was little difference in the distribution of gender, age, self-assessed health status and number of chronic conditions between the sample in the NPHMC HCCSJ and the sub-sample in the NPHMC HCCSJ MCP. There was, however, a slight shift in the distribution for the education and income adequacy categories. Consent rate was higher among respondents with higher income and education in the NPHMC HCCSJ MCP sub-sample than that of the NPHMC HCCSJ sample. This is not surprising given the response rates in surveys is generally higher if the sampling frame is found to have a high proportion of educated subjects. The shift in distribution for income and education is even more evident when the NPHMC HCCSJ MCP sample is compared to the overall NPHMC sample. This socio-economic shift results in a higher proportion of NPHMC/HCCSJ/MCP respondents indicating their health status as excellent than that of larger NPHMC sample (26.5% verses 21.5%). Again this is to be expected given the highest concentration of educated people in the province is found in the St. John's area. As a result

of this shift in socio-economic status caution should be taken when generalizing the results of this study to the entire province.

Table 1
Descriptive Comparisons of Select Variables Between Study Groups

Variable	NPHMC	NPHMC/HCCSJ*	NPHMC/HCCSJ/MCP
Gender			
Male	46.5	45.8	45.7
Female	53.5	54.2	54.3
Age			
20-29	21.6	23.6	21.8
30-39	23.5	25.0	24.4
40-49	23.7	23.1	23.9
50-59	13.1	13.0	14.2
60-69	9.4	8.7	8.7
70+	8.6	6.7	7.0
Education			
Less than high school	36.0	20.6	18.1
High school completed	19.1	18.8	17.9
Trades	25.0	27.7	28.4
University, no degree	10.0	15.6	16.7
University, w/degree	10.0	17.3	18.9
Income Adequacy			
Very low	7.7	6.8	4.9
Low	25.0	16.4	13.8
Lower Middle	35.0	29.3	28.2
Upper Middle	18.4	24.1	27.3
High	13.9	23.4	25.8
Self-assessed Health Status			
	21.5	25.2	26.5
Excellent	57.9	59.1	57.8
Good	18.1	13.9	14.0
Fair	2.5	1.9	1.8
Poor			
Chronic Conditions			
	27.1	28.2	27.5
None	26.0	27.5	28.0
1	18.9	18.5	18.0
2	28.0	25.8	26.6
3 or More			

Table 1 (Cont'd)
Descriptive Comparisons of Select Variables Between Study Groups

Variable	NPHMC	NPHMC/HCCSJ*	NPHMC/HCCSJ/MCP
SES Score			
Lowest	4.7	3.4	2.3
2	15.5	8.2	6.6
3	18.1	10.7	9.6
4	15.2	13.9	12.6
5	14.6	14.9	15.4
6	11.4	15.5	17.1
7	8.7	12.9	14.6
8	5.1	8.8	9.9
9	4.6	8.8	9.8
Missing	2.1	2.8	2.1
TOTAL	11,789	3,821	2,831

*Health Care Corporation of St. John's - Represents St. John's Institutional Board Area.

5.2 Demographics: Age and Gender

The total sample included 1,295 males (45.7%) and 1,536 females (54.3%), with the mean age of males being 42.3 years and females 43.3 years. There was little difference in the distribution of the male and female age group, although females had slightly higher occurrences in the over sixty age group at 16.6% versus males at 14.6%. Table 2 outlines age groups by gender.

Table 2
Age Groups by Gender

AGEGR2		Sex		Total
		Male	Female	
20-29	Count	272	344	616
	% within sex	21.0%	22.4%	21.8%
30-39	Count	332	359	691
	% within sex	25.6%	23.4%	24.4%
40-49	Count	309	367	676
	% within sex	23.9%	23.9%	23.9%
50-59	Count	192	211	403
	% within sex	14.8%	13.7%	14.2%
60-69	Count	112	134	246
	% within sex	8.6%	8.7%	8.7%
70+	Count	78	121	199
	% within sex	6.0%	7.9%	7.0%
Total	Count	1295	1536	2831
	% within sex	100.0%	100.0%	100.0%

5.3 Socio-economic

a) Educational Status

In the sample, 64.0% of respondents were found to have some post-secondary education, whereas 18.1% indicated they had not completed high school. Male respondents were found to have more university experience (39.3%) than their female counterparts (32.4%), however, females were more likely than males to attend trades schools/diploma granting schools (32.9% versus 23.2%). Table 3 illustrates education level by gender.

Table 3
Education Level by Gender

EDUCGP5		Sex		Total
		Male	Female	
< high school	Count % within sex	222 17.1%	289 18.8%	511 18.1%
high school	Count % within sex	264 20.4%	244 15.9%	508 17.9%
trades sch/diploma	Count % within sex	300 23.2%	505 32.9%	805 28.4%
univ - no degree	Count % within sex	247 19.1%	226 14.7%	473 16.7%
univ - with degree	Count % within sex	262 20.2%	272 17.7%	534 18.9%
Total	Count % within sex	1295 100.0%	1536 100.0%	2831 100.0%

5.4 Income Adequacy

Overall, 18.7% indicated 'low' or 'very low' income status; 28.2% reported income in the 'lower middle' category, while the majority (53.6%) indicated 'upper middle' or high. Income adequacy, as defined by Statistics Canada, used reported income, the number of individuals in the household, and the provincial low income cut off (LICOs) points as per the procedure used in the Canada Census (Segovia et al. 1997). Table 4 outlines income status by gender.

Table 4
Income Status by Gender

INCAD5		Sex		Total
		Male	Female	
very low	Count % within sex	44 3.5%	91 6.1%	135 4.9%
low	Count % within sex	160 12.6%	222 14.8%	382 13.8%
lower middle	Count % within sex	364 28.7%	418 27.8%	782 28.2%
upper middle	Count % within sex	355 28.0%	401 26.7%	756 27.3%
high	Count % within sex	345 27.2%	371 24.7%	716 25.8%
Total	Count % within sex	1268 100.0%	1503 100.0%	2771 100.0%

NOTE: 60 respondents did not answer question on income.

5.5 Health Status

The vast majority (84.2%) of individuals in the study rated their health status as either excellent or good. There was little difference in subjective health status between males (83.8%) and females (84.6%) for those rating their health status as either excellent or good. Table 5 shows health status by gender.

Table 5
Health Status by Gender

Self Assessed Health Status		Sex		Total
		Male	Female	
excellent	Count % within sex	322 24.9%	427 27.8%	749 26.5%
good	Count % within sex	763 58.9%	873 56.8%	1636 57.8%
fair	Count % within sex	187 14.4%	208 13.5%	395 14.0%
poor	Count % within sex	23 1.8%	28 1.8%	51 1.8%
Total	Count % within sex	1295 100.0%	1536 100.0%	2831 100.0%

5.6 Chronic Conditions

Overall 27.5% of the sample indicated no chronic conditions, 46.0% reported one or two, while 26.6% reported three or more. Male respondents were more likely to indicate no chronic conditions than their female counterparts (31.5% versus 24.0%); however, males were more likely than females to have one chronic condition (30.9% versus 25.5%). Females were more likely than males to have more than two chronic conditions (50.5% versus 37.6%). Table 6 depicts number of chronic conditions by gender.

Table 6
Number of Chronic Conditions by Gender

Chronic Conditions		Sex		Total
		Male	Female	
zero	Count % within sex	408 31.5%	369 24.0%	777 27.5%
one	Count % within sex	400 30.9%	391 25.5%	791 28.0%
two	Count % within sex	227 17.5%	283 18.4%	510 18.0%
three or more	Count % within sex	260 20.1%	492 32.1%	752 26.6%
Total	Count % within sex	1295 100.0%	1535 100.0%	2830 100.0%

NOTE: Data from one record, dealing with chronic conditions, was missing.

5.7 Physician Utilization

(a) Selected Descriptive Statistics

Table 7 includes mean (with 95% C.I.), median, and maximum value for visits to general practitioners and specialists, by sex and for all subjects over a three year period.

Table 7
Descriptive Statistics: Physician Type by Gender (3-Year Average)

	Female	Male	All
GPs			
Mean	24.21	14.95	19.97
95% C.I.	23.19 - 25.22	13.95 - 15.95	19.40 - 20.71
Median	19.0	10.0	15.0
Maximum	176	242	242
Specialists			
Mean	7.41	5.13	6.37
95% C.I.	6.76 - 8.06	4.53 - 5.73	5.92 - 6.82
Median	4.0	1.0	3.0
Maximum	220	199	220

(b) Type of Visit

Table 8 depicts Type of Visit by individuals to physicians during the study period. Of the 2,831 individuals comprising the sample, visits to general practitioners constituted only 26.4% while 70.9% visited both general practitioners and specialists; less than 1% of individuals (0.5%) visited a specialist only, while 2.2% visited neither a general practitioner nor a specialist.

Table 8
Type of Visit

Type of Visit	Total	%
General Practitioner Only	748	26.4
Specialist Only	14	0.5
General Practitioner and Specialist	2008	70.9
Neither	47	2.2
Total	2831	100.0

ج) Level of Visit

Table 9 describes the categories of physician utilization and the average number of visits per year.

Table 9
Typology and Average Number of Visits

Category	Number of Visits	Average Visits per Year
No utilization	0	0
Very low utilization	1 - 5	0.3 - 1.6
Low utilization	6 - 20	2 - 6.6
Moderate utilization	21 - 40	7 - 13.3
High utilization	41 - 60	13.6 - 20
Very high utilization	61+	21+

Table 10 depicts the Level (number) of Visits by individuals to physicians. This variable is divided into six categories to reflect the level of utilization. The categories are arbitrary, however, they correspond to the categories noted in Table 9 which used the average

number of visits in a year for all visits. These categories represent a compromise considering the number of visits to general practitioners and specialists.

A small portion of the sample (2.2%) reported no visits to a physician, while most subjects (38.5%) had 6 - 20 visits in the three year period.

Table 10
Level of Visits

Visits GP/Specialist	Total	%
None	61	2.2
1 - 5	346	12.2
6 - 20	1089	38.5
21 - 40	783	27.7
41 - 60	310	11.0
61+	242	8.5
Total	2831	100.0

In general, the demographic, SES health status variables and physician utilization distribution in this sub-set population corresponded to the distribution in the larger (NPHMC panel) population. As previously discussed, however, there was a slight shift in the distribution for the education and income adequacy categories due, no doubt, to higher number of educated people in the St. John's area.

5.8 Bivariate Analysis: Distribution and Relationship

This section explores and describes the level and type of physician utilization with the following demographic variables: gender and age, the socio-economic variables, education and income, and health status variables (including some chronic diseases). To test

for the significance of the associations between variables, Chi-Square and Gamma were used. Chi-Square is very sensitive to large sample sizes; therefore, it is likely to be statistically significant even if the association is very small. The results of some of the Chi-Square tests are included as examples. Reliance on Gamma, which is the most frequently used measure of ordered cross-tabular association, is evident. Gamma is symmetric as it yields the same results despite the order of the two variables. Its value ranges from +1.00 to -1.00. For example, a value of 0.50 indicates that the variation in the first variable accounts for 50% of the variation in the second variable. Therefore, the value of Gamma provides an indication of the strength of the association, independently from the statistical significance.

5.8.1 Demographic Variable: Gender

Gender and Type of Visits to General Practitioners and Specialists

Table 11 depicts the Type of Visits to General Practitioners and Specialists by Gender. Four categories of visit types are outlined: (1) visits to general practitioners only; (2) specialists only; (3) general practitioner and specialist; and (4) neither. As illustrated, females were more likely to visit a general practitioner/specialist over the three year study period than males (77.9% versus 62.7%). Conversely, males were more likely than females to visit a general practitioner only (33.0% versus 20.9%).

Table 11
Type of Visits to General Practitioners and Specialists

Type of Visit		Sex		Total
		Male	Female	
GP Only	Count % within sex	427 33.0%	321 20.9%	748 26.4%
Specialist	Count % within sex	9 .7%	5 .3%	14 .5%
GP and Spec	Count % within sex	812 62.7%	1196 77.9%	2008 70.9%
Neither	Count % within sex	47 3.6%	14 .9%	61 2.2%
Total	Count % within sex	1295 100.0%	1536 100.0%	2831 100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	87.56951	3	.0000
Likelihood Ratio	88.42345	3	.0000
Linear-by-Linear Association	40.64033	1	.0000
Minimum Expected Frequency	6.404		

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	.229	.038	5.797	.000
N of Valid Cases	2831			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

The data reflects the association between the types of visits to general practitioners and specialists. (Chi-Square significance = 0.0000; Gamma = 0.2294, significance 0.0000).

Gender and Level of Visits to General Practitioners and Specialists

Table 12 depicts the Level of Visits by Gender. Study subjects were grouped into six specific categories with respect to the number of times they visited a physician during the three year study period. The range of visits encompassed 'no visits' to 'greater than 60 visits'. Males tended to have 20 or less visits to a physician over the study period (67.2%) than females (40.7%); while 26.7% of females had more than 40 visits and males had 10.9%. Gamma has a value of .44 (significance .000) indicating an association between gender and type of visits. The data reflects the association between gender and level of visits is significant (Chi-Square significance = 0.000; Gamma = 0.440, significance 0.000).

Table 12
Level of Visits by Gender

Categories of Visits to GP/SP		Sex		Total
		Male	Female	
0	Count % within sex	47 3.6%	14 .9%	61 2.2%
1 - 5	Count % within sex	251 19.4%	95 6.2%	346 12.2%
6 - 20	Count % within sex	573 44.2%	516 33.6%	1089 38.5%
21 - 40	Count % within sex	283 21.9%	500 32.6%	783 27.7%
41 - 60	Count % within sex	67 5.2%	243 15.8%	310 11.0%
61+	Count % within sex	74 5.7%	168 10.9%	242 8.5%
Total	Count % within sex	1295 100.0%	1536 100.0%	2831 100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	269.18003	5	.0000
Likelihood Ratio	278.78267	5	.0000
Linear-by-Linear Association	228.98356	1	.0000
Minimum Expected Frequency	27.904		

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	.440	.025	17.081	.000
N of Valid Cases	2831			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Gender and Visits to General Practitioner Only

Table 13 illustrates the Level of General Practitioner Visits by Gender. There is a clear difference between male and female subjects having between 1 - 5 general practitioner visits (24.5% versus 8.5%). There was a slight difference only between gender in the 6 - 20 category of visits (49.0% versus 44.6%). Females were more than twice as likely than males to have between 21 - 60 visits (41% versus 19.9%). There was little difference in gender for visits in excess of 60. The data reflects the association between gender and level of visits is significant (Chi-Square significance = 0.000; Gamma = 0.456, significance 0.000).

Table 13
Gender and Level of Visits to General Practitioners Only

GP Visit		Sex		Total
		Male	Female	
No Visits	Count % within sex	56 4.3%	19 1.2%	75 2.6%
1 - 5	Count % within sex	317 24.5%	130 8.5%	447 15.8%
6 - 20	Count % within sex	634 49.0%	685 44.6%	1319 46.6%
21 - 40	Count % within sex	211 16.3%	471 30.7%	682 24.1%
41 - 60	Count % within sex	47 3.6%	158 10.3%	205 7.2%
>60 Visits	Count % within sex	30 2.3%	73 4.8%	103 3.6%
Total	Count % within sex	1295 100.0%	1536 100.0%	2831 100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	256.976[a]	5	.000
Likelihood Ratio	264.833	5	.000
Linear-by-Linear Association	220.577	1	.000
N of Valid Cases	2831		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 34.31.

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Gamma	.456	.025	16.941	.000
N of Valid Cases		2831			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Gender and Visits to Specialists Only

Visits to Specialists by Gender is illustrated in Table 14. Overall, males were more likely not to have visited a specialist (36.6% versus 21.8%). Females were more likely than males to have at least one specialist visit over the study period (78.2% versus 63.4%). When assessing those subjects who visited a specialist, there was little difference noted between gender and the number of visits, although females appear to be more likely to have 6 - 20 visits than males (33.5% versus 20.5%). A Gamma of 0.284 indicates that gender has less influence on the number of visits to specialists than for general practitioners.

Table 14
Gender and Level of Visits to Specialists Only

Specialist Visit		Sex		Total
		Male	Female	
No Visits	Count % within sex	474 36.6%	335 21.8%	809 28.6%
1 - 5	Count % within sex	487 37.6%	575 37.4%	1062 37.5%
6 - 20	Count % within sex	265 20.5%	514 33.5%	779 27.5%
21 - 40	Count % within sex	48 3.7%	85 5.5%	133 4.7%
41 - 60	Count % within sex	12 .9%	15 1.0%	27 1.0%
>60 Visits	Count % within sex	9 .7%	12 .8%	21 .7%
Total	Count % within sex	1295 100.0%	1536 100.0%	2831 100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	102.044[a]	5	.000
Likelihood Ratio	102.960	5	.000
Linear-by-Linear Association	76.783	1	.000
N of Valid Cases	2831		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.61.

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	.284	.028	9.953	.000
N of Valid Cases	2831			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

5.8.2 Demographic Variable: Age

This section explores the association of visits to both general practitioners and specialists with the age of sample subjects 20 to 70+ years.

Age and Level of Visits to General Practitioners

Table 15 shows level of visits to general practitioners by age group. It is evident that as age increases (up to 70) there is also a tendency for greater than five visits to general practitioners to occur. The percentage of individuals between the age of 20-29 with more than 20 visits was found to be 32.0%, whereas for subjects over the age of 70 this percentage was 59.3%. The association between age categories and number of visits was found to be significant (Chi-Square significance = 0.000; Gamma significance = 0.000), but small (Gamma 0.139).

Table 15
Age and Level of Visits to General Practitioners

GP Visit		AGEGRP						Total
		20-29	30-39	40-49	50-59	60-69	70+	
No Visits	Count	12	19	22	11	8	3	75
	%withinAGEGRP	1.9%	2.7%	3.3%	2.7%	3.3%	1.5%	2.6%
1 - 5	Count	111	133	112	53	31	7	447
	%withinAGEGRP	18.0%	19.2%	16.6%	13.2%	12.6%	3.5%	15.8%
6 - 20	Count	296	320	353	179	100	71	1319
	%withinAGEGRP	48.1%	46.3%	52.2%	44.4%	40.7%	35.7%	46.6%
21 - 40	Count	149	156	125	115	68	69	682
	%withinAGEGRP	24.2%	22.6%	18.5%	28.5%	27.6%	34.7%	24.1%
41 - 60	Count	34	49	40	24	24	34	205
	%withinAGEGRP	5.5%	7.1%	5.9%	6.0%	9.8%	17.1%	7.2%
>60 Visits	Count	14	14	24	21	15	15	103
	%withinAGEGRP	2.3%	2.0%	3.6%	5.2%	6.1%	7.5%	3.6%
Total	Count	616	691	676	403	246	199	2831
	%withinAGEGRP	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	125.890[a]	25	.000
Likelihood Ratio	125.705	25	.000
Linear-by-Linear Association	61.847	1	.000
N of Valid Cases	2831		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.27.

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	.139	.020	6.708	.000
N of Valid Cases	2831			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Age and Level of Visit to Specialists

Table 16 depicts the Level of Visits by Age to Specialists. It is noted that for all age groups the highest percentage of visits (37.5%) was in the 1 - 5 range category. Generally speaking, as age increased the frequency of visits to specialists increased. The association tests for gender and visits to specialists was moderate (Chi-Square significance = 0.000; Gamma significance = 0.000).

Table 16
Age and Level of Visits to Specialists

Specialist Visit		AGEGP						Total
		20-29	30-39	40-49	50-59	60-69	70+	
No Visits	Count % within AGEGRP	250 40.6%	212 30.7%	184 27.2%	88 21.8%	52 21.1%	23 11.6%	809 28.6%
1 - 5	Count % within AGEGRP	222 36.0%	289 41.8%	269 39.8%	142 35.2%	72 29.3%	68 34.2%	1062 37.5%
6 - 20	Count % within AGEGRP	125 20.3%	153 22.1%	187 27.7%	132 32.8%	101 41.1%	81 40.7%	779 27.5%
21 - 40	Count % within AGEGRP	16 2.6%	23 3.3%	27 4.0%	28 6.9%	18 7.3%	21 10.6%	133 4.7%
41 - 60	Count % within AGEGRP	3 .5%	7 1.0%	6 .9%	5 1.2%	1 .4%	5 2.5%	27 1.0%
>60 Visits	Count % within AGEGRP		7 1.0%	3 .4%	8 2.0%	2 .8%	1 .5%	21 .7%
Total	Count % within AGEGRP	616 100.0%	691 100.0%	676 100.0%	403 100.0%	246 100.0%	199 100.0%	2831 100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	180.177[a]	25	.000
Likelihood Ratio	178.893	25	.000
Linear-by-Linear Association	135.079	1	.000
N of Valid Cases	2831		

a. 7 cells (19.4%) have expected count less than 5. The minimum expected count is 1.48.

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	.245	.020	12.109	.000
N of Valid Cases	2831			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

5.8.3 Socio-economic Variables: Education and Income

Education and Level of Visits to General Practitioners

The level or number of visits to general practitioners based on the educational attainment level of individual subjects in the sample study is illustrated in Table 17. The table suggests that for this sample, individuals with higher levels of educational attainment made fewer visits to general practitioners than those with less education. For individuals with some university education, 6.6% visited a general practitioner more than 40 times, whereas 11.2% of individuals achieving a high school level had 40 or more visits. Individuals with trades school/diploma levels (33.5%) visited a general practitioner 20 - 60 times compared with those who had a university degree (23.3%). The association between educational levels attained and the level or number of visits was found to be significant (Chi-Square significance = 0.000; Gamma significance = 0.000).

Table 17
Education and Level of Visits to General Practitioners

GP Visit		EDUCGP5					Total
		< high school	high school	trades/ diploma	univ - no degree	univ - with degree	
No Visits	Count % within EDUCGP5	12 2.3%	9 1.8%	14 1.7%	15 3.2%	25 4.7%	75 2.6%
1 - 5	Count % within EDUCGP5	63 12.3%	84 16.5%	107 13.3%	85 18.0%	108 20.2%	447 15.8%
6 - 20	Count % within EDUCGP5	183 35.8%	239 47.0%	383 47.6%	241 51.0%	273 51.1%	1319 46.6%
21 - 40	Count % within EDUCGP5	140 27.4%	119 23.4%	216 26.8%	101 21.4%	106 19.9%	682 24.1%
41 - 60	Count % within EDUCGP5	76 14.9%	33 6.5%	54 6.7%	24 5.1%	18 3.4%	205 7.2%
>60 Visits	Count % within EDUCGP5	37 7.2%	24 4.7%	31 3.9%	7 1.5%	4 .7%	103 3.6%
Total	Count % within EDUCGP5	511 100.0%	508 100.0%	805 100.0%	473 100.0%	534 100.0%	2831 100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	150.096[a]	20	.000
Likelihood Ratio	146.981	20	.000
Linear-by-Linear Association	102.731	1	.000
N of Valid Cases	2831		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.53.

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	-.196	.021	-9.280	.000
N of Valid Cases	2831			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Education and Levels of Visits to Specialists

Table 18 outlines the educational status attained in the study sample and the level of visits to specialists. It appears that individuals with more education are more likely to make less visits to specialists, however, while Gamma is significant, its value is too low (-.096). Results of a Chi-Square analysis are not valid as there were 7 cells with less than 5 expected cases.

Table 18
Education and Level of Visits to Specialists

Specialist Visit		EDUCGP5					Total
		< high school	high school	trades/ diploma	univ - no degree	univ - with degree	
No Visits	Count	124	146	214	167	158	809
	% within EDUCGP5	24.3%	28.7%	26.6%	35.3%	29.6%	28.6%
1 - 5	Count	176	190	301	168	227	1062
	% within EDUCGP5	34.4%	37.4%	37.4%	35.5%	42.5%	37.5%
6 - 20	Count	158	145	238	119	119	779
	% within EDUCGP5	30.9%	28.5%	29.6%	25.2%	22.3%	27.5%
21 - 40	Count	42	19	39	13	20	133
	% within EDUCGP5	8.2%	3.7%	4.8%	2.7%	3.7%	4.7%
41 - 60	Count	9	5	5	3	5	27
	% within EDUCGP5	1.8%	1.0%	.6%	.6%	.9%	1.0%
>60 Visits	Count	2	3	8	3	5	21
	% within EDUCGP5	.4%	.6%	1.0%	.6%	.9%	.7%
Total	Count	511	508	805	473	534	2831
	% within EDUCGP5	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	53.671[a]	20	.000
Likelihood Ratio	51.476	20	.000
Linear-by-Linear Association	18.748	1	.000
N of Valid Cases	2831		

a. 7 cells (23.3%) have expected count less than 5. The minimum expected count is 3.51.

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	-.096	.021	-4.571	.000
N of Valid Cases	2831			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Income and Level of Visits to General Practitioners

In this section, five categories of income were measured in the sample–very low; low; lower middle income; upper middle income; and high and were cross tabulated with six ranges of visits from 'no visits' to greater than 60 visits for both general practitioners and specialists. The association between each was explored.

Table 19 illustrates that individuals with a higher income were more likely to have fewer visits than those reporting low or very low income. For individuals with greater than 40 visits, those reporting very low income (27.4%) had almost three times the number of visits compared with those reporting upper middle (7.7%) or high income (6.4%). Over ninety five percent of subjects had at least one visit, while 10.7% had more than 40 visits. For the 6 - 20 visit group, the number of subjects visiting physicians increased as income

levels increased. This tailed off, however, at the upper middle income group. The association between income and level of visits to general practitioners was found to be significant (Chi-Square significance = 0.000; Gamma significance = 0.000).

Table 19
Income and Level of Visits to General Practitioners

GP Visit		*INCAD5*					Total
		very low	low	lower middle income	upper middle income	high	
No Visits	Count % within INCAD5	4 3.0%	9 2.4%	13 1.7%	23 3.0%	26 3.6%	75 2.7%
1 - 5	Count % within INCAD5	21 15.6%	62 16.2%	112 14.3%	116 15.3%	130 18.2%	441 15.9%
6 - 20	Count % within INCAD5	43 31.9%	147 38.5%	370 47.3%	378 50.0%	348 48.6%	1286 46.4%
21 - 40	Count % within INCAD5	30 22.2%	96 25.1%	197 25.2%	181 23.9%	166 23.2%	670 24.2%
41 - 60	Count % within INCAD5	22 16.3%	45 11.8%	58 7.4%	40 5.3%	33 4.6%	198 7.1%
> 60 Visits	Count % within INCAD5	15 11.1%	23 6.0%	32 4.1%	18 2.4%	13 1.8%	101 3.6%
Total	Count % within INCAD5	135 100.0%	382 100.0%	782 100.0%	756 100.0%	716 100.0%	2771 100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	99.297[a]	20	.000
Likelihood Ratio	89.311	20	.000
Linear-by-Linear Association	53.760	1	.000
N of Valid Cases	2771		

a. 2 cells (6.7%) have expected count less than 5. The minimum expected count is 3.65.

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	-.136	.022	-6.023	.000
N of Valid Cases	2771			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Income and Level of Visits to Specialists

The level of visits to specialists based on income is noted in Table 20. The Gamma test shows no significant association between income and visits to Specialists (Gamma significance = 0.615). Chi-Square is not conclusive, due to four cells with expected counts of less than 5.

Table 20
Income and Level of Visits to Specialists

Specialist Visit		INCAD5					Total
		very low	low	lower middle income	upper middle income	high	
No Visits	Count	42	117	210	227	198	794
	% within INCAD5	31.1%	30.6%	26.9%	30.0%	27.7%	28.7%
1 - 5	Count	46	123	308	294	269	1040
	% within INCAD5	34.1%	32.2%	39.4%	38.9%	37.6%	37.5%
6 - 20	Count	32	107	220	191	212	762
	% within INCAD5	23.7%	28.0%	28.1%	25.3%	29.6%	27.5%
21 - 40	Count	10	29	33	30	27	129
	% within INCAD5	7.4%	7.6%	4.2%	4.0%	3.8%	4.7%
41 - 60	Count	4	4	6	5	6	25
	% within INCAD5	3.0%	1.0%	.8%	.7%	.8%	.9%
> 60 Visits	Count	1	2	5	9	4	21
	% within INCAD5	.7%	.5%	.6%	1.2%	.6%	.8%
Total	Count	135	382	782	756	716	2771
	% within INCAD5	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.580[a]	20	.048
Likelihood Ratio	27.869	20	.113
Linear-by-Linear Association	.861	1	.353
N of Valid Cases	2771		

a. 4 cells (13.3%) have expected count less than 5. The minimum expected count is 1.02.

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	-.011	.022	-.503	.615
N of Valid Cases	2771			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

5.8.4 Health Status and Physician Utilization

In this section, the self assessed status of the sample subjects was cross tabulated with the level of visits to general practitioners and specialists, and the association between them was explored. Each is examined separately.

Health Status and Level of Visits to General Practitioners

In this section the association between self assessed health status of individuals in the sample study and level of visits to general practitioners and specialists was explored. In assessing their health status individuals ranked themselves according to a four category scale: excellent; good; fair; and poor. Six levels of visits ranging from 'no visits' to greater than 60 are noted. Table 21 illustrates that individuals who indicated their health status as fair were more than four times as likely to have had more than 40 visits compared with individuals

who reported their health status as excellent (20.5% versus 4.9%). Chi-Square and Gamma tests reveal the association between health status and level of visits to general practitioners was significant (Chi-Square significance = 0.000; Gamma = .325, significance = 0.000).

Table 21
Health Status and Level of Visits to General Practitioners

GP Visit		Self Assessed Health Status				Total
		excellent	good	fair	poor	
No Visits	Count % within self assessed health status	28 3.7%	44 2.7%	3 .8%		75 2.6%
1 - 5	Count % within self assessed health status	163 21.8%	250 15.3%	33 8.4%	1 2.0%	447 15.8%
6 - 20	Count % within self assessed health status	385 51.4%	777 47.5%	148 37.5%	9 17.6%	1319 46.6%
21 - 40	Count % within self assessed health status	136 18.2%	400 24.4%	130 32.9%	16 31.4%	682 24.1%
41 - 60	Count % within self assessed health status	25 3.3%	114 7.0%	56 14.2%	10 19.6%	205 7.2%
> 60 Visits	Count % within self assessed health status	12 1.6%	51 3.1%	25 6.3%	15 29.4%	103 3.6%
Total	Count % within self assessed health status	749 100.0%	1636 100.0%	395 100.0%	51 100.0%	2831 100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	256.054[a]	15	.000
Likelihood Ratio	205.794	15	.000
Linear-by-Linear Association	185.858	1	.000
N of Valid Cases	2831		

a. 3 cells (12.5%) have expected count less than 5. The minimum expected count is 1.35.

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	.325	.024	12.774	.000
N of Valid Cases	2831			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Self Assessed Health Status and level of visits to Specialists

As noted in Table 22, individuals who visited specialists 1 to 20 times in the three year study period, and who indicated their health status as excellent, had similar levels of visits to those who indicated their health status as poor (64.1% versus 64.7%). While individuals with greater than 6 visits who reported their health status as fair visited with far greater frequency than those who assessed their health status as good (49.4% versus 32.9%), it is noted that a number of cells are small. Despite this, however, the tests of significance indicate there is an association between health status and level of visits to specialists (Gamma significance = 0.000). Although Chi-Square is significant, there are 5 cells with expected counts less than 5.

Table 22
Health Status and Level of Visits to Specialists

Specialist Visit		Self Assessed Health Status				Total
		excellent	good	fair	poor	
No Visits	Count % within self assessed health status	243 32.4%	494 30.2%	69 17.5%	3 5.9%	809 28.6%
1 - 5	Count % within self assessed health status	321 42.9%	604 36.9%	131 33.2%	6 11.8%	1062 37.5%
6 - 20	Count % within self assessed health status	159 21.2%	443 27.1%	150 38.0%	27 52.9%	779 27.5%
21 - 40	Count % within self assessed health status	22 2.9%	71 4.3%	31 7.8%	9 17.6%	133 4.7%
41 - 60	Count % within self assessed health status	1 .1%	13 .8%	7 1.8%	6 11.8%	27 1.0%
> 60 Visits	Count % within self assessed health status	3 .4%	11 .7%	7 1.8%		21 .7%
Total	Count % within self assessed health status	749 100.0%	1636 100.0%	395 100.0%	51 100.0%	2831 100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	197.326[a]	15	.000
Likelihood Ratio	154.170	15	.000
Linear-by-Linear Association	112.234	1	.000
N of Valid Cases	2831		

a. 5 cells (20.8%) have expected count less than 5. The minimum expected count is .38.

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	.241	.025	9.431	.000
N of Valid Cases	2831			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

5.8.5 Chronic Conditions and Physician Utilization

In this section both the level and type of visits to general practitioners and specialists were examined. Chronic conditions were categorized as zero; one; two, and three or more and were cross tabulated with the six visit ranges from 'no visits' to greater than 60.

Chronic Conditions and Level of Visits to General Practitioners

Table 23 illustrates the level of visits to general practitioners with chronic conditions. The data suggest the higher the number of chronic conditions the higher the level of visits. Of those study subjects having 1 - 5 visits to a general practitioner, 27.7% indicated they had no chronic conditions, whereas only 5.3% who indicated that they had three or more chronic conditions fell in this category. The same trend is evident in the 6 - 20 visit category. Individuals who had greater than 20 visits and one chronic condition visited a physician with

half the frequency of those with three or more (29.9% versus 60.3%). The data indicates there is an association between chronic conditions and level of visits to general practitioners and specialists (Gamma significance = 0.000).

Table 23
Chronic Conditions and Level of Visits to General Practitioners

Categories of Visits to GP		Chronic Conditions				Total
		zero	one	two	three or more	
No Visits	Count	38	20	11	6	75
	% within chronic conditions	4.9%	2.5%	2.2%	.8%	2.7%
1 - 5	Count	215	137	55	40	447
	% within chronic conditions	27.7%	17.3%	10.8%	5.3%	15.8%
6 - 20	Count	398	397	270	253	1318
	% within chronic conditions	51.2%	50.2%	52.9%	33.6%	46.6%
21 - 40	Count	103	179	133	267	682
	% within chronic conditions	13.3%	22.6%	26.1%	35.5%	24.1%
41 - 60	Count	15	45	31	114	205
	% within chronic conditions	1.9%	5.7%	6.1%	15.2%	7.2%
61+	Count	8	13	10	72	103
	% within chronic conditions	1.0%	1.6%	2.0%	9.6%	3.6%
Total	Count	777	791	510	752	2830
	% within chronic conditions	100.0%	100.0%	100.0%	100.0%	100.0%

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	.445	.019	22.152	.000
N of Valid Cases	2830			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Chronic Conditions and Level of Visits to Specialists

Table 24 depicts the level of visits to specialists and the presence of chronic conditions. A similar trend in visits to general practitioners is noted. Individuals who indicated a greater number of chronic conditions visited a specialist more frequently over the study period. Those who visited a specialist 6 - 20 times and who had indicated three or more chronic conditions made almost double the visits than those with one chronic condition (41.6% versus 23.5%).

Table 24
Chronic Conditions and Level of Visits to Specialists

Categories of Visits to SP		Chronic Conditions				Total
		zero	one	two	three or more	
No Visits	Count % within chronic conditions	356 45.8%	227 28.7%	129 25.3%	97 12.9%	809 28.6%
1 - 5	Count % within chronic conditions	297 38.2%	343 43.4%	187 36.7%	235 31.3%	1062 37.5%
6 - 20	Count % within chronic conditions	113 14.5%	186 23.5%	166 32.5%	313 41.6%	778 27.5%
21 - 40	Count % within chronic conditions	9 1.2%	28 3.5%	22 4.3%	74 9.8%	133 4.7%
41 - 60	Count % within chronic conditions		5 .6%	4 .8%	18 2.4%	27 1.0%
61+	Count % within chronic conditions	2 .3%	2 .3%	2 .4%	15 2.0%	21 .7%
Total	Count % within chronic conditions	777 100.0%	791 100.0%	510 100.0%	752 100.0%	2830 100.0%

Symmetric Measures

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal Gamma	.410	.019	20.355	.000
N of Valid Cases	2830			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Chronic Conditions and Type of Visits

As indicated in Table 25, the vast majority of individuals in the sample reporting either no chronic conditions (53.9%) or up to three or more (86.8%) visited a general practitioner and a specialist. About 26.4% of individuals with zero to three or more chronic conditions also reported seeing a general practitioner only, while only 0.5% saw a specialist only. The association between type of visit and chronic conditions is significant (Gamma significance = 0.000). For subjects who visited both a general practitioner specialist, the tendency was for these visits to occur more frequently as the number of chronic conditions present increased. This trend is reversed for those subjects visiting a general practitioner only.

Table 25

Chronic Conditions and Type of Visits to General Practitioners and Specialists

Type of Visit		Chronic Conditions				Total
		zero	one	two	three or more	
GP Only	Count	320	214	121	93	748
	% within chronic conditions	41.2%	27.1%	23.7%	12.4%	26.4%
Specialist	Count	2	7	3	2	14
	% within chronic conditions	.3%	.9%	.6%	.3%	.5%
GP & Spec	Count	419	557	378	653	2007
	% within chronic conditions	53.9%	70.4%	74.1%	86.8%	70.9%
Neither	Count	36	13	8	4	61
	% within chronic conditions	4.6%	1.6%	1.6%	.5%	2.2%
Total	Count	777	791	510	752	2830
	% within chronic conditions	100.0%	100.0%	100.0%	100.0%	100.0%

Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Ordinal by Ordinal	Gamma	.320	.028	10.932	.000
N of Valid Cases		2830			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Subjects with High Utilization

From the maximum number of cases illustrated in Table 7, it is evident that some subjects have a very high level of utilization of physicians' services. Table 26 shows the frequency distribution of select variables for subjects who had more than 60 general practitioner (GP) visits only and for those with more than 60 specialist and general practitioner (GP SP) visits combined. The distribution of subjects for all levels of physician visits is also presented. For subjects who had more than 60 GP visits, approximately 70% were women. The same percentage maintained for 60+ visits to a GP SP. There were similar age distributions for both GP and GP/SP visits, although there was a greater proportion of the 30-39 age cohort seeing a GP/SP than only a GP (21.2% versus 14.6%). A possible explanation for this difference is women utilizing the services of an obstetrician during the course of their pregnancy. There was also a small difference in subjects 70 years of age and older seeing both a GP/SP, than only a GP (14.9% versus 12.6%). With respect to education, it was found that approximately 35% of all subjects who had 60+ visits to a GP or GP/SP had not graduated from high school. Subjects with a university degree were twice as likely (9.9% versus 3.9%) to have 60+ visits to a GP SP than only a GP. Subjects with very low income, and more than 60 physician visits, were more likely to have seen only a GP, rather than both GP/SP (14.6% versus 10.3%). This trend is reversed for the upper-middle, high income subjects. Not surprisingly, subjects who had 60+ visits and had rated their health status as excellent was less than half of that for all subjects regardless of the number of physician visits (12.0% versus 26.5%). As well, the majority of subjects with more than 60 physician visits had indicated they had 3 or more chronic conditions (approximately 70%). This is compared to 26.6% for all subjects.

Table 26
High Visits to GPs, all Physicians, and all subjects
Comparison by selected variables

Variables		61+ visits GPs	61+ visits; all Physicians	All Subjects
Sex	Female	70.9	69.4	54.3
	Male	29.1	30.6	45.7
Age	20-29	15.5	13.2	24.6
	30-39	14.6	21.2	23.7
	40-49	23.3	20.7	23.8
	50-59	20.4	17.8	13.1
	60-69	13.6	12.4	8.4
	70+	12.6	14.9	6.4
Education				
	<High School	35.9	34.7	18.1
	High School	23.3	16.9	17.9
	Trades/Diploma	30.1	28.5	28.4
	University no degree	6.8	9.9	16.7
	University degree	3.9	9.9	18.9
Income Adequacy				
	Very low	14.6	10.3	4.8
	Low	22.3	21.5	13.5
	Lower middle	31.1	30.6	27.6
	Upper middle	17.5	19.0	26.7
	High	12.6	16.5	25.3
Health Status				
	Excellent	11.7	12.0	26.5
	Good	49.5	50.4	57.8
	Fair	24.3	26.9	14.0
	Poor	14.6	10.7	1.8
No. Chronic Conditions				
	None	7.8	7.4	27.4
	One	12.6	13.6	27.9
	Two	9.7	11.2	18.0
	Three or more	69.9	67.8	26.6
M		103	242	2831

5.9 Multivariate Analysis

5.9.1 Introduction

This section presents multivariate analysis of physician utilization. Considering the presence of categorical variables, logistic regression techniques are used. Polychotomous ordinal logistic regression (Minitab, release 12.22), which permits dependent variables with three or more categories, was used. For this analysis, the independent variables include sex, age, education, income adequacy, SESCORE1 (a simple additive index of education and income adequacy, with 9 categories), health status, and number of chronic conditions, with the same categories as in previous analyses. The dependent variables were level of visits to general practitioners and to specialists, with the same six categories as in previous analyses.

Models were run, including interaction terms when appropriate; variables which were not significant were removed, and the model run again. Standard Goodness-of-Fit Tests were used to verify the fit of the models. Although SESCORE1 was not used previously, it was included here as, in some models, it provided a better fit to the data than education and income adequacy, either separately or together.

Results are presented by including commonly accepted statistics and co-efficients, as well as odds ratios with 95% C.I. As well, an additional interpretation, using event probabilities for each of the models is presented. This allows a presentation that is easy to interpret, using the percentages of subjects in each level of utilization, as estimated by the models.

5.9.2 Ordinal Logistic Regression - General Practitioners

Tables 27 and 28 illustrate analysis by the ordinal logistic regression models for general practitioners.

Table 27 presents the results of applying an Ordinal Logistics Regression Model to the data. The dependent variable was number of visits to a general practitioner while the independent variables were gender, age, gender*age interaction, self-reported health status, socio-economic score and number of chronic conditions. The results show that all independent variables entered into the model are significant in predicting the number of GP visits. The odds ratio tells us how much the likelihood of an outcome changes with a one unit change in an independent variable. From the data, it is noted that the interact term (gender*age) has an influence on the number of GP visits. Older females are about 1.04 times more likely to see a GP (a shift from low number to a high number of visits) than young males. The influence of socio-economic status is large in that persons with a higher SES score are 1.12 times more likely to visit GPs than those with lower scores. Persons with higher levels of self-reported health status are 0.67 times more likely to see a GP than those reporting lower levels. Persons with chronic conditions are about 0.6 times more likely to see a GP than those with less chronic conditions.

Interaction Terms

The interaction term "age*gender" was entered into the regression model to determine if it would influence the dependent variable. This term was found to have statistical significance ($p = 0.000$) and as a result the model has a better fit.

Table 27
Ordinal Logistic Regression Model - General Practitioners

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI	
						Lower	Upper
Const (1)	1.3734	0.4024	3.41	0.000			
Const (2)	3.6630	0.3951	9.27	0.000			
Const (3)	6.2593	0.4099	15.27	0.000			
Const (4)	8.0181	0.4183	19.17	0.000			
Const (5)	9.2754	0.4278	21.68	0.000			
Sex	-2.8502	0.2238	-12.73	0.000	0.06	0.04	0.09
Age	-0.067228	0.007992	-8.41	0.000	0.93	0.92	0.95
SexAge	0.040487	0.004801	8.43	0.000	1.04	1.03	1.05
Sescore1	0.10988	0.01806	6.08	0.000	1.12	1.08	1.16
HSTAT	-0.40152	0.05799	-6.92	0.000	0.67	0.60	0.75
CCGP4	-0.51549	0.03636	-14.18	0.000	0.60	0.56	0.64

Log-Likelihood = -3475.872
Test that all slopes are zero: G = 799.931, DF = 6, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	10862.850	11049	0895
Deviance	5896.524	11049	1.000

Table 28 presents the estimated distributions for number of visits to general practitioners (categorized), by the variables entered in the model in Table 27. The interpretation of these figures is straightforward; they indicate the percentage of subjects in each of the categories. Therefore, a "shift to the right" shows a tendency to higher utilization. To simplify the presentation, only the extreme categories of the independent variables are presented.

For gender, in males the largest percentages are in the categories of 1-5 and 6-20 visits (71%), while in females, they are in the categories 6-20 and 21-40 (74%). For age, there is a shift to the right for subjects 70+ years old, which have 18% in the highest categories (41-60 and 61+), while for younger subjects there are only 9% in the same two categories.

It is interesting to note the influence of socio-economic status. The lower category (score 1) shows a clear tendency towards higher utilization; 84% of the subjects are in three categories, from 6 to 60 visits, while for the individuals with the higher socio-economic status (score 9), 77% have between 1 and 20 visits.

Finally, both health status and number of chronic conditions are also related to the number of visits, and in the expected direction. For health status, when reported as excellent, 77% of the subjects have between 1 and 20 visits, while for subjects reporting poor health, there are 71% with 21 visits or more. The figures for number of chronic conditions are similar.

Table 28
Ordinal Logistic Regression Mean Utilization - General Practitioners

Variable		Number of Visits					
		0	1 - 5	6 - 20	21 - 40	41 - 60	61+
Gender							
	Male	4	22	49	17	4	2
	Female	1	9	43	31	10	5
Age	20 - 29 years	4	19	46	21	6	3
	70+	.01	7	39	34	12	6
SES Score[1]	1	1	7	37	34	13	8
	9	4	22	50	18	4	2
Health Status							
	Excellent	4	22	50	18	4	1
	Poor	.03	3	25	38	20	13
Chronic Conditions	0	5	26	51	13	3	1
	3	.06	5	35	37	14	8

[1]Only extreme values shown.

5.9.3 Ordinal Logistic Regression - Specialists

Preliminary analysis with the same variables included in the analysis for general practitioners did not result in a satisfactory model. Further analysis demonstrated that the variables influencing the utilization of specialists were substantially affected by gender. Therefore, it was decided to run two separate models, one for females, and one for males.

Table 29 presents the results for females. The independent variables entered include age, education, health status, and chronic conditions. As well, the (age x age) and the (age x education) interaction factors were included. P-values for all the independent variables ($p < 0.001$) [except (age x age)] and education ($p = 0.528$) indicate a reasonable model for predicting visits to specialists. The test that all slopes = 0 is rejected ($p = < 0.001$).

Table 29
Ordinal Logistic Regression Model -Visits to Specialists Female

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI	
						Lower	Upper
Const (1)	-0.5624	0.6568	-0.86	0.392			
Const (2)	1.2228	0.6571	1.86	0.063			
Const (3)	3.5293	0.6649	5.31	0.000			
Const (4)	5.0411	0.6860	7.35	0.000			
AGE	0.00190	0.02145	0.09	0.929	1.00	0.96	1.04
Age*age	0.0001117	0.0001770	0.63	0.528	1.00	1.00	1.00
EducGP5	0.3277	0.1213	2.70	0.007	1.39	1.09	1.76
Age*EDU	-0.006679	0.002582	-2.59	0.010	0.99	0.99	1.00
HSTAT 2	-0.57642	0.1413	-4.08	0.000	0.56	0.43	0.74
CCGP4	-0.41389	0.04453	-9.29	0.000	0.66	0.61	0.72

Log-Likelihood = -1907.071
Test that all slopes are zero: G = 169.514, DF = 6, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	3215.645	3358	0.960
Deviance	2432.061	3358	1.000

Table 30 shows the mean utilization of visits to specialists by females across five ranges [0, 1 - 5, 6 - 20, 21 - 40, and 41+ (for this analysis, 41-60 and 61+ single categories were collapsed into one category, due to small numbers)] when the ordinal logistic regression model is applied. Age, education, health status, and number of chronic conditions are significant. As earlier data indicated, females visit specialists more frequently than males and this trend increases with age. In the 20 - 29 year range, 24% of females had no visits to specialists compared with 16% for those in the 70+ age range. Although this trend

continues, the number of visits are more evenly distributed among the same age groups for those who had 1 - 20 visits (70% versus 74%). In terms of education, females with less than a high school education who visited a specialist 0 - 5 times visited less than those with some university education or a degree (52% versus 61%); however, the trend reversed for those making 6 - 40 visits where 45% of females with less than high school visited a specialist compared with 37% of those with university. The association of health status and number of chronic conditions is also present for specialists in females.

Table 30

Ordinal Logistic Regression Mean Utilization - Visits to Specialists Female

Variable		Number of Visits				
		0	1 - 5	6 - 20	21 - 40	41+
Age	20 - 29 years	24	39	31	5	1
	70+	16	35	39	7	2
Education						
	< High School	17	35	38	7	2
	University/or Degree	23	38	32	5	2
Health Status						
	Excellent	9	28	15	1	0
	Poor	6	20	34	5	1
Chronic Conditions	0	33	41	22	3	0
	3	11	30	45	10	3

Table 31 presents the ordinal logistic regression model for male visits to specialists. Only two independent variables, age and number of chronic conditions, were found to be significant. P-values for these two independent variables = $p < 0.001$ and indicate a reasonable model for predicting visits to specialists by males. The test that all slopes = 0 was rejected ($p < 0.001$).

Table 31
Ordinal Logistic Regression Model - Visits to Specialists Male

Predictor	Coef	StDev	Z	P	Odds Ratio	95% CI	
						Lower	Upper
Const (1)	2.2628	0.4494	5.03	0.000			
Const (2)	4.1944	0.4615	9.09	0.000			
Const (3)	6.2544	0.4758	13.15	0.000			
Const (4)	7.5270	0.5096	14.77	0.000			
AGE	-0.06924	0.01995	-3.47	0.001	0.93	0.90	0.97
Age*age	0.0003519	0.0002070	1.70	0.089	1.00	1.00	1.00
CCGP4	-0.57341	0.05209	-11.01	0.000	0.56	0.51	0.62

Log-Likelihood = -1468.647
Test that all slopes are zero: G = 298.379, DF = 3, P-Value = 0.000

Goodness-of-Fit Tests

Method	Chi-Square	DF	P
Pearson	909.332	909	0.491
Deviance	770.719	909	1.000

Table 32 illustrates the mean utilization of visits by males to specialists. For the 20 - 29 age group, 48% of males made no visits to specialists compared with 11% of those in the 70+ age range. Fifty percent of males in the 20 - 29 age group made 1 - 20 visits while 74% of the visits were made by males in the 70+ age range for the same categories.

Table 32 also illustrates the significant association of specialist utilization by males when chronic conditions are present. When chronic conditions are absent, almost 50% of males do not make visits while only 13% do not visit when three chronic conditions are present. Only 17% of males with no chronic condition visited specialists 1 - 20 times while

almost five times as many visits (74%) were made by those with three chronic conditions for the same group (1-20 visits).

Table 32
Ordinal Logistic Regression Mean Utilization - Visits to Specialists Male

Variable		Number of Visits				
		0	1 - 5	6 - 20	21 - 40	41+
Age	20 - 29 years	48	37	13	2	0
	70+	11	33	41	11	5
Chronic Conditions	0	48	4	13	16	0
	3	13	35	39	9	4

CHAPTER 6: DISCUSSION

With respect to the independent variables, this study describes a population which is younger, more educated, and commands a higher income than the population of the province as a whole (Segovia, 1997). Considering all visits, this study sample had an average of 8.78 visits to a doctor in a year; 10.54 for females and 6.69 for males, derived from data in Table 7 (example: mean visits to general practitioners plus mean visits to specialists, divided by three years = 19.97 + 6.37 = 26.34 3 = 8.78). Females have significantly more visits, both for general practitioners and specialists. As would be expected, older subjects have more visits, and this trend is more pronounced for visits to specialists. This finding supports that of other researchers, Aday, Anderson & Fleming (1980); Broyles et al. (1983) and Tataryn (1995).

Considering the bivariate associations, and for socio-economic status, there is a moderate inverse association between visits to general practitioners and education as well as for income adequacy. Individuals with less education and income tend to have more visits. This does not occur with visits to specialists; there is a small inverse association with education, probably of no practical value (significance is related to the relative large sample size), and no association with income. The conclusion of this analysis generally supports the findings of Anderson et al. (1980) and Kronenfeld (1980), which found that educational attainment was a good prediction of physician utilization. The study did not support more recent research by Enterline et al. (1996) and McIsaac (1997) that the higher levels of education and household income continue to align with greater use of specialist physician services.

With respect to the health variables, both self-assessed health status and the number of chronic conditions show a significant association with the number of visits to both general practitioners and specialists. This finding is again consistent with the literature Tomiak et al. (1998), Roos et al. (1999) and National Population Health Survey (2000).

As expected, the multivariate analysis offers a more precise indication of the influence of the independent variables included in these analyses.

For visits to general practitioners, five variables were entered in the logistic regression model. A way to simplify the understanding of these results is to add the percentages for the last three categories (21-40, 41-60, and 61+) noted in Table 27, and to obtain the difference for the extreme values of each independent variable. For example, and for age:

Age	21-40	41-60	61+	Total
20-29	21	6	3	30
70+	34	12	6	52
Difference				22

This shows that for older subjects, there are 22% more subjects in the high visits categories included here (21+).

In this model, self-assessed health status and number of chronic conditions show the largest influence on the number of visits (48% and 42% difference for 21+ visits). Again, this is consistent with the findings of Hertzman et al. (1994) and Roos et al. (1999). Socio-

economic status (in this model, SESCORE1, the additive score combining education and income adequacy entered the model) is next, with the lower value (less education and income) having 31% more subjects with high utilization. This is not consistent with the findings of Enterline et al. (1996) and McIsaac et al. (1997) who reported that higher levels of education and household income continue to align with relatively greater use of specialist physician services. Sex and age have a more modest effect, with 23% more utilization in females, and 22% more utilization in older subjects.

For visits to specialists, no model fit the data satisfactorily for all subjects. It was necessary to run separate models by sex, and these showed remarkable differences. For females, four variables affect the number of visits to specialists. The largest effect is for chronic conditions with 33% more subjects having higher utilization when reporting three conditions or more. Again, this finding correlates to that of Tomiak et al. (1998) who found that the consumption of health care increased significantly as the number of chronic conditions and the severity of disabilities increased. Self-assessed health status is next with 24% more utilization for subjects reporting poor health over excellent health. Age has a moderate influence (11%) and education only 8%. For males, only two variables were significant in explaining the number of visits to specialists. Age had the largest influence with 42% higher utilization in older subjects than in younger, and the number of chronic conditions present had 23% higher utilization for subjects reporting three or more conditions. The findings of this study, in terms of age, are consistent with Hertzman et al. (1994) who identified the age of 75 years as the time where health status is often determined by the late and usually less specific effects of more than one chronic degenerative disease processes. However, it is unclear if the reference is to specialists only.

Finally, and considering the subjects with high utilization, of 61 visits or more, there are 242 subjects for all visits, and 103 for visits to general practitioners. Both figures are presented because visits to general practitioners are initiated by patients, while visits to specialists are the result of referrals. When the distributions for selected variables for these two sub-groups are studied in comparison with the whole sample, high utilization subjects are more likely to be females, older, have less education and lower income, and poorer health, as measured by health status and the number of chronic conditions.

CHAPTER 7: CONCLUSION

In this sample of residents of the area served by the St. John's Health Care Institutions Board (HCCSJ), the average number of ambulatory visits to physicians is 8.78 per year, which was obtained from utilization data for a three-year period (fiscal years 1992-93 to 1994-95). Using data from the OECD (1999), Canada reported an average of 6.7 visits in 1994, and 6.6 visits in 1995. For the years 1994, 1995, and 1996, the United States reported 6.0, 5.8, and 5.8 visits, and the UK 6.1, 6.1 and 6.1 respectively.

Therefore, it can be concluded that the utilization of physicians in this sample is higher than in the rest of Canada; with a difference of more than 30%. Another way to view the data is to make estimates for the population 20 years and older. Using estimates provided by the Newfoundland and Labrador Centre for Health Information (2000), this figure is 144,919. Rounding to 140,000, to compensate for sampling and other possible errors, the total number of visits in a year for this study is 1,232,000, which represents an excess of 308,000 visits, if the Canadian average of 6.6 is used.

According to the level of utilization, the sample may be divided into 4 sub-groups. For one sub-group, a very small percentage of the sample (2.2%) did not make any visits. A second sub-group made between 1 and 20 visits over 3 years, or a maximum of 6.6 visits per year. This finding could be considered as a low or moderate utilization. Included were 50.7% of the sample, which amounts to 20% of the total number of visits. This is a useful indicator, as it is almost identical to the median, and indicates that half of the sample had a moderate level of utilization, or less.

In contrast, a fourth group had between 21 and 60 visits over three years, or between 7 and 20 visits per year. These groups included 38.7% of the sample, and represented 51% of the total number of visits. This was considered as the high utilization sub-group.

Finally, there were the very high users. They included 242 subjects, or 8.5% of the sample, but comprised 29% of the total number of visits. This group had from a minimum of approximately 20 visits per year to greater than 27 times over the three-year study period. The exact number was not reported for confidentiality reasons. Sixteen (16) cases reported at least one visit per week, on average, for the three-year study period, while seven (7) subjects recorded 200 visits over three years or more. The 16 cases represent 0.56% of the sample. Extrapolating this to the conservative figure of 140,000 subjects $\geq$ 20 years old, it is estimated that approximately 750 subjects may have had this level of utilization in the area served by the St. John's Health Care Institutions Board.

The very high sub-group may be characterized by studying the distributions of selected variables, in comparison with the distributions for the sample (Table 9). This shows that these subjects tend to be females (about 15% more females), older, report less education and income, and poorer health status, as measured by self-assessed health status and number of chronic conditions. Nevertheless, there are subjects who did not correspond to this characterization; including males, young subjects, some subjects with relatively good levels of education and income, as well as some subjects reporting their health to be excellent to good. Therefore, these variables did not fully explain the reasons that may drive some individuals to have very high levels of visits to physicians.

Commentary has already been provided regarding the variables that influence the level of utilization for both bivariate and multivariate analysis. There are no surprises in this. It is fitting then to reject the null hypothesis stated for the study: there is an association between demographic variable health status and chronic conditions on the one hand and the type and level of medical care utilization on the other, for ambulatory consultation to physicians.

One finding which may be the subject of further investigation, and require policy decisions, relates to the clear influence of socio-economic status on the level of utilization for visits to general practitioners, even after controlling for age and health status.

While the high unemployment levels (20%) in Newfoundland and Labrador as well as the high illiteracy rates throughout the Province (44%) cannot be deemed as the explicit rationale for high utilization in the Province compared with Canada and U.S., they may be contributing factors. From a population health perspective, however, the figures point to the need for increased emphases on promoting the Province's Strategic Health Plan (SSP). The aim of the SSP is to promote and sustain healthy vibrant communities by focusing on the determinants of health. All sectors of Government should continue efforts in this regard.

As the health sector figures prominently in the SSP, there is need to renew, strengthen, and promote opportunities for increased education as well as job opportunities within the Province. Further research is also required regarding the impact of physician

practice variations to learn more about why increased utilization rates for specific physicians could be contributing factors to high utilization.

Public education/communication programs concerning overreliance/utilization on physicians may assist in bringing the utilization patterns more in line with Canadian and U.S. rates. Current interest throughout Newfoundland and Canada in primary health care reform and the role of other disciplines, such as nurse practitioners, in health services delivery may impact ambulatory physician utilization. In addition, the development of alternate health delivery models such as strengthened community based programs to support the elderly and the chronically disabled, including day programs, increased home and other support programs, may reduce the current utilization patterns. Finally, exploration by Government regarding alternate remuneration models for physicians which would see increased emphasis on prevention and early intervention as well as appropriate treatment needs to be undertaken.

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