

Interprovincial Comparisons of Health Care Expenditures

June 1997

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Health Policy and Evaluation**
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ACKNOWLEDGMENTS

The authors wish to acknowledge the contributions of the many individuals whose efforts and expertise made it possible to produce this report, especially to Evelyn Shapiro for her consultations and advice throughout the project, and to Ulrich Wendt for comments and information. We also wish to express our appreciation to the many individuals who provided feedback on a draft version of the document: Charlyn Black, Noralou Roos, Marni Brownell, Carolyn DeCoster, Mike Farnworth, Cam Mustard, Norm Frohlich, and Evelyn Shapiro. Thanks to Geoff Belanger at CIHI for additional information, also to Leonard MacWilliam and Carmen Steinbach for programming support. Thanks to Shannon Lussier for preparation of figures and tables as well as the final preparation of this document.

Kathleen Thompson, Saskatchewan Health and Michael Wolfson, Statistics Canada provided external reviews of this document. We thank them for their insightful comments.

The results and conclusions are those of the authors and no official endorsement by Manitoba Health was intended or should be implied. This report was prepared at the request of Manitoba Health as part of the contract between the University of Manitoba and Manitoba Health.

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EXECUTIVE SUMMARY

Introduction

This project was undertaken as a result of a query by Manitoba Health as to how health expenditures in Manitoba compare to those of other provinces. The question also extended to include consideration of whether or not there are differences in provincial population characteristics that might be associated with any variations in provincial government expenditures on health care.

The project attempted to answer those questions in a manner that would inform the health policy process, by comparing indicators of need for health care and expenditure across provincial populations. However, given the limited scope of this report, *the study is of a descriptive nature and no attempt was made to evaluate the appropriateness of health expenditures, to determine whether greater or lesser expenditure is better, or to propose alternate distribution of health dollars.*

The study questions were addressed in stages. First, an attempt was made to determine whether differences exist across provinces in the following factors that have been shown elsewhere to affect need for health care services: health status, socio-economic status and population demographics. Age-adjusted mortality rates were selected as a key indicator of need for health care services. Next, differences in per capita provincial expenditures on health care were reviewed. Finally, health care expenditures and factors that affect need for health services were examined to see if an existing relationship could be found.

Working with available data, various indicators that have been shown to affect need for health care were examined and compared to provincial expenditures on health care. For example, do provinces that have more of their population over age 65, in poorer health status, or with poorer socio-economic status, have higher health care expenditures? Or are expenditure levels driven by other factors not captured by our general understanding of health care needs?

For the purpose of this study, 1994 Health Canada expenditure data were selected over Statistics Canada or provincial budget data. The Health Canada expenditure data incorporate a broad reporting base for health care expenditures, which is in keeping with current health and social planning. The Health Canada data set includes all health expenditures whether or not all provinces offer the program.

Findings

Considerable variation in population characteristics was found across provinces:

- On all three groups of indicators used, (health status, socio-economic status and demographics) Manitoba's position is consistently in the middle ranks.
- Ontario, Alberta and British Columbia consistently rank highest overall on both the health status and socio-economic characteristics. The findings are converse for Nova Scotia and Newfoundland, which consistently rank poorly on indicators, reflecting a population which has poorer health status and at higher socio-economic risk.
- Saskatchewan stands out as an anomaly with inconsistencies in its rankings on various indicators, scoring well on age-standardized mortality rates and many health status indicators, despite a high proportion of elderly persons and Registered Indians with high health care needs, and ranking *medium* to *low* on socio-economic indicators.

Provincial per capita health expenditures also vary across provinces:

- Manitoba's per capita expenditures of \$1,612 place it in fourth highest place, a *medium* ranking.
- British Columbia, Ontario and Quebec rank high on per capita expenditures, while New Brunswick, Saskatchewan and Nova Scotia rank low.
- There is a total variation of \$360 in per capita provincial expenditures, but the variation is only \$75 per capita from the fourth to the eighth ranking (a variation of approximately 5% of expenditures across five provinces).

- Manitoba's middle ranking on health expenditures is congruent with its middle ranking on age-adjusted mortality rates, a key health status indicator of a population's relative need. Saskatchewan, which has the best health status (using age-standardized mortality rates) of all provinces, ranks among the lowest on per capita health expenditures. However, for most other provinces, total expenditures appear to have no relationship to age-adjusted mortality rates.
- There does not appear to be any evidence that demographic differences across provinces are associated with differences in provincial health expenditures.
- Provincial per capita expenditures on health care are not significantly correlated with many factors which have been linked to increased need for health services, such as unemployment, child poverty and labour force participation of women.
- The mean value of occupied dwellings is positively and significantly correlated with per capita provincial expenditure on health care ($r = .84$, $p = 0.002$). If housing prices are a proxy for wealth in a province, this relationship may suggest that it is the presence of increased wealth in a province that is related to higher expenditures on health care. Another explanation that warrants investigation is that in wealthier provinces, the cost of living and wages may on average be higher and thus affect health care costs.

Discussion

The expenditure data used for this project included all programs defined as health care whether or not the program was offered by every province. Therefore, one reason for differences in expenditures may be due to the choice of programs covered by provincial health departments.

The project focused on provincial health expenditure data. However provincial health expenditures made up only 66% of total health expenditures. Of the remaining 34%, six percent consisted of 'other' public expenditures (Worker's Compensation Board payments, municipal expenditures, and federal direct health expenditures for certain groups such as

Registered Indians, the Armed Forces and Veterans), and 28% was private expenditures. When 'other' public expenditures are taken into consideration, Manitoba shifts moving from a *medium* to a *high* ranking. This shift in position is because Manitoba appears to receive higher than average funding from sources other than the provincial government for health care.

The data also suggest that Canadians are bearing a progressively higher portion of health care costs outside the insured health plan. In 1994, 28% of total health expenditures were funded from private sources. Provincial government contributions as a proportion of overall health expenditures in Manitoba have been on the decline since 1985.

If provinces are to learn from each other's experiences, comparisons of health care programs, health care expenditures and health outcomes should be made across the country. Currently this is very difficult to do. All of the findings above are suggested somewhat cautiously as there were several data limitations encountered during the course of this study. The data set comprised of a single year (1994) of aggregated provincial expenditure data. With 10 provinces, thus 10 data points, the power of the analysis was extremely limited. Also, the lack of consistent definitions across provinces limited comparison of the various sectors within the health care system. Reported utilization data are also not consistently defined across provinces and were not included in this report.

However, given the relationship between relative need for health services and expenditures on health services in Manitoba, the lack of a direct relationship between these variables across the country was an unexpected finding. MCHPE has found a strong relationship between need and expenditures across regions within Manitoba. That is, areas with higher needs have higher health expenditures.

Additional data, which would allow inter- and intraprovincial comparisons, would allow us to answer important questions that arise from the analysis in this report. Does the lack of relationship of need to expenditures across provinces mask an underlying distribution of resources in relation to need within each province? Or is it true only for Manitoba? To answer these questions data collection efforts across the country will need to be enhanced. To

ensure the data is comparable all provinces, territories and federal departments' of health will need to cooperate.

1. INTRODUCTION

Each year, the Manitoba Government prepares budget estimates which project expenditures on health for the coming year. For the year 1996/97, health expenditure estimates were \$1.8 billion. In preparing for future years, Manitoba Health was interested in understanding how health expenditures in Manitoba compare to those of other provinces, and whether there are differences in population characteristics across the provinces which account for variations in expenditures.

These questions were addressed in two stages. First, an attempt was made to determine whether differences exist across provinces in factors which are known to affect need for health services, such as health status, demographic mix and socio-economic status (Black et al., 1993; Pappas et al., 1993; Eyles et al., 1993; Frohlich and Mustard, 1996; Frohlich and Carriere, 1997; Roos and Mustard, 1997). Subsequently, differences in per capita provincial government expenditures on health care were reviewed, including differences across sectors of the health care system. Finally, the existence of relationships between expenditures and factors which affect need for health services was explored by studying the following question: Do provinces which have a greater proportion of their population over age 65, in poorer health status, or with poorer socio-economic status, have higher or lower health care expenditures?

Health Canada expenditure data for 1994 were used for inter-provincial comparisons because they incorporate a broad reporting base. Other available data were considered but were not used either because of lack of consistent definitions across provinces (as is the case with provincial budgets), or because of a narrower scope of reporting of health expenditures (as with data used by Statistics Canada). The data are discussed in more detail in a later section.

While other reports have compiled data on expenditures, health status, and demographics of Canadians (Saskatchewan Health, 1996; Health Canada, 1996a), this project attempts to move beyond the collection and reporting of data, by examining relationships across various

indicators. The data are explored for the existence of direct relationships between health status, socio-economic factors and health care expenditures at the provincial level.

This descriptive project attempts to inform the health policy process by comparing indicators of need and expenditures across provincial populations. The information provided herein will assist policy-makers in assessing how their provincial expenditures compare with those of other provinces, as well as how their provincial populations rate on characteristics which are widely thought to influence need for health care. However, *no attempt is made to evaluate the appropriateness of health expenditures, to determine whether higher or lower expenditure is better, or to propose alternate distribution of health dollars.*

2. METHODS

The first step in this project was to define variables that could be used as indicators of relative need. This approach establishes a context for expenditures and helps ascertain whether those expenditures reflect population health care needs.

The analysis of population characteristics was done in three steps:

1. Initially, provinces were ranked according to age-standardized mortality. Age-standardized mortality served as the health status anchor against which all other indicators were compared. Provinces were ordered according to this ranking on all subsequent analyses, and were ranked *better*, *medium* and *worse* on each indicator, where *better* refers to provinces having lower mortality rates and *worse* was used to indicate those having higher mortality rates.¹
2. Provinces were compared on indicators of health status, socio-economic status and demographics, all of which might be expected to be related to health care expenditures.

¹ The better/medium/worse groupings were used to get a better picture of the true relative provincial positions. Assigning straight rankings on a 1-10 scale would be misleading, especially for the middle rankings, as these were very similar in many instances.

3. Relationships between the three series of characteristics were examined.

Next, the expenditure data for each province were examined:

1. Comparisons of provincial government expenditures were made, to get a sense of the variability of actual dollar expenditures between provinces.
2. These provincial expenditures were then examined in relation to the population characteristics discussed earlier, to determine whether relative expenditure levels are associated with differences in characteristics which might affect population health needs. This included using a simulation of expenditures to explore the relationship between the age of the population and health care expenditures. Correlation analyses were used to explore the relationships between provincial government health expenditures and population characteristics.
3. And finally, total public and private expenditures on health care were examined.

3. LIMITATIONS

This study is limited by several factors, the major ones of which can be summarized as follows:

- The project was undertaken using available aggregated provincial data for one year.
- Provinces are the basic units of comparison; there is no attempt made to determine which sub-populations within provinces are receiving more or less health care services.
- Poor availability of data and inconsistency of definitions precluded comparison of health care utilization data across provinces.
- Definitional issues limited inter-sectoral comparison of expenditures between provinces.

4. DATA

The data used for examining the characteristics of the population and expenditures are described below:

4.1 Population Characteristics

It is widely recognized that many factors contribute to the health of a population and to the differences in health care needs between populations (Evans and Stoddart, 1990). Many of these differences can be linked to socio-economic factors such as income, employment, etc., or to demographic factors such as age or gender, or environmental factors such as housing and the workplace, each of which has been shown to have an impact on a population's health status.

Three sets of characteristics which are thought to influence the need for health care, and hence which one might expect to influence the level of a province's health care expenditures, are included in this report. These characteristics and the expected relationship to health expenditures are as follows:

Health status - Provinces with higher rates of residents in poor health might be expected to spend more on the provision of health care (Birch et al., 1993; Frohlich and Carriere, 1997; Shanahan et al., 1997).

Socio-economic status - The relationships between socio-economic status and health status is widely researched and documented (Marmot et al., 1978; Pappas et al., 1993; Frohlich and Mustard, 1994; Statistics Canada, 1994a; Frohlich and Mustard, 1996; Roos and Mustard, 1997). Populations with high unemployment, low educational levels, many single parent families, and poor housing have been found to be at high risk for poor health. Hence, provinces with higher rates of residents with poor socio-economic status might be expected to have higher levels of expenditures on health care.

Demographic characteristics - Demographic characteristics of the population associated with the need for health care are also described for each of the provinces. For example, it has

been well established that aboriginal populations have higher health needs than other population groups in Canada, and that utilization patterns in the population vary with age characteristics. Older individuals have higher rates of contacting physicians, higher rates of hospital use, and higher rates of nursing home admission (Frohlich et al., 1994; Black et al., 1993; DeCoster et al., 1993). A province whose population is older might be expected to spend more on health care than a province with a younger population.

For each of the three sets of characteristics described above, a variety of indicators were included, based on two criteria: 1) recognition of the validity of the measure in the literature, and 2) availability of data for all provinces. The rationale for inclusion of individual indicators in a particular series of comparisons is provided below. Sources of data and additional definitions are found in Appendix 1.

Health Status Series

The indicators selected for inter-provincial health status comparisons are: age-adjusted mortality rates, infant mortality, self-rated health status, potential years of life lost (PYLL), and smoking rates.

Age-adjusted mortality per 1,000,000 population was used as the key indicator of health need throughout this report. It is an indicator of death rates across the population, adjusted so that comparisons can be made across provinces with different population structures.

Infant mortality is an indicator of poor infant health status within one year of birth. The infant mortality rate is calculated per 1,000 live births, and because the rates fluctuate in areas with small populations, three year averages were chosen over a single year of data. Infant mortality is seen as an indicator of health status, level of health care of an area, and the effectiveness of prenatal care (Wilkins et al., 1991; Hansluwka, 1985; Wadhera and Strachan al., 1992).

Self-rated health status has been shown to be related to more objective health indices. Although there is a tendency for some populations, especially men, to under-report poor health status, this variable is seen as providing insight into the existence of chronic diseases (Segovia et al., 1989).

Smoking, while not a direct indicator of health status, leads to an increased risk of poor health and early mortality. Since the long-term effects are mainly linked to cardiovascular disease, cancer and lung disease (Rogers and Powell-Griner, 1991; Collishaw et al., 1991), one might expect to see a positive relationship between high rates of smokers and expenditures on health care.

Potential Years of Life Lost (PYLL) is an indicator of premature mortality which gives greater weight to causes of death occurring at a younger age than to those at later ages. This measure is calculated by subtracting the actual age of death from 70² in each age group, and dividing the total potential years of life lost by the total population under age 70 (ACPH, 1996b). By emphasizing the loss of life at an early age, PYLL focuses attention on the need to deal with the major causes of such early deaths - cancer, accidents and cardiovascular disease - in order to improve health status. PYLL has also been found to vary with characteristics such as sex, socio-economic status and place of residence (Canadian Institute for Health Information, 1995).

Socio-Economic Status Series

The socio-economic series compares provincial populations on eight factors: educational attainment, income below poverty level, poverty rate among children in lone-parent families, unemployment rate, labour force participation of women over 15 years, income inequality (Gini coefficient), mean value of occupied dwellings, and provincial gross domestic product (GDP) per capita.

Educational attainment is widely acknowledged as one of the key components of socio-economic status, and is positively linked to income and health status (ACPH 1996b). Less than high school education, age-adjusted, was used as our measure of educational attainment.

Income Below the Poverty Level is a commonly-used indicator when addressing the relationship between health status and socio-economic status. A considerable literature exists which demonstrates the health gradients between not only the poor and those at upper-income

² PYLL under age 75 is widely accepted as the measure to use, but these data using age 70 were the most recent available to us.

levels, but also between each level of income (Roos and Mustard, 1997; Billings et al., 1993; Wilkinson, 1992). One might therefore expect to find higher expenditures on health care in provinces with a higher proportion of population below the poverty level.

Poverty Rate among Children in Lone-Parent Families provides a measure of economic and social burden related to being in a poor single-parent family. Children raised in poverty are more likely to have health problems both during childhood and as adults (Statistics Canada, 1996; Ezzy, 1993).

Unemployment Rate and Labour Force Participation of Women over 15 Years are two separate employment measures which were included. The unemployment rate measures those currently not in the workforce relative to the labour force 15 years or over. The unemployed are those who do not have a job and are currently (within the last four weeks) seeking a job. There is an established link between unemployment, health status and life expectancy. The percent of women participating in the workforce provides another perspective on this factor.

The Gini Coefficient is an indicator of income inequality reflecting the distribution of income throughout the population. If income is distributed equally across the population, the coefficient is equal to 0, and if the wealth is predominantly held by a few individuals, the coefficient is closer to 1. This measure was selected because research has shown that the greater the inequality of income, the poorer the health status of the population across the lower levels of income (Kennedy et al., 1996).

*Mean Value of Occupied Dwellings*³ provides another perspective on the wealth of the population and general cost of living. There are two opposing possibilities. There may be a relationship between low housing values and poor health status, leading to higher health care expenditures. Alternatively, if health care expenditures are driven by factors associated with ability to spend, one might expect to find a positive relationship between high expenditures and high housing prices.

³ Caution must be taken when interpreting analyses which use housing values. Although reported housing prices may be confounded by property values in provinces with considerable agriculture properties, we felt that at the provincial level the data should be relatively robust and therefore included them in our analyses.

Provincial Gross Domestic Product (GDP) Per Capita is included as a relative measure of the wealth of the individual provinces. If provincial health expenditures are a function of need for health care, one might expect the residents of poorer provinces to have poorer health status and require higher health care expenditures than provinces where the population is relatively more wealthy. On the other hand, if expenditures reflect the ability to spend, as with housing prices, we might expect provinces with greater wealth to have higher expenditures.

Demographic Series

The demographic indicators included in this series illustrate the proportion of each province's population that falls within specific groups known to have high health care needs.

Percentage of the population over 65 is included because older persons consume health care services disproportionately to their numbers. Variations in this indicator might therefore be associated with differences in expenditures across provinces.

Registered Indians as a percentage of the population, and the change in this indicator over time, were considered because the health of the aboriginal population is below the Canadian average. This poor health status would be expected to affect utilization and therefore health care costs (ACPH, 1996b). While the Federal Government is responsible for on-reserve services and non-insured services, the provincial governments fund hospital services and significant portions of physician services.

Median Age (actual and projected) assists in inter-provincial comparisons, and helps compare the expected substantial change in relative provincial populations over 65 years of age from 1994 to 2011.

Demographic Projections show trends in population characteristics and are included because of the potential implications for public policy.

4.2 Health Expenditures

Three different estimates of health budget expenditures were examined. They were:

1) 1994/95 annual budget estimates prepared by the provincial governments,

- 2) the 1994 Health Canada report entitled *National Health Expenditures in Canada 1975-1994*,⁴ and
- 3) Statistics Canada's 1994/95 budget analyses.

Health Canada 1994 data were selected for the inter-provincial comparisons because their expenditure data incorporate a broad reporting base that is in keeping with current health and social planning. Health Canada's definition of health care expenditures also has a good fit with the Manitoba Health vision of a continuum of services with flexibility, co-ordination and community-based services and supports, as enunciated in *Quality Health for Manitobans, The Action Plan* (Manitoba Health, 1992). Specifically, Health Canada defines health expenditure as "any type of expenditure for which the primary objective is to improve or prevent the deterioration of health status, health status being defined within the context of health determinants and their impact on health. This includes, for example, such expenditures as occupational health and safety expenditures, debt service charges, and capital expenditures" (Health Canada, 1996a).

The Statistics Canada data exclude funding for any service or expenditure that is not offered in all provinces (e.g. chiropractic), making it difficult to capture all expenditures on health care (Saskatchewan Health, 1996). Provincial budget estimates were not considered suitable for comparison because of inter-provincial differences in allocation of health care expenditures in social services, seniors' programs, family services, etc.

The data used in both the Health Canada and Statistics Canada analyses originate from data provided by the provinces. However the two different agencies use different methodologies, including different definitions of health. Health Canada data, around which we build our estimates, analyzes provincial budget estimates and reallocates expenditures according to standard definitions. In so doing, they do not limit themselves to the health estimates, but analyze other departmental estimates for expenditures that warrant reclassification. For example, if a province has budgeted any health expenditures within other provincial

⁴ The data used in this project may be slightly different from the published *National Health Expenditures in Canada 1975-1994* data. The 1994 published data are estimates and we obtained from CIHI updated estimates which vary slightly from the published data.

departments such as family services, justice, etc., these are reallocated to the health budget (Saskatchewan Health, 1996). Statistics Canada compares spending only on common, comparable services. Since it excludes any service not offered in all provinces, the result is a much narrower interpretation of health expenditures. For example, since chiropractic services are not publicly funded in all provinces, funding related to this program is excluded from all analyses; as well, any health spending in National Defence and Veterans Affairs is not considered a health expenditure (Saskatchewan Health, 1996). The broader, more inclusive, Health Canada definition was deemed more appropriate for the purposes of this analysis. On the other hand, because it is more inclusive, it may contain different types of expenditures for individual provinces.

The data limitations and differences in definitions discussed earlier also made it difficult to do a detailed analysis of how different provinces allocate expenditures across sectors such as hospitals, other institutions, physicians etc. For example, there is a wide variation in how provinces remunerate their physicians. In 1988/89, the value of non-fee-for-service billings ranged from 23% of fee-for-service billings in Newfoundland to less than 1% in Prince Edward Island and Alberta (see Table A1). Also, each province has a different proportion of physician remuneration included in hospital budgets. This creates a significant problem in allocating expenditures between hospitals and physicians. In recognition of the fact that findings may be distorted by inconsistencies in data compilation, the results of sectoral analysis are presented in Appendix 2.

The year 1994 was selected as the base year for comparisons, based on availability of data. A decision was also made to exclude data from the Yukon and Northwest Territories due to the lack of data for some of the indicators, unstable rates due to small populations, as well as the different funding processes for the territories.

5. FINDINGS

The report examines, through a series of comparisons, whether the anticipated relationships discussed above in fact hold: that is, do provinces with sicker residents, lower socio-economic status or a higher proportion of elderly have higher per capita expenditures on health care?

The results are first presented separately for the various population indicators and for provincial government expenditures, and then population characteristics and provincial expenditures are examined together. Lastly, non-provincial government expenditures are examined.

5.1 Population Characteristics

Health Status Indicators

Age-standardized mortality rates range from 466 to 566 deaths per 100,000 population, a difference of 100 deaths per 100,000 population or 17.7% across provinces. Manitoba ranks mid-range, being in the fifth position, with 511 deaths per 100,000 population, just over the Canadian average of 505 (Figure 1).

Saskatchewan has the lowest age-adjusted mortality rate at 466 per 100,000 population, followed by the provinces of British Columbia, Alberta and Ontario. The provinces of Newfoundland, Nova Scotia and Prince Edward Island are found at the higher end of the range; Newfoundland has the highest mortality rate at 566.

NOTE: All figures and tables are presented in order of age-standardized mortality rates, as in Figure 1. The order across all tables and figures is therefore Saskatchewan, British Columbia, Alberta, Ontario, Manitoba, Quebec, New Brunswick, Prince Edward Island, Nova Scotia and Newfoundland. All data are sorted in this manner for ease of comparison.

**Figure 1: Age-Standardized Mortality
Rates per 100,000 Population**

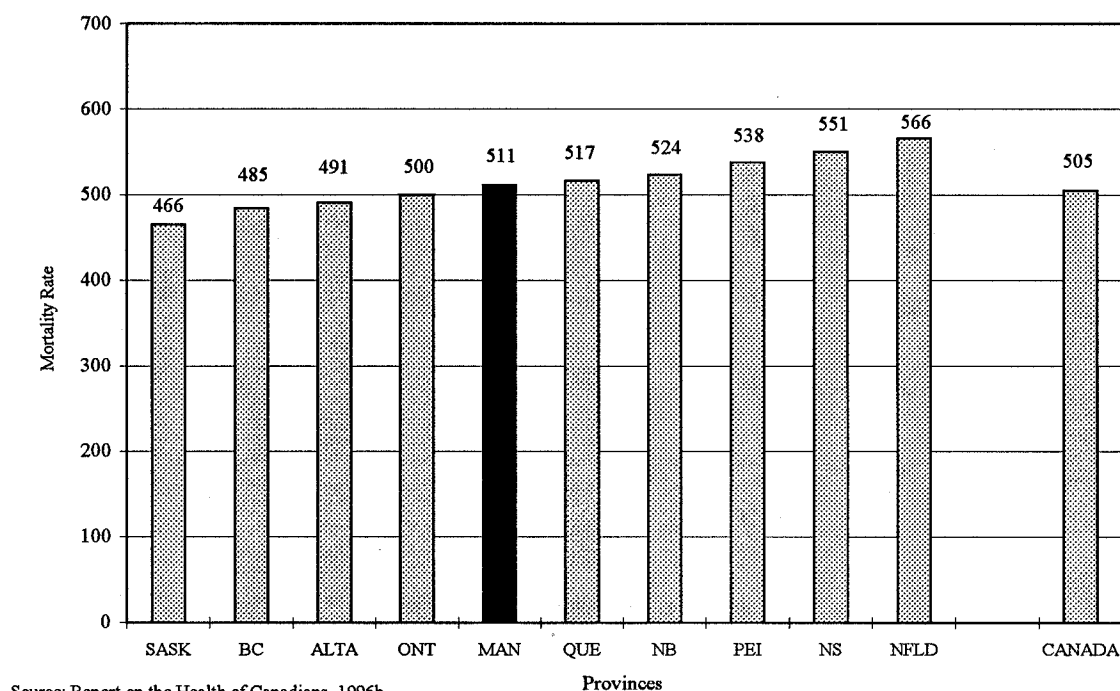


Table 1 presents the findings on health status indicators. First, the raw data for all provinces are presented in Table 1A, followed by rank orderings of these data in Table 1B, and classification into *better/medium/worse* categories in 1C. Finally, a summary of the number of *better*, *medium*, and *worse* ratings is provided for each province for ease of comparison. Tables 2 and 3 are also organized in this manner.

When the provinces were compared on all five health status indicators, Manitoba's ranking was clearly average, ranking *medium* on all indicators (Tables 1A-1C). Generally speaking, the westernmost provinces rank better on health status than do the eastern provinces. Ontario, British Columbia, and Alberta have three better ratings each and Saskatchewan has two.

Table 1: Health Status Indicators**A: Actual Measures**

	Age-Standardized Mortality Rates	Infant Mortality	Self-Rated Health Status (good to excellent)	PYLL	Smoking
	per 100,000 pop.	per 1000 live births	%	years per 1000 pop.	(% pop)
SASK	466	7.9	90	38.4	29
BC	485	6.2	91	40.5	26
ALTA	491	6.9	91	38.9	28
ONT	500	6.1	90	36.5	27
MAN	511	6.8	88	40.4	29
QUE	517	5.7	90	41.9	34
NB	524	6.5	87	41.0	31
PEI	538	5.8	87	41.4	31
NS	551	6.3	83	41.7	33
NFLD	566	7.6	90	35.8	31
CANADA	505	6.3	91	39.1	29

B: Provincial Rankings (Rank: Better: 1-3; Medium: 4-7; Worse: 8-10)

	Age-Standardized Mortality Rates	Infant Mortality /1,000 livebirths	Self-Rated Health Status (good to excellent)	PYLL /1,000 pop	Smoking/ (% pop)
SASK	1	10	3	3	4
BC	2	4	1	6	1
ALTA	3	8	1	4	3
ONT	4	3	3	2	2
MAN	5	7	7	5	4
QUE	6	1	3	10	10
NB	7	6	8	7	7
PEI	8	2	8	8	7
NS	9	5	10	9	9
NFLD	10	9	3	1	7

C: Categorizing Better to Worse (Rank: Better: 1-3; Medium: 4-7; Worse: 8-10)

	Age-Standardized Mortality Rates	Infant Mortality /1,000 livebirths	Self-Rated Health Status (good to excellent)	PYLL /1,000 pop	Smoking/ (% pop)
SASK	B	W	M	B	M
BC	B	M	B	M	B
ALTA	B	W	B	M	B
ONT	M	B	M	B	B
MAN	M	M	M	M	M
QUE	M	B	M	W	W
NB	M	M	W	M	M
PEI	W	B	W	W	M
NS	W	M	W	W	W
NFLD	W	W	M	B	M

D: Summary

	BETTER	MEDIUM	WORSE
SASK	2	2	1
BC	3	2	0
ALTA	3	1	1
ONT	3	2	0
MAN	0	5	0
QUE	1	2	2
NB	0	4	1
PEI	1	1	3
NS	0	1	4
NFLD	1	2	2

Nova Scotia and Prince Edward Island rank the lowest on health status, with four and three *worse* ratings respectively. This analysis on five selected indicators is unchanged from the findings on preliminary analyses done with a much larger group of health status indicators (data not included).

Using age-standardized mortality as an anchor allows additional perspective on the relationship among health status indicators. For example, from Table 1C, one can see that most of the *worse* rankings on health status are located in the bottom half of the table, in the provinces with *worse* age-adjusted mortality rates (Prince Edward Island, Nova Scotia, Newfoundland). Similarly the majority of *better* and *medium* rankings belong to the provinces which also rank *better* on age-adjusted mortality rankings (British Columbia, Alberta, Ontario, Saskatchewan).

However, in light of these findings there were two unexpected observations. First, Saskatchewan has the best age-standardized mortality rate, but has the worst infant mortality rate. It may be that older persons do better than younger persons in Saskatchewan, or it may be related to a high infant mortality rate among First Nations people. Saskatchewan had 11 infant deaths per 1,000 live births, in comparison to six infant deaths per 1,000 live births for the rest of the Canadian population (Health Canada, Infant Mortality, 1996b). Since Saskatchewan has a *high* proportion of Registered Indians in its population (Table 3a), this may in part explain the *worse* infant mortality rates.⁵ A second unexpected observation was Newfoundland's *better* ranking on PYLL despite having the worst age-standardized mortality rates and high infant mortality rates but, we were unable to determine any explanation for this.

Socio-Economic

The provinces' relative ranking on the various indicators of socio-economic status are illustrated in Tables 2A to 2D. Manitoba again falls in the middle group, just as it did on health status scores, ranking *medium* on five measures, but *better* on one measure

⁵ The PEI ranking has also reversed, from a *worse* position on age-standardized mortality rates, to a *better* position on infant mortality. Some experts feel that more than 10,000 births are needed in the denominator to obtain an accurate estimate of infant mortality. 3-year averages were used to try to overcome this problem, but in the case of a province with a small number of births, such as PEI, infant mortality rates may still be unstable.

(unemployment rate), and *worse* on two measures (income below poverty level, and poverty rate in children in lone-parent families).

Once again, the provinces of Ontario, Alberta and British Columbia have the better rankings, with six, six and five *bettors* respectively, and almost no *worse* rankings. The rankings of Quebec and New Brunswick are mid-range, similar to Manitoba's. As with findings on mortality, Nova Scotia and Newfoundland have a poorer showing on socio-economic status, with four and seven *worse* rankings out of the eight socio-economic indicators respectively, including GDP per capita, unemployment rate, poverty rates in children from lone-parent families, and the labour force participation of women.

In contrast to its high health status rankings, Saskatchewan has an average showing on socio-economic indicators: five *medium* and two *worse* rankings on socio-economic indicators. Provincial rankings on Gross Domestic Product (GDP) per capita appear consistent with intuitive groupings of wealthy (Alberta, British Columbia and Ontario) provinces and poorer Atlantic provinces.

Demographic

Analyses of demographic data indicates that Manitoba ranks second highest⁶ both on the proportion of elderly persons (13.4%) and of Registered Indians (8.2%) in the general population (Tables 3A-3C). A province with a higher proportion of elderly or a higher proportion of Registered Indians might be expected to have higher health care expenditures. This is because elderly persons have been shown to use a disproportionate amount of health services (Centre on Aging, 1996) and the aboriginal population have been found to have poor health status in comparison to other Canadians (ACPH, 1996b).

A high proportion of Saskatchewan's population is made up of elderly persons (14.2%) and Registered Indians (9.2%), the highest proportion of all provinces. If it holds that these two population groups generate disproportionately high health expenditures, one would then expect to find *high* health expenditures in Saskatchewan.

⁶ *High/medium/low* were used instead of *better/medium/worse* when referring to indicators where the former categories would imply a value judgement - this is the case with demographic indicators as well as expenditures.

Table 2: Socio-Economic Indicators**A: Actual Measures**

	Education < High School	Unemploy- ment Rate (age 15+)	Income < Poverty Level	Mean Value Occupied Dwellings	Poverty Rate Children in Lone Parent Families	Labour Force Participation of Women 15+ yrs	Income Inequality - Gini Coefficient	Gross Domestic Product Per Capita (GDP)
	%		%	\$	%	%		\$
SASK	32	7.0	13	68,537	66	60	0.31	22,815
BC	17	9.8	11	175,565	59	60	0.30	27,233
ALTA	22	8.4	13	114,542	58	66	0.32	30,269
ONT	23	9.3	11	197,982	56	62	0.29	27,642
MAN	32	8.5	17	85,735	70	60	0.29	22,185
QUE	32	13.2	16	105,146	64	56	0.27	22,949
NB	32	13.8	12	69,419	62	54	0.28	19,763
PEI	33	19.1	10	75,474	60	62	0.26	18,045
NS	29	13.9	13	79,395	67	55	0.30	19,668
NFLD	40	19.6	16	64,783	68	54	0.30	16,705
CANADA	26	10.6	13	112,161	60	60	0.30	25,645

B: Provincial Rankings (Rank: Better: 1-3; Medium: 4-7; Worse: 8-10)

	Education < High School	Unemploy- ment Rate (Age 15+)	Income < Poverty Level	Mean Value Occupied Dwellings	Poverty Rate Children in Lone Parent Families	Labour Force Participation of Women 15+ yrs.	Income Inequality - Gini Coefficient	Gross Domestic Product Per Capita
SASK	5	1	5	9	7	4	9	5
BC	1	5	2	2	3	5	6	3
ALTA	2	2	5	3	2	1	10	1
ONT	3	4	2	1	1	3	5	2
MAN	5	3	10	5	10	5	4	6
QUE	5	6	8	4	6	7	2	4
NB	5	7	4	8	5	9	3	7
PEI	9	9	1	7	4	2	1	9
NS	4	8	5	6	8	8	8	8
NFLD	10	10	8	10	9	10	6	10

C: Categorizing Better to Worse (Rank: Better: 1-3; Medium: 4-7; Worse: 8-10)

	Education < High School	Unemploy- ment Rate (age 15+)	Income < Poverty Level	Mean Value Occupied Dwelling	Poverty Rate Children in Lone Parent Families	Labour Force Participation of Women 15+ yrs.	Income Inequality - Gini Coefficient	Gross Domestic Product Per Capita
SASK	M	B	M	W	M	M	W	M
BC	B	M	B	B	B	M	M	B
ALTA	B	B	M	B	B	B	W	B
ONT	B	M	B	B	B	B	M	B
MAN	M	B	W	M	W	M	M	M
QUE	M	M	W	M	M	M	B	M
NB	M	M	M	W	M	W	B	M
PEI	W	W	B	M	M	B	B	W
NS	M	W	M	M	W	W	W	W
NFLD	W	W	W	W	W	W	M	W

D: Summary

	BETTER	MEDIUM	WORSE
SASK	1	5	2
BC	5	3	0
ALTA	6	1	1
ONT	6	2	0
MB	1	5	2
QUE	1	6	1
NB	1	5	2
PEI	3	2	3
NS	0	3	5
NFLD	0	1	7

Table 3: Demographics**A: Actual Measures**

ACTUAL			PROJECTED			
	Registered Indians 1995	Population 65+, 1991	Median Age, 1996	Registered Indians 2015	Population 65+ in 2011	Median Age in 2011
	%	%	years	%	%	years
SASK	9.2	14.2	34.6	13.5	14.5	38.9
BC	2.7	12.9	35.9	3.2	15.4	39.9
ALTA	2.7	9.1	33.2	3.4	12.4	37.4
ONT	1.2	11.7	34.9	1.6	14.3	38.8
MAN	8.1	13.4	34.5	11.2	14.3	38.5
QUE	0.6	11.2	36.1	1.1	15.3	41.0
NB	1.3 (Atlantic)	12.2	35.3	1.5 (Atlantic)	16.0	42.4
PEI	NA	13.2	34.6	NA	16.3	40.2
NS	NA	12.6	35.5	NA	15.5	41.9
NFLD	NA	9.7	33.5	NA	15.1	42.6
CANADA	2.1	11.6	35.1	2.3	14.6	39.5

B: Provincial Rankings (Rank: High 1-3; Medium: 4-7; Low: 8-10)

ACTUAL				PROJECTED		
	Registered Indians 1995	% Population 65+, 1991	Median Age, 1996	Registered Indians 2015	Population 65+ in 2011	Median Age in 2011
SASK	1	1	6	1	7	7
BC	3	4	2	4	4	6
ALTA	3	10	10	3	10	10
ONT	5	7	5	5	8	8
MAN	2	2	8	2	8	9
QUE	10	8	1	10	5	4
NB	6-9 (Atlantic)	6	4	6-9 (Atlantic)	2	2
PEI	NA	3	6	NA	1	5
NS	NA	5	3	NA	3	3
NFLD	NA	9	9	NA	6	1

C: Categorizing Highest to Lowest (Rank: High: 1-3; Medium: 4-7; Low: 8-10)

ACTUAL			PROJECTED			
	Registered Indians 1995 *	Population 65+, 1991	Median Age, 1996	Registered Indians 2015*	Population 65+ in 2011	Median Age in 2011
	%	%	years	%	%	years
SASK	H	H	M	H	M	H
BC	L	M	H	L	M	M
ALTA	L	L	L	L	L	H
ONT	L	M	M	L	L	M
MAN	H	H	L	H	L	H
QUE	L	L	H	L	M	M
NB	L (Atlantic)	M	M	L (Atlantic)	H	L
PEI	NA	H	M	NA	H	M
NS	NA	M	H	NA	H	L
NFLD	NA	L	L	NA	M	L

*Because the percentage of Registered Indians in the population is very dichotomous, only High and Low rankings were assigned.

Demographic projections for 2011

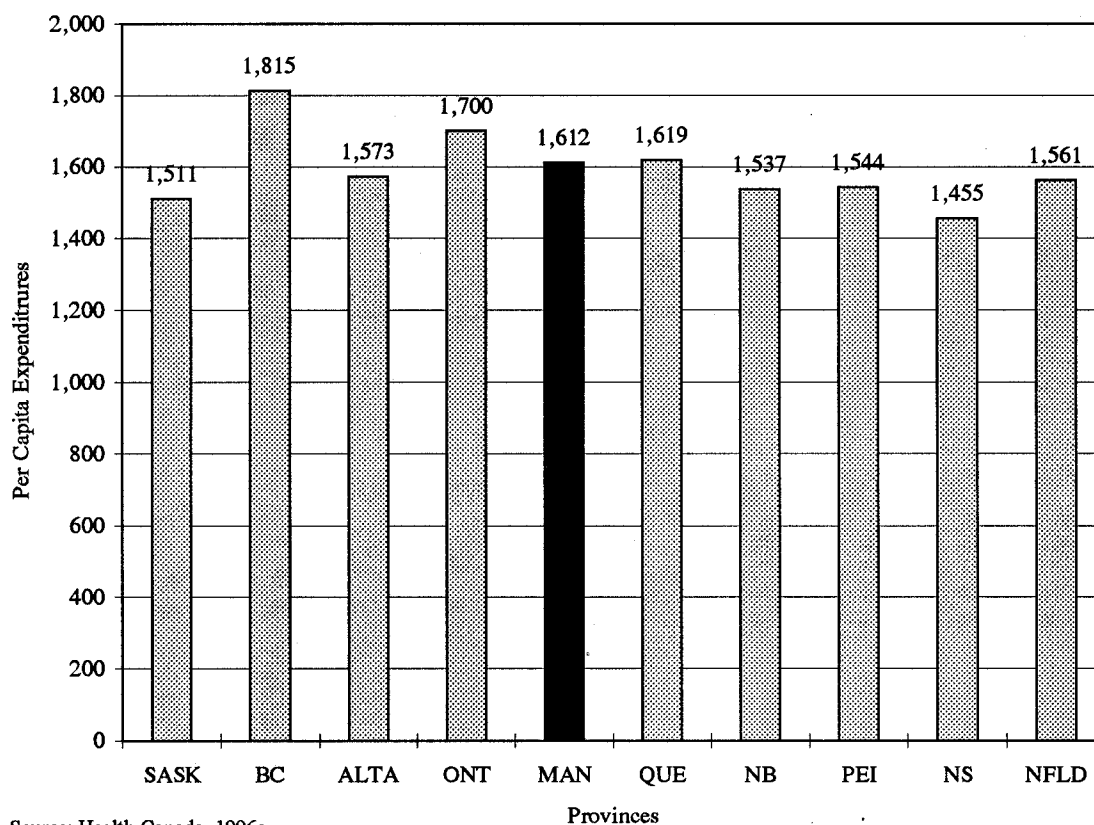
Demographic projections for the future have implications for public policy initiatives and proactive interventions in the present. For this reason, projections are presented here for the three demographic indicators.

Both Manitoba and Saskatchewan are projected to maintain their *high* ranking in terms of percent of the population that are Registered Indians in the year 2011. In fact, as shown in Table 3A, Registered Indians as a percent of the population are projected to increase in both provinces.

Somewhat different projections are true for the percent of the population over 65. Although the actual number of elderly persons will grow in Manitoba and Saskatchewan in the year 2011, their ranking on this indicator relative to other provinces will change. Manitoba will shift from a *high* to a *low* ranking, and Saskatchewan's ranking will shift from *high* to *medium*. This appears to be a function of the current median age of various provincial populations. Manitoba and Saskatchewan populations appear to be more evenly dispersed over the age groups at this time, resulting in a greater proportion of elderly in spite of a low median age. By 2011, the other provinces, which already have a higher median age, will have caught up and surpassed Manitoba and Saskatchewan in the proportion of the population over 65.

5.2 Provincial Government Expenditures on Health Care

Table 4 and Figure 2 illustrate provincial government per capita health expenditures and relative provincial rankings. Manitoba's per capita expenditures of \$1,612 place it in fourth place, a *medium* ranking. British Columbia, Ontario and Quebec have *high* per capita expenditures, while New Brunswick, Saskatchewan and Nova Scotia have *low* expenditures. While there is a total variation of \$360 in per capita provincial expenditures, there is only \$75 per capita difference (approximately 5%) from the fourth- to the eighth-ranked provinces.

Figure 2: Provincial Health Expenditures, 1994

Is Age-Standardized Mortality Associated with Differences in Expenditures?

Once these differences in health expenditures were identified, expenditures were compared to the population characteristics identified earlier, to see whether differences in health expenditures are related to health care need indicators (i.e. age-standardized mortality rates, health, socio-economic and demographic status).

Table 4: Provincial Government Per Capita Expenditures

	Age-Adjusted Mortality Rates	Per Capita Health Expenditure	Ranking	High to Low Grouping
SASK.	466	1,511	9	Low
BC	485	1,815	1	High
ALTA	491	1,573	5	Medium
ONT	500	1,700	2	High
MAN	511	1,612	4	Medium
QUE	517	1,619	3	High
NB	524	1,537	8	Low
PEI	538	1,544	7	Medium
NS	551	1,455	10	Low
NFLD	566	1,561	6	Medium

(Rankings: High=1-3; Medium=4-7; Low=8-10)

Source: Health Canada, 1996a

Manitoba's middle ranking on health expenditures is consistent with its middle ranking on mortality rates (Table 4). Saskatchewan, which has the best age-adjusted mortality rate of all provinces, is in the *low* category on per capita health expenditures. However, for most other provinces, total expenditures do not appear to be related to age-adjusted mortality rates.

Those provinces that had *better* rankings on health status indicators (British Columbia, Ontario and Alberta have *high* and medium health expenditures, ranking first, second, and fifth respectively. Whereas provinces ranking *worse* on mortality rates (Newfoundland, Nova Scotia and Prince Edward Island) actually rank *low* and *medium* on health expenditures, they would be expected to have above-average health expenditures if relative need for health care was driving expenditures. Overall, the correlation between age-standardized mortality rates and expenditures is negative and not significant (see Table 7).

Once it became clear that health care expenditures varied across provinces and that a single health care need indicator such as age-adjusted mortality did not appear to account for the differences, additional analyses were undertaken. A simulation was carried out as well as correlation analyses, to delve further into simple relationships between population characteristics and provincial health care expenditures. These analyses, which are described below, were conducted despite the small number of data points available for analysis.

Is the Age-Mix of the Population Associated with Differences in Expenditure?

Table 5, which provides the per capita expenditures on health services across Canada for four broad age categories, indicates clear differences in expenditures as one moves across the age categories (Health Canada, 1996a).

Table 5: Per Capita Provincial Government Expenditure for Canada

Age Group	Per Capita Expenditures (\$)
0-14	514
14-44	914
45-64	1,466
65+	6,818
Total	1,642

(Source: Health Canada 1996a)

Based on the fact that per capita health expenditures increase in older age groupings, the argument is often made that provinces with a larger portion of the population in older age categories could be expected to spend more on health care than do provinces with a younger population. Because provincial expenditures could not be age- and sex- adjusted, a simulation was undertaken to see whether the age and sex distribution of provinces' populations are associated with differences in provincial health expenditures. Data from *A Project to Investigate Provincial Expenditures on Health Care to Manitobans - A POPULIS Project* (Shanahan et al., 1997) were used to explore this possibility.

This simulation, which assumes that age and sex are the only two things which affect costs, attempts to determine how provincial government expenditures on health would vary if all provinces spent the same amount on each age and sex group as the province of Manitoba. This simulation is similar to an indirect age and sex adjustment. Obviously, there are many other factors that do and should affect how much a province spends on health care, and this simulation does not consider those alternatives. It attempts *only* to understand how age and sex structure might affect expenditures. As mentioned earlier it was necessary to undertake such a simulation because currently there are no age-specific expenditure data available for cross-provincial comparisons.

Per capita expenditures on Manitoba hospitals, personal care homes, and physicians were estimated for each of the five-year age categories for both men and women. A given age and sex category in each province is allocated the same expenditures for all hospital, physician and 'other' institutional care. For example, if each man in the 60-64-age category was allocated \$1,385 in Manitoba, then this amount was also allocated to all men in that age category in every other province. This step was repeated for every age and sex group and then summed, to yield an overall expected per capita expenditure for each province. The ordering of these simulated expenditures therefore reflects how provincial per capita expenditures would differ if age and sex were the only factors affecting expenditures. Thus, based on demographic differences, Saskatchewan would be expected to have the highest per capita expenditures, followed by Manitoba and Prince Edward Island. The lowest expenditures would be expected in Alberta.

The actual expenditures for each province for the sectors of hospitals, other institutions and physicians (Health Canada 1996a) were then compared to this expected per capita⁷ expenditure and is presented in Table 6.

Table 6: Does Age-Mix Explain Expenditure Differences? Results of a Simulation

	Actual Expenditures Per Capita: Health Canada Data	Simulated (Expected) Expenditures Per Capita – Based on Man. Age- and Sex- Specific Expenditures	Ratio of Health Canada Expenditures to Simulation Expenditures
	\$	\$	Actual/Expected
SASK	1,172	1,343	0.87
BC	1,401	1,245	1.13
ALTA	1,194	1,099	1.09
ONT	1,344	1,205	1.12
MAN	1,294	1,294	1.00
QUE	1,289	1,190	1.08
NB	1,254	1,232	1.02
PEI	1,282	1,286	1.00
NS	1,192	1,258	0.95
NFLD	1,289	1,113	1.16

⁷ In the *Project to Investigate Provincial Expenditures on Health Care to Manitobans* capital expenditures, depreciation, and some other expenditures not directly related to patient care were excluded. The Manitoba data were scaled in order to have data comparable to the Health Canada data.

If age and sex were the only two factors that affected health care expenditures, then one would expect the ratio of actual to expected to be equal to 1.0 for all provinces.

Saskatchewan, the province with the highest percentage of its population greater than the age of 65, has rates of actual-to-expected expenditures less than 1.0, (that is, expenditures are much lower than would be expected given their age and sex mix, based on Manitoba patterns of spending). In contrast, Newfoundland, British Columbia, Ontario, Alberta and Quebec all have actual per capita expenditures that are higher than would be expected based on Manitoba spending patterns. With the results of this simulation in mind, it is not surprising that the correlation between provincial government expenditures on health care and percent of the population greater than 65 years of age is not significant (see Table 7).

Another way to examine the relationship between demographic distribution and expenditures on health care is to look at provinces that have a combined high proportion of elderly persons and Registered Indians. As discussed in relation to Table 3A, one might expect Manitoba and Saskatchewan, which have the highest relative proportions of these two groups, to have *high* health expenditures.⁸ However, as seen in Table 4, Saskatchewan has *low* provincial government health care expenditures per capita. Although all other provinces have proportionally fewer aboriginal residents than do Manitoba and Saskatchewan, only in Alberta and Newfoundland do elderly persons make up a markedly smaller proportion of the population.

Other Possibilities:

Correlation analyses were performed between each of the socio-economic, health status and demographic indicators that were included in the report (Table 7).

Provincial government expenditures on health care are not directly correlated with many factors that have been linked to increased need for health care services, such as unemployment, child poverty and distribution of wealth. However, the mean value of occupied dwellings is positively associated with expenditures on health care by provincial governments. This may suggest that it is the wealth of a province that is associated with

⁸ While the federal government is responsible for on-reserve services and non-insured services, the provincial governments fund hospital services and significant portions of physician services.

higher expenditures on health care. Another explanation that warrants investigation is whether in some provinces, the cost of living or wages may on average be higher and thus increase expenditures on health care. A cursory examination of average nursing department wages (Statistics Canada, Cat. No. 93-332-XPP) across provinces did not show a relationship between wages and expenditures on health care. In order to fully explore this finding, other factors would need to be considered, including utilization, average wage and number of providers.

Two variables were found to be significantly and negatively correlated with provincial health care expenditures - the percent of population that smokes, and the percent of the population which has less than a Grade 12 education. This negative relationship is contrary to expectations, and indicates that provinces with less-educated residents and with a higher proportion of their population that are smokers spend less on health care than other provinces.

Table 7: Provincial Expenditures on Health Care - Correlation Results

Provincial government per capita expenditures	
Indicators	r value
Age-Standardized Mortality Rates	-0.42
Infant Mortality	-0.33
Self-rated Health Status	0.63
PYLL	-0.14
< High School Education	-0.65 *
Unemployment Rate	-0.31
Income < Poverty Level	-0.18
Value of Occupied Dwelling	0.84 **
Child Poverty Rate	-0.49
Women in Workforce	0.29
Population > 65	-0.02
Median Age	0.30
GDP	0.58
Gini coefficient	-0.01
Smoking	-0.66 *

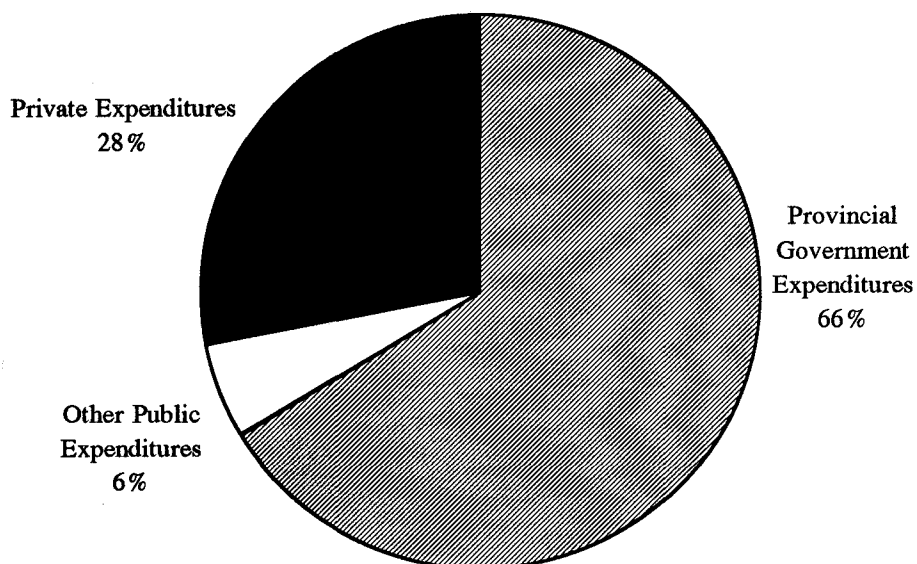
* significant at < .05 ; ** significant at < .01

5.3 Additional Health Care Expenditures

Due to the nature of the original research question, the analyses concentrated on provincial government health care expenditure data. However, it is important to point out that provincial government health care expenditures make up only 66% of total health expenditures (Health Canada, 1996a). Of the remaining 34%, 6% consists of 'other' public expenditures (federal direct payments, Workers' Compensation Board expenditures on health, and municipal expenditures), and 28% is funded as private expenditures (Figure 3).

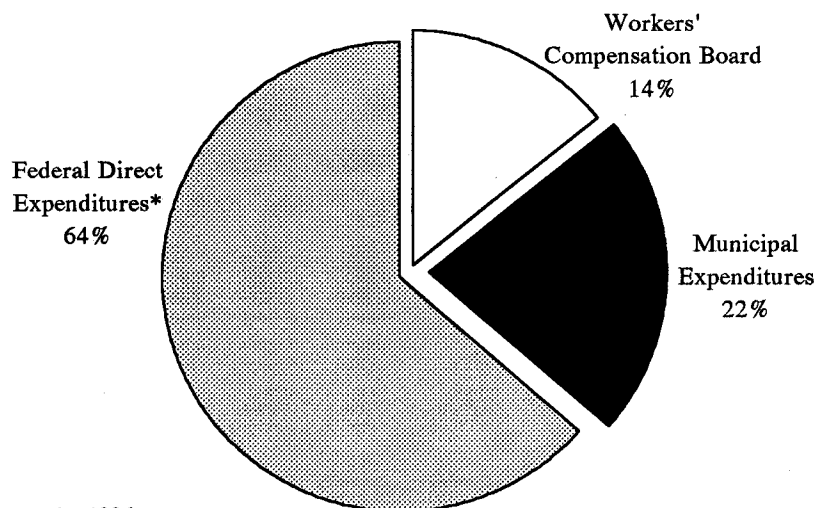
Federal direct health expenditures which are funds paid by the federal government for certain groups such as Registered Indians, members of the Armed Forces and veterans, as well as expenditures on research make up the majority of other public expenditures (see Figure 4). A considerable portion of these expenditures is for Registered Indians. This is reflected in the high 'other' public expenditures for Manitoba and Saskatchewan (Table 8), which have the highest proportions of aboriginal populations.

Figure 3: Distribution of Total Health Care Expenditures for Canada, 1994.



Source: Health Canada, 1996a

Figure 4: 'Other' Public Expenditures on Health Care by Provider - Canadian Distribution



Source: Health Canada, 1996a

* Consists mostly of expenditures on Registered Indians, Armed Forces, Veterans and Special Programs

When these additional sources of funding are taken into account the relative per capita expenditure ranking of some provinces changes (see Tables 8A-C). Manitoba moves from a *medium* to a *high* ranking and Saskatchewan from *low* to *medium* with the addition of 'other' public health care expenditures, suggesting that there are higher than average contributions to these two provinces' health expenditures from sources other than the provincial government. Quebec shifts from a *high* to *medium* ranking with the inclusion of 'other' public expenditures and Prince Edward Island from *medium* to *low*.

When private expenditures are added to public expenditures, Quebec and Newfoundland have *low* rankings, with Prince Edward Island and New Brunswick shifting to *medium* ratings. This would suggest that the private sector contribute at different levels in different provinces.

Table 8: Comparison of Health Expenditures Across Provinces - Per Capita Expenditures

	Provincial Government (\$)		Total Public Expenditures* (\$)		Total **(\$)
	per capita	% of total	per capita	% of total	per capita
SASK	1,511	63.2%	1,753	73.4%	2,389
BC	1,815	68.3%	1,955	73.5%	2,659
ALTA	1,573	65.3%	1,787	74.1%	2,410
ONT	1,700	65.1%	1,821	69.7%	2,611
MAN	1,612	61.9%	1,898	72.8%	2,606
QUE	1,619	70.0%	1,696	73.3%	2,313
NB	1,537	65.8%	1,652	70.7%	2,337
PEI	1,544	64.7%	1,650	69.1%	2,387
NS	1,455	64.3%	1,629	72.0%	2,263
NFLD	1,561	70.7%	1,669	75.6%	2,207

B. Provincial Rankings

Province	Provincial Government (\$)	Total Public Expenditures* (\$)	Total ** (\$)
SASK	9	5	5
BC	1	1	1
ALTA	5	4	4
ONT	2	3	2
MAN	4	2	3
QUE	3	6	8
NB	8	8	7
PEI	7	9	6
NS	10	10	9
NFLD	6	7	10

C: Categorizing Highest to Lowest (Rank: High: 1-3; Medium: 4-7; Low: 8-10)

Province	Provincial Government (\$)	Total Public Expenditures* (\$)	Total (\$) **
SASK	L	M	M
BC	H	H	H
ALTA	M	M	M
ONT	H	H	H
MAN	M	H	H
QUE	H	M	L
NB	L	L	M
PEI	M	L	M
NS	L	L	L
NFLD	M	M	L

*Total Public Expenditures include provincial expenditures and other public expenditures on health (Workers' Compensation Board; municipal expenditures; federal direct payments to Registered Indians, members of the Armed Forces & veterans).

**Total Expenditures include total public expenditures plus private expenditures.

Correlations between total per capita expenditures and variables examined earlier are found in Table 9. They show that, as with the provincial government expenditures, both the percentage of a province's population that has less than Grade 12 education and the

percentage of the population that smoke are negatively and significantly correlated with total public expenditures. The mean value of housing is also positively correlated as found previously.

Table 9: Total Expenditures on Health Care - Correlation Results

	Provincial Government	Total Public	All Health Care (Public and Private)
Indicators	r value	r value	r value
Age-Standardized Mortality Rates	-0.42	-0.66 *	-0.63
Infant Mortality	-0.33	0.30	-0.23
Self-rated Health Status	0.63	0.55	0.37
PYLL	-0.14	-0.15	-0.04
< High School Education	-0.65 *	-0.66 *	-0.70 *
Unemployment Rate	-0.31	-0.69 *	-0.63
Income < Poverty Level	-0.18	0.01	-0.27
Value of Occupied Dwelling	0.84 **	0.66 *	0.74 *
Child Poverty Rate	-0.49	-0.21	-0.4
Women in Workforce	0.29	0.49	0.57
Population > 65	-0.02	0.17	0.35
Median Age	0.30	0.05	0.18
GDP	0.58	0.68 *	0.64 *
Gini coefficient	-0.01	0.34	0.07
Smoking	-0.66 *	-0.82 **	-0.81 **

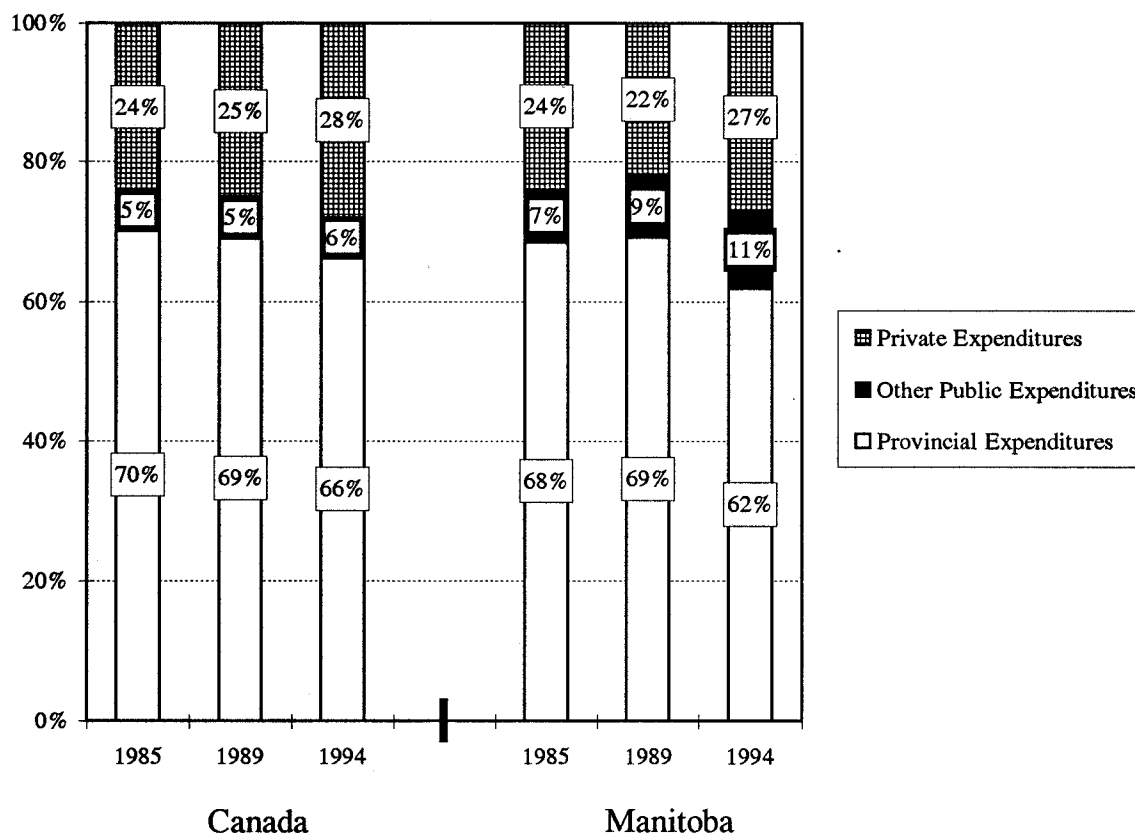
* significant at < .05 ; ** significant at < .01

In contrast to the provincial government expenditure correlation results, and contrary to expectations, age-standardized mortality rates and unemployment rates are both negatively correlated with total public expenditures, suggesting that as mortality rates and unemployment increase across the provinces, total public expenditures on health care decrease. GDP per capita is positively correlated with total public expenditures on health care, suggesting that increased wealth in a province may be associated with increased expenditures on health care.

When private expenditures on health care are also included, the correlation results are similar to those for the total public expenditures on health care, except that age-standardized mortality rates and unemployment rates are no longer significant. However, they retain the same negative sign.

Figure 5 illustrates the proportional decline in provincial government contributions to overall health care expenditures in Manitoba since 1985, with a corresponding increase in 'other' public expenditures and private expenditures on health care. For Canada overall, the 'other' public expenditures have remained constant, with provincial government expenditures on health care declining and private expenditures increasing. This increase in private expenditures warrants further investigation, not only because of the burden on individuals, but because it is very difficult to control health care expenditures once they are shifted to the private domain. A shift to the private sector also raises questions regarding accessibility of health services as defined by the Canada Health Act.

Figure 5: Who Pays for Health Care?



6. DISCUSSION

Currently there are significant difficulties in attempting to understand how health care systems compare across provinces. These comparisons are essential if provinces are to learn from each other's experiences. With the data available, it is possible to draw only very crude conclusions. That is, there appears to be no evidence at the provincial level, that the amount of health care spending is positively related to need for health care as indicated by poor health status, poor socio-economic status, or demographic indicators.

There was a 17% difference in age-adjusted mortality rates across provinces from 466 per 100,000 population in Saskatchewan to 566 per 100,000 population in Newfoundland. The findings for other health status indicators, used in the report, were similar to that of the mortality rates - that is, provinces that ranked *better* on age-adjusted mortality rates tended to rank *better* on other health status measures. There were a couple of exceptions to this; both Saskatchewan and Alberta, which ranked better on age-adjusted mortality rates, were *worse* for infant mortality rates.

When examining the socio-economic characteristics we found that the provinces of British Columbia, Alberta and Ontario all ranked *better* on most indicators while Nova Scotia and Newfoundland ranked *worse* on most indicators. Saskatchewan, Manitoba, Quebec and New Brunswick ranked *medium* overall.

Previous work done by MCHPE researchers focussing on the province of Manitoba demonstrates higher health care utilization and expenditures for those areas with poorer health status. There also exists a strong relationship within Manitoba between socio-economic status and premature mortality, implying that those living in areas with lower socio-economic status tend to have higher expenditures on health care. If expenditures on health care in Canada varied across provinces as they do across Manitoba, it would follow that those provinces with poorer health status and lower socio-economic status would have higher health care expenditures. This report illustrates that this is not the situation across Canada; there was no apparent relationship between age-adjusted mortality rates and per capita provincial government expenditures. With respect to socio-economic status, there was no evidence that

provinces with lower socio-economic status had higher expenditures; in fact, the opposite appears to be the case.

The assumption is frequently made that age and sex differences across populations account for differences in expenditures and utilization, but the analysis in the report suggest that demographic differences in populations probably do not account for the differences in provincial health expenditures across the provinces.

The correlation between average housing prices and provincial expenditures on health care shows a significant positive correlation. If housing prices were a proxy for wealth in the province, as has been often suggested, then this would indicate that the wealthier provinces spent more on health care. GDP per capita was also positively correlated with provincial expenditures on health care, although not statistically significant.

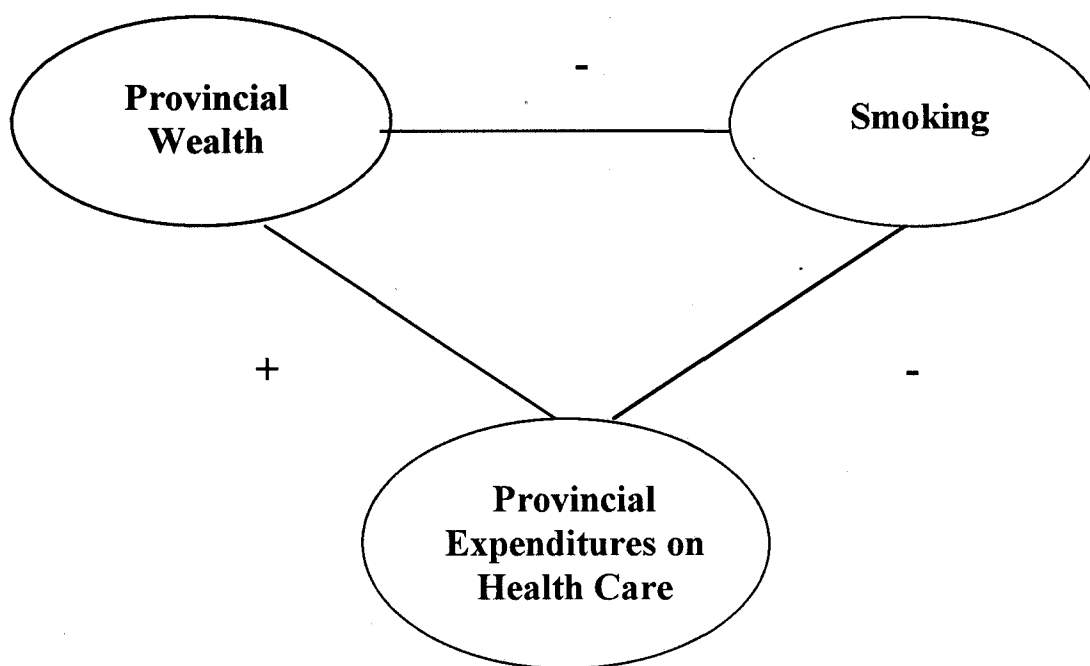
One might ask whether health care expenditures are higher in wealthier provinces because the average wages of health care workers are higher. As discussed earlier, a cursory examination of average nursing department wages across provinces did not show a positive correlation between the average nursing department wages and provincial per capita expenditures. This is by no means a conclusive analysis, but raises the issue that there may well be other factors that explain the differences in expenditures.

Another possible reason for variability of health care expenditures may be related to the range of services that are funded by various provinces. The Health Canada expenditure data was chosen for this project as it incorporates a broad reporting base for health care. Health Canada did not limit the data to only comparable programs and this might explain some of the differences in expenditures across provinces. Health Canada also included health care programs that are found within other departments such as Social Services and National Defence.

As previously indicated, one must be cautious when examining these results. When two-variable correlation analyses are performed, there may be many confounding factors that are not included in the analysis that may affect the results. For example, confounding factors may

explain the negative correlation between the percentage of the population that smokes and expenditures on health reported in Section 5.1. There is a strong negative correlation between wealth in a province (GDP per capita and housing prices) and percentage of the population that smokes, suggesting that provinces with less wealth have a larger proportion of their population smoking cigarettes. In addition, there also appears to be a positive relationship between wealth in a province and expenditures on health care. It may be that these two relationships cause the apparent negative relationship between smoking and expenditures on health. This illustrates the caution that must be used when considering two variable correlation results (see Figure 6).

Figure 6: Two Variable Correlations: Confounding Factors



The interprovincial comparison of health care expenditures is challenging, limited by only 10 observations and one point in time. Having only 10 data points limits the study of inter-relationships and causal linkages. To study these issues in depth, a much wider data set would be necessary.

Even for a descriptive comparison the data are problematic, for example,

- comparable variables are difficult to obtain across provinces; this is especially true for expenditure and utilization data but also for some health status indicators;
- age and sex adjusted data are not available for most variables, so age and sex adjustments cannot be undertaken.

In comparisons of population characteristics and provincial expenditures on health care, Manitoba most often occupies a middle (*medium*) ranking, i.e. fourth to seventh place of 10 provincial rankings, indicating that the relative health care needs of Manitobans are similar to the relative level of provincial health care expenditures. In contrast to Manitoba and the majority of other provinces, Saskatchewan stands out as an interesting anomaly, with medium socio-economic status, overall better rankings on health status, low age-standardized mortality rates and low health expenditures. Since Saskatchewan and Manitoba are similar in population size, make-up and distribution, the question arises as to why the two provinces are dissimilar on health status and expenditure. A more in-depth study of the differences in health and social systems and services could attempt to determine how Saskatchewan manages to have better health outcomes despite apparently spending fewer resources on health care. These differences may be explained in part by earlier health reform in Saskatchewan.

The inclusion of 'other' public expenditure data results in a shift in rankings primarily for Manitoba (from fourth to second highest) and Saskatchewan (from ninth to fifth). This is principally due to the direct health care expenditures for Registered Indians, who are found in higher proportions in Manitoba and Saskatchewan. The inclusion of this 'other' public expenditure data caused few changes in the correlation results. The total public expenditures on health care were negatively and significantly correlated with age-standardized mortality rates (Table 9), suggesting that as age-adjusted mortality rates increase, expenditures decrease.

Despite the limited data, and the strong relationship between relative need and expenditures on health services in Manitoba, our finding that these two variables did not appear to be directly related across the country was unexpected. Additional data, which would allow inter-

and intraprovincial comparisons, would allow us to answer important questions that arise from this analysis. Does the lack of relationship of need to health care expenditures across provinces mask an underlying distribution of resources in relation to need within the provincial level? Is this true for all provinces or only for Manitoba? If policy makers and researchers are ever going to answer these important questions data-reporting and collection efforts across the country will need to be improved and standardized.

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APPENDIX 1

DEFINITIONS AND SOURCES OF POPULATION CHARACTERISTICS

CHARACTERISTIC	INDICATOR	MEASURE	SOURCE
Health Status	Age-standardized mortality	Death rates per 100,000 population, 1992	Federal, Provincial and Territorial Advisory Committee on Population Health, Report on the Health of Canadians, Technical Appendix, September 1996b
	Infant Mortality	Infant deaths (less than 1 year) per 1,000 live births, 3 yr. average 1991-1993	Federal, Provincial and Territorial Advisory Committee on Population Health, Report on the Health of Canadians, Technical Appendix, September 1996b
	Self-rated health status	Self-rated excellent health as % of population, 1994-95	Federal, Provincial and Territorial Advisory Committee on Population Health, Report on the Health of Canadians, Technical Appendix, September 1996b
	Smoking	% population >12 yrs. current smokers, 1994-95	Federal, Provincial and Territorial Advisory Committee on Population Health, Report on the Health of Canadians, September 1996a
	PYLL	Years of life lost prior to age 70, per 1,000 population, 1993	Statistics Canada, Health Indicators, Catalogue no. 82-221-XDE, 1996
Socio-Economic Status	Educational attainment	% population >20 yrs. with less than high school, 1994-95	Federal, Provincial and Territorial Advisory Committee on Population Health, Report on the Health of Canadians, September 1996a
	Income < Poverty Level	% of population below 1992 low income cut-off points, taking into account household size & regional cost of living, 1994.	Federal, Provincial and Territorial Advisory Committee on Population Health, Report on the Health of Canadians, September 1996b
	Poverty Rates Children in lone-parent families	% children in lone-parent families under poverty income cut-offs, 1992	Federal, Provincial and Territorial Advisory Committee on Population Health, Report on the Health of Canadians, September 1996b

CHARACTERISTIC	INDICATOR	MEASURE	SOURCE
	Unemployment Rate	% population >15 yr., 1995	Federal, Provincial and Territorial Advisory Committee on Population Health, Report on the Health of Canadians, September 1996b
	Labour Force Participation of Women	% of females > 15 yrs. in workforce	Canada Census, 1991
	Income Inequality, Gini coefficient	Measure of income inequality, 0=perfect equality in income, 1.0=one family receiving all the income and the rest receive nothing, 1992	Federal, Provincial and Territorial Advisory Committee on Population Health, Report on the Health of Canadians, September 1996b
	Mean Value Occupied Dwelling		Canada Census, 1991
	Gross Domestic Product	GDP per capita 1994	National Health Expenditures 1975-1994 Health Canada 1996a
Demographics	% Population 65+	For 1991	McMaster University, The Office of Gerontological Studies, Facts on Aging in Canada, 1996
	% Population > 65, projected for 2011		McMaster University, The Office of Gerontological Studies, Facts on Aging in Canada, 1996
	Registered Indian Population, 1995		Health Canada, First Nations and Inuit Health Programs, Eligible Clients by Region, 1995
	Registered Indian Population projected for 2015		Statistics Canada, Population Projections of Registered Indians, 1991-2105, 1993
	Median Age, 1996		Statistics Canada, Population Projections for Canada, Provinces and Territories 1993-2106, catalogue no. 91-520, December 1994b
	Median Age, projected for 2011		Statistics Canada, Population Projections for Canada, Provinces and Territories 1993-2106, catalogue no. 91-520, December 1994b

APPENDIX 2

SECTORAL ANALYSIS

Limitations of the data:

As was indicated earlier, there are several challenges which must be dealt with in any attempt to compare expenditures across provinces. The first relates to what is health care, and what are the expenditures related to the provision of health care for a population. This issue was resolved insofar as possible by using Health Canada's broader definition of health care.

A second major challenge relates to definitions of sectors within health care, and how expenditures are allocated between sectors such as hospitals, other institutions, physicians etc. These determinations could conceivably cause distortions when comparing various sectors.

For example:

- The extra-mural hospitals in New Brunswick are included in the hospital budgets and not in the home care budget, although in other provinces such care would be covered under home care (Health Canada, 1996a). This grouping would affect comparisons of both the hospital expenditures and 'other expenditures' (which includes home care).
- Capturing all physician expenditures is problematic across the provinces. In the methodology used by Health Canada, the remuneration of physicians on the payrolls of hospitals remained in the hospital sector (Health Canada, 1996a). If each province had similar proportions of physician remuneration in the hospital budgets, this would not be a significant problem. However, in the past there was a wide variation in how provinces remunerated their physicians, and this variation likely persists today. For example, in 1988/89, the value of non-fee-for-service billings ranged from 23% of fee-for-service billings in Newfoundland to less than 1% in Prince Edward Island and Alberta (see Table A1). This is an important caveat when attempting to separately compare per capita expenditures on physicians as well as on hospitals across provinces (personal correspondence, R. Jamieson, Manitoba Health).

Table A1: Summary of Physician Remuneration (000s) 1988/89

	Fee-For-Service (FFS)	Non-FFS	Total Physician Remuneration	Percent Non-FFS
SASK	200,191	7,182	207,373	3.5%
BC	943,000	42,888	985,888	4.4%
ALTA	649,677	5,339	655,016	0.8%
ONT	3,721,234	90,135	3,811,369	2.4%
MAN	186,682	26,592	213,274	12.5%
QUE*	1,121,175	178,688	1,299,863	13.7%
NB	116,143	13,266	129,409	10.3%
PEI	27,000	152	27,152	0.6%
NS	203,781	6,362	210,143	3.0%
NFLD	90,100	20,842	110,942	18.8%

Source: Manitoba Health

* Quebec data are for calendar year 1988

- 'Other' institutions are facilities that provide residential care, primarily for the elderly (i.e. nursing homes), but also for the mentally and physically handicapped, while hospitals include acute, extended and rehabilitation facilities. There is considerable room for overlap between these two sectors when the function of any given facility is not clearly defined, or when a facility may serve several purposes such as providing both extended care and residential care. This would further complicate comparisons of hospital expenditures.

Clarification of all of these issues was beyond the scope of this project, and a review of the literature did not reveal any methods used by other researchers to resolve these challenges. However, we do try and shed more light on these issues.

Table A2 below presents expenditures per capita by provincial governments, and rankings on various sectors of the health care system. When comparing the per capita expenditures, one finds that there are greater differences between sectors than overall. For example, there appears to be a 28% difference in expenditures on hospitals between Newfoundland and Saskatchewan, but only a 3% difference in total expenditures for these two provinces. This

illustrates the care one needs to use when undertaking inter-sectoral comparisons. From the aggregated data, there is no way of knowing whether Saskatchewan is indeed substituting care in other institutions and other areas such as public health or home care for hospital care, or if there is an inaccuracy in how the sector-specific data are classified.

Some of the provinces which have relatively high hospital expenditures (Newfoundland, Prince Edward Island) have low expenditures on physicians, and other provinces with high expenditures on physicians, have relatively low expenditures on hospitals (British Columbia and Ontario) (see Tables A2). In all provinces, expenditures on other professionals, drugs, and capital comprise a small portion of total expenditures.

Table A2: Provincial Government Per Capita Expenditures, 1994 Data

	Hospitals	Other Institutions	Physician	Other Professional	Drugs	Capital	Other Expenditures	Total
SASK	636	257	279	18	55	54	211	1,511
BC	747	250	405	41	88	49	236	1,815
ALTA	763	105	326	54	77	36	213	1,573
ONT	766	154	423	21	111	11	213	1,700
MAN	809	239	246	15	50	55	198	1,612
QUE	857	129	303	25	102	50	153	1,619
NB	821	162	271	6	70	65	142	1,537
PEI	850	200	231	15	57	50	141	1,544
NS	805	114	273	12	89	72	90	1,455
NFLD	880	178	232	11	88	41	133	1,561

Source: Health Canada, (1996a)

To try and put the limitations raised above into perspective, expenditures were summed for three key sectors where it is widely recognized that overlap may occur (i.e. hospitals, other institutions, and physicians). Table A3 presents the data for these three sectors, separately and summed together. A shift in rankings in terms of provincial expenditures appears to suggest that, for some provinces, there is either substitution of services between sectors, or lack of clarity of definition of sectors. However, given the uncertainty of the data it is unclear which is more likely.

Table A3: Provincial Government Expenditures - Selected Sectors

	Hosp	Other Inst	Phys	All Hosp, Phys, & Other Inst	Hosp & Other Inst	Hosp & Phys	All Hosp, Other Inst, & Phys	Hosp & Other Inst	Hosp & Phys
	Provincial Per Capita Expenditures						Rankings		
	1	2	3	1+2+3	1+2	1+3	1+2+3	1+2	1+3
SASK	636	257	279	1,172	893	915	L	L	L
BC	747	250	405	1,401	996	1,152	H	M	H
ALTA	763	105	326	1,194	868	1,089	L	L	M
ONT	766	154	423	1,344	921	1,189	H	M	H
MAN	809	239	246	1,294	1,048	1,055	H	H	L
QUE	897	90	303	1,289	986	1,199	M	M	H
NB	821	162	271	1,254	983	1,092	M	M	M
PEI	850	200	231	1,282	1,050	1,081	M	H	M
NS	805	114	273	1,192	919	1,078	L	L	L
NFLD	880	178	232	1,289	1,057	1,111	M	H	M

Source: Health Canada, (1996a)

Saskatchewan and Nova Scotia continue to have low expenditures, whether one looks at physician expenditures alone, at combined institutional expenditures, or at all three groups combined. In Manitoba, high expenditures in all institutions lead to a high ranking, whether only hospitals and other institutions are combined, or all three sectors are combined.

However, combining hospital and physician expenditures for Manitoba leads to a *low* ranking, suggesting that expenditures on physicians in Manitoba may be lower than other provinces.

This assumes that there is no other physician remuneration elsewhere, i.e. in other institutions or in public health.

Ontario and British Columbia appear to have *low* expenditures on hospitals, but when combined with expenditures on physicians and other institutions, they rank *high*.

There remains considerable ambiguity in sectoral analysis, and any conclusions on sectoral differences in expenditures must be reached with considerable caution. In many areas such as physician remuneration, we do not have sufficient information to suggest that the apparent differences in provincial expenditure are real. Further work on definitions and allocations of expenditure is required to solve this very real issue.