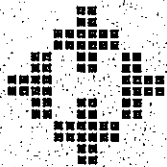Population Health Information System
1991/92

Population Health:
Health Status Indicators

Volume I: Key Findings

January 1994

**Manitoba Centre for
Health Policy and Evaluation**
Department of Community Health Sciences
Faculty of Medicine, University of Manitoba

Marsha M. Cohen, M.D., F.R.C.P.C.
Leonard MacWilliam, M.Sc., M.N.R.M.

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ACKNOWLEDGEMENTS

The Manitoba Centre for Health Policy and Evaluation

The Manitoba Centre for Health Policy and Evaluation (MCHPE) is a unit within the Department of Community Health Sciences, Faculty of Medicine, University of Manitoba. The MCHPE is active in health services research, evaluation and policy analysis, concentrating on using the Manitoba health data base to describe and explain patterns of care and profiles of health and illness.

Manitoba has one of the most complete, well-organized and useful health data bases in North America. The data base provides a comprehensive, longitudinal, population-based administrative record of health care use in the province.

Members of the MCHPE consult extensively with government officials, health care administrators, and clinicians to develop a research agenda that is topical and relevant. This strength, along with its rigorous academic standards and its exceptional data base, uniquely position the MCHPE to contribute to improvements in the health policy process.

The Centre's researchers are widely published and internationally recognized. They collaborate with a number of highly respected scientists from Canada, the United States and Europe.

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EXECUTIVE SUMMARY

The Population Health Information System consisting of 5 modules, is designed to focus on health care utilization and health status to examine how efficiently a health care system produces health in a population. This module contains the population health status assessment.

For this report, we have developed 102 health status indicators from administrative data namely vital statistics death data, hospital discharge summaries, and physician fee claims. These indicators capture various dimensions of community health ranging from mortality/morbidity from cancer, injuries and chronic diseases to disability among youth and medical conditions associated with functional limitations and restricted activity days among the elderly. We also include a series of indicators which relate to the impact of medical treatment outcomes against which the use of resources can be evaluated (Health Care System Sensitive Indicators).

Data is presented for fiscal year 1991/92 and by Manitoba regions as defined by Manitoba Health (8 regions). The Standardized Mortality/Morbidity Ratio (SMR) was computed for all indicators; this technique eliminates differences in population across regions due to age and sex distributions and uses the provincial rate for each indicator as the standard (the provincial rate is equal to one). We determined if differences we saw were not due to chance variations by using a statistical measure which ensures that we are confident of the true rate 99 out of 100 times.

We have examined these indicators using various approaches and summary measures and found persistent patterns even after considering the effects of differential hospitalization and physician utilization for Winnipeg and non-Winnipeg residents. The residents for Thompson and Norman regions appear to have the poorest health as measured by the total number of indicators above the provincial average, as well as the number of statistically significant indicators above the provincial average especially for mortality and hospitalization for conditions relating to injuries, chronic diseases and infectious diseases. Differences in health status were seen for the more "serious" indicators relating to mortality and hospitalization. There were no consistent patterns found upon examining variations in visits to physicians for

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a variety of conditions; rates for the various regions clustered around provincial averages despite differences in physician/population ratios.

Despite differential utilization patterns between Winnipeg and non-Winnipeg residents, the range of health status reveal true differences depending upon geographical residence in the province. It is not the purpose of this report to explain these differences but merely to report them. Future reports in this series will examine regional differences over time as well as smaller geographical units to determine if patterns of differential health persist in the longer term.

POPULATION HEALTH:
HEALTH STATUS INDICATORS
VOLUME I: KEY FINDINGS

Introduction to the Population Health Information System

In January 1991, the Manitoba Centre for Health Policy and Evaluation (MCHPE) was established at the University of Manitoba to provide the Manitoba Department of Health with research-based analyses, evaluation, and policy options. The researchers agreed to undertake several specific projects each year. In addition, they agreed to develop a health information system for the province.

The Population Health Information System (PHIS) is designed to focus on the link between health care utilization and health, and to make it possible to examine how efficiently a health care system produces health in a population. We have attempted to develop an information system to facilitate rational decision making and ultimately to permit shifting discussions from demand for health care to demand for health. The system is population-based, designed to track the health status and health care use of residents of given regions (regardless of where such use takes place), as distinct from examining use of clinical care for individual patients by specific providers. The PHIS also identifies the socioeconomic characteristics of regional residents since socioeconomic status has long been linked to poorer health outcomes and greater need for health care.

The Population Health Information System will produce separate reports for each of the modules outlined below. Each module will be presented in two volumes and will contain a summary and key of findings, as well as an appendix with more details. This report contains the Population Health Status assessment.

MODULES OF THE POPULATION HEALTH INFORMATION SYSTEM

Population Health: Health Status Indicators

Socioeconomic Characteristics

Utilization of hospital resources

Utilization of personal care home resources

Utilization of physician resources

We intend this first report of the PHIS to have limited distribution, primarily to obtain comment and feedback. Thereafter the reports will be distributed to a wider audience. Subsequent versions of the system will include several years of data; patterns persisting through time will be of most interest. We use multiple independent indicators and only draw conclusions when several point in the same direction. The data represent usage for the entire Manitoba population at one point in time. The smaller population of some regions (specifically Thompson, Parkland and Norman) must be acknowledged (Figure A); conclusions drawn form the data from these regions must remain appropriately tentative.

The first volume of the Population Health: Health Status Indicators Module contains the highlights of the analysis. Volume II of the module contains more extensive tables and figures, a listing of which is found in Appendix C.

Figure A
Regional Populations
Dec 31, 1991

Thompson
44,957

Norman
24,944

Interlake
71,918

Parklands
45,979

Westman
117,689

Central
94,456

Eastman
85,138

Winnipeg
654,861
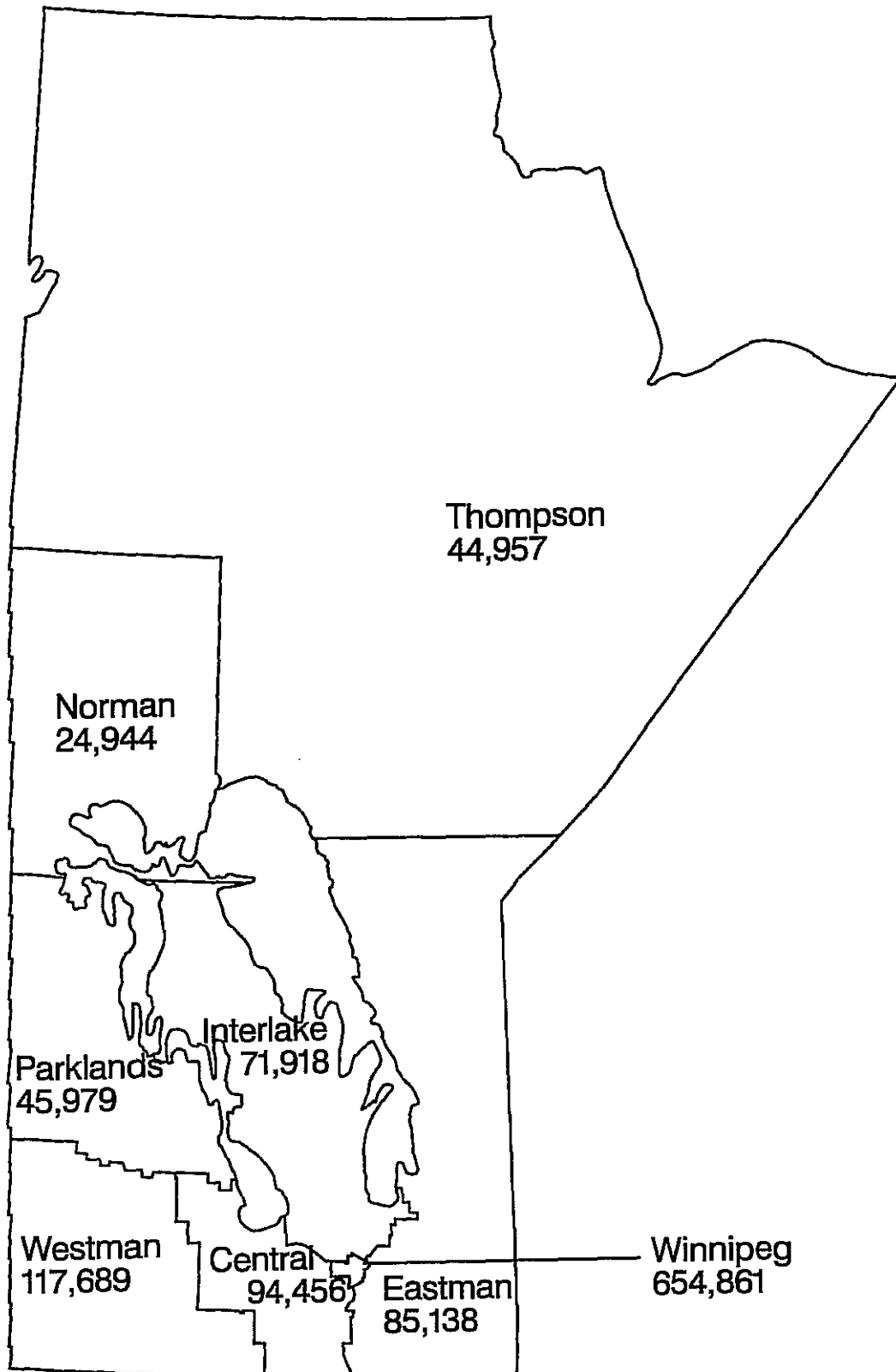
POPULATION HEALTH: HEALTH STATUS INDICATORS MODULE

Introduction

For this report, we have developed health status indicators using three different sources; from Manitoba Health hospital discharge diagnoses, and the diagnoses associated with each physician visit, and from Vital Statistics, death information (see Appendix B for a compete listing). This project has been restricted to indicators that were developed using administrative data. Using administrative data means that many of the "lifestyle" and behaviourial factors (such as smoking, diet and exercise) recommended in the literature cannot be readily assessed by this method. However, some of the consequences of such behaviours can be included (for example, death or hospitalization for lung cancer) and medical conditions most associated with restricted activity days or functional limitations are included. Some potentially useful indicators were not included due to small numbers of events.

Using administrative data to assess health status has the major advantage over surveys in that the overview of health status can be readily repeated over time (e.g. annually) and can be extremely useful to supplement the more traditional health surveys which are extremely resource intensive and usually take several years for the appearance of results. As well surveys of the population such as the Canada Health Survey usually do not sample sufficient numbers of persons from the various regions of Manitoba so that only estimates for the entire province are available. The method we are using here allows us to examine differences between the regions of the province.

While mortality is widely accepted as a measure of assessing the health of communities, utilization of health services data as a means of assessing health status has tended to be secondary or complementary to survey data. We have demonstrated in several studies that administrative data perform well in assessing health status (Young et al 1991, Roos 1989, Mossey & Roos 1987, Shapiro & Roos 1985). In Manitoba persons not visiting physicians over the course of the year tend to be well (Roos & Shapiro 1985). However, since utilization is influenced by factors other than health needs (supply of hospital beds being one example), we have been conservative when calculating utilization-based measures of health status. Indicators are grouped and summarized separately by source of data, that is, those developed from cause of death records are analyzed separately from hospital or physician use. As well, all utilization measures are individual-based, not discharge or contact based. For

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example, we calculate rates of persons hospitalized for diabetes, not admission rates for diabetes.

As Patrick and Bergner (1990) point out, routine data sources are limited or nonexistent for assessing community health status. They recommend the reorganization of data which is already available such as the measures of sentinel health events from administrative data. The U.S National Health Objectives for 1990 use health care utilization in their assessment of health status (Andersen et al 1987). As well the Directors of the WHO Non-communicable Disease Collaborating Centres and Key Officials (1993) recommend the use of administrative databases to help in the monitoring of chronic diseases in various countries. We hope that this module of the Population Health Information System will make a major contribution to this literature and demonstrate the utility of using administrative data for the determination of population health status.

METHODS

We have developed 102 separate indicators of health status which include various aspects of community health such as mortality/morbidity from cancer, injuries and chronic diseases. In addition, we focus on disability among youth and those conditions associated with poor functional status among the elderly (Pope 1988). We also include a set of indicators which relate to the impact of medical treatment outcomes against which the use of resources can be evaluated. These include both mortality-based and hospitalization-based measures such as deaths amenable to medical treatment (Charlton 1983) and avoidable hospitalizations (Weissman 1992). See Definitions and listings in Appendix A and B.

The 102 indicators which form the basis of this analysis are derived from a series of articles and reports from the literature which concentrate on the health of communities and/or populations. Since there are many indicators which are common to several of these reports, we used a set of criteria for selection as follows: 1. The item had to have some credibility, that is, it is considered to be a useful or recommended indicator in a previous major report. 2. Since the indicators used in the health information system are all based upon administrative data, an item had to be included in one of the Manitoba administrative datasets. 3. The item had to occur at a fairly high rate so that there would be sufficient numbers in most small regions. 4. The items had to have some discriminating power, that is, there had to be differences in the distribution of the item across regions. 5. There had to be a distinct

unambiguous code in the administrative dataset for the condition. All 102 indicators met the criteria for 1 and 2. For criteria 3 and 4, most indicators occurred at a frequent rate among the Manitoba population. However, for some regional breakdowns, the numbers were small. For very infrequent, but important indicators such as mortality from AIDS, these items are included in the tables in Volume II, but not included in the graphical presentations. For criteria 5, the coding for hospitalizations was not problematic since hospitals utilize 5 digit codes for diagnoses associated with the hospital visit. However, for physician visits, coding is less specific requiring grouping of some diagnoses or exclusion of others. In the report, indicators are grouped into six major categories: I. Demographic profile, II. Low Birth Weight, III. Health Care System Sensitive Indicators, IV. Mortality indicators: population and cause-specific, V. Hospitalization indicators, VI. Physician visit indicators. Each of the major categories is further subdivided into finer categories, for example, mortality indicators include deaths due to injuries, chronic diseases, and cancer. (See Volume II and Appendix B for a complete listing).

The Population Health module of the Population Health Information System presents the health status of Manitobans based on data for the fiscal year 1991/92 (April 1, 1991 to March 1992). For this report (March 31), claims for services provided during the year 1991/92 were included. Since the number of deaths among residents is small for some regions, in order to have a better assessment of mortality rates, two years of vital statistics data were used (calendar years 1990 and 1991). Subsequent reports will analyze several years of data to assess trends.

All comparisons are made across the Manitoba regions as defined by Manitoba Health, with Winnipeg considered as one region. Information about the region of residence was obtained from the Manitoba Health Registration File, except in the case of Status Indians, for whom postal code information from hospital discharge abstracts or physician claims was used. Since the large numbers of Winnipeg residents strongly affect the provincial averages, an aggregate of non-Winnipeg regions was also developed.

The numerator for all rates was determined by counting individuals rather than the number of admissions (e.g. number of persons admitted to hospital for lung cancer) for individuals identified as residents of a specified region. Denominators were based on counts of individuals resident in specific regions as per registry information as of December 31, 1991.

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The rates of various indicators for the overall population of Manitoba were used as the comparison. Most rates presented in this module have been age and sex adjusted; a mathematical procedure which removes the effects of different population distributions in influencing death rates and occurrences of specific illnesses. After adjusting for age and sex differences, the resulting rates can then be more directly compared.

While various rates have been used in this report (and are presented in Volume II), we primarily refer to the Standardized Mortality/Morbidity Ratio (SMR) (also called the Adjusted Mortality Ratio). The SMR is a widely used method which adjusts for differences in age and sex across regions. Instead of giving an adjusted rate, the SMR gives a ratio, that is a direct comparison with a standard. Here we use the entire province as the standard. The province's SMR for a condition will always be 1. If a SMR for a particular region for a specific condition is greater than one, then that region's rate for that condition is higher than the provincial average. If the SMR for a particular region is less than one for a given condition, then that region has a lower rate for that condition. Thus a SMR above one implies that a region is less healthy; a SMR below one implies a region is more healthy than the provincial average. An SMR of 1.30 means that the rate in that region for that particular condition was 30% higher than for the province as a whole. SMR's below 1 are equivalent to the inverse of SMR's greater than 1. For example, SMR of 0.5 is equivalent in magnitude to a SMR of 2 and a SMR of 0.33 is equivalent in magnitude to a SMR of 3. In the graphical representations, we have attempted to use a uniform scale for the SMR axis with the values ranging from 0 to 3 unless otherwise indicated.

For graphical presentation in this report we have chosen the Standardized Mortality/Morbidity Ratio (SMR). This is because the SMR allows the easiest comparison with the provincial rates and with all other regions. For each graph, there is a bold line across the value of 1 which represents the rate of that indicator for the province as a whole. Bars for each region below this line represent conditions for which the region has a lower rate than the province. Those bars above the provincial line mean that for that indicator, the rate of the region is higher than the provincial average. Note that for some indicators, there may be a missing bar for a particular region. This means that the rate for that region was equal to the rate for the province. For some regions, for some indicators, there were no events for that indicator. Therefore rates cannot be calculated and the value of the SMR is zero.

In order to interpret the graphical representations to determine the health status of a region, it is necessary to focus on two items: First, whether a rate for a particular region is statistically significant higher or lower than the provincial average. Since some of the events in a particular region occurred infrequently, it is possible that the elevated or decreased rate for that region was due to random fluctuations. In order to determine if this is the case, we used confidence intervals (using the Poisson distribution) to determine if the difference between the regional and the provincial rate was by chance alone. (Snedecor & Cochran, 1980). If a region's rate is statistically significantly higher or lower than the province, then we are 99% confident that the regional rate is different. For all indicators, those regions whose rate was statistically significantly higher or lower than the provincial average are marked with an asterisk (*) with the exception of figure 4. For figure 4, all rates were statistically significant except two. These two rates which were not significant are marked with a cross (+). Some figures have no asterisks or crosses which means that there were no rates which were statistically significant.

Second, we are interested in the profiles and patterns of the indicators whether statistically significant or not. If for a particular set of indicators, the majority are above the provincial average, this indicates that region has a poorer health profile.

The major focus of the Population Health Information System is on describing the patterns of health of residents of a defined area. This population-based approach is fundamentally different from analyses which focus on descriptions of specific illness treated in hospitals or by physicians. This System and this module present analyses intended to describe rather than explain different patterns of health status of Manitobans.

KEY FINDINGS

I.   Demographic Profile:

I.1   Population Distribution: The Proportion of the Population
Which Is at the Extremes of Age

The population distribution is useful as a health status indicator since it reveals the more
vulnerable groups--those at the extremes of age as well as the proportion of the population in
the mid years who are financially and otherwise responsible for the care of the other two
groups (total dependency ratio) (WHO, 1986, National Health Information Taskforce 1991).
The patterns of illness in a region will therefore vary according to the distribution of the
population. For example, in a region with more young residents, the influence of injuries
will be more pronounced, whereas in an older region there will be more deaths and disability
associated with chronic diseases (Miller et al 1989). Here we define youth as persons less
than 25 years of age according to the World Health Organization (WHO 1986) and the elderly
as persons aged 75 or older, those who are at most risk for personal care home placement,
disability or ill health.

Norman and Thompson regions have a much higher proportion of persons aged 24 or less
(black bars) than the rest of the province and much lower proportions of elderly (Figure 1).
Parklands and Westman have a much greater higher proportion of elderly (aged 75+). In
general, the Non-Winnipeg regions have higher proportions of their populations at the
extremes of age as compared to Winnipeg.
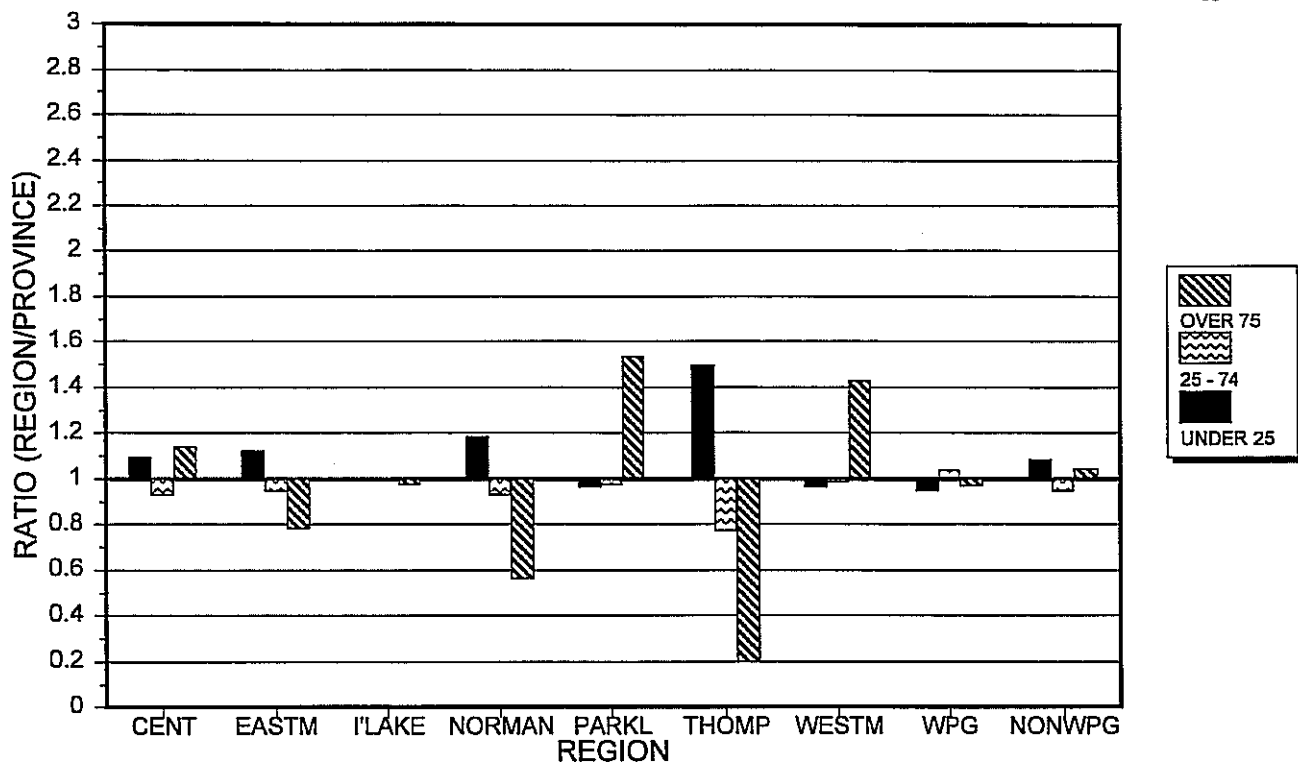
Figure 1: Ratio of population in each region to Manitoba population for persons over 75 and under 25 to persons aged 25-74 years, 1991.
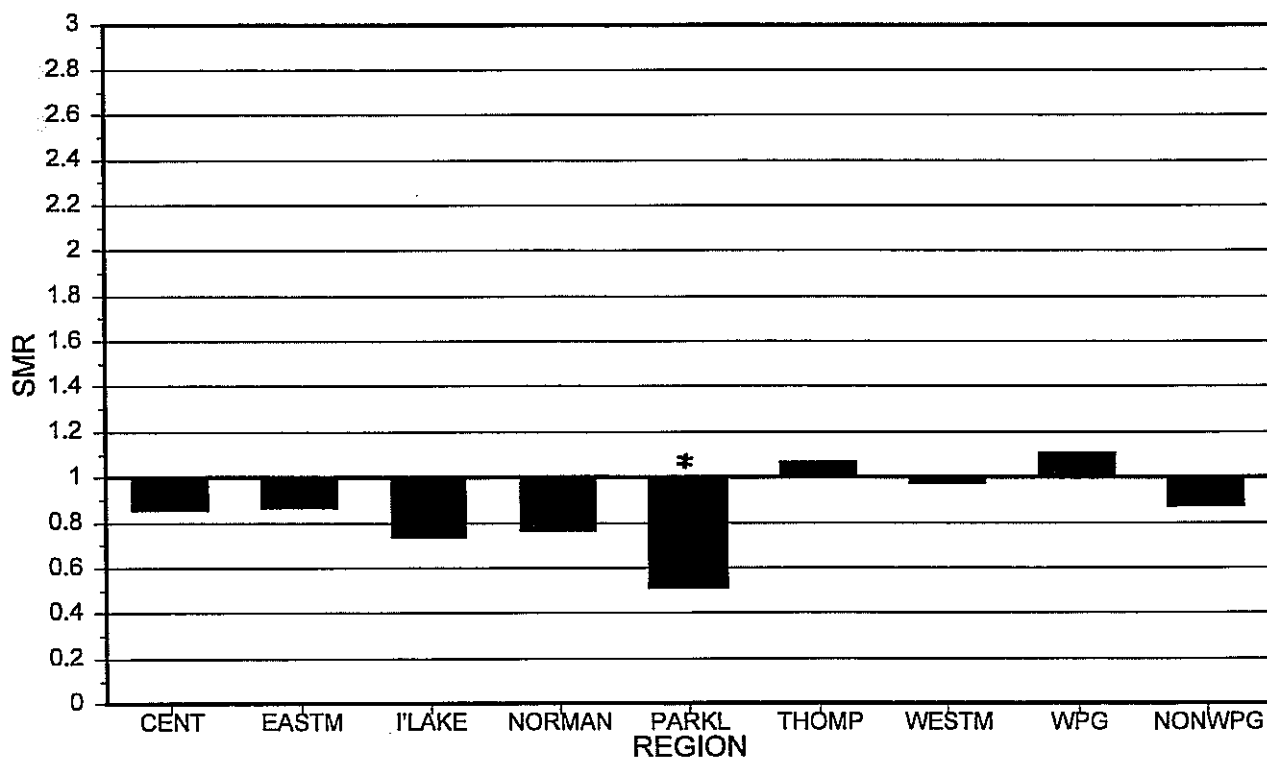
Figure 2: Proportion of low weight (<2500 grams) births in each region compared to Manitoba average, 1991.

II. Proportion of Low Weight (<2500 gm) Births

Miller et al (1989) define low birth weight infants as those weighing less than 2500 grams at birth. Low birth weight may be due to premature delivery or to infants whose weight is low for their gestational age. These infants are at higher risk for developmental delay, physical complications such as birth defects and death. The resource implications for low birth weight infants who spend time in neonatal intensive care units are considerable.

Two regions in Manitoba showed small increased proportions of low birth weight infants relative to the provincial averages (Figure 2). These were Thompson and Winnipeg regions. The other regions had rates of low birth weight infants less than the provincial average. Note that the only difference which was statistically significant was that of Parklands, but for this region, there was a large number of infants whose birthweight was not known so that this measure should be interpreted cautiously. Overall, non-Winnipeg regions had lower rates of low birth weight infants and Winnipeg had somewhat higher rates. . . . .

III.   Health Care System Sensitive Indicators

A number of indicators presented in the report are derived from articles in the literature purporting to reflect the need for health care. If the health care system is operating well, there should be little difference seen across regions for these indicators. These indicators are aggregates of a series of medical conditions for which medical treatment is believed to be effective in either preventing the condition, finding and treating the condition in an early phase to avoid major consequences, or treating the condition in a late phase thus avoiding death or disability. The health care system sensitive indicators include the following: amenable conditions, single event rate indicators, rate event indicators, ambulatory sensitive hospitalizations, and avoidable hospitalizations (see Appendix A for definitions). Different authors have used these various measures in a similar fashion; while each contain overlapping elements it does not appear that any one of the five is superior to the others. Therefore we have included all five in this report. The health care system sensitive indicators are derived both from mortality data and from hospitalization data.

III.1   Health Care System Sensitive Indicators: Mortality

Patterns of mortality Indicators which reflect the provision of health care (amenable and rate event) were higher than the provincial average for Norman and Thompson regions (Figure 3).

Single event death rates were also higher for Norman region. Rate event deaths were lower for Central, Interlake and Westman regions. Single event deaths were lower than the provincial average for Parkland. None of the differences in rates were statistically significant for the three indicators.

III.2   Health Care System Sensitive Indicators: Hospitalization

SMR's for Health care system sensitive hospitalizations (amenable, single event, rate event, ambulatory-sensitive and avoidable hospitalizations) are seen in Figure 4. All of the regional rates were statistically significantly different from the provincial average except for single event hospitalizations for Central and Eastman regions (marked by a "+"). Looking at the patterns of rates, the highest rates for all five indicators were seen for Thompson region, followed by Norman and Parkland. The lowest rates for medical care sensitive hospitalizations were found in Winnipeg. Central, Eastman and Interlake had low rates with Westman's rates somewhat higher. All non-Winnipeg regions had hospitalization rates for health care system sensitive indicators above the provincial average.
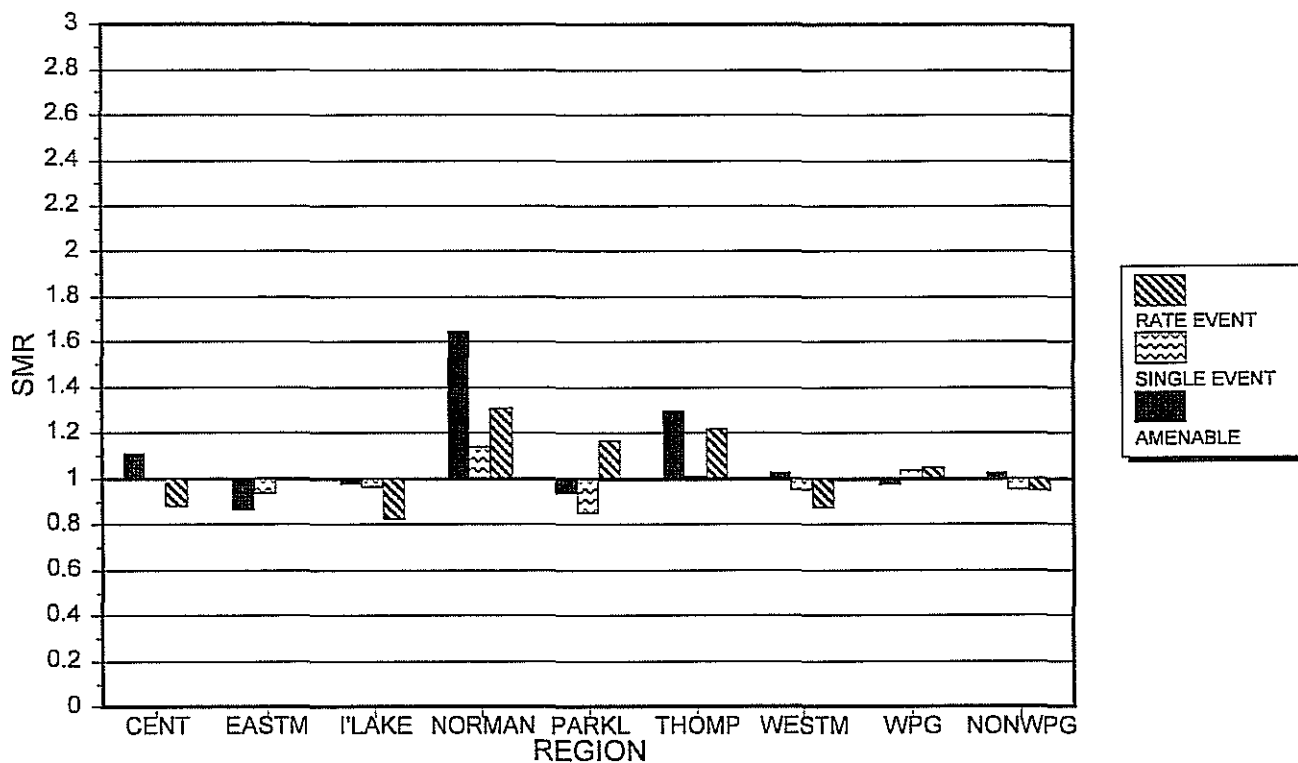
Figure 3: SMR's for health care sensitive indicator deaths in each region compared to provincial averages, 1991.
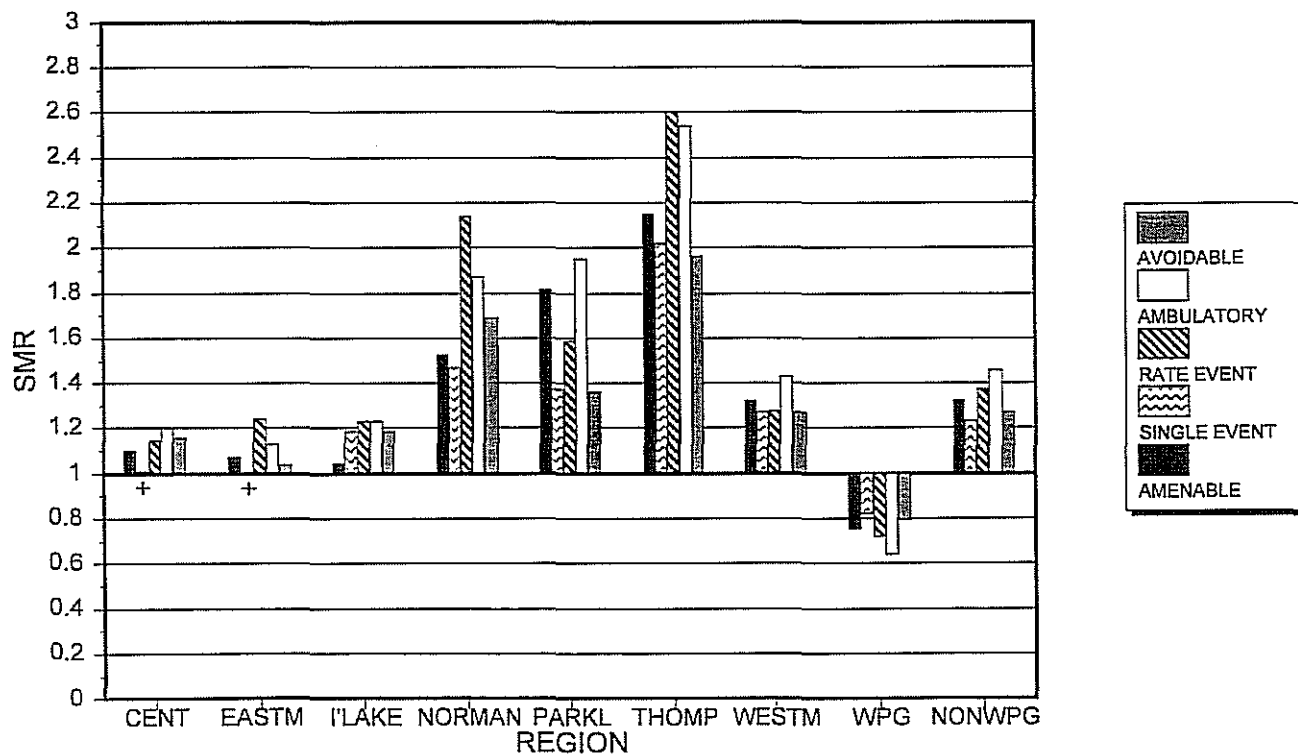
Figure 4: SMR's for health care sensitive indicator hospitalizations in each region compared to provincial averages, 1991.

IV. Mortality Indicators: Population and Cause-Specific

IV.1 Death rates for males and females

The Standardized Mortality Ratios for all causes of death for Manitobans of all ages were significantly higher in Thompson and Norman regions for males (Figure 5). Rates were significantly higher for females in Thompson region. Note that this data has been adjusted for differences in age composition across the regions. Parklands and Westman had rates for both males and females which were somewhat less than the provincial average. The other regions had mortality rates which were close to the provincial average. Volume II shows that these patterns generally hold across each of 10 specific age and sex groupings.

IV.2 Standardized Mortality Ratio (0-64) (SMR (0-64))

In this ratio, only deaths for persons aged 0-64 years are included as well as only including the population who are 0-64 years of age in the denominator. British researchers (Carstairs and Morris 1989) as well as a group at McMaster (Birch and Eyles 1991) have suggested that the standardized mortality ratio (SMR 0-64) for those aged 0 to 64 is the best single indicator of health status capturing the need for health care. The Scottish Health Authorities have used the SMR 0-64 for allocating funds for health care.

The Standardized Mortality Ratio 0-64 was significantly higher for Thompson region (Figure 6). Overall for the non-Winnipeg regions, the SMR 0-64 was higher than for the entire province (not statistically significant).
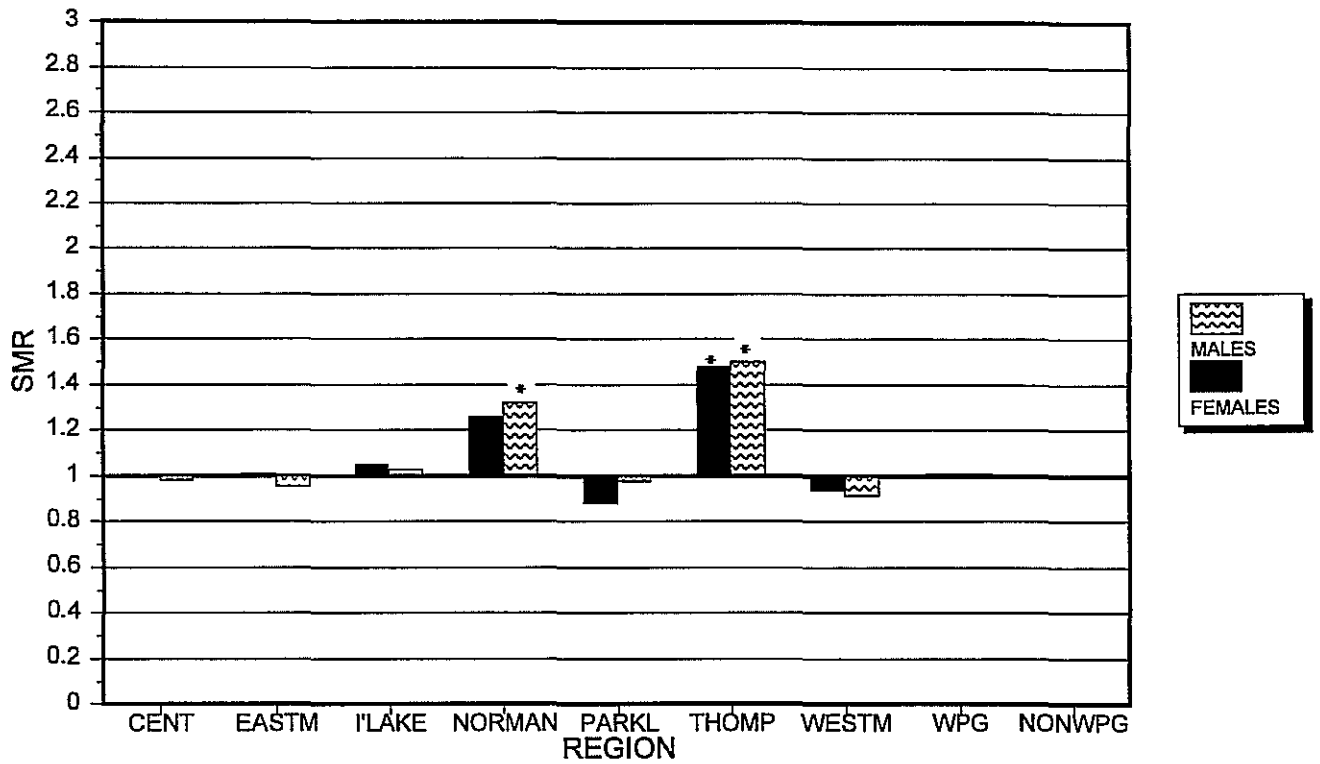
Figure 5: SMR for deaths among males and females in each region compared to provincial average, 1991.
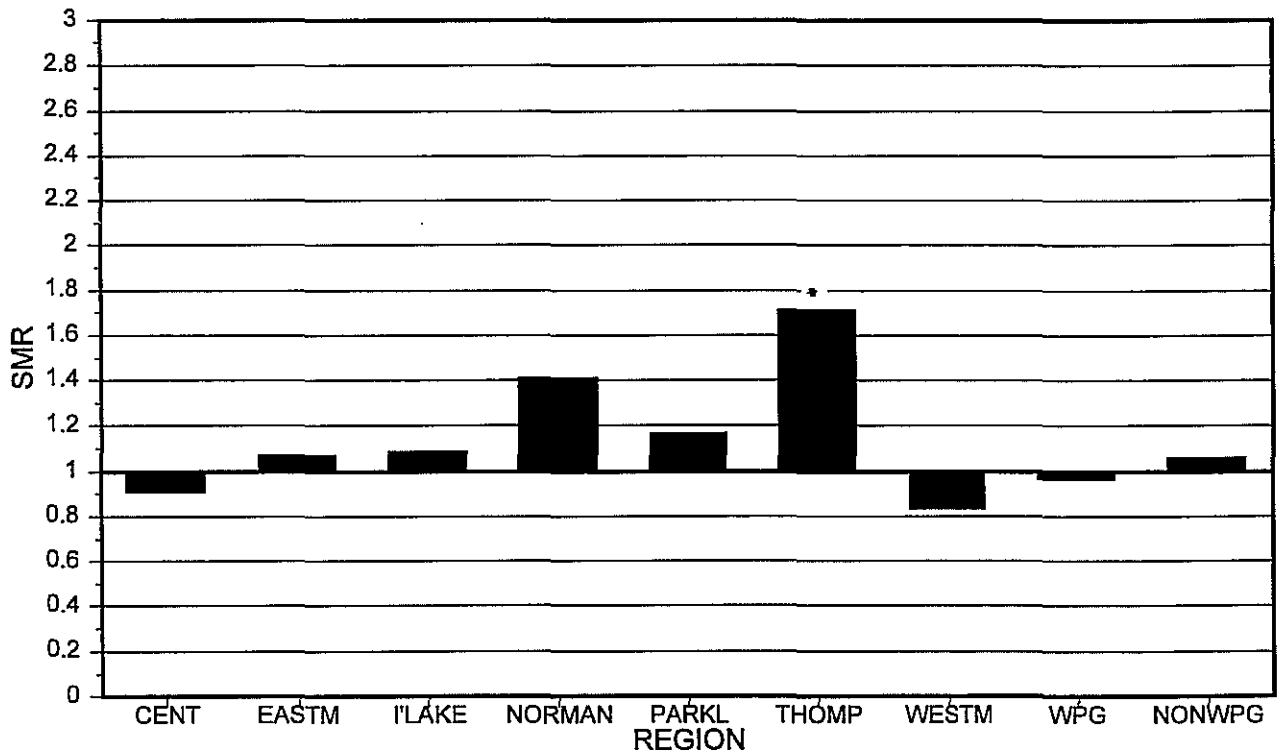
Figure 6: SMR for deaths among persons aged 0-64 years of age in each region compared to provincial average, 1991.

IV.3   Injury Deaths

Injuries including suicides are the highest cause of death for adolescents and young adults. Most unintentional injuries are attributable to motor vehicles (McGinnis et al, 1992). For a list of included conditions for injuries, infectious diseases, chronic diseases and cancer indicators see Appendix B, Table 2. Note that vital statistics uses special codes known as "E-codes" to record the cause of the injury.

Deaths from seven specific causes of injuries plus "other injuries" are included in Figure 7 (note change in SMR axis). For motor vehicle accidents, the SMR was highest in Thompson region (difference was statistically significant) followed by Interlake . Deaths from motor vehicles were significantly lower in Winnipeg. Deaths from drowning were very high in Thompson region as compared to the Manitoba average and this difference was statistically significant. Looking at patterns of indicators (whether statistically significant or not) shows that deaths from falls were high in Norman and Westman regions and very low in Interlake, Parklands and Thompson regions. Low death rates for drowning accidents were seen in Central and Interlake.

Homicide deaths were highest in Thompson region and deaths from fire related injuries were high in Norman and Thompson regions. Overall, injury related deaths were generally higher in non-Winnipeg regions as compared to provincial averages. Central and Winnipeg regions had generally lower rates of injury deaths when compared to the provincial rates. Overall, the patterns of indicators suggest that rates of injury deaths were highest in Thompson region.
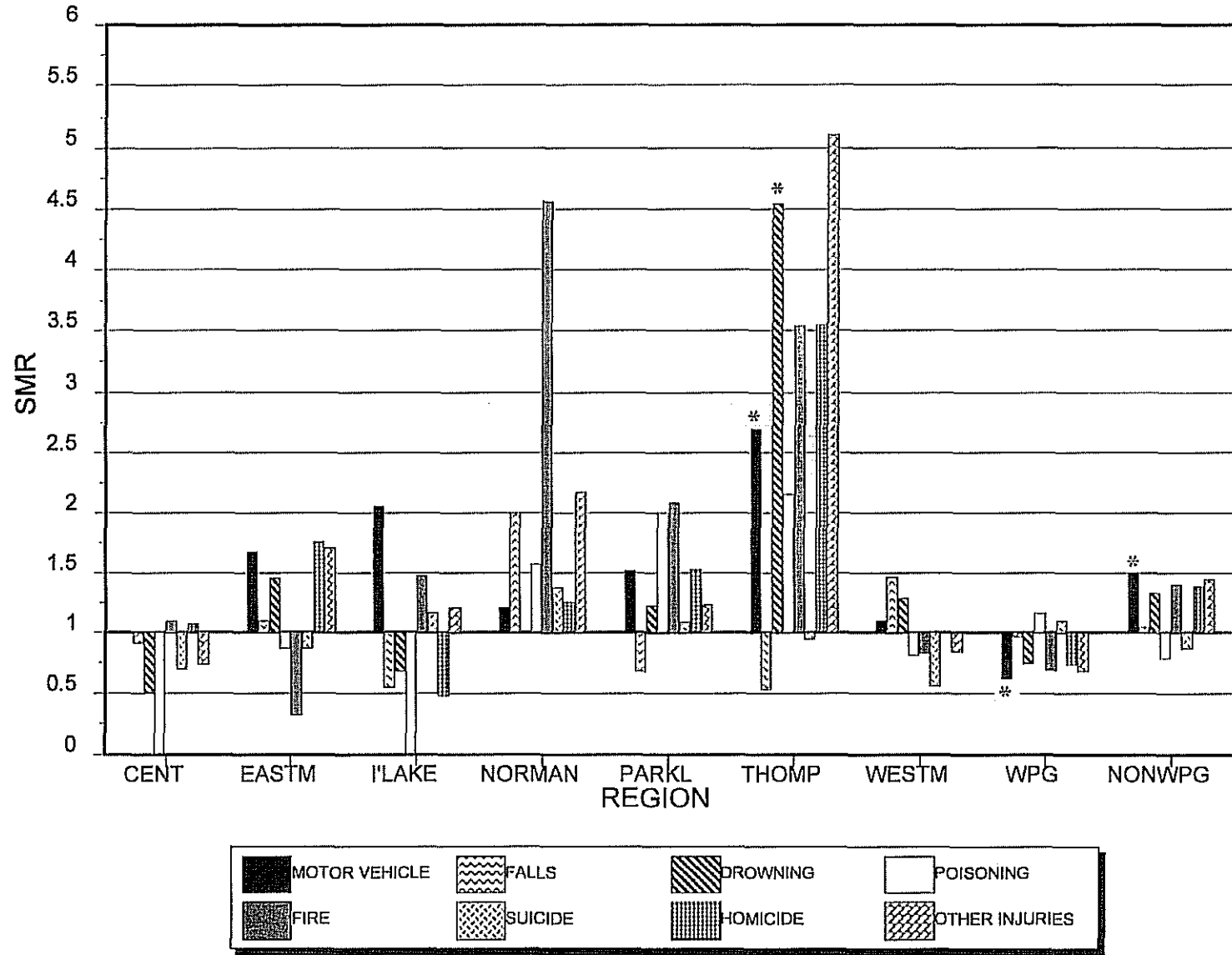
Figure 7: SMR's for injury indicator deaths in each region compared to provincial averages, 1991.

IV.4   Cancer Deaths

In Canada, cancer accounts for about one-quarter of all deaths (Bisch et al 1989) with lung cancer, breast cancer and cancer of the colon accounting for the most cases and deaths (Muir and Sasco 1990). Other cancers such as bladder and kidney are associated with occupational exposures (Andersen et al 1987).

The variations in SMR for the 5 different types of cancer deaths were small across the regions (Figure 8). There were no regions whose rates were significantly lower or higher than the provincial mean. Focussing on patterns of indicators, for lung cancer, there were no regions where death rates were markedly higher than provincial averages. Mortality from lung cancer was somewhat lower than average in Central, Eastman and Parklands. Deaths from breast cancer were higher in Eastman and Interlake regions and low in Thompson. Cancer of the colon death rates were highest in Winnipeg and low in the other parts of the province, particularly Central and Thompson. Overall, cancer deaths rates were somewhat lower in non-Winnipeg regions than for the province as a whole and rates in Winnipeg regions somewhat higher. When deaths from all cancers were combined, deaths rates were significantly lower (at the 95% level) in Parklands and Westman regions and were higher in Winnipeg (See Table 1).

IV.5   Deaths Due To Chronic Disease

For adults in the mid years, chronic diseases are the main causes of death and disability. These include heart disease, stroke, and diabetes. For the elderly, heart disease, stroke, chronic obstructive lung disease (emphysema), and diabetes are among the leading causes of death (McGinnis et al 1992).

There were no regions whose rates were generally significantly higher for chronic disease indicators (Figure 9). For patterns of indicators, the highest SMR's for deaths due to chronic disease appear among Norman residents (all 6 indicators). Asthma death rates were highest in Eastman, Norman and Westman and lowest in Central and Interlake. There were no asthma deaths in Thompson. For
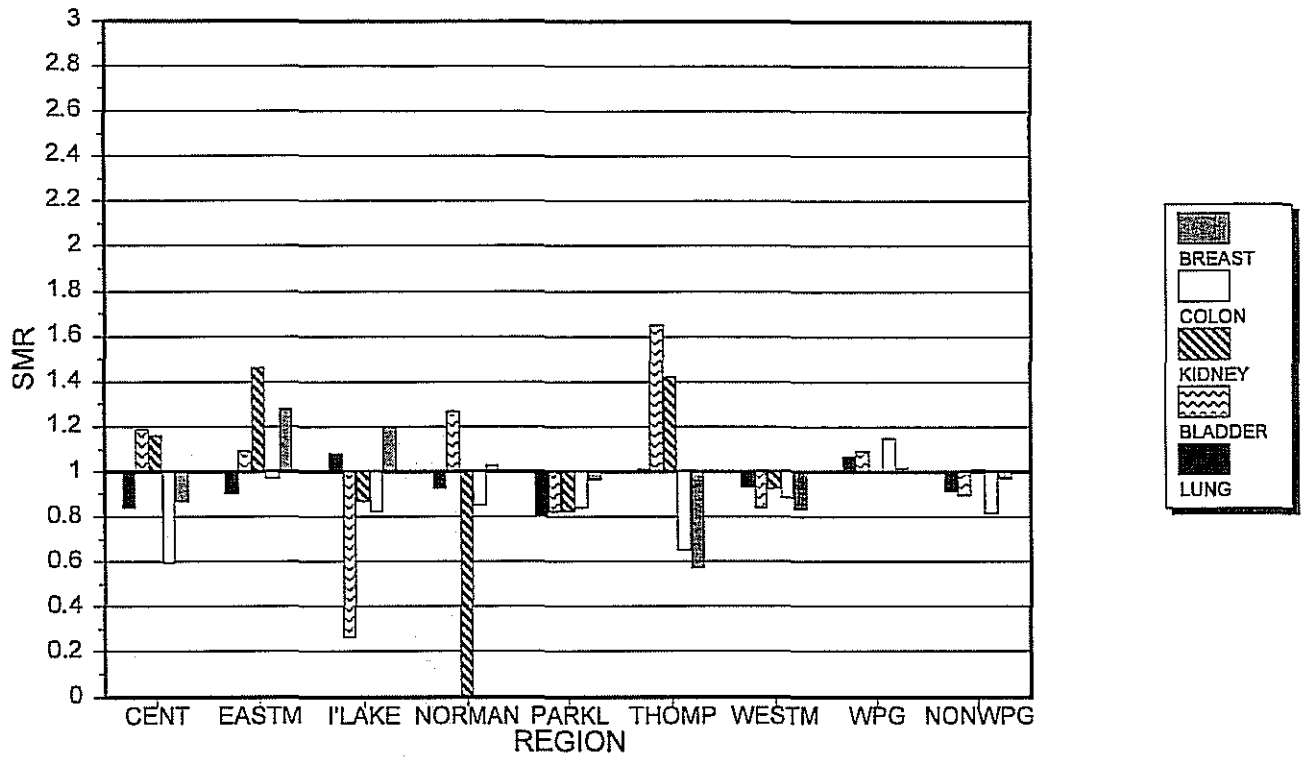
Figure 8: SMR's for cancer indicator deaths in each region compared to provincial averages, 1991.
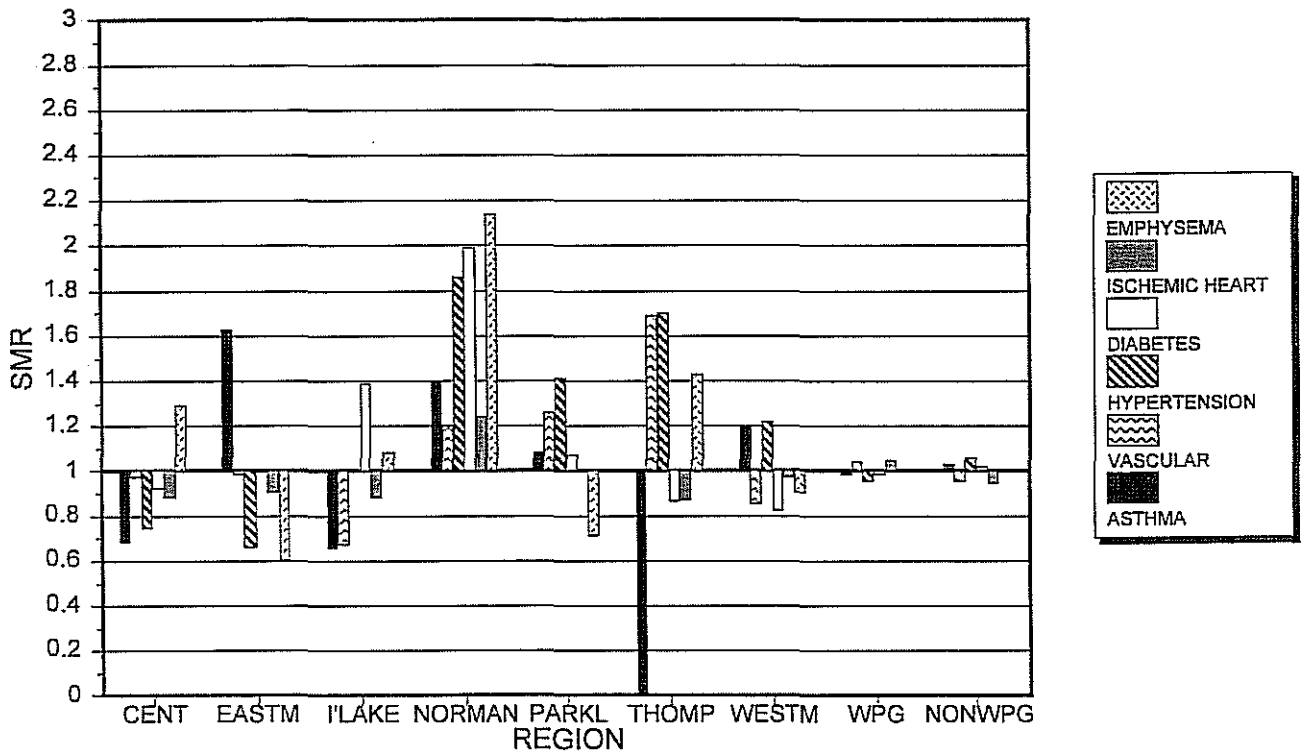
Figure 9: SMR's for chronic disease indicator deaths in each region compared to provincial averages, 1991.

hypertension, high death rates were seen in Norman and Thompson regions as well as Westman. Low rates of hypertension deaths were seen in Central and Eastman regions. High death rates for diabetes were seen in Interlake and Norman regions. Ischemic heart disease deaths rates were close to the provincial average for all regions of the province. Overall, the lowest mortality rates for chronic diseases were found in Central, Eastman and Winnipeg.

V. Hospitalization Indicators

V.1 Injury Indicator Hospitalizations

Hospitalizations for injury indicators are displayed in Figure 10. For Norman and Thompson regions, the rates of all indicators (marked with a *) were significantly higher than provincial averages. For Winnipeg, the hospitalization rates were significantly lower than provincial averages. For Central, Eastman, Interlake and Westman, several indicators had rates which were not significantly different from provincial means. Overall rates for non-Winnipeg regions were higher than for Winnipeg.

V.2 Cancer Indicator Hospitalizations

Rates of hospitalization for cancer indicators were not significantly different from provincial means for the types of cancer reported in Figure 11 except for lower rate of breast cancer in Parklands. Hospitalization rates for all cancers combined were significantly higher in the Interlake region than the provincial average (see Table 1, page 43). Looking at patterns of hospitalization for cancer indicators reveals no consistent patterns except for 6 out of 7 indicators, the rates of hospitalization were higher for Interlake than the provincial average.   .

Figure 10: SMR's for injury indicator hospitalizations in each region compared to provincial averages, 1991.
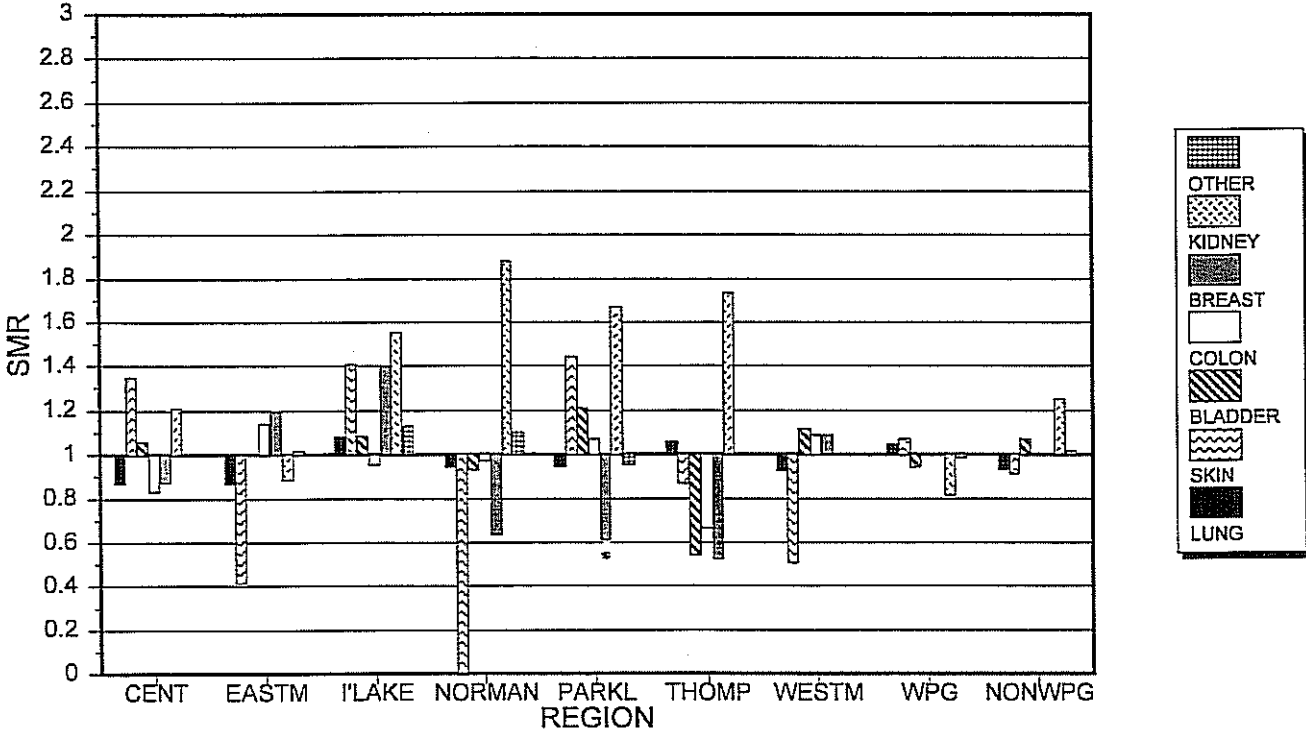
Figure 11: SMR's for cancer indicator hospitalizations in each region compared to provincial averages, 1991.

V.3   Chronic Disease Indicator Hospitalizations

The patterns for hospitalization for chronic disease indicators are shown in (Figure 12). All but 14 of the 48 hospitalization rates for chronic diseases were significantly different from provincial means.   Thompson and Norman regions had higher hospitalization rates for all of these indicators except for asthma in Thompson. The rate of hospitalization for ischemic heart disease was highest in Norman region and lowest in Central. Lower rates for all 6 indicators were seen for residents of Central, Eastman, Interlake and Westman; rates were below the provincial average for emphysema in Central and Eastman. Rates of hospitalization for all 6 indicators were lowest for residents of Winnipeg; this may however, reflect the overall lower use of hospital beds in Winnipeg.

V.4   Hospitalizations For Infectious Disease Indicators

While mortality from infectious diseases has declined from the onset of the century, there is still considerable mortality and morbidity associated with infectious diseases. For the elderly, pneumonia and influenza are major causes of mortality and morbidity. Some infectious diseases reflect lifestyle, for example, pelvic inflammatory disease and AIDS.

Infectious disease hospitalization indicators are shown in Figure 13.   (Note the different scale for SMR). The rates for Thompson region were highest particularly for tuberculosis (statistically significant). For Norman region, the SMR for pneumonia was high, and low for influenza as compared to the provincial average. There were no hospitalizations for hepatitis in Central, Eastman and Westman regions and no hospitalizations for tuberculosis or STD in Parklands. The rates for the other indicators in the other regions were similar to each other.
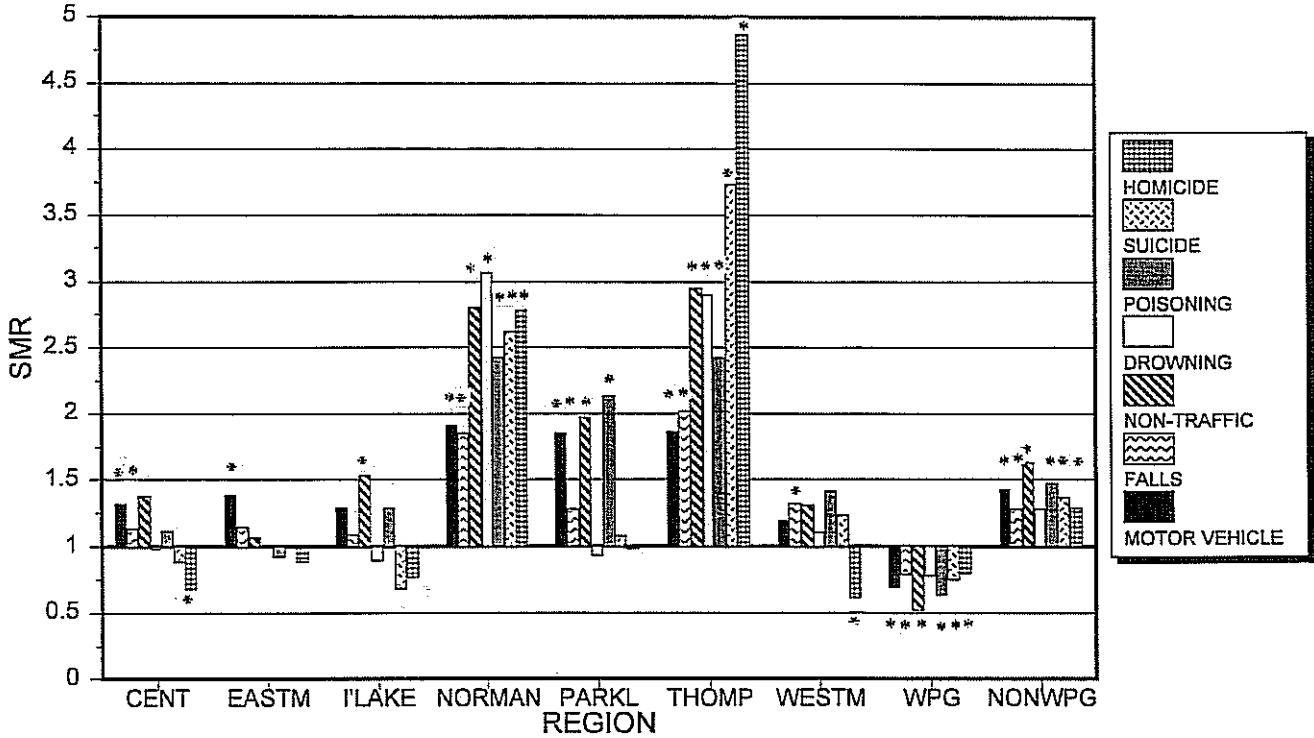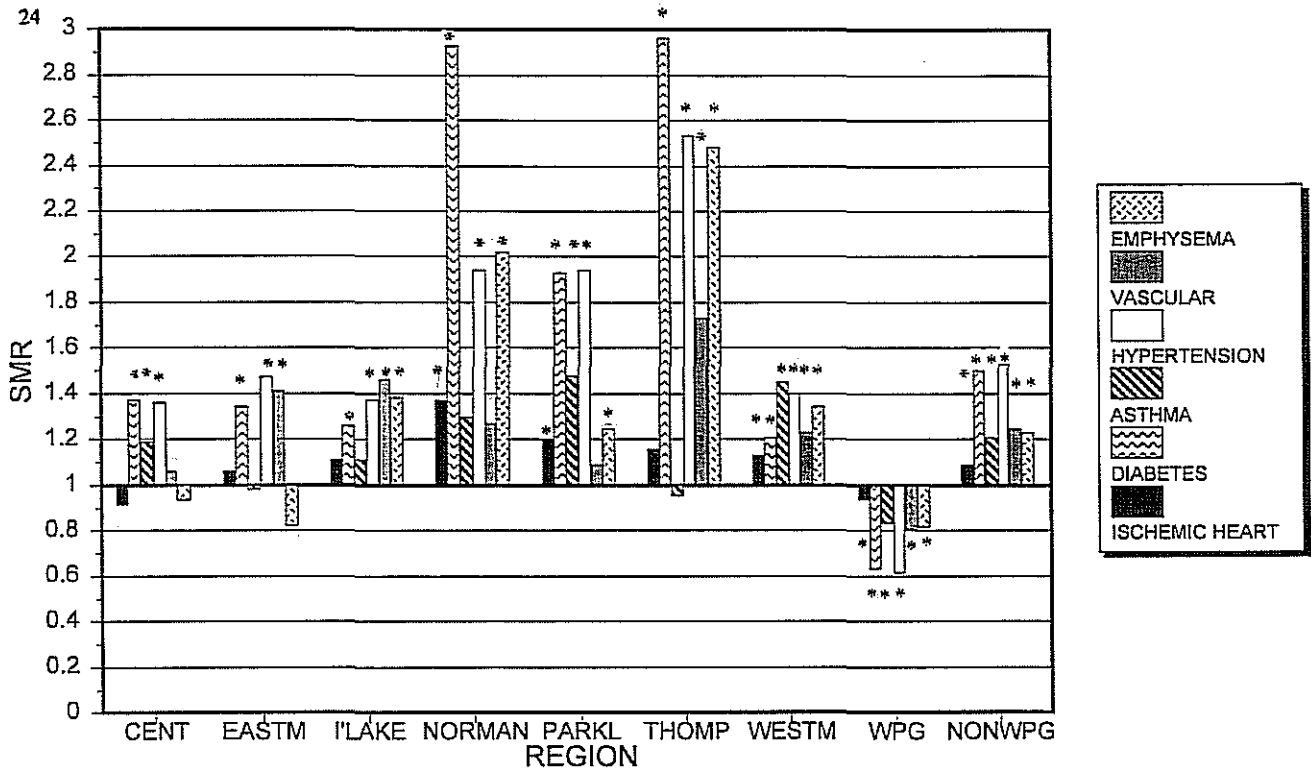
Figure 12: SMR's for chronic disease indicator hospitalizations in each region compared to provincial averages, 1991.
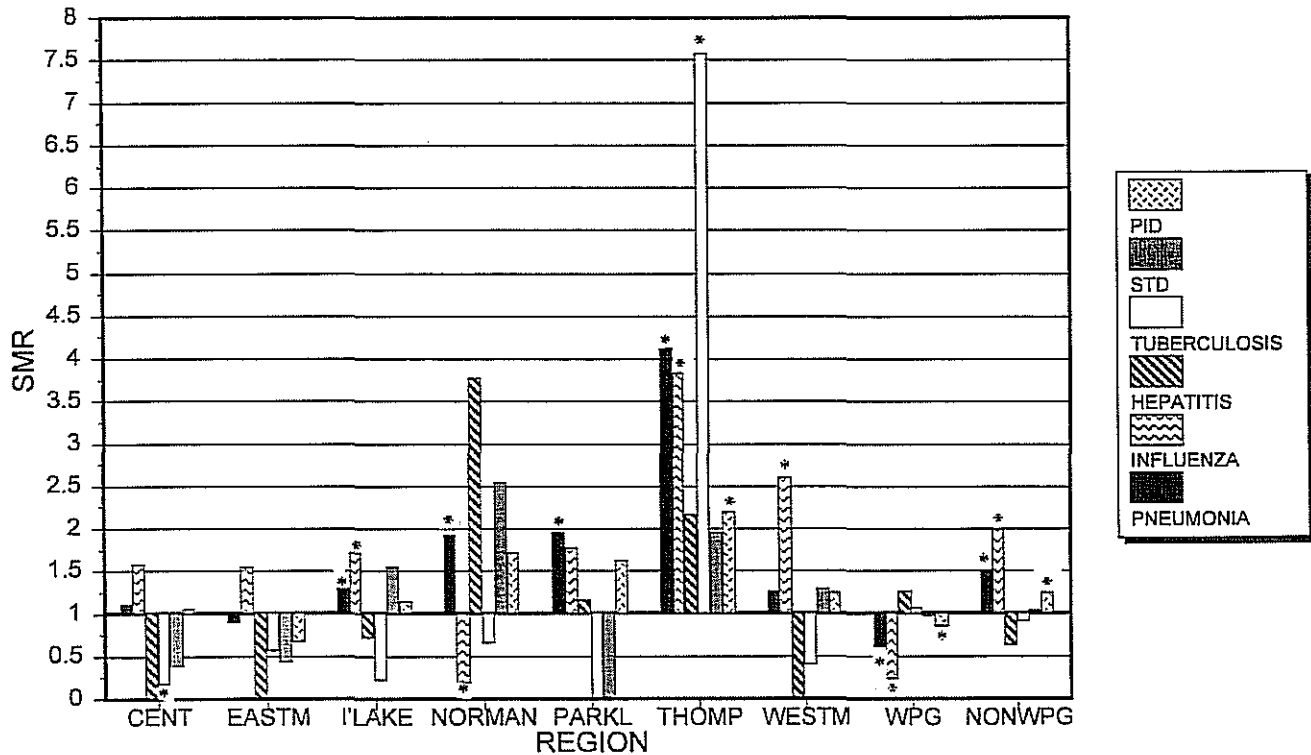
Figure 13: SMR's for infectious disease indicator hospitalizations in each region compared to provincial averages, 1991.

VI.   Physician Visits

VI.1   Disability Among Youth (0-24 Years)

The disabled group represent a vulnerable population who may have been disadvantaged since birth but in developed countries, medical advance and careful management have enabled these children to survive beyond adolescence (WHO 1986). A list of disabling conditions as derived from the WHO report on the health of youth is given in Appendix B, Table 2. Individuals with these conditions will not necessarily be admitted to hospital but will very likely see a physician for care over the course of the year. Therefore we report the use of physician visit rates by individuals for these conditions (i.e. two or more visits in one year).

These conditions exemplifying disability among youth show no consistent patterns (Figure 14). The number of visits for some indicators were very small, making rates unstable and comparisons difficult. There is a wide variability across the regions for the various indicators but Winnipeg residents score somewhat higher on most indicators. Since Winnipeg residents have a greater supply of physicians and visit physicians more frequently (see Utilization of Physician Resource Module), at least some of these differences may reflect utilization patterns.
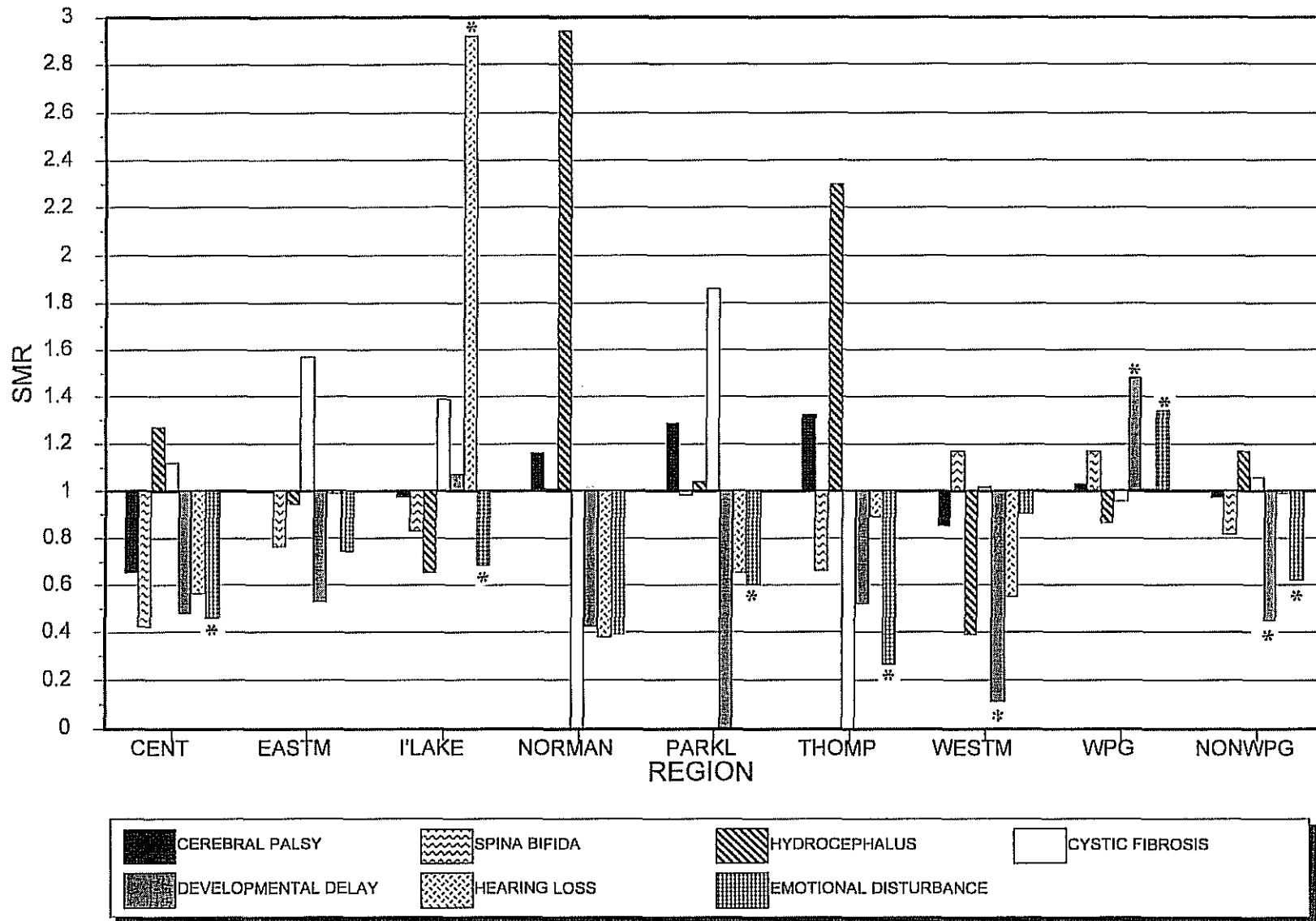
Figure 14: SMR's for disability among youth physician visits in each region compared to provincial averages, 1991.

**VI.2   Functional Status/Role Limitations/Perceived
          Health Status among the elderly**

For the elderly in particular, the definition of health must include more than the presence of
medical conditions; social functioning and disability become very important in the assessment
of the health of a region's elderly residents (McGinnis et al 1990). Four of the most widely
used health status measures for assessing social functioning are self perceived health status
(PHS), role limitations (RL), restricted activity days (RAD) and functional limitations (FL).
These items are usually derived from interviewing samples of persons in the population. Pope
(1988) used data from a large U.S. interview study (the National Medical Care Utilization and
Expenditure Study 1980) which measured the four dimensions of health status described above
as well as a list of medical problems a person may have had. He was then able to compare
the medical problems a person reported with their score on the four dimensions of health
status. Using a sophisticated statistical technique, Pope derived the most common medical
conditions associated with each of the four dimensions. Each of the four items was assessed
separately, but Pope found there was a large overlap in those medical conditions which caused
the most disability. Therefore in this report, we have grouped the most common medical
conditions together into two groupings; those medical conditions associated with functional
limitations and those associated with restricted activity days. The various conditions and the
corresponding ICD-9CM codes are listed in Appendix B, table 1.

For physician visits for conditions associated with functional limitations among persons 75+,
different conditions show varying rates across the regions (Figure 15 A and 15B). For
example, physician visits for ischemic heart disease (IHD) are significantly high in Winnipeg
and significantly low in Central, Norman, Parklands and Thompson. Visits for other
respiratory conditions are significantly high in Thompson and Interlake and low in Central and
Eastman. However the differences across the province in these indicators are quite small
relative to the differences observed in the rates of individuals hospitalized.

Figure 15A: SMR's for functional limitations physician visits for ages 75+ in each region compared to provincial averages, 1991.

Figure 15B: SMR's for additional functional limitations physician visits for ages 75+ in each region compared to provincial averages, 1991.

Figure 16: SMR's for restricted activity days physician visits for ages 75+ in each region compared to provincial averages, 1991.

VI.3   Restricted Activity Days among persons 75+

Rates of elderly individuals contacting physicians for upper respiratory tract infections were significantly high in Eastman and Parkland. Rates of individuals seen for fractures were high in Westman and low in Parklands. For sprains, low rates (compared to provincial averages) were seen in Central, Eastman, Parklands and Westman. Higher rates for sprains were found among Winnipeg residents.

V1.4   Functional Status/Role Limitations/Perceived Health Status (all ages)

Rates of individuals (of all ages) contacting physicians for medical conditions associated with functional limitations show that there were somewhat more persons seen by physicians for these conditions in Norman and to a lesser degree in Thompson regions (Figure 17A and 17 B). Eastman had a high SMR for ischemic heart disease.   However the most striking feature of Figure 17A and 17B was the low rate of individuals identified as having these conditions among residents of Central (statistically significantly lower for 11/13 indicators). However, residents of Central also had the lowest overall physician contact rate of individuals in the province. (Appendix A, figure A.4) so that these findings may reflect differing utilization. Overall residents of non-Winnipeg regions had fewer individuals identified with functional limitations and residents of Winnipeg were identified somewhat more frequently as having these conditions. However, the differences for both Winnipeg and non-Winnipeg residents were small and close to the provincial average.

VI.5 Restricted Activity Days (all ages)

Individuals with two or more physician contacts for indicators associated with restricted activity days for persons of all ages are shown in Figure 18. Residents of Central region were significantly less likely to be seen for these conditions. Winnipeg residents were somewhat more likely to be seen than provincial averages.
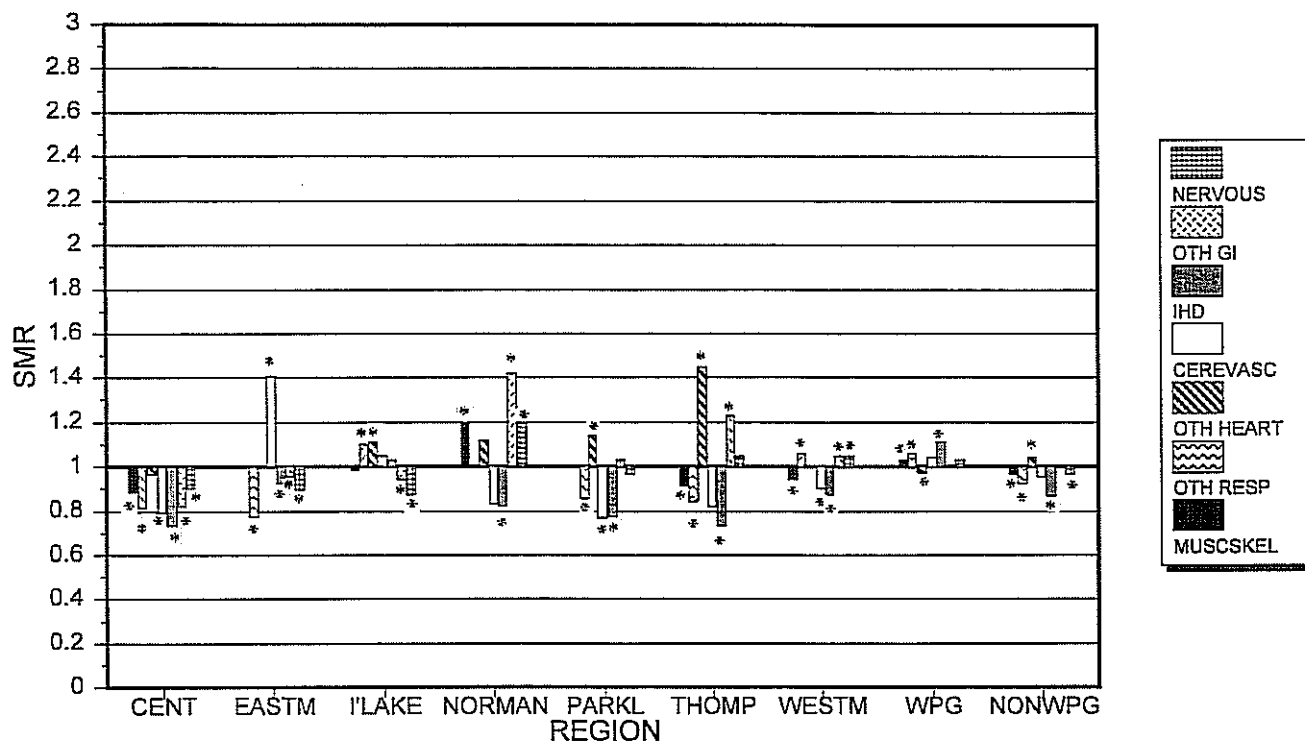
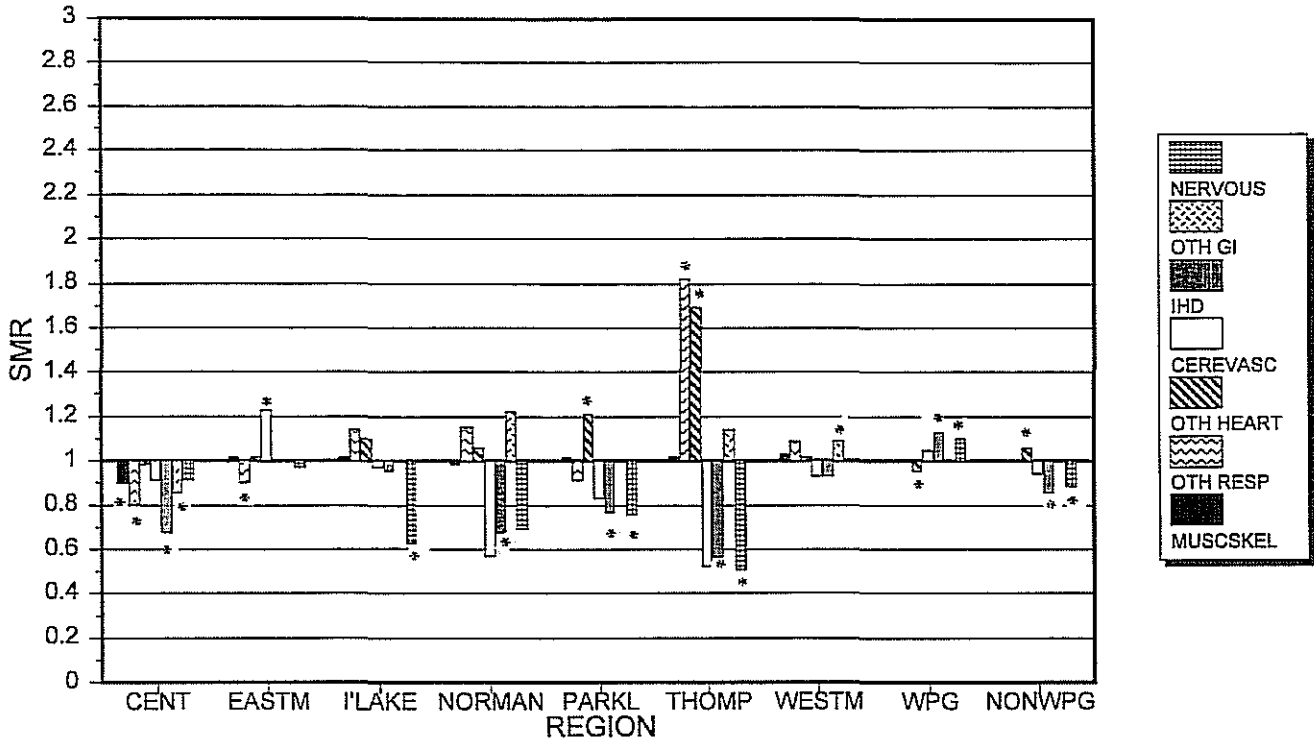Figure 17A: SMR's for functional limitations physician visits for all ages in each region compared to provincial averages, 1991.
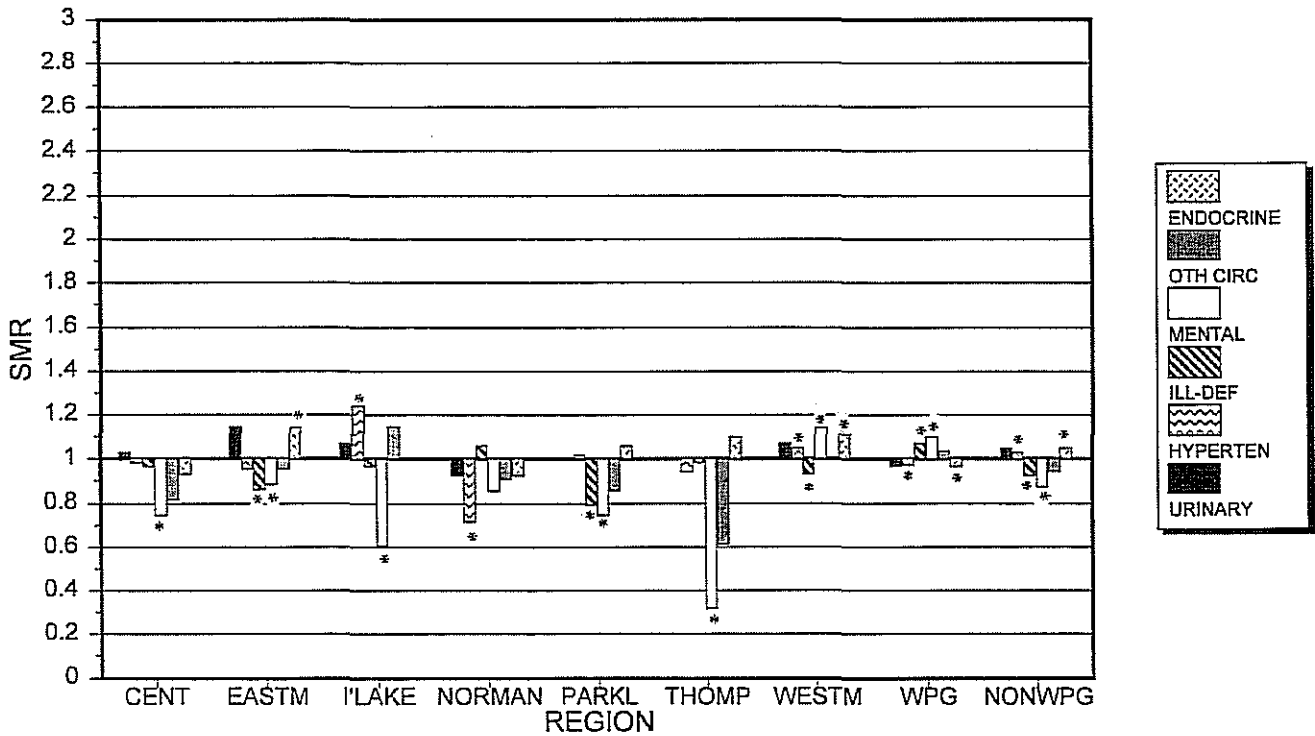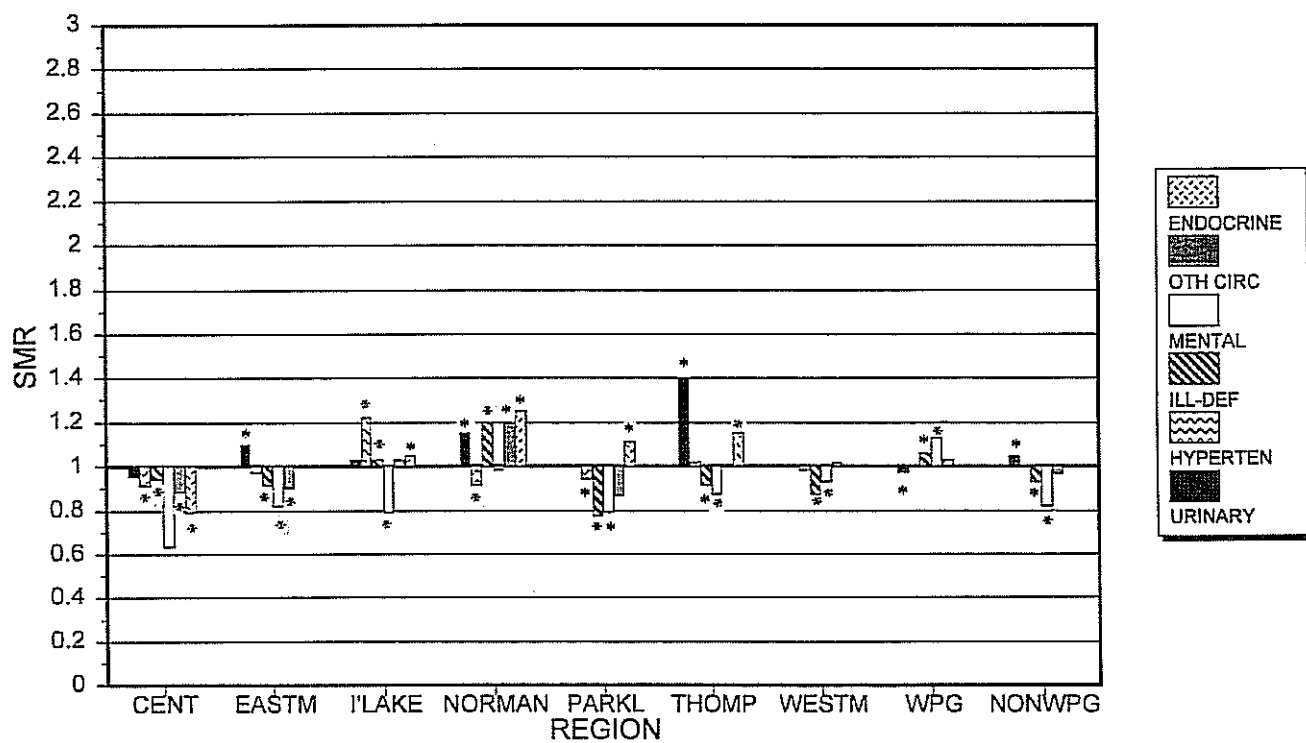

Figure 17B: SMR's for additional functional limitations physician visits for all ages in each region compared to provincial averages, 1991.
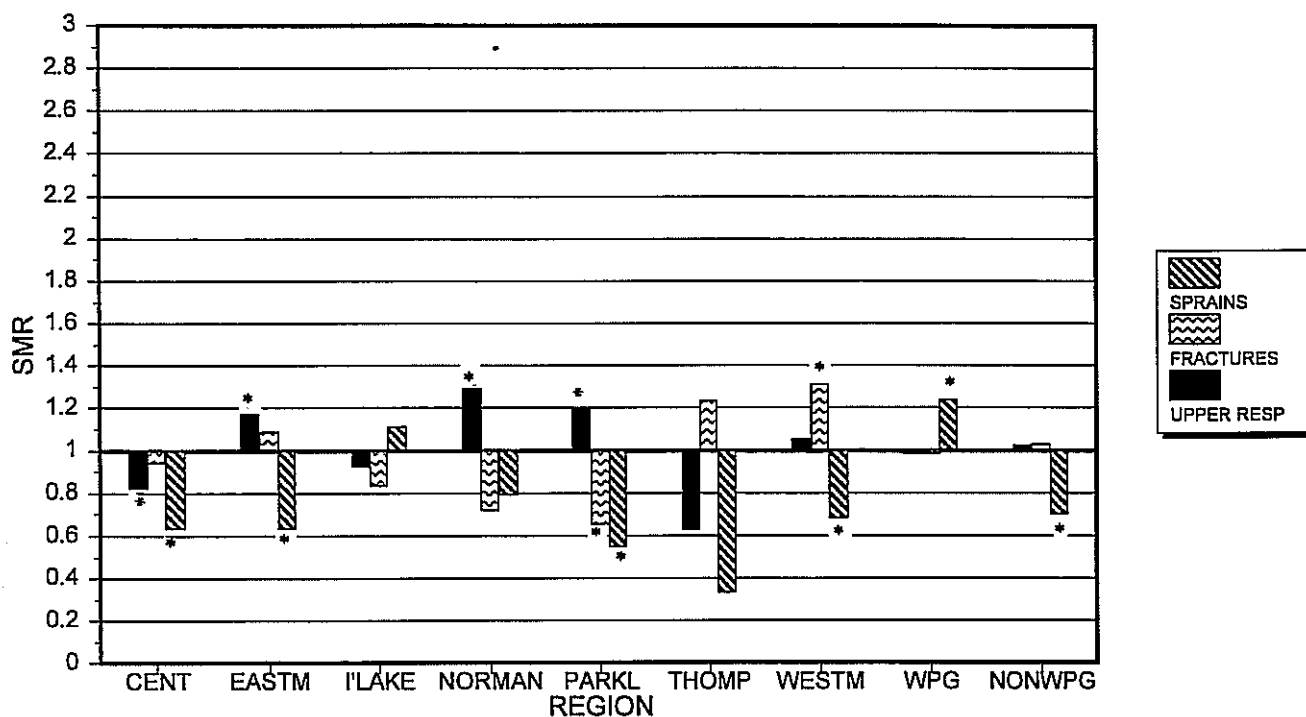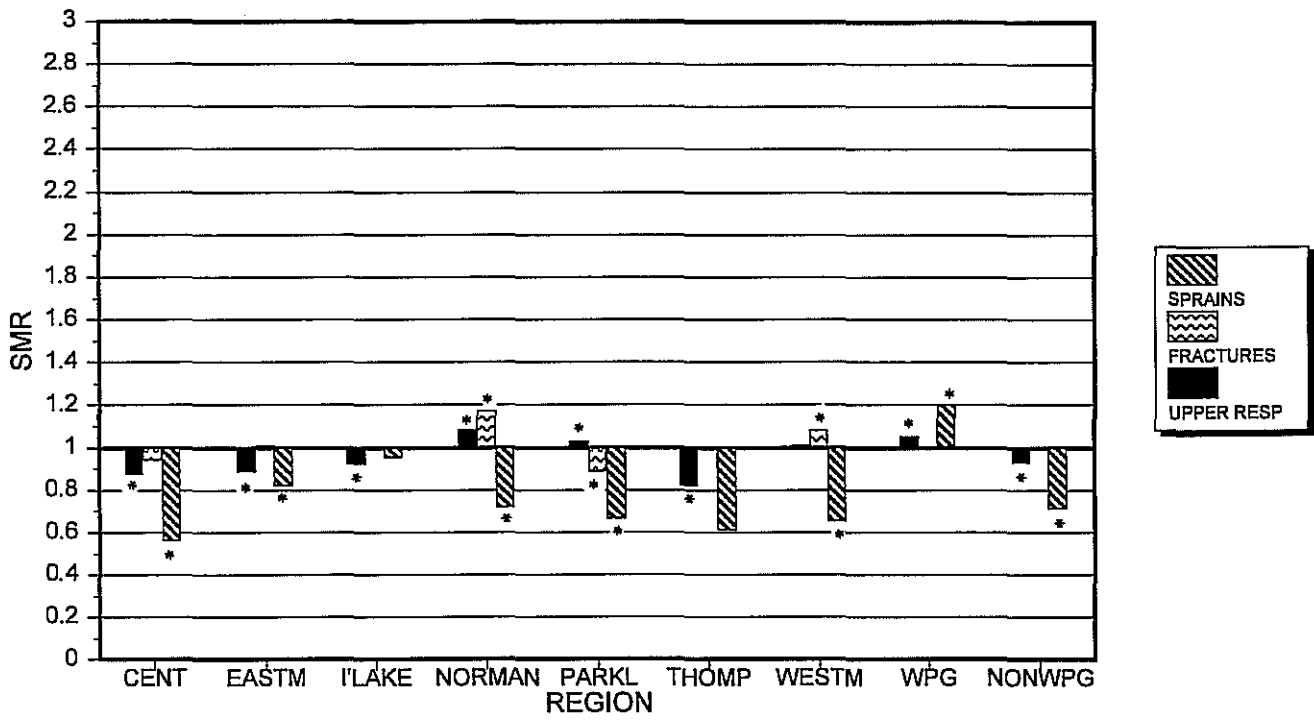
Figure 18: SMR's for restricted activity days physician visits for all ages in each region compared to provinical averages, 1991.

VII. Summary of Indicators

To illustrate the overall findings of the study, we have summarized the 102 indicators of health status in several different ways in this report. First SMR's are examined by graphical representation of groupings of mortality, hospitalization and physician visit based indicators. Second, for individual indicators, all SMR's are listed by region and those values which are statistically different from provincial averages are highlighted. Third, those indicators which are statistically significant are graphed by region.

A. SMR'S For Grouped Indicators:

Figure 19 illustrates SMR values for groupings of indicators as follows: all injury deaths, all cancer deaths, all chronic disease deaths, all infectious disease hospitalizations, all injury hospitalizations, all cancer hospitalizations and all chronic disease hospitalizations. (Note change in SMR axis). Indicators were thus grouped for two reasons. First patterns of poor health by category of condition can be more easily visualized. Second, by combining the various indicators which individually may have small numbers of events, taken together, the number of events is large so that instability due to small numbers is not an issue.

Figure 19 shows that SMR's for all injury deaths were highest in Thompson region and lowest in Winnipeg. For cancer mortality, rates were close to provincial averages among all regions; cancer deaths were lower in Norman, Parklands and Thompson (not statistically significant). For chronic disease deaths, rates were higher in Norman, Parklands and Thompson (not statistically significant) and close to provincial averages for the rest of the regions.
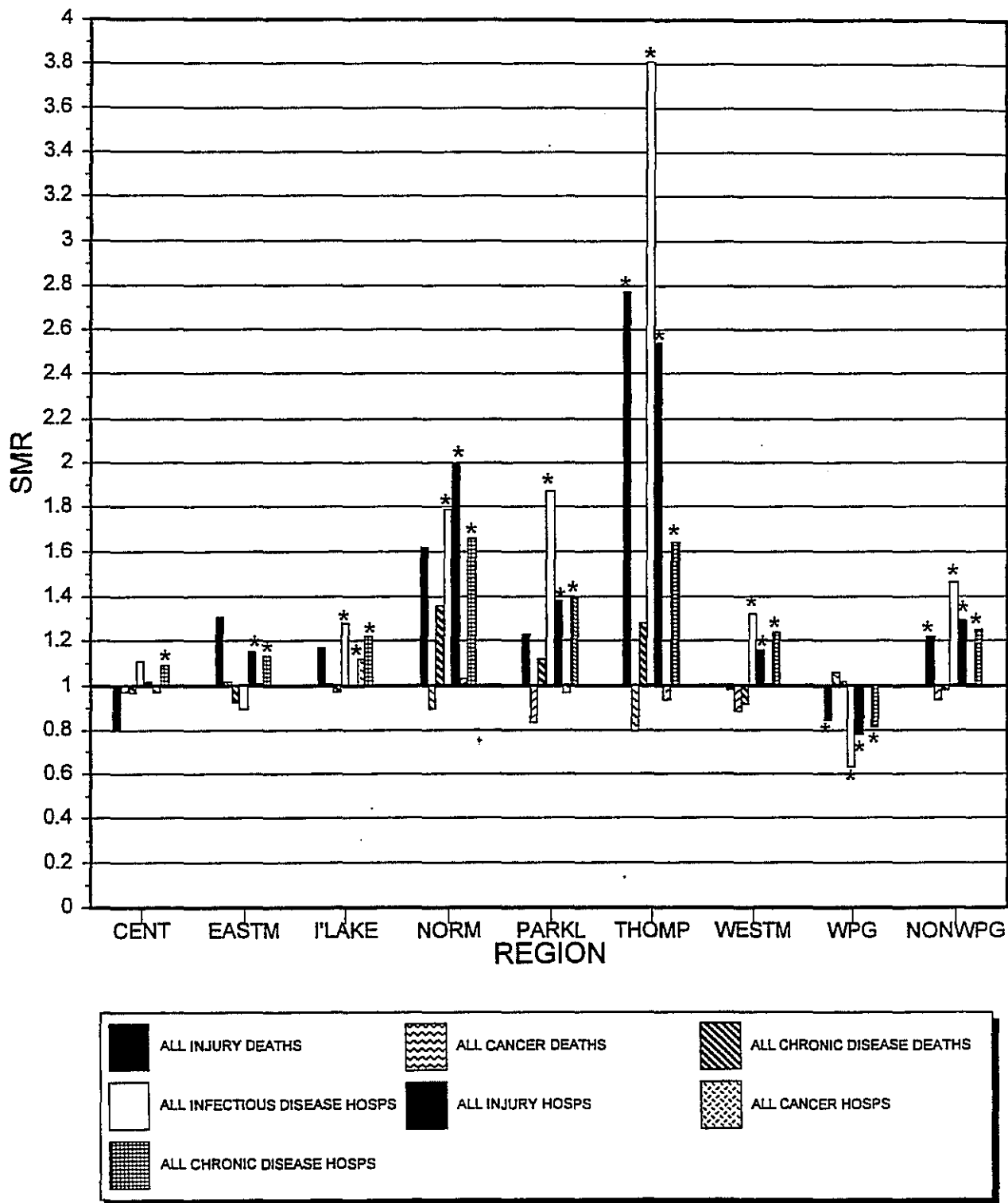
Figure 19: SMR's for mortality and hospitalization summary indicators by region as compared to provincial averages.

All hospitalizations for infectious diseases were particulary marked in Thompson region and also high in Interlake, Norman, Parkland and Westman. Rates for Winnipeg were below provincial means. All injury hospitalizations were also high in Thompson and Norman regions. Hospitalizations for all cancers did not vary much and all regions except Interlake show rates comparable to provincial averages. All chronic disease hospitalizations are particularly high in Thompson, Norman and Parklands regions and were statistically significantly different from the provincial mean. Rates were significantly higher from the provincial mean for the other regions, with only Winnipeg region being lower than the provincial rate.

Figure 20 shows functional limitation indicators that were grouped into four categories: all musculoskeletal conditions (e.g. fracture, sprains), all cardiovascular conditions (e.g. heart attacks, strokes), all respiratory conditions (e.g. pneumonia, emphysema) and all other conditions (e.g. diabetes, thyroid disease). For all four categories, rates of individuals contacting physicians were significantly low for residents of Central region. Visits were also below provincial means for Eastman, Parklands and Westman residents (3 of 4 were significantly different from the provincial means). Rates were significantly higher for Winnipeg residents for all four indicators. For Norman region, physician visit rates were higher for musculoskeletal, respiratory and other reasons but lower for all cardiovascular conditions. For Thompson region visits were significantly lower for all musculoskeletal conditions and all respiratory conditions and similar to provincial averages for the other two categories. All four categories showed low variation across the regions.
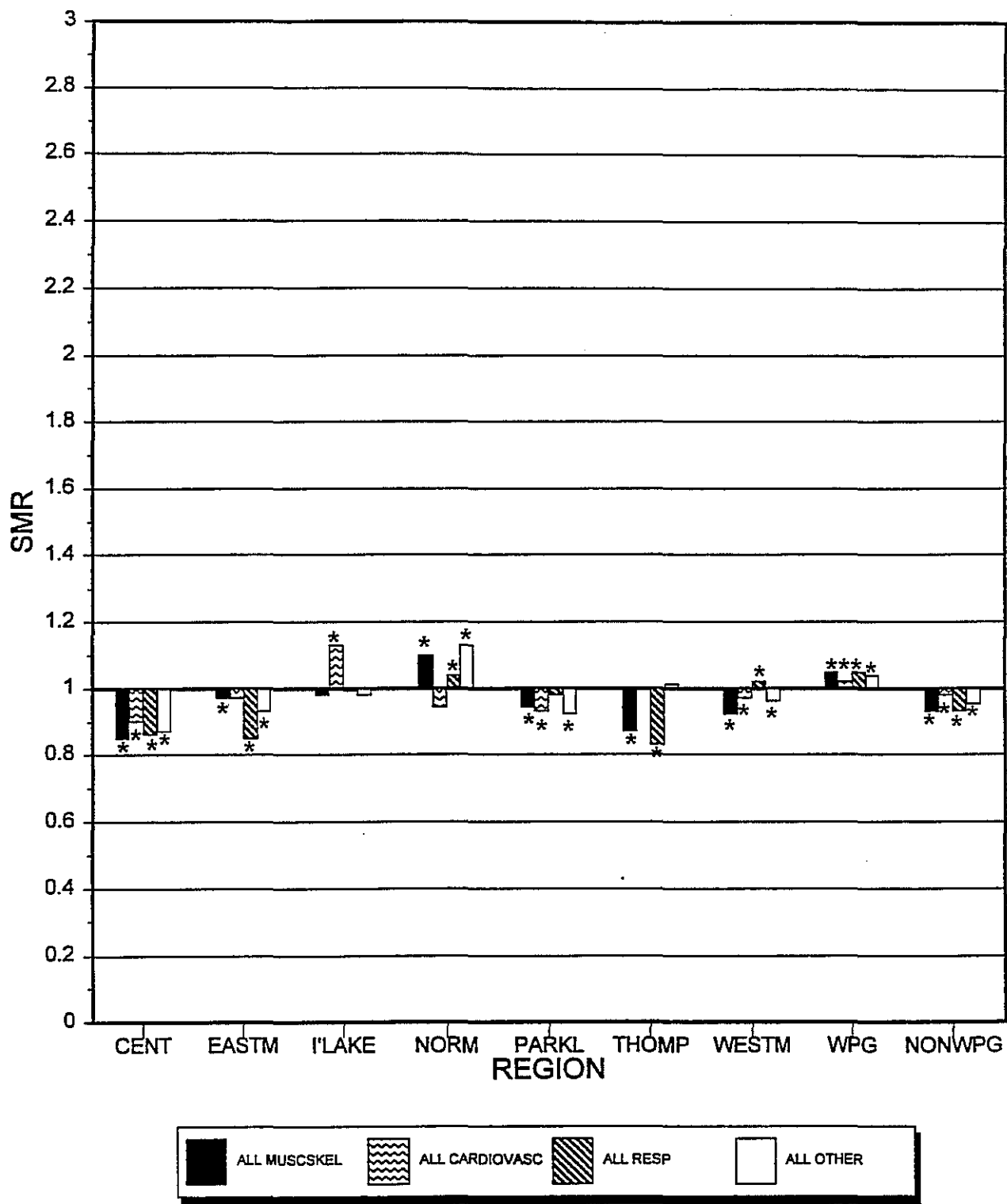
Figure 20: SMR's for all age functional limitations summary indicators by region as compared to provincial averages.

B. Table of Individual SMR's By Region

Table I lists Standardized Mortality and Morbidity Ratios (SMR's) for each indicator (e.g. death from motor vehicle accidents) and grouped indicator (e.g. mortality from all injuries). The column at the far right gives the actual rates for that condition for the province as a whole. This overall Manitoba rate allows the reader to gain a perspective on the prevalence of that condition in the province. The higher the rate, the more common is the condition. Note that provincial rates are expressed either per 1,000 population or per 100,000 population.

Those SMR's which are statistically significantly different from the provincial mean 99 out of 100 times (i.e. p=0.01), are marked by double underlining and bold print (i.e. **0.53**) and those which are significant at the 95 out 100 level (i.e. p=0.05) are marked by single underlining (i.e. 1.11). These values represent differences which are unlikely to have been spurious.

TABLE I

SUMMARY OF STANDARDIZED MORBIDITY AND MORTALITY RATIOS FOR VARIOUS INDICATORS, MANITOBA 1991/92

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
I. Demographic Profile										
proportion of population 0-24 years	40.2	41.1	36.9	43.9	35.7	54.8	35.5	34.5	27.3	36.8
proportion of population 75+ years	6.5	4.4	5.4	3.2	8.6	1.1	8.1	5.4	4.0	5.6
II. Low Birth Weight										
<2500 low birth weight	0.85	0.86	0.73	0.75	_0.53_	1.07	0.97	_1.11_	_0.87_	42.8
III. Health Care System Sensitive Indicators †										
amenable deaths	1.10	0.86	0.97	1.66	0.94	1.32	1.03	0.97	1.03	0.5
single event deaths	0.99	0.93	0.96	1.14	0.85	1.01	0.95	1.04	0.95	1.0
rate event deaths	0.88	0.99	0.82	1.31	1.17	1.22	0.87	1.05	0.94	1.1
amenable hospitalizations	_1.12_	_1.08_	_1.08_	_1.66_	_1.85_	_2.19_	_1.40_	_0.72_	_1.37_	15.9
single event hospitalizations	1.01	0.99	_1.19_	_1.48_	_1.37_	_2.02_	_1.27_	_0.82_	_1.23_	8.2
rate event hospitalizations	_1.15_	_1.24_	_1.23_	_2.14_	_1.59_	_2.60_	_1.28_	_0.72_	_1.37_	10.4
ambulatory care hospitalizations	_1.20_	_1.13_	_1.24_	_1.87_	_1.95_	_2.54_	_1.43_	_0.64_	_1.46_	17.7
avoidable hospitalizations	_1.16_	1.04	_1.19_	_1.69_	_1.36_	_1.96_	_1.27_	_0.79_	_1.27_	6.2
IV. Mortality Rates: Population and Cause-Specific †										
female deaths	0.98	1.01	1.05	1.27	0.88	_1.50_	0.92	1.01	0.98	7.3
male deaths	0.97	0.95	1.03	_1.33_	0.97	_1.51_	_0.91_	1.01	0.99	8.3
0-64 years deaths	0.90	1.07	1.09	_1.41_	1.17	_1.71_	_0.83_	0.96	1.06	1.9

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
Infectious Disease & Injury Mortality Indicators §										
motor vehicle	0.99	1.67	<u>2.05</u>	1.21	1.51	<u>**2.70**</u>	1.10	<u>0.62</u>	<u>1.50</u>	10.1
falls	0.91	1.10	0.54	2.00	0.67	0.53	1.46	0.96	1.05	6.6
drowning and suffocation	0.50	1.45	0.67	1.00	1.22	<u>**4.54**</u>	1.28	0.74	1.33	4.1
poisoning	0.00	0.86	0.00	1.57	2.00	2.15	0.81	1.16	0.79	1.5
fire and flames	1.10	0.32	1.47	4.56	2.08	3.53	0.83	0.69	1.40	1.9
suicide	0.70	0.87	1.16	1.37	1.09	0.94	0.55	1.10	0.86	11.7
homicide	1.07	1.76	0.47	1.25	1.52	<u>**3.55**</u>	1.01	0.73	1.38	3.1
other injuries	0.76	1.28	1.09	1.62	1.19	<u>**2.65**</u>	0.71	0.90	1.13	22.8
all injuries	0.80	1.31	1.17	1.62	1.23	<u>**2.77**</u>	0.98	<u>0.84</u>	<u>1.22</u>	46.9
pneumonia	1.06	0.93	0.91	1.60	1.10	1.09	1.02	0.98	1.03	33.3
AIDS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.57	0.00	0.8
Cancer Mortality Indicators §										
lung	0.84	0.90	1.08	0.92	0.80	1.01	0.93	1.07	0.91	48.3
bladder	1.19	1.09	0.27	1.28	0.83	1.67	0.84	1.09	0.89	5.0
kidney	1.16	1.46	0.86	0.00	0.82	1.42	0.92	0.99	1.01	4.6
colon	<u>0.59</u>	0.97	0.82	0.85	0.84	0.65	0.88	1.15	0.81	22.0
breast	0.86	1.28	1.20	1.03	0.96	0.57	0.83	1.02	0.97	36.9
other cancer	1.10	1.02	1.02	0.89	0.83	0.68	0.87	1.04	0.95	105.8
all cancers	0.97	1.02	1.01	0.89	<u>0.83</u>	0.79	<u>0.88</u>	<u>1.06</u>	<u>0.93</u>	204.5
Chronic Disease Mortality Indicators §										
asthma	0.68	1.63	0.65	1.40	1.08	0.00	1.20	0.98	1.03	2.2
vascular complications	0.97	0.98	<u>0.67</u>	1.20	1.26	1.69	0.85	1.04	0.95	58.2
hypertension	0.74	0.66	0.99	1.86	1.41	1.70	1.22	0.95	1.06	5.6
diabetes	0.92	1.01	1.39	1.99	1.07	0.86	0.82	0.98	1.02	15.0
ischemic heart disease	0.88	0.90	0.88	1.24	1.01	0.87	0.97	1.05	0.94	173.0
emphysema	1.29	0.60	1.08	2.14	0.71	1.43	0.90	1.01	0.99	24.2

INDICATOR	CENT	EASTM	PLAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
all chronic diseases	0.96	0.92	0.97	_1.36_	1.12	1.28	0.91	1.02	0.98	201.8

V. Hospitalizations

Infectious Disease Indicators §

pneumonia	_1.11_	0.89	_1.29_	_1.93_	_1.96_	_4.14_	_1.26_	_0.61_	_1.48_	315.6
influenza	_1.57_	_1.54_	_1.71_	_0.19_	1.77	_3.84_	_2.60_	_0.23_	_1.98_	25.2
hepatitis	0.00	0.00	0.70	3.78	1.16	2.17	0.00	1.26	0.62	2.1
tuberculosis	_0.17_	0.56	_0.21_	0.65	0.00	_7.58_	_0.39_	1.07	0.90	6.5
STD	0.38	0.42	1.55	2.54	0.00	1.96	1.30	0.97	1.04	2.8
pelvic inflammatory disease	1.05	_0.66_	1.14	_1.72_	_1.63_	_2.20_	1.24	_0.84_	_1.24_	42.7
AIDS	0.00	0.00	0.00	0.00	0.00	0.00	0.83	1.53	0.19	2.3
all infectious diseases	_1.11_	_0.89_	_1.28_	_1.79_	_1.87_	_3.81_	_1.32_	_0.63_	_1.46_	395.1

Injury Indicators §

motor vehicle	_1.32_	_1.39_	_1.29_	_1.91_	_1.85_	_1.86_	1.20	_0.68_	_1.43_	83.13
falls	_1.14_	_1.15_	1.09	_1.85_	_1.28_	_2.02_	_1.32_	_0.78_	_1.28_	366.62
vehicular non-traffic	_1.38_	1.07	_1.53_	_2.80_	_1.97_	_2.95_	_1.31_	_0.51_	_1.63_	42.09
drowning	0.97	1.00	0.89	_3.06_	0.93	_2.90_	1.11	_0.77_	_1.28_	17.01
poisoning	1.12	0.92	1.29	_2.42_	_2.13_	_2.42_	_1.42_	_0.63_	_1.47_	27.27
fire and flames	1.30	1.11	1.55	_3.25_	2.10	_3.65_	1.43	_0.42_	_1.75_	7.10
attempted suicide	0.88	1.01	_0.67_	_2.62_	1.08	_3.73_	1.23	_0.74_	_1.37_	65.9
attempted homicide	_0.67_	0.88	0.76	_2.78_	0.97	_4.86_	_0.60_	_0.79_	_1.29_	74.8
all injuries	1.02	_1.15_	1.00	_2.00_	_1.38_	_2.54_	_1.16_	_0.78_	_1.29_	790.5

Cancer Hospitalization Indicators §

lung	0.86	0.86	1.08	0.94	0.94	1.06	0.92	1.05	0.93	74.2
non-melanoma skin	1.35	0.41	1.41	0.00	1.44	0.86	0.50	1.07	0.91	6.6
bladder	1.06	1.00	1.08	0.93	1.21	0.54	1.12	0.94	1.07	26.0
colon	0.83	1.14	0.95	0.97	1.07	0.66	1.09	1.00	1.00	67.9
breast	0.87	1.19	_1.40_	0.63	_0.61_	0.52	1.09	0.99	1.01	128.2
kidney	1.21	0.88	1.55	1.88	1.67	1.73	1.01	0.81	1.25	11.8

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
other cancers	1.00	1.02	1.13	1.10	0.95	1.01	1.01	0.98	1.02	520.9
all cancers	0.97	1.01	1.12	1.03	0.96	0.93	1.01	0.99	1.01	746.1

Chronic Disease Hospitalization Indicators §

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
ischemic heart	0.91	1.06	1.11	1.37	1.20	1.16	1.13	0.93	1.09	517.8
diabetes	1.37	1.34	1.25	2.93	1.93	2.96	1.21	0.63	1.50	257.1
asthma	1.19	0.98	1.11	1.30	1.48	0.95	1.45	0.83	1.21	211.9
hypertension	1.36	1.47	1.37	1.94	1.94	2.53	1.40	0.61	1.53	181.9
vascular complications	1.06	1.41	1.46	1.27	1.09	1.73	1.23	0.80	1.25	200.9
emphysema	0.93	0.82	1.38	2.02	1.25	2.48	1.34	0.81	1.23	190.8
all chronic diseases	1.09	1.13	1.22	1.66	1.40	1.64	1.24	0.81	1.25	1473.3

VI. Visits to Physicians †

Disability Related Reasons <24 Years †

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
cerebral palsy	0.65	1.07	0.97	1.16	1.29	1.31	0.85	1.02	0.98	0.5
spina bifida	0.42	0.76	0.62	1.01	0.98	0.88	1.16	1.17	0.81	0.2
hydrocephalus	1.27	0.94	0.65	2.94	1.04	2.29	0.39	0.85	1.17	0.1
cystic fibrosis	1.13	1.59	1.17	0.00	1.89	0.00	0.89	0.99	1.01	0.2
developmental delay	0.48	0.40	1.08	0.42	0.00	0.51	0.11	1.49	0.43	0.2
hearing loss	0.65	1.01	2.88	0.37	0.65	0.92	0.60	0.98	1.03	0.8
emotional disturbance	0.48	0.77	0.69	0.39	0.58	0.30	0.87	1.33	0.63	3.1

Functional Limitations 75+ Years †

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
musculoskeletal	0.90	1.00	1.01	1.00	1.02	1.04	1.04	1.00	1.00	171.3
other respiratory	0.80	0.87	1.11	1.13	0.92	1.84	1.08	1.01	0.99	101.8
other heart	1.00	1.01	1.08	1.04	1.22	1.68	1.02	0.95	1.06	91.0
cerebrovascular	0.92	1.21	0.98	0.58	0.83	0.46	0.93	1.05	0.94	30.0
ischemic heart disease	0.67	1.00	0.97	0.67	0.75	0.54	0.95	1.11	0.86	79.4

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
other gastrointestinal	<u>0.85</u>	1.00	0.99	1.21	1.02	1.14	<u>1.10</u>	0.99	1.01	82.7
nervous system	0.94	0.98	<u>0.63</u>	0.68	<u>0.72</u>	<u>0.46</u>	1.03	<u>1.09</u>	<u>0.89</u>	34.6
urinary	1.03	1.12	1.07	0.96	0.99	1.03	1.06	0.96	1.05	41.7
hypertension	0.99	0.95	<u>1.26</u>	<u>0.71</u>	1.03	0.89	1.05	<u>0.97</u>	<u>1.04</u>	162.1
ill-defined	0.97	<u>0.85</u>	0.97	1.09	<u>0.80</u>	0.97	<u>0.94</u>	<u>1.06</u>	<u>0.92</u>	170.6
mental disorders	<u>0.76</u>	<u>0.84</u>	<u>0.60</u>	0.91	<u>0.74</u>	<u>0.30</u>	<u>1.17</u>	<u>1.09</u>	<u>0.88</u>	86.7
other circulation	0.87	0.91	1.14	0.97	0.86	0.59	1.03	1.03	0.96	30.2
endocrine	0.94	<u>1.14</u>	1.01	0.93	1.05	1.11	<u>1.12</u>	<u>0.96</u>	<u>1.05</u>	89.1

Restricted Activity Days 75+ Years †

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
upper respiratory	<u>0.84</u>	1.15	0.94	1.34	<u>1.26</u>	0.77	1.04	0.97	1.03	49.8
fractures	0.93	1.05	0.84	0.80	<u>0.66</u>	1.27	<u>1.31</u>	0.98	1.03	24.1
sprains	<u>0.65</u>	<u>0.61</u>	1.18	0.82	<u>0.61</u>	0.34	<u>0.68</u>	<u>1.22</u>	<u>0.72</u>	6.0

Grouped Functional Limitations 75+ Years †

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
all musculoskeletal	<u>0.89</u>	0.99	1.00	0.95	0.97	1.06	1.04	1.01	0.99	203.4
all cardiovascular	<u>0.94</u>	0.99	<u>1.10</u>	<u>0.79</u>	1.00	0.90	1.01	1.00	1.00	364.5
all respiratory	<u>0.83</u>	0.95	1.05	1.17	1.03	<u>1.46</u>	<u>1.08</u>	0.99	1.01	156.2
other functional limitations	<u>0.94</u>	1.00	<u>0.92</u>	0.97	<u>0.91</u>	0.91	<u>1.04</u>	<u>1.02</u>	<u>0.97</u>	447.3

Functional Limitations All Ages †

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
musculoskeletal	<u>0.88</u>	1.00	0.98	<u>1.2</u>	1.00	<u>0.91</u>	<u>0.95</u>	<u>1.03</u>	<u>0.96</u>	79.8
other respiratory	<u>0.81</u>	<u>0.77</u>	<u>1.1</u>	1.00	<u>0.86</u>	<u>0.85</u>	<u>1.06</u>	<u>1.06</u>	<u>0.93</u>	57.8
other heart	0.97	0.99	<u>1.1</u>	1.11	<u>1.15</u>	<u>1.44</u>	1.00	<u>0.97</u>	<u>1.04</u>	10.4
cerebrovascular	<u>0.78</u>	<u>1.41</u>	1.05	0.83	<u>0.77</u>	0.81	<u>0.91</u>	1.04	0.95	3.5
ischemic heart disease	<u>0.73</u>	<u>0.92</u>	1.04	<u>0.82</u>	<u>0.78</u>	<u>0.74</u>	<u>0.88</u>	<u>1.11</u>	<u>0.86</u>	13.9
other gastrointestinal	<u>0.83</u>	<u>0.95</u>	<u>0.94</u>	1.42	1.03	<u>1.24</u>	<u>1.06</u>	1.00	1.00	38.3
nervous system	<u>0.91</u>	<u>0.89</u>	<u>0.88</u>	1.20	0.96	1.06	<u>1.05</u>	1.02	<u>0.97</u>	12.3
urinary	0.96	<u>1.10</u>	1.04	<u>1.16</u>	1.02	<u>1.41</u>	0.99	<u>0.96</u>	<u>1.05</u>	18.1
hypertension	<u>0.92</u>	0.97	<u>1.21</u>	<u>0.90</u>	<u>0.95</u>	1.03	0.99	1.00	1.00	45.1

INDICATOR	CENT	EASTM	I'LAKE	NORM	PARKL	THOMP	WESTM	WPG	NON WPG	MAN RATE
ill-defined	<u>0.94</u>	<u>0.92</u>	<u>1.04</u>	<u>1.20</u>	<u>0.77</u>	<u>0.92</u>	<u>0.88</u>	<u>1.05</u>	<u>0.93</u>	82.6
mental disorders	<u>0.64</u>	<u>0.82</u>	<u>0.81</u>	0.99	<u>0.80</u>	<u>0.88</u>	<u>0.94</u>	<u>1.12</u>	<u>0.82</u>	42.0
other circulation	<u>0.89</u>	<u>0.90</u>	1.03	1.21	0.89	0.99	1.03	1.02	0.97	7.7
endocrine	<u>0.8</u>	1.00	<u>1.05</u>	<u>1.25</u>	<u>1.12</u>	<u>1.14</u>	1.01	1.00	1	37.1

Restricted Activity Days All Ages †

upper respiratory	<u>0.87</u>	<u>0.88</u>	<u>0.93</u>	<u>1.09</u>	<u>1.04</u>	<u>0.83</u>	1.01	<u>1.05</u>	<u>0.93</u>	116.8
fractures	0.94	1.02	0.98	<u>1.19</u>	<u>0.89</u>	1.01	<u>1.07</u>	1.00	1.01	13.2
sprains	<u>0.56</u>	<u>0.82</u>	0.96	<u>0.73</u>	<u>0.66</u>	<u>0.61</u>	<u>0.65</u>	<u>1.20</u>	<u>0.71</u>	21.1

Grouped Functional Limitations All Ages †

all musculoskeletal	<u>0.85</u>	<u>0.97</u>	0.98	<u>1.10</u>	<u>0.94</u>	<u>0.87</u>	<u>0.92</u>	<u>1.05</u>	<u>0.93</u>	117.0
all cardiovascular	<u>0.90</u>	0.97	<u>1.13</u>	0.94	<u>0.93</u>	1.00	<u>0.97</u>	<u>1.02</u>	<u>0.98</u>	76.8
all respiratory	<u>0.86</u>	<u>0.85</u>	0.99	<u>1.04</u>	0.98	<u>0.83</u>	<u>1.02</u>	<u>1.05</u>	<u>0.93</u>	179.4
other functional limitations	<u>0.87</u>	<u>0.93</u>	0.98	<u>1.13</u>	<u>0.92</u>	1.01	<u>0.96</u>	<u>1.04</u>	<u>0.95</u>	224.5

†   Rate per 1,000 population
§   Rate per 100,00 population

═   Difference is significant $p < 0.01$
─   Difference is significant $p < 0.05$

SMR below 1 = lower than provincial average
SMR above 1 = higher than provincial average

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C. Statistically Significant SMR'S

Figures 21-24 are graphical representations of those SMR's which are statistically significant from provincial averages at the 1 in 100 level (see Table I). SMR's for mortality indicators were significant only for Norman and Thompson regions (Figure 21). For health care system sensitive indicators, SMR's were highest for Norman, Parkland and Thompson regions, while the SMR values for the other regions clustered closer to provincial averages (Figure 22). Indicators based on hospitalizations showed that the number and magnitude of significant indicators was highest for Thompson region followed by Norman and Parklands (Figure 23). Note that seven indicators for Thompson showed SMR's greater or equal to 3.5. To keep Figures 21-24 on the same scale, these were all given a value of 3.5 in Figure 23. Turning to indicators based on functional limitations, the SMR values which were significant clustered around the provincial mean for all regions (Figure 24). Values for Central region all were below provincial averages.

Standardized Mortality Ratio*
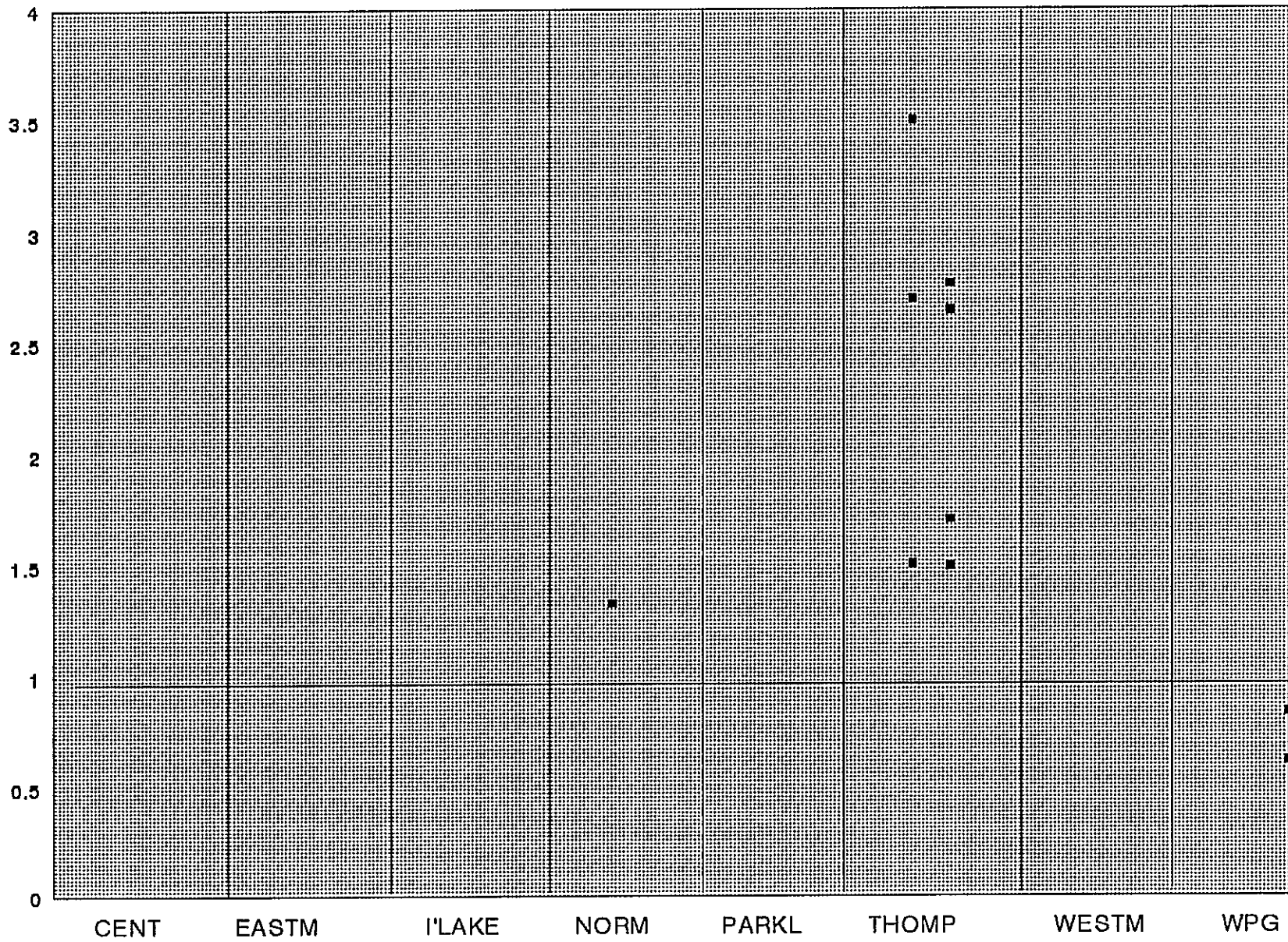
Figure 21: SMRs significantly (@ 1 in 100 level) different from Manitoba. Mortality indicators 1991
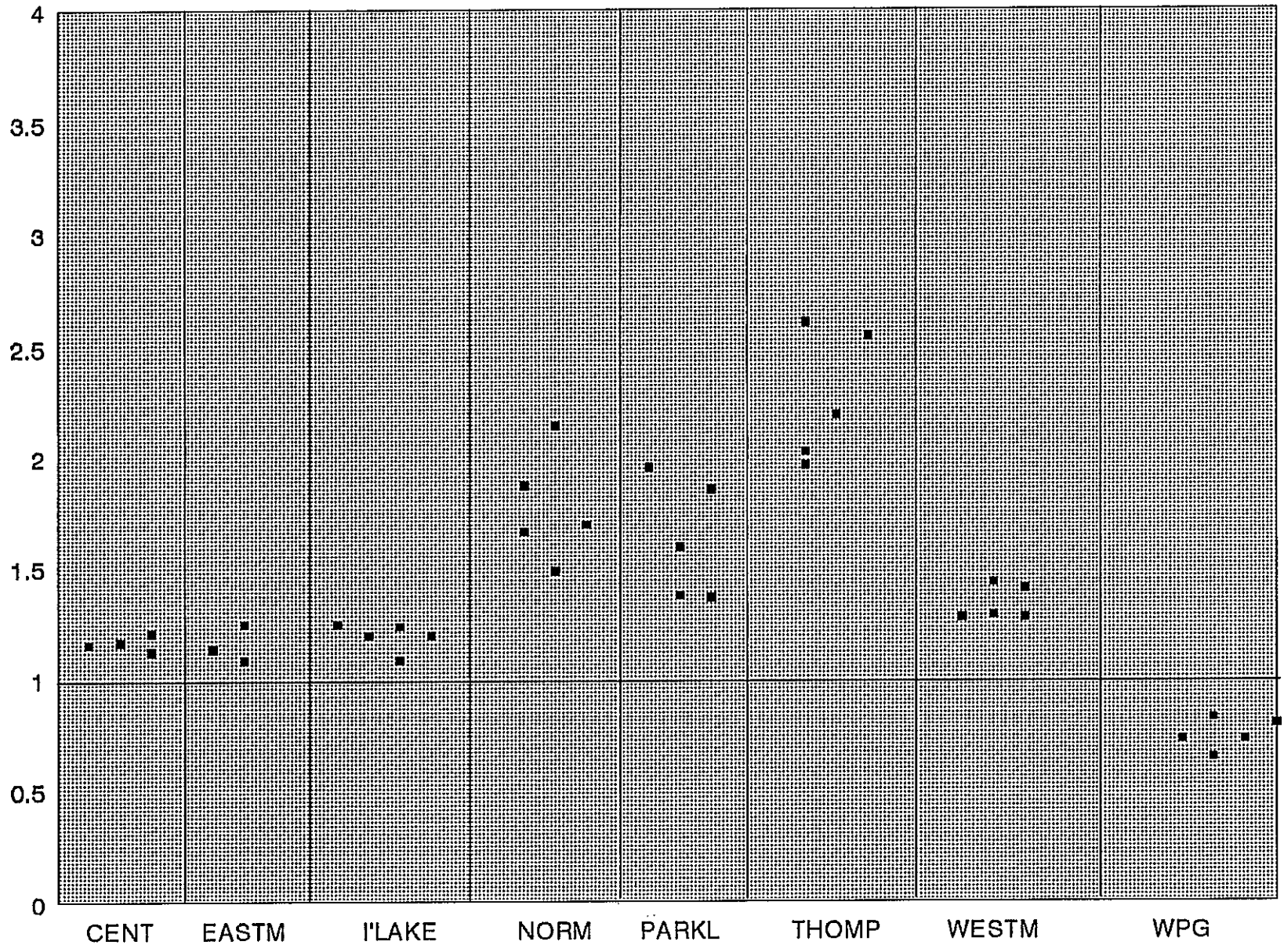
Standardized Morbidity Ratio

Figure 22: SMRs significantly (p < .01) different from Manitoba. Health Care System indicators 1991
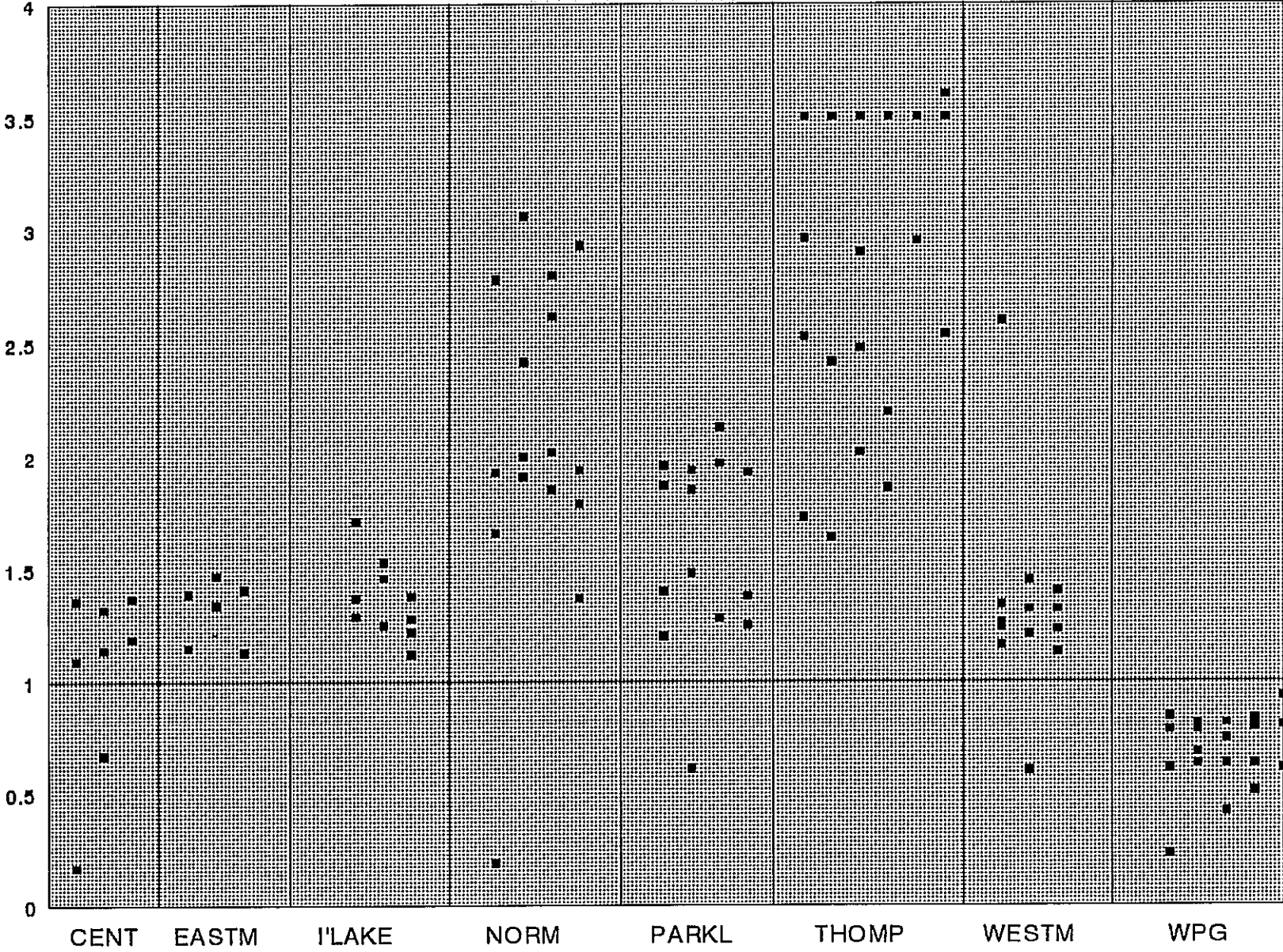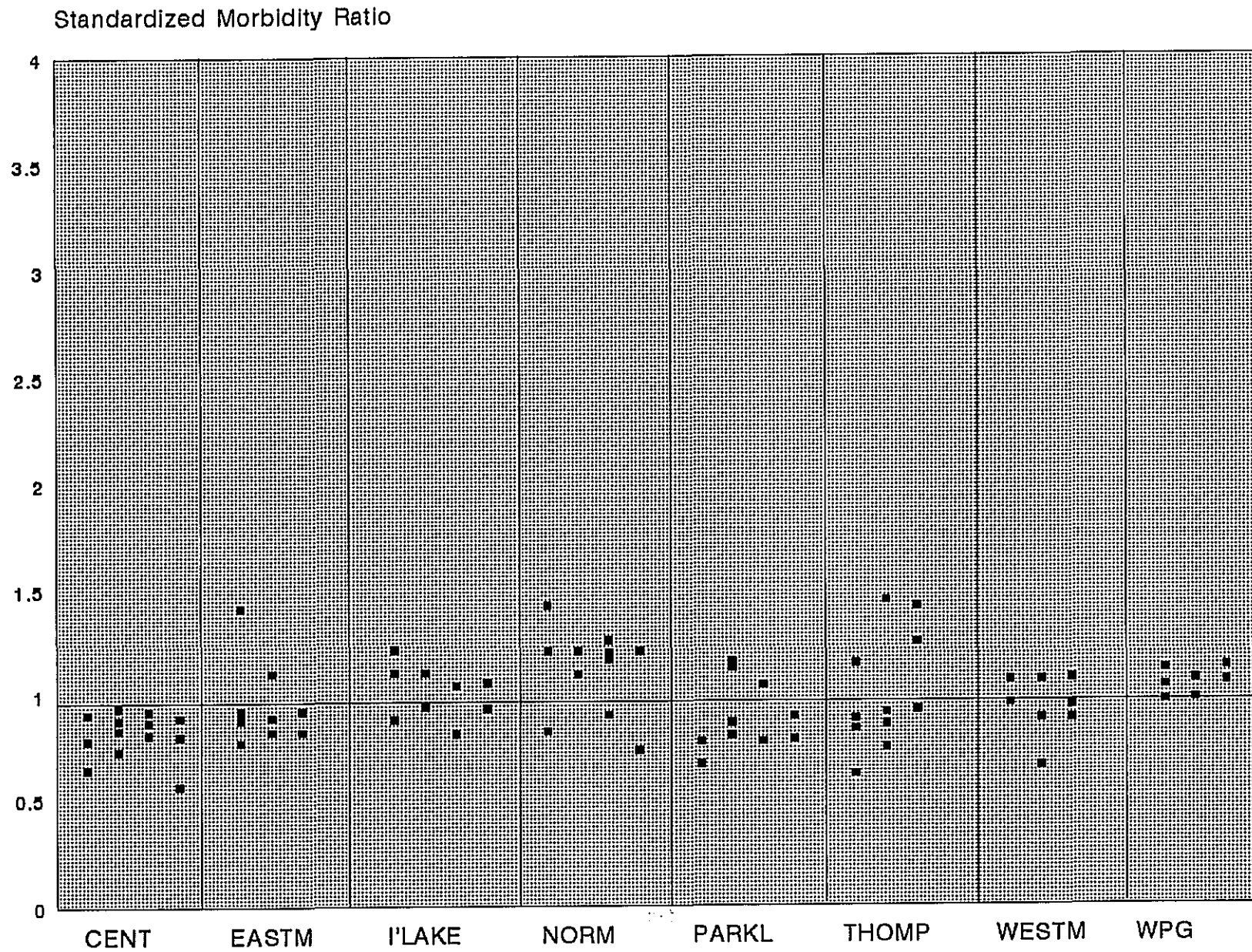
Standardized Morbidity Ratio

CENT   EASTM   I'LAKE   NORM   PARKL   THOMP   WESTM   WPG

Figure 23: SMRs significantly (p < .01) different from Manitoba. Hospitalization indicators 1991

Figure 24: SMRs significantly (p < .01) different from Manitoba.
Functional Limitations & Restricted Activity Indicators, 1991

Conclusion

We have developed 102 health status indicators measuring the health of Manitobans based on those conditions which reflect residents' death rates, the various conditions for which they are hospitalized, or for which they visit physicians. We have examined these indicators using various approaches and found that patterns persist even after considering the effects of differential hospitalization and physician visit utilization for Winnipeg and non-Winnipeg residents. The residents for Thompson and Norman regions appear to have the poorest health as measured by the total number of indicators above the provincial average, as well as the number of statistically significant indicators above the provincial average particularly regarding mortality and hospitalization for conditions relating to injuries, chronic diseases and infectious diseases[1].

Larger variations in health status were seen for the more "serious" indicators relating to mortality and hospitalization. There were no consistent patterns found upon examining variations in rates of individuals making two or more visits to physicians for a variety of conditions; rates for the various regions clustered around provincial averages despite differences in physician/population ratios. It is not the purpose of this report to explain these differences but merely to report them. Future reports in this series will examine regional differences over time to determine if patterns of differential health persist in the longer term. We will also examine health status for smaller geographical units and attempt to develop an index or indexes of health status.

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[1] Note, by considering Winnipeg as a single region health status differences among sub-populations within Winnipeg may be masked.

APPENDIX A: DEFINITIONS

Time period covered: Analyses in this report are based on hospital separations and physician visits reported to Manitoba Health for the 1991/92 fiscal year which fell within the periods April 1, 1991 through to March 31, 1992. Thus hospital admissions occurring in fiscal year 1991/92 where the person was discharged from hospital after March 31, 1992 are not included. All analysis are based on when the event took place rather than when the claim was processed.

Manitoba population: The definition of Manitoba residents includes individuals who are considered residents by Manitoba Health. This includes persons who reside temporarily out of the province (e.g. persons attending post-secondary schools out of province) as well as Manitoba residents who have moved to another province (for two months after their move). In addition, new residents arriving from another province (eligible after a two month waiting period) and new Manitobans arriving from another country (eligible for coverage immediately) are also included. Excluded from the Manitoba population are non-residents of Manitoba, armed forces personnel, federal penitentiary inmates and foreign students. For persons who are temporarily out of province, such as vacations or business trips, Manitoba Health routinely records information about hospital care received in such circumstances (but not outpatient care). Visits to physicians in other provinces are included in the files (reciprocal arrangement), as well as any claims by Manitoba residents for reimbursement for visits to foreign physicians.

Population counts are based on the Manitoba Registry as of December 31, 1991. Newborns born after December 31, 1991 are not counted in the population denominators, but are included in the service counts. Persons who died after December 1991 (i.e. January 1, 1992 to March 31, 1992) are counted in the population denominators.

Region of residence: Manitoba is divided by Manitoba Health into eight regions: Thompson, Norman, Parklands, Westman, Eastman, Interlake, Central and Winnipeg. Information about region of residence is obtained from the Manitoba Health Registry file except in the case of Treaty Status Indians. For this group, the postal code associated with each claim is used to determine the region of residence. All utilization are based on the region of residence of the patient, regardless of where the service was received. For

example, any services received in Winnipeg by a resident of Norman are counted towards the Norman resident.

Determination of Mortality: Causes of death were determined from provincial vital statistics which uses Death Certificates. The "main cause of death" was used in our rate calculations. It should be noted that only one "cause" can be given even for persons with multiple health problems. In some circumstances it is difficult to know the cause of death precisely. Using Death Certificates may be unreliable for certain conditions where the cause of death is poorly known, for multiple conditions, or where conditions carry a social stigma.

Hospitalizations: The number of persons hospitalized (rather than the number of hospitalizations) for the various indicators were determined for residents of each region of the province. Even if a person was hospitalized out of the region, the hospitalization was counted according to the residence of that person.

The reason for the hospitalization is coded by trained abstractors at each hospital who search through the medical records and discharge summaries after a patient is discharged. While coding at hospitals is generally good, there is always some discrepancies across hospitals with regard to how certain conditions are coded or with the number of coexisting conditions recorded. For this study we used the first diagnosis which is considered the most important reason contributing to the hospital stay. Acute care was defined as hospital stays of 60 days or less. Rates of hospitalization vary markedly across the regions with Winnipeg residents hospitalized much less often than Thompson and Norman residents (Appendix Figures A.1 and A.2). Since almost half of hospitalizations by some region's residents take place out of region, these use rates are not strictly driven by availability of local resources. How or whether one should adjust for these utilization differences is not clear. However, the very low use of hospitals by Winnipeg residents must be noted and its potential impact on our indicators derived from rates of individuals hospitalized appreciated.
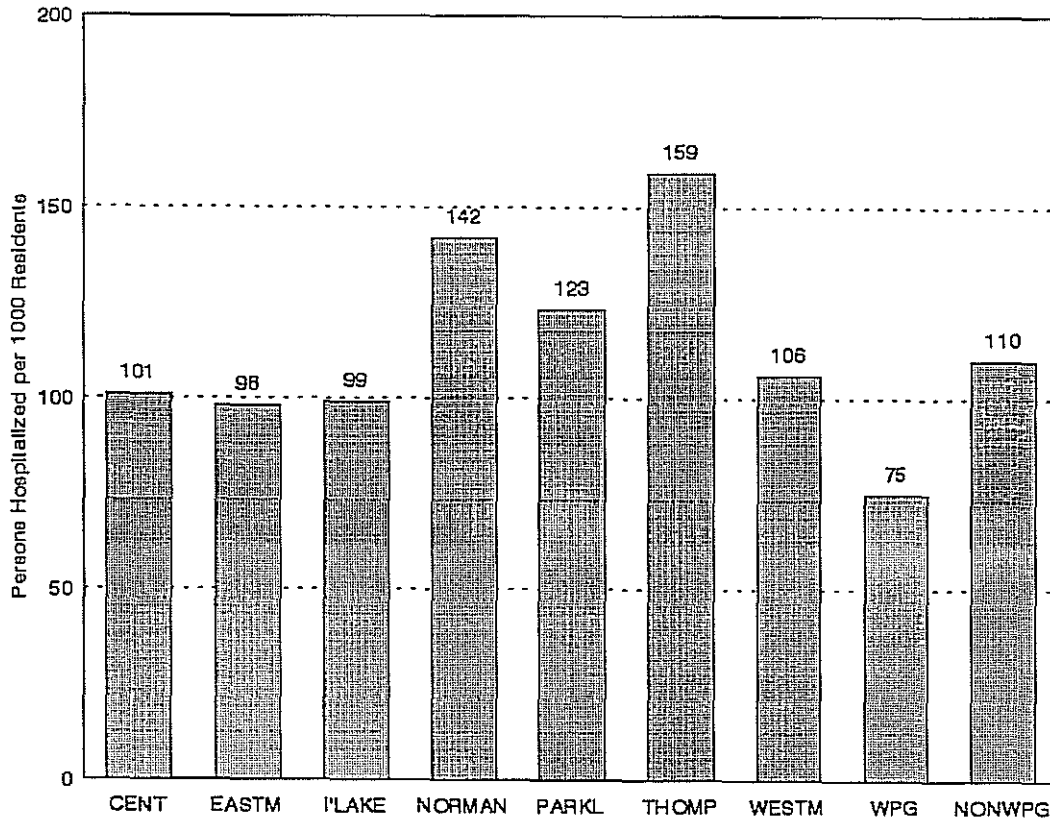
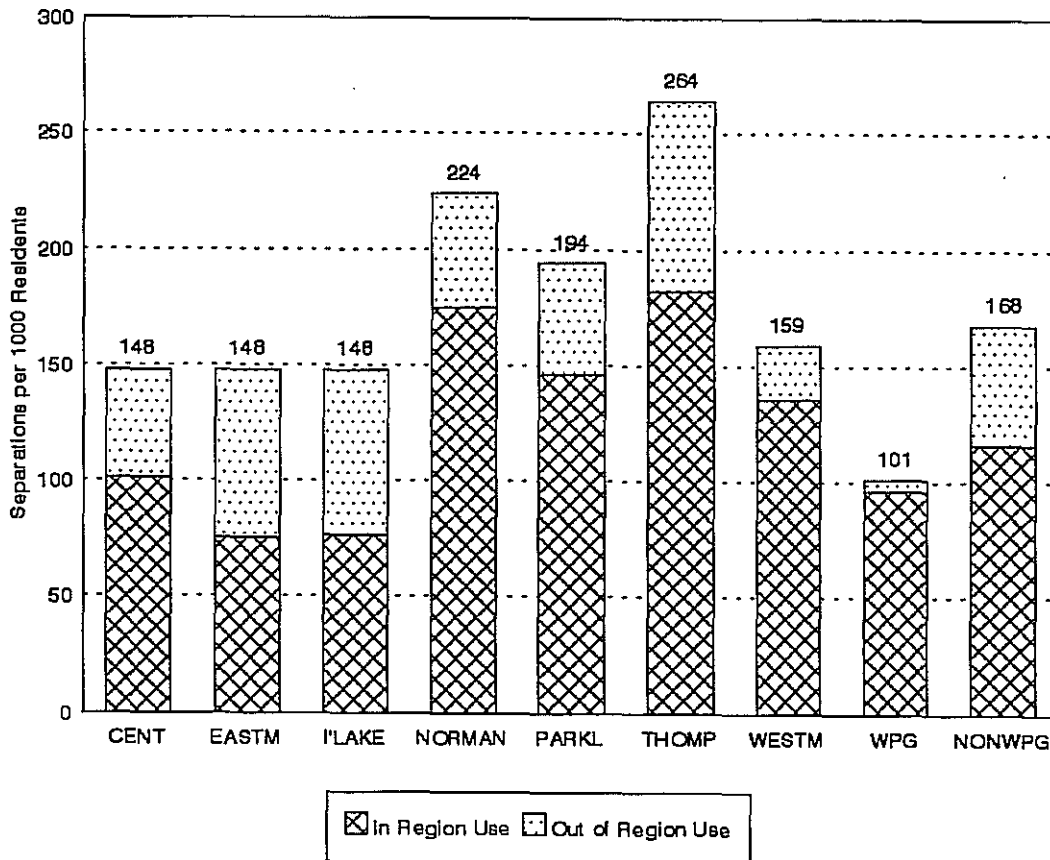Figure A.1: Use of Acute Care Across Manitoba Regions, 1991

In Region Use   Out of Region Use

Figure A.2: Use of Acute Care Across Manitoba By Where Hospitalization Occured, 1991

Physician Visits: For this report we examined all ambulatory physicians visits in the province of Manitoba for the 8 regions. An ambulatory visit was defined as any contact by a person with a physician which is billable by the physician to Manitoba Health. Physicians in salaried positions also send fee claims to Manitoba Health so are included in the study. Ambulatory visits are classified into office visits (private office or place of private practice), outpatient/emergency department (in the hospital setting but the patient is not admitted to the hospital), visits to persons in Personal Care Homes, and visits to patients in their own homes. Visits to patients who are in the hospital are not included. In order to receive payment for seeing a patient, the physician submits a fee claim to Manitoba Health. This claim must contain a reason for the visit; these reasons are then converted into numerical codes based on an international coding system--The International Classification of Diseases--Clinical Modification (9th revision). The coding of diagnoses (reason for the visit) from physician visits is less detailed than for hospitalizations. A simplified version of the coding system is used which does not discriminate well for some conditions. Furthermore, a person may visit a physician with multiple problems but only one reason can be recorded in the database. To ensure that a person was more likely to have the actual health condition, in this module, persons were counted if they saw a physician two or more times for one of the conditions listed in Appendix B, Table 1.

As Appendix Figure A.3 illustrates, individuals across Manitoba regions access physicians at a remarkably similar rate - with the percent having at least one visit annually ranging from 79% of Thompson residents to 85% of Winnipeg residents. However, there is considerably more variation in overall physician visits. This ranges from 41 visits per 100 Central residents to 52.9 visits per 100 Winnipeg residents (Appendix Figure A.4). Part of this difference is driven by availability with Winnipeg having many more physicians per capita than any other region. Since this report is mainly descriptive in nature, we have not adjusted the indicators for utilization differences.
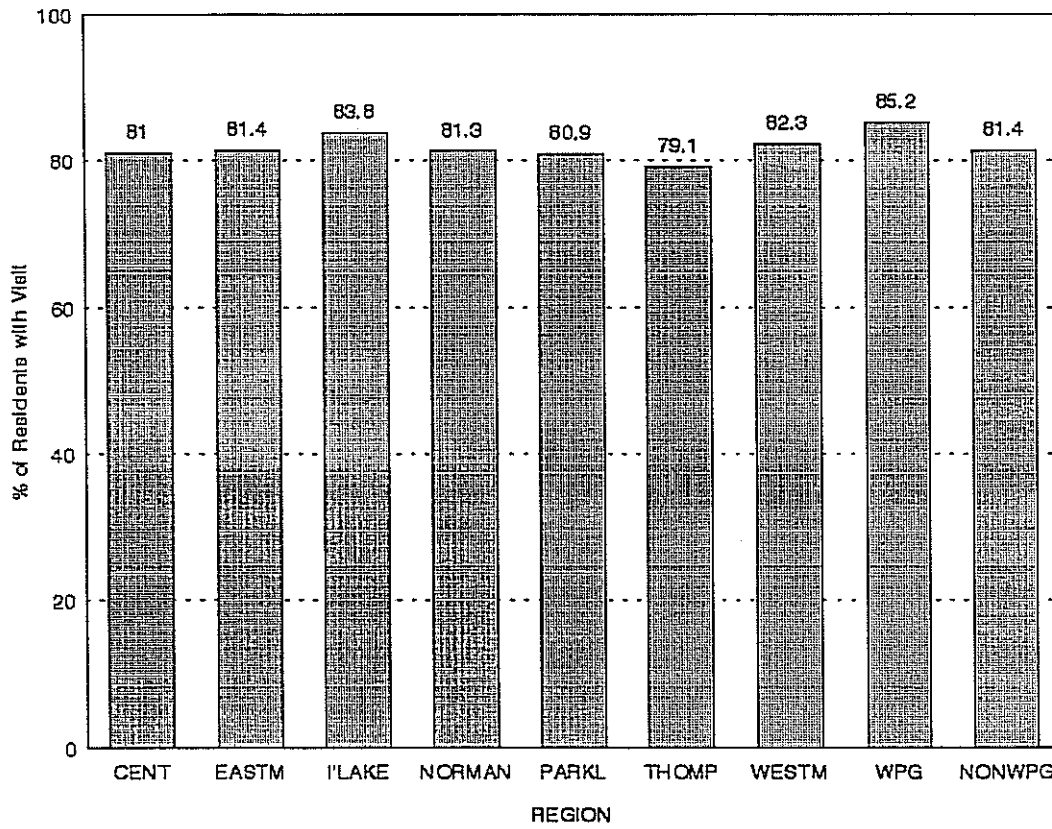
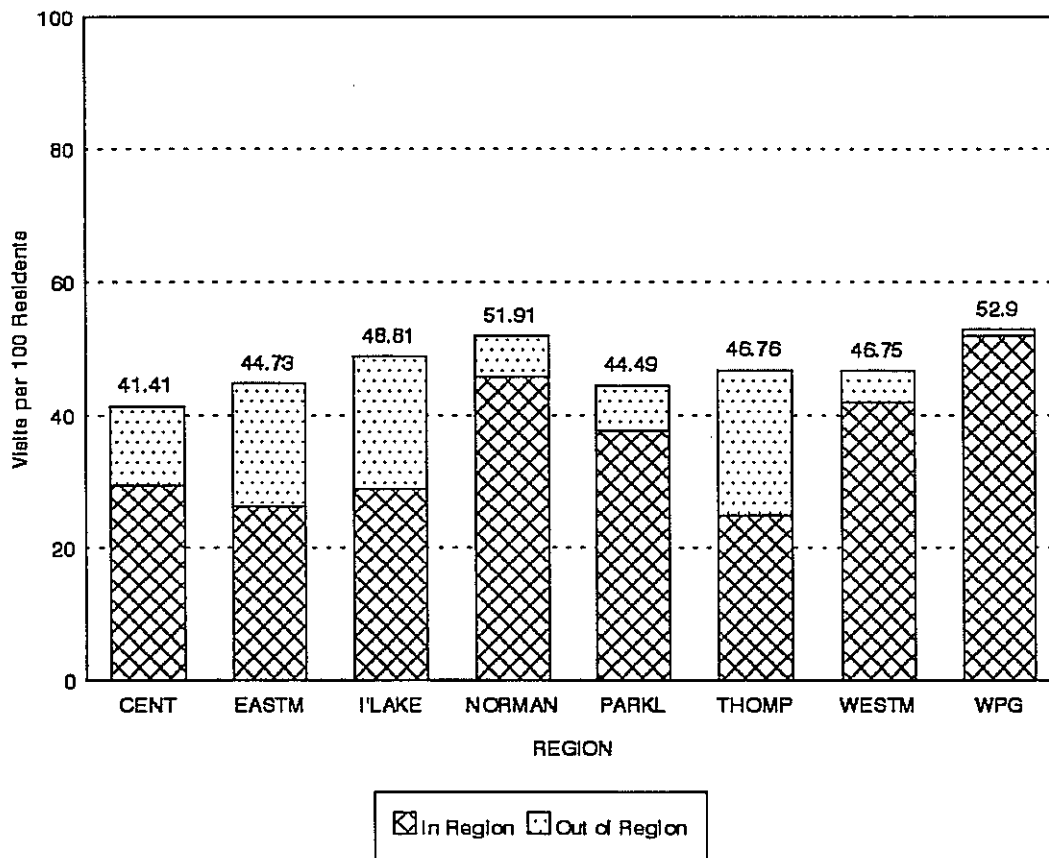Figure A.3: Patterns of Physician Contact Access to Physicians, 1991

Figure A.4: Patterns of Physician Contact Where Visit Takes Place

Determination Of Rates: The following rates were determined for each indicator: Crude rate, indirect adjusted rate, standardized mortality or morbidity ratio, and excess hospitalizations, physician visits or deaths (see Volume II for detailed tables). Indicators were aggregated into various like groupings for graphical representations. For example, hospitalizations for injuries were grouped together.

Health: While there is no single agreed upon definition of health, most authorities agree that health is more than the absence of medically defined diseases. Bergner and Rothman (1987) suggest that "health" consists of several dimensions including a physiological or biological component, the mental state, physical and social functioning, and health behaviours and attitudes. Several instruments to measure health status are currently available and can be broadly classified into those that measure individual health status and those that measure the health of populations or communities. It is with the latter that our Health Information System is concerned. There are several health status indicators currently developed to measure the health of populations and our information system draws heavily from these (National Information Task Force 1991, Klein & Hawk 1992, and other references).

Ambulatory Sensitive Hospitalizations: "Diagnoses for which timely and effective outpatient care can help to reduce the risks of hospitalization by either preventing the onset of an illness or condition, controlling an acute episodic illness or condition or managing a chronic disease or condition". The conditions were identified and assessed by a panel of U.S. physicians (Billings et al 1993).

Avoidable Hospitalizations: Conditions for which hospitalization can be avoided if ambulatory care is provided in a timely and effective manner (Weissman et al 1992). The conditions which are included in the grouping were those agreed upon by a panel of physicians and represent important health problems, which would be affected by appropriate ambulatory care, and have been used in previous studies. The fourteen conditions and their corresponding ICD-9CM codes are given in Appendix B, Table 2.

Conditions Amenable To Medical Treatment: Most of the health care expenditures are devoted to illness treatment (physician and hospital) so that it is reasonable to consider the impact that such expenditures have on "health". The list of medical conditions which a panel of physicians have agreed should prevent untimely death originates with a study by Charlton et al (1983) from England and later modified by Poikolainen and Eskola (1986) and

Desmeules and Semenciw (1991). The indicators chosen were "intended to be used not to provide a definitive evaluation, but rather to indicate where a problem may exist and to stimulate further inquiry". Age limits were imposed for some of the conditions such as deaths from diabetes, acute respiratory infections and Hodgkin's disease. A list of the medical conditions included are given in Appendix B, Table 2.

Single Event Indicator Conditions: List of medical conditions where death, and for most conditions the disease itself, are preventable or avoidable so that even one case is considered to be disturbing (Carr et al 1988, Rutstein et al 1980). These cases are considered as "sentinel" events whose occurrence is a marker that quality of care may need to be improved. Since the list of indicators included is very lengthy, the reader is referred to Rutstein et al 1976.

Rate Event Indicator Conditions: List of medical (sentinel) conditions which are considered to be of concern when there are sufficient numbers of events rather than only one (Rutstein et al 1976, Carr et al 1988).

APPENDIX B:

List Of Indicators And Corresponding ICD9-CM Codes

TABLE B1: List of Medical Conditions Associated with Perceived Health Status, Role Limitation, Functional Limitations and Restricted Activity Days.

Rank	PHS	RL	FL	RAD
1	Musculoskeletal ICD: 710-739	Musculoskeletal	Musculoskeletal @	Other diseases of respiratory system
2	Other disease respiratory system ICD: 480-519	Disease pulmonary Circulation & other heart disease ICD: 415-429	Other diseases respiratory system @	Musculoskeletal
3	Disease of other digestive system ICD: 530-579	Signs, symptoms ill defined ICD: 780-799	Signs, symptoms ill defined conditions @	Disease other digestive system
4	Hypertension ICD: 402-405	Mental disorders ICD: 290-319 @	Disease other digestive system @	Diseases upper respiratory ICD: 460-478 @
5	Endocrine, metabolic, nutritional ICD: 240-279	Rheumatic fever, other circulatory disease ICD: 390-398, 440-459	Diseases nervous system @ ICD: 320-359	Signs, Symptoms ill defined conditions
6	Signs, symptoms ill defined conditions	Cerebrovascular disease ICD: 430-438	Hypertension @	Disease of pulmonary circ. & other heart ICD: 415-429
7	Disease of pulmonary circ. & other heart	Ischemic heart disease ICD: 410-414	Disease pulmonary circ. & other heart disease @	Fractures @ ICD: 800-829
8	Rheumatic fever other circ.	Disease other digestive system	Endocrine, metabolic nutritional @	Cerebrovascular disease @
9	Disease nervous system	Diseases nervous system	Ischemic heart disease @	Rheumatic fever, other circulatory @
10	Mental disorders	Diseases urinary system @ ICD: 580-599	Other injuries, early compl. trauma ICD: 910-929, 958-959	Dislocations, sprains, strains @ ICD: 830-848

@ - Included in the 102 Health Status Indicators

TABLE B2: List of Indicators and Associated ICD9-CM Codes

Group	Indicator:	ICD9 CM Code
Ambulatory Sensitive Hospitalizations*@:		
	Congenital syphilis	090
	Immunization-related/preventable	033,037,045,320.0, 390,391.
	Grand mal/epileptic convulsions	345,780.3.
	Severe ENT infections	382,462,463,465,472.1
	Pulmonary tuberculosis	011
	Other tuberculosis	012-018
	COPD	491,492,494,496.
	Bacterial pneumonia	481,482.2,482.3,482.9 483,485,486.
	Asthma	493
	Congestive heart failure	428,402.01,402.11, 402.91,518.4
	Hypertension	401.0,401.9,402.00, 402.10,402.90
	Angina	411.1,411.8,413
	Cellulitis	681,682,683,686
	Diabetes	250.1,250.2,250.3
	Hypoglycaemia	251.2
	Gastroenteritis	558.9
	Kidney/urinary infection	590,599.0,599.9
	Rehydration/volume depletion	276.5
	Iron deficiency anemia	280.1,280.8,280.9
	Nutritional deficiencies	260,261,262,268.0,268.1
	Failure to thrive	783.4
	Pelvic inflammatory disease	614
	Dental conditions	521,522,523,525,528
Avoidable Hospitalizations*@:		
	Ruptured appendix	540.0, 540.1
	Asthma	493
	Cellulitis	681,682
	Congestive heart failure	428, 402.01, 402.11,402.91

Diabetes	250.1,250.2,250.3,251.0
Gangrene	785.4
Hypokalemia	276.8
Immunizable conditions	032,033,037,072,045,055
Malignant hypertension	401.0,402.0,403.0,404.0 405.0,437.2
Pneumonia	481,482,483,485,486
Pyelonephritis	590.0,590.1,590.8
Perforated or bleeding ulcer	531.0,531.2,531.4,531.6, 532.0,532.2,532.4,532.6,533.0 533.1,533.2,533.4,533.5,633.6

Conditions Amenable To Medical Treatment*#@:

Enteritis & other diarrhoeal diseases	001-009
Syphilis	090-097
Tuberculosis	010-018,137
Other infectious & parasitic diseases	004,320-322, 381-383,391, 680-686,711,730
Cervical cancer	180
Hodgkin's disease	201
Goitre, thyrotoxicosis	240-242
Diabetes	250
Avitaminosis, nutritional deficits	260-269
Epilepsy	345
Active rheumatic fever	390,392-398
> Hypertensive disease	401-405
Acute respiratory infections	460-466
Influenza	487
Pneumonia	480-486
Chronic bronchitis & emphysema	490-492,496
⟩ Asthma	493
Peptic ulcer	531-534
Gallbladder disease	574-576
Appendicitis +	540-543

Intestinal obstruction & hernia	550-553,560
Complications of pregnancy +	630-676
Perinatal mortality	760-779

Disability Among Youth @:

Epilepsy	345
Hydrocephalus	742
Spina bifida	741
Developmental delay	315
Hearing loss	389
Cystic fibrosis	277,748
Emotional problems	307,312,313,314
Cerebral palsy	343
Blindness	369

Infectious Disease Indicators #@:

Pneumonia	481,482.3,482.9,485-486
Influenza	487.0-487.8
Hepatitis	70.2,70.3,40.0,70.1,70.4-70.6,70.9
Tuberculosis	10.0-18.9
Sexually transmitted diseases	90.0-99.9,54.1
Pelvic inflammatory disease	614-616
AIDS	42.0-44.9

Injury Indicators #@:

Motor vehicle	E810-E819
Falls	E880-E888
Vehicular non-traffic	E820-E829
Drowning	E910-E915
Poisoning	E850-E869
Fire & flames	E890-E899
Suicide/attempted suicide	E950-E959

Homicide/homicide related   E960-E969

Cancer Indicators #:

Lung [@]	162
Non-melanoma skin [@]	173
Bladder [@]	188
Colon [@]	153-154
Breast [@]	174.0-179.7
Kidney [@]	189.0
All cancers	140-239

Chronic Disease Indicators #@:

>	Ischemic heart disease	410-414
	Diabetes	250
>	Asthma	493
>	Hypertension	401-405
	Vascular complications	430-437
	Emphysema	492-496

* Some age and other restrictions apply

+ Excluded from hospitalization indicator

Mortality and morbidity

@ included in the 102 Health Status Indicators

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APPENDIX C:

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Population Health Information System (analyses for 1991/92 to be released in 1993/94)

Population Health: Health Status Indicators, by Marsha Cohen, M.D., F.R.C.P.C. and Leonard MacWilliam, M.Sc., M.N.R.M.

Socio-Economic Characteristics, by Norman Frohlich, Ph.D. and Cam Mustard, Sc.D.

Utilization of Hospital Resources, by Charlyn Black, M.D., Sc.D., Noralou Roos, Ph.D. and Charles Burchill, B.Sc., M.Sc.

Utilization of Personal Care Home Resources, by Carolyn DeCoster, R.N., M.B.A., Noralou Roos, Ph.D. and Bogdan Bogdanovic, B. Comm., B.A.

Utilization of Physician Resources, by Douglas Tataryn, Ph.D. and Noralou Roos, Ph.D.

For copies of these reports, please call or write:

Manitoba Centre for Health Policy and Evaluation
Department of Community Health Sciences, University of Manitoba
S101 - 750 Bannatyne Avenue
Winnipeg, Manitoba, Canada, R3E 0W3
Tel: 204-789-3657   Fax: 204-774-4290