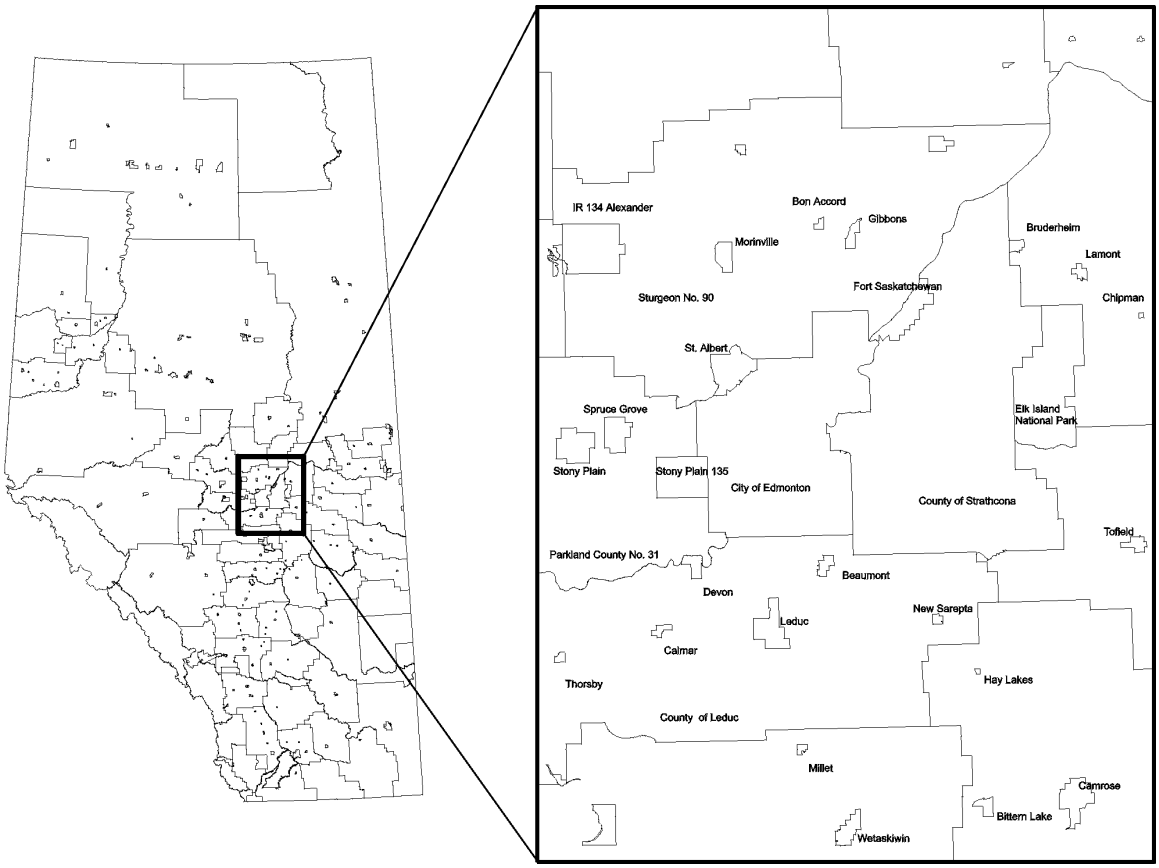
Geographic and Temporal Variations of Selected Respiratory Diseases in Strathcona County and Fort Saskatchewan



Alberta Health
September, 1996

Geographic and Temporal Variations of Selected Respiratory Diseases in Strathcona County and Fort Saskatchewan

Dr. John Waters
Provincial Medical Officer

Dr. Stephan Gabos
Director, Health Surveillance

Prepared by

Fu-Lin Wang, MD, PhD
Margaret King, MN
Erik Ellehoj, MSc
Don Schopflocher, PhD

Alberta Health

September, 1996

ACKNOWLEDGMENTS

The process of health assessment requires considerable work and assistance and it is difficult to be sure that everyone has been included. Sincere thanks is expressed to those individuals who gave many hours of their time to generate this document. Alberta Health provided the data and resources for the project, and Capital Health, Lakeland Regional Health Authority, and Alberta Environmental Protection provided invaluable help to complete the task.

Dr. John Waters
Dr. Stephen Gabos

EXECUTIVE SUMMARY

This report provides the findings of a descriptive epidemiologic study of asthma, bronchitis and emphysema in Strathcona County. Comparisons of rates of these selected respiratory diseases are made for Ft. Saskatchewan, Edmonton, Ft. McMurray and the province. The study was undertaken at the request of Strathcona County Council, due to a concern that respiratory diseases, especially asthma, may be higher in their community. A committee comprised of the medical officers of health and health inspectors from Lakeland and Edmonton Regional Health Authorities, and the Provincial Health Officers and the Director of the Surveillance Branch, Alberta Health have participated in the review of the findings. This report represents the first in a series of population health assessment and monitoring activities conducted by the Surveillance Branch, Alberta Health, in collaboration with Regional Health Authorities.

Age-standardized mortality rates of asthma for Alberta and Canada from 1950 to 1992 were used to look at temporal variations of this disease. To assess regional differences, data on age-standardized rates of hospital admissions and physician visits for 1990 to 1994, and deaths from 1985 to 1994 were used. The major findings are:

1. Overall, the mortality rate from asthma in Alberta and across Canada has decreased since 1950. Since 1972, the rate for Alberta has fluctuated between 3.04 and 1.23 per 100,000 population;

2. Children under the age of five are more likely to be seen by physicians or hospitalized for asthma but rarely die from this disease. Bronchitis primarily targets children less than five years of age and adults 65 years and over. Emphysema has the strongest impact on older adults, especially males;

3. Seasonal patterns in physician visits and hospital admissions for asthma are pronounced in children and are highest in March and September and lowest in July and August;

4. There is no evidence of appreciably higher rates of mortality or hospital admissions from asthma, bronchitis and emphysema in Strathcona County and Ft. Saskatchewan. Although the rates of physician visits for asthma appear to be higher in both communities, this increase is offset by the decrease of bronchitis during the study period.

5. The diagnostic shift among disease categories is an important phenomenon, which must be considered when assessing population health.

These findings support the necessity of on going surveillance and monitoring of population health status on a provincial and sub-provincial basis, with the timely dissemination of information.

TABLE OF CONTENTS

LIST OF TABLES, FIGURES AND MAPS

Tables

Figures

Maps

ABBREVIATIONS

In this report, the following abbreviations are used:

COPD	Chronic Obstructive Pulmonary Disease
CSD	Census Sub-Division
Ft. Sask.	Fort Saskatchewan
Ft. McMry	Fort McMurray
ICD	International Classification of Diseases
RHA	Regional Health Authority
SRR	Age-standardized rate ratio
Strathco	Strathcona County
WHO	The World Health Organization

A. INTRODUCTION

The health status of a population depends upon many factors. According to data provided by the World Health Organization, there is a strong relationship between a country's economy and the health of its population. As shown in Figure 1, people in economically disadvantaged countries experience a longer life span than those who live in less advantaged regions. Over the past 70 years, economic development together with the introduction of public health practices, such as the provision of safe sources of food and water, and the development of immunization programs, have contributed to the significant increase in life expectancy of all Albertans (Figure 2).

Although life expectancy is steadily increasing, respiratory diseases remain among the leading causes of death in Alberta. Prevention and control of these diseases is a challenge we are facing. From a population health perspective, air pollution remains an important topic in Alberta for both communities and health professionals. Although dramatic air pollution episodes associated with high rates of illness or death are unlikely to present as health hazards in Canada, ozone, acid aerosols, nitrogen oxides, volatile organic compounds and particulate matter may be responsible for adverse health effects at current levels of exposure. Over the past two decades, many respiratory hazards have been recognized and controlled in industrialized countries. Concern remains, however, about the safety provided by existing standards for environmental exposures and the risks posed by new agents.

A large proportion of the Canadian population is exposed to ambient (outdoor) pollutants which have known adverse health effects. In response to individual and community concerns, public health agencies are often called to address the effects of air pollutants on exposed groups. When the air quality of a community is adversely affected by pollutants, the incidence of respiratory diseases such as asthma, bronchitis and emphysema may increase among the residents.

B. BACKGROUND

Over the past fifteen years, health concerns related to air quality have been raised by a number of citizens and communities in Alberta, including Pincher-Creek, Edmonton, Ft. McMurray, Ft. McKay, Drayton Valley, Hinton, Grand Prairie, High Level, Strathcona County and Ft. Saskatchewan. As a response to community concerns or as a follow-up to an accident, researchers have conducted scientific studies of air quality and health effects (Snider, 1983; Moon et al., 1984; Spitzer et al., 1986; Hessel, 1995).

A review of past air quality and health studies in Alberta reveals that isolated studies produce fragmented information and fail to address the complexity of air quality and human health issues. As a result, the studies are of uncertain benefit to the public. In addition, one-time studies propagate community health concerns and hence, the need for further research.

An active, systematic approach to strategic data and information gathering by public health agencies provides the basis for a population health approach. The emerging health system in Alberta recognizes the importance of population health surveillance and monitoring as they relate to environmental factors and other health determinants. Population health assessment - the ongoing and systematic collection, analysis and interpretation of data on health status and health determinants - is an important core function at all levels - local, regional, provincial and national.

Asthma, bronchitis and emphysema are common respiratory disorders which have a significant impact on the health of Albertans, and place a substantial economic burden on society. In 1991, there were about 200,000 physician visits for asthma in Alberta, 127,000 physician visits for bronchitis, and 15,100 physician visits for emphysema. There were 6,900 hospital admissions for asthma, 1,400 for bronchitis and 450 for emphysema. For asthma alone, the Alberta Lung Association estimates the cost of treatment at $24 million (1996).

C. OBJECTIVES

The present review of population health status in Strathcona County and Ft. Saskatchewan is the first in a series of population health assessment and monitoring activities conducted by the Regional Health Authority in collaboration with Alberta Health. This review is focused on respiratory disorders in response to immediate community concerns about the higher incidence of asthma and possibly other respiratory disorders in this geographic area.

The main objectives of this study are to:

1. provide an overview of respiratory diseases from a Canadian and Alberta perspective;

2. describe temporal and spatial variations of respiratory diseases in Alberta;

3. estimate the rate of selected respiratory diseases in Strathcona County and Ft. Saskatchewan; and

4. compare the findings to other areas in the province and the province as a whole.

The results will be used to make decisions about future health assessment needs and to identify emerging health monitoring requirements. This study is descriptive in nature. It was not the objective of this study to make inferences about the relationship between the state of air quality and rates of respiratory diseases in Strathcona County or Ft. Saskatchewan.

D. MATERIALS AND METHODS

D.1 Study Population and Study Area

Demographic data for the region were obtained from the Canada Census, Statistics Canada for the years 1981, 1986 and 1991. The information includes population counts by gender and five year age groups as well as socio-economic data (e.g., income, housing characteristics). Four cities/regions are included in this report: Strathcona County, Fort Saskatchewan, Edmonton, and Fort McMurray. The latter two cities were selected for comparison. In the 1991 census, Strathcona County had a total population of about 56,500, more than half of which (approximately 66 percent) is concentrated in or around the community of Sherwood Park. The city of Ft. Saskatchewan, bordering Strathcona County to the northwest, has a population which exceeded 12,100 people in 1991. The age distribution of the population for the four cities and the province as a whole in 1991 is attached in Appendix A-1.

D.2 Disease Categories and Data Sources

D.2.1 Description of Selected Diseases

The disease categories selected for inclusion in this study include asthma, bronchitis, and emphysema.

Asthma is a reversible airway obstruction that is characterized by hyper irritability and inflammation of the airways. A principal feature of asthma is its extreme variability, both from patient to patient and from time to time in the same patient. Classically, asthma presents as bouts of coughing, shortness of breath, chest tightness, and wheezing. Asthma traditionally is divided into two forms:

a. an allergic form, responsible for most of childhood asthma, which is immunologically mediated and can be due to immediate hypersensitivity to inhaled allergic irritants, and
b. an intrinsic form, which occurs in adults and shows no evidence of immediate hypersensitivity to specific irritants.

Bronchitis is a condition with excessive mucus secretion in the large airways of the lungs leading to productive cough with sputum. If the cough last for at least 3 months during each of 2 successive years, the condition is classified as chronic bronchitis (Fiel, 1994). A small proportion of patients with bronchitis may develop irreversible narrowing of the airways. When exposed to bronchial irritants, bronchospasm may result - asthmatic bronchitis (Matthay et al., 1996). The diagnosis of bronchitis in clinical practice is sometimes ambiguous, resulting in non-specified bronchitis as a category of diagnosis.

Emphysema is characterized by destruction of alveolar walls and the abnormal, permanent enlargement of alveoli (Fiel, 1994). Many patients develop a combination of chronic bronchitis and emphysema. Thus, patients with emphysema may present with chronic cough, sputum, and episodes of shortness of breath. Physical signs and chest x-rays of patients help make the diagnosis.

In practice, asthma, chronic bronchitis and emphysema are often put into a broad category - chronic obstructive pulmonary disease (COPD) which is the second leading cause of death among all patients with respiratory disorders. The causal mechanism of COPD is not yet well understood. The following factors may play a role in the development of this disorder (Balaban, 1992; Cloutier, 1996; Fiel, 1996; Health Effects Institute, 1995; Sears, 1995):

- smoking
- occupational exposure
- exposure to allergens, smoke, mites, some medications, and some environmental substances,
- respiratory infections,
- family history,
- weather change, and
- emotional stress.

D.2.2 Data Sources

The Ninth International Classification of Diseases (ICD-9) was used to identify diagnoses in mortality and morbidity statistics. Records of non-Alberta residents were excluded from all analyses. Data were obtained from three sources:

- Mortality data were obtained from Alberta Vital Statistics for the years 1985 to 1994, and from Statistics Canada for the years 1950 to 1992;

- Hospitalization data were obtained from the Hospital Morbidity Files maintained by Alberta Health for the years 1990 to 1994; and

- Data on the number of physician visits/services were obtained from the Alberta Health Care Insurance Plan files for the years 1990 to 1994. The primary

diagnosis was used in analyses of physician visit data and hospital admissions. The underlying cause of death provided the disease information in the mortality data.

D.3 Epidemiologic Measures and Data Presentation

In this report, the relative proportion (percent distribution), age-specific rate and age-standardized (adjusted) rate were used as measurements. While the relative proportion provides useful information for initial assessment, the age-specific rate and age-standardized rate offer solid measures for each population age group and the overall population.

Census Sub-Divisions were the basic geographic units for analysis. In addition, the province was grouped into three regions and two cities by Regional Health Authority boundaries: Southern (**RHAs 1-5, excluding Calgary**), Central (**RHAs 6-10, excluding Edmonton**) and Northern Alberta (**RHAs 11-17**), and the cities of Calgary and Edmonton. Five year age intervals (i.e., 0-4, 5-9, ... 90+ years) were used for rate estimations. Age-specific rates by sex were computed for deaths, hospital admissions, and physician visits for Alberta and Canada. Age-standardized rates of mortality, hospital admissions and physician visits were computed by sex and **sex-combined** for each **CSD of residence** and the province as a whole. The direct method was used for standardizing rates by applying the 1991 Canadian population as the standard set of weights. This method controls for potential sources of bias resulting from variations in population structure across regions.

The frequency of hospital admissions and physician visits allowed the calculation of rates by one year intervals at the provincial level. In the case of deaths, a relatively rare event, rates were computed using ten year periods (i.e., 1985-1994) to reduce the variability due to the small number of deaths. For comparisons between geographic areas, five year period rates were used for hospital admissions and physician visits. Carriere's method (Carriere et al., 1994) was used to compute the standard error and 95% confidence interval for standardized rates and rate ratios. All rates were expressed per 100,000 person-years.

Total admissions and physician visits were used rather than identifying the number of individuals who had admissions to hospitals and visits to physicians. The two measures are highly correlated; however, using the total number of admissions and physician visits provides larger numbers and therefore more stable rates.

To look at temporal variations, the mortality rates from asthma in Alberta and Canada from 1950 to 1992 and the monthly percent distribution of asthma hospital admissions and physician visits in Alberta by age group were presented. The age groups include infants under one year of age,

preschoolers aged 1-4 years, children aged 5-14 years, adults aged 15-64, and seniors aged 65 years and over.

Tables, graphs and maps were used for presentation. Line plots, bar charts and box plots were used in the graphic presentations. The box plot shows the minimum, median, 25%, 75% and maximum values.

D.4 Mapping Methods

D.4.1 Classification of Mapping

All respiratory disease maps were generated using a constant set of classes. The use of a consistent set of values across diseases allows comparisons among diseases and data types. The categories are a modification of the classification scheme used for cancer mapping in the Province of Alberta and in Denmark.

The standardized rate ratios (SRR) were computed for each geographic region by dividing the observed standardized rate for the area by the provincial standardized rate. The SRR was used to determine the mapping classes. The range of values from 10 to 0.1 were used as the basis of classification. The logarithms of these values were calculated to create a scheme based on a normal distribution. This resulted in a scheme with values ranging from -1 to 1 (the logs of 0.1 and 10 respectively). This range was divided into 11 classes yielding a class range of 0.1818. If the centre of the scheme is 0 (log(1)) then the first class ranges from -0.0909 to 0.0909. The value 0.1818 is added to or subtracted from the values above to generate the remaining 10 classes.

The two classes above the average and the two classes below the average were each amalgamated to create "High" and "Low" classes respectively. The remaining three classes at both extremes were each amalgamated to create "Higher" and "Lower" classes. Thus, five categories were defined as follows:

Category	SRR	Log(SRR)
Lower	Minimum to 0.35	Minimum to -0.4546
Low	0.36 to 0.81	-0.4545 to -0.0909
Average	0.82 to 1.23	-0.0910 to 0.0909
High	1.24 to 2.85	0.0910 to 0.4545

Higher	2.86 to Maximum	0.4546 to Maximum

(Note that 2.86 means the standardized rate is almost 3 times the provincial rate)

In this report, maps were used for illustrative, not analytic, purposes to show overall variability across geographic regions and diseases. The classification scheme used for mapping was developed to ensure that maps can be easily compared one to another. However, a great variety of data sets and categories often challenged the comparisons. The wide range of data mapped results in categories which may have some variations within them. The charts and tables are better suited for examining details or for analytical results because they are specific to each data set and because only four regions are examined at a time.
Because of the potential multiple testing problem, no statistical inference was attempted in all mapping presentations.

D.4.2 Map Symbolization

The symbolization in these maps consists of applying the appropriate shade of grey or color to each Census Sub-Division polygon. The shade used for each is determined by the standardized rate ratio value observed for the mapped variable. There is a note at the bottom of each map explaining that white areas are unpopulated. This assessment of populated regions was based on detailed census information obtained specifically for this purpose.

The maps were placed three to a page for easier comparison across disease categories. The Alberta maps were used to provide a province-wide context. Because small geographic regions, such as Ft. Saskatchewan, are difficult to read in the provincial map, enlargements of the maps for Strathcona County and neighbouring regions were presented.

E. OVERVIEW OF THE DISTRIBUTION OF SELECTED RESPIRATORY DISEASES IN ALBERTA AND CANADA

E.1 Mortality Rates

E.1.1 Trends in Asthma Mortality Rates in Alberta and Canada, 1950-1992

Figure 3 presents age-standardized mortality rates for asthma in Alberta and Canada for the period 1950-1992. Figure 3a shows a trend of decreasing mortality rates from the early 1950s through the early 1970s. Since 1973, the rate has remained low though fluctuating between 3.04 and 1.23 for males, and 3.03 and 1.86 for females. This pattern is very similar to that observed for the national rates (Figure 3b).

Compared to the national average over the past 43 years, the rate of deaths from asthma in Alberta appears slightly higher for both males and females (Figure 3c-d), with an average difference of 0.34 per 100,000 person-years. The lower position of the median in the 25-75 percent box also indicates the uneven distribution of the data during the period 1950-1992.

E.1.2 Age-Specific Rates of Selected Respiratory Diseases by Sex in Alberta, 1985-1994

Figure 4 shows the age-specific mortality rates for selected respiratory diseases in Alberta from 1985 to 1994 for males and females. For all of the diseases shown, rates increase with age, and with the exception of asthma, rates are higher in males than in females. The asthma mortality rate is lower before the age of 60 years (Figure 4a). From ages 60 to 80 years, the rate increases about four times for both males and females to over 30 per 100,000 person-years. Rates of mortality from bronchitis remain low until the age of 65 years when they rise rapidly to 130 per 100,000 person-years for males and 72 per 100,000 person-years for females over 85 years of age. After age 60, the rates for males are significantly higher than those for females (Figure 4b). Deaths from emphysema are rare before age 40 (Figure 4c). The rate steadily increases until the age of 65 years, when it increases sharply to 193 per 100,000 person-years in males and 45 per 100,000 person-years in females. It is noted that after age 65, the death rates for males are significantly higher than females, and this difference increases with age. This is also true for all chronic obstructive diseases (COPD) (Figure.4d).

Fig. 1 Age-Standardized Mortality Rates of Asthma in Alberta & Canada, 1950-1992

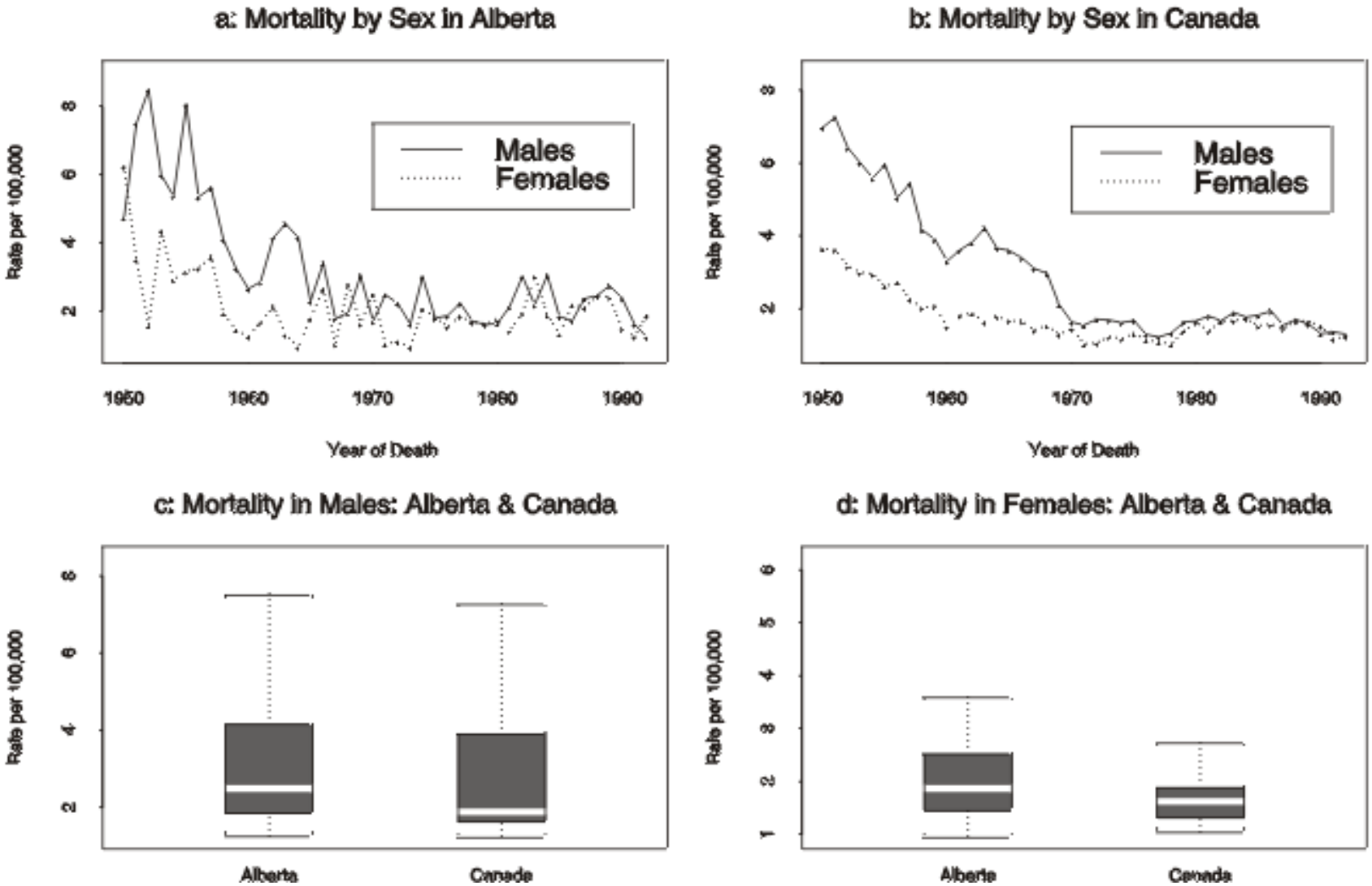
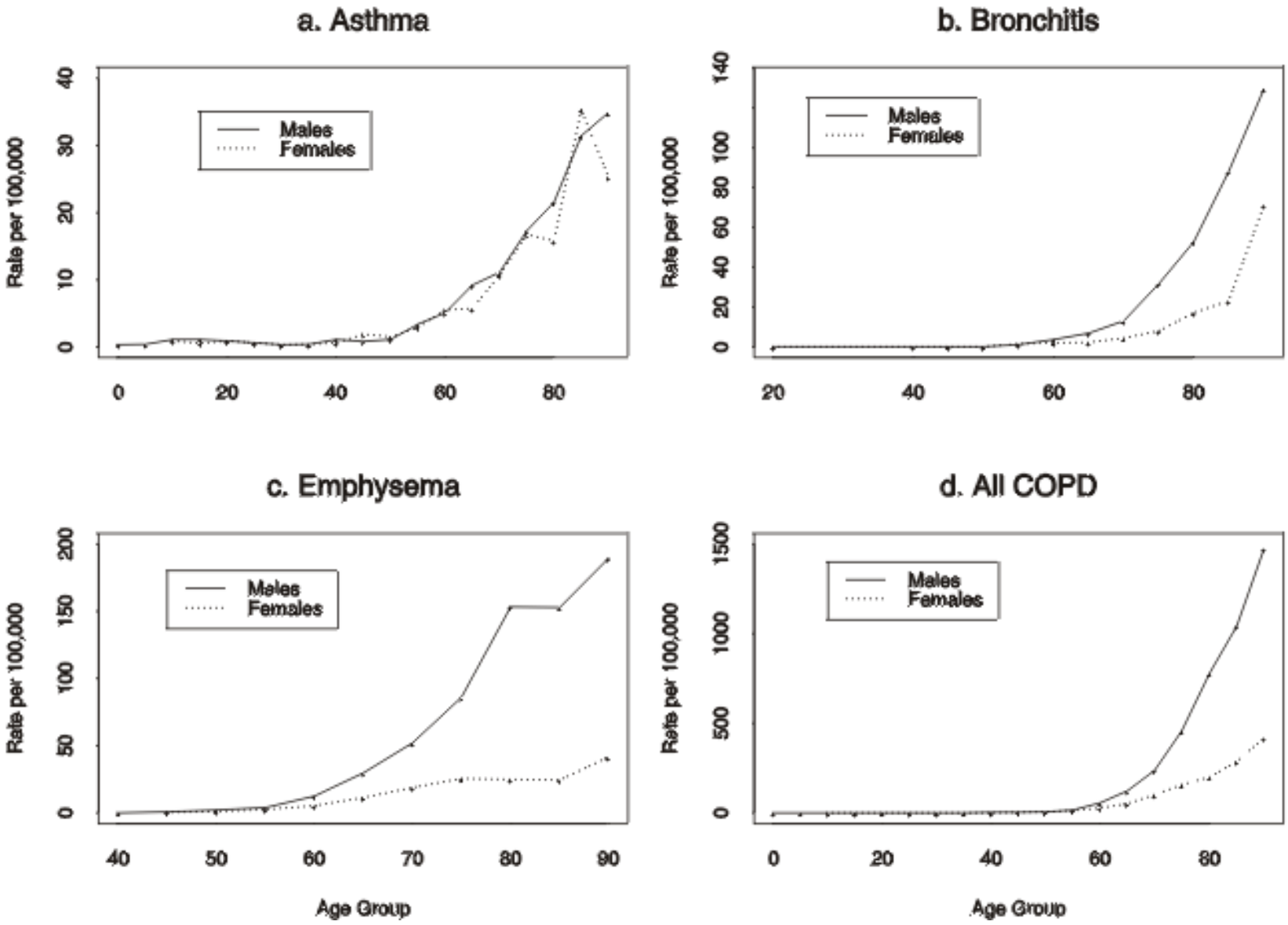


Fig. 2 Age-Specific Death Rates of Selected Respiratory Diseases by Sex in Alberta, 1985-1994



E.2 Hospital Admissions

E.2.1 Age-Specific Rates of Respiratory Disease by Sex in Alberta, 1990-1994

Figure 5 presents the age-sex and geographic distributions of hospital admission rates of selected respiratory diseases in Alberta from 1990 to 1994. The highest admission rate for asthma is in the 0-4 years age group for both males and females (Figure 5a). The rate decreases through later childhood and early adult years then rises again with a second peak seen at the ages of 75-79 years; after that the rate decreases. The gender differences in the rate are interesting. Before the age of 10 years, the rates for males are higher than for females, especially in the 0-4 years age group. Between the ages 15 and 70 years, the rates for females are consistently higher than for males.

The pattern for bronchitis is different. The highest rate is seen in the 80-84 years age group for both males and females; a small peak can be detected for children 0-4 years (Figure 5b). The gender differences appear to be slight before the ages 65-69 years and become more pronounced thereafter. The admission rate for emphysema is low before the age of 60-64 years (Figure 5c); thereafter, it increases with age for males through 80-84 years. After the age 60-64 years, the rates for males are one to two times higher than those for females. Although the mortality rate from asthma is lower than for the other selected respiratory diseases, the hospital admission rates for this disease are the highest.

E.2.2 Regional Distribution of Respiratory Diseases in Alberta, 1990-1994

Respiratory disorders show regional variations across the province. The hospital admission rates for asthma and bronchitis are higher in Northern Alberta (Figure 5d-e). No appreciable difference in the rates of these disorders are seen between Southern and Central Alberta or between Edmonton and Calgary. Emphysema shows a different pattern: the hospital admission rate in Central Alberta appears lower than in Southern and Northern Alberta. The admission rate in Calgary is higher than in Edmonton (Figure 5f).

E.2.3 Seasonal Variations in Asthma by Age Group

Seasonal patterns are also evident. Although monthly variations are seen for all age groups, the level and pattern of variation appears to differ among the five age groups (Figure 6). The largest variation is seen for school-aged children (5-14 years), with a three fold difference between the highest month (September) and the lowest (January). Infants and seniors show peaks in spring and winter, with August being the lowest. In contrast, preschool children (1-4 years), school-aged children and adults 15-64 show. peaks in fall and spring, with September being the highest. This pattern also holds for the all ages combined.

Fig.3 Rates of Hospital Admissions of Resp. Diseases by Sex & Region in Alberta, 1990-1994

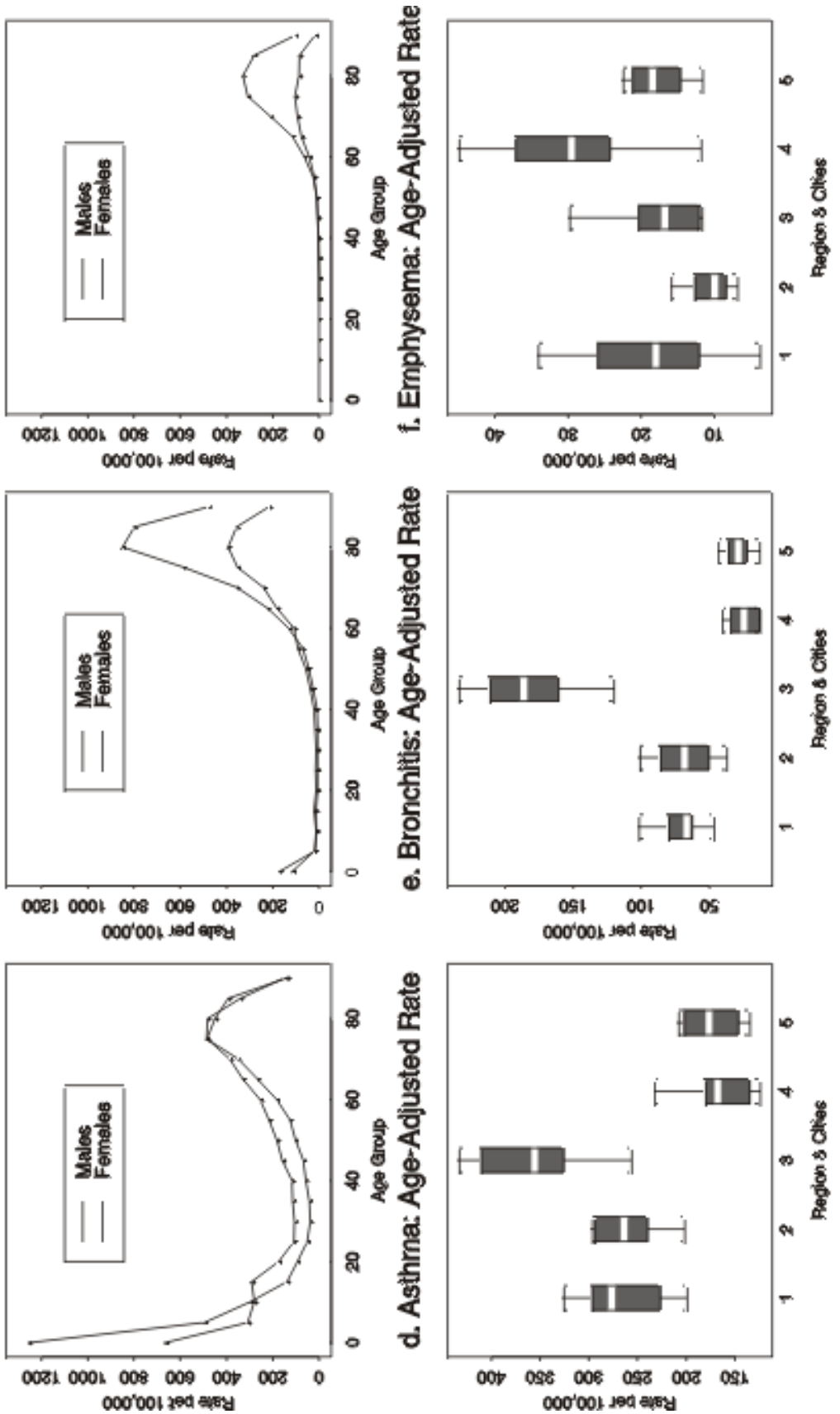
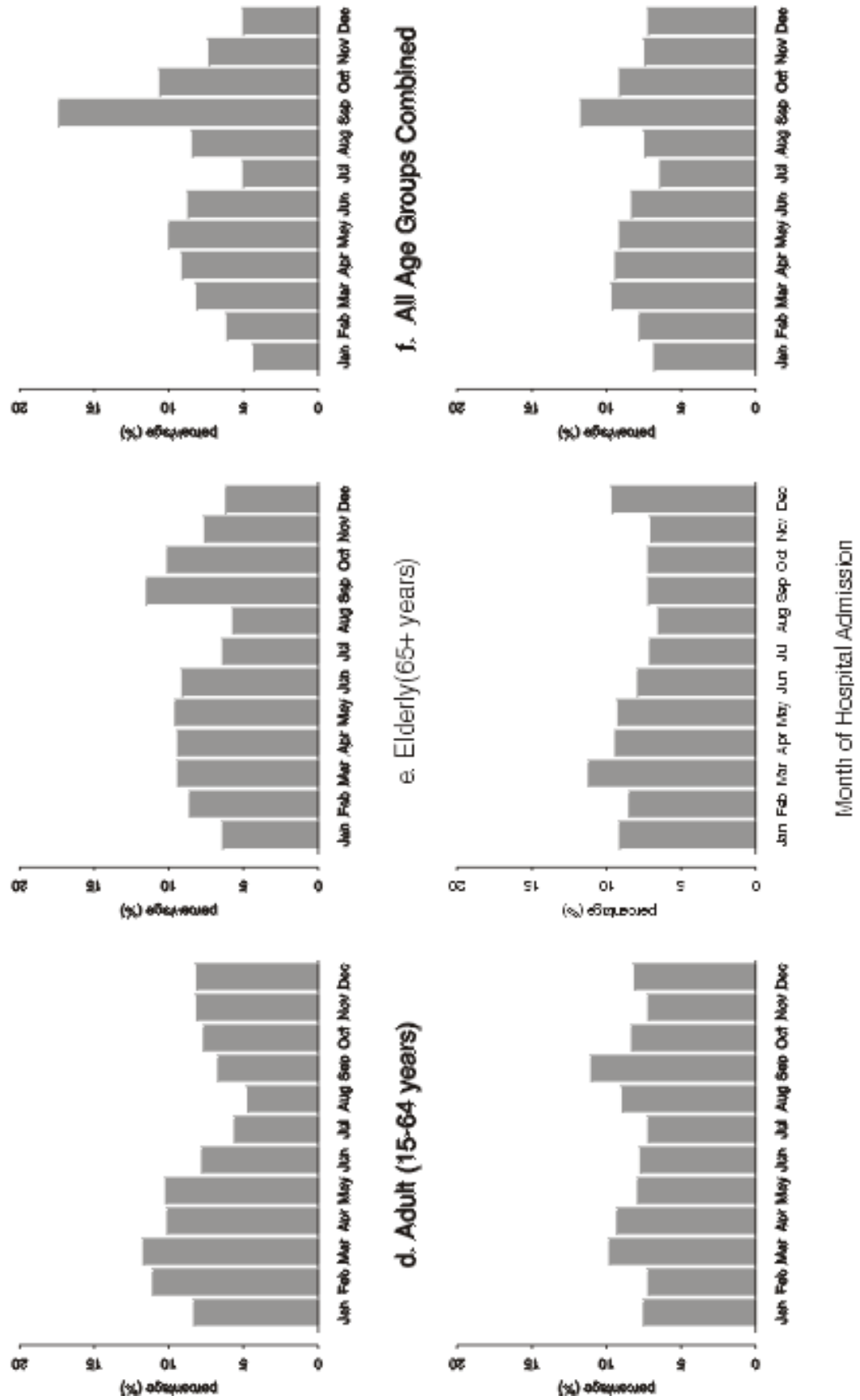


Fig. 4 Seasonality of Hospital Admissions of Asthma by Age Group in Alberta, 1990-1994



E.3 Physician Visits

E.3.1 Population Distribution of Selected Respiratory Diseases

Figure 7 shows the percent age distributions and the age-specific rates of asthma, bronchitis and emphysema in Alberta. Children 0-14 years of age account for about 42% of all physician visits for asthma, and seniors 65 and over, 11% (Figure 7a). For bronchitis, the percentage for children is smaller (27.6%), and higher (19.4%) for seniors (Figure 7b). Over 67% of physician visits for emphysema involve seniors, with adults 15-64 years of age accounting for 29.4% of visits. Interestingly, about 4% of physician visits for emphysema are for children (Figure 7c). It has to be emphasized that as the percent distribution is only a relative proportion, it should not be used for direct comparisons when the population age distribution in the comparison groups differ.

The age-specific rates provide further information. Figure 7d shows that children aged 0-4 years have the highest rate of physician visits for asthma. The rate is lower for those in their 30s, and rises again in the late 70s and early 80s. Similarly to the hospital admission rates, males have a higher rate than females before the age of 15 years, but the rate for males is lower than that for females for those aged 15-64. There are excess visits for males over females after age 65 years. The pattern of rates by age for bronchitis are "J-shaped", with people aged 80-84 having the highest rates (Figure 7e). The sex differences in the rates of physician visits for bronchitis are close to those for asthma, with smaller differences in children. The pattern for emphysema is different. The rates are low and appear not to change significantly before the age of 55 years (Figure 7f). Thereafter the rates increase with age and show a peak in the 85-89 years age-group for men and 80-84 years age-group for women.

E.3.2 Seasonal Variations in Asthma by Age Group

Similar to the seasonal patterns for asthma hospital admissions, the monthly distribution of physician visits for asthma also shows strong seasonality, although it is less pronounced across the age-groups (Figure 8). The relative proportion of visits for infants peak in late winter, with the highest rates in March. Preschool children and school-age children have a similar seasonal pattern to infants, but with an appreciable peak in September. The seasonality of physician visits for asthma is not as evident for adults and seniors, though a small peak in September/October is still visible. For all the age-groups combined, the September and April peaks are evident, which is probably attributable to the seasonality observed in children.

Fig. 5 Age Distribution and Age-Specific Rates of Physician Visits of Resp. Diseases in Alberta, 1990-1994

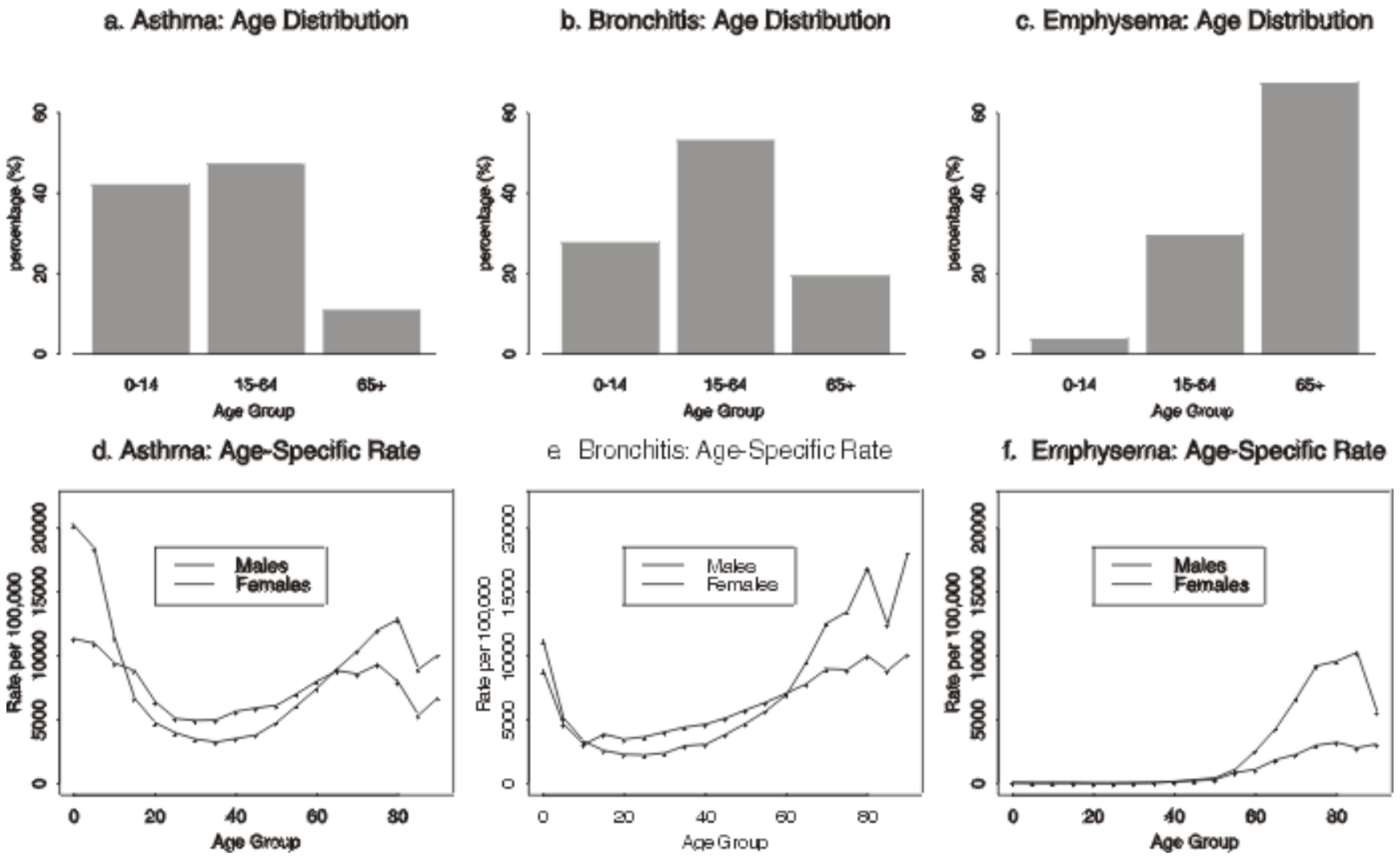
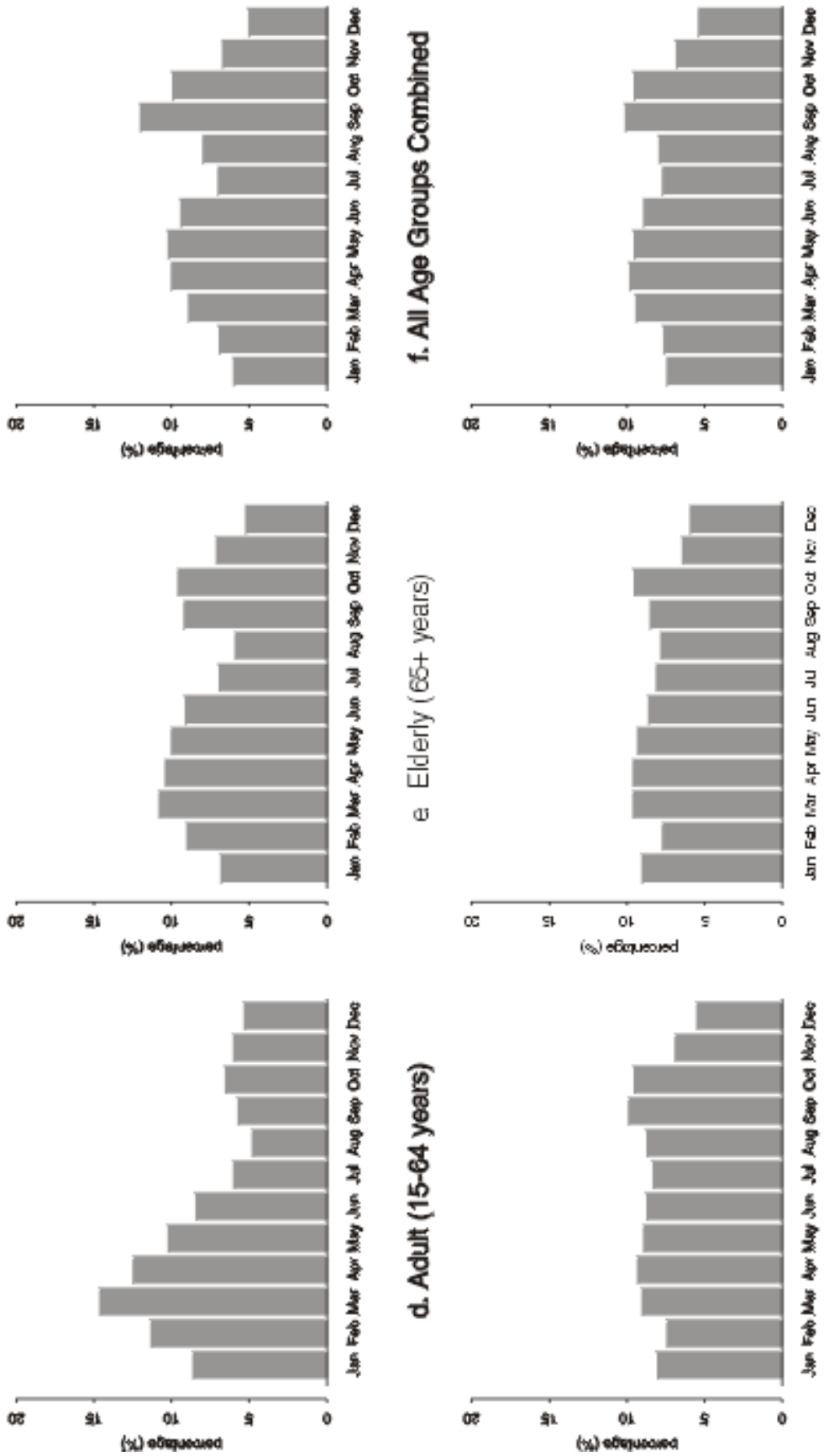


Fig. 6 Seasonality of Physician Visits for Asthma by Age Group in Alberta, 1991-1993



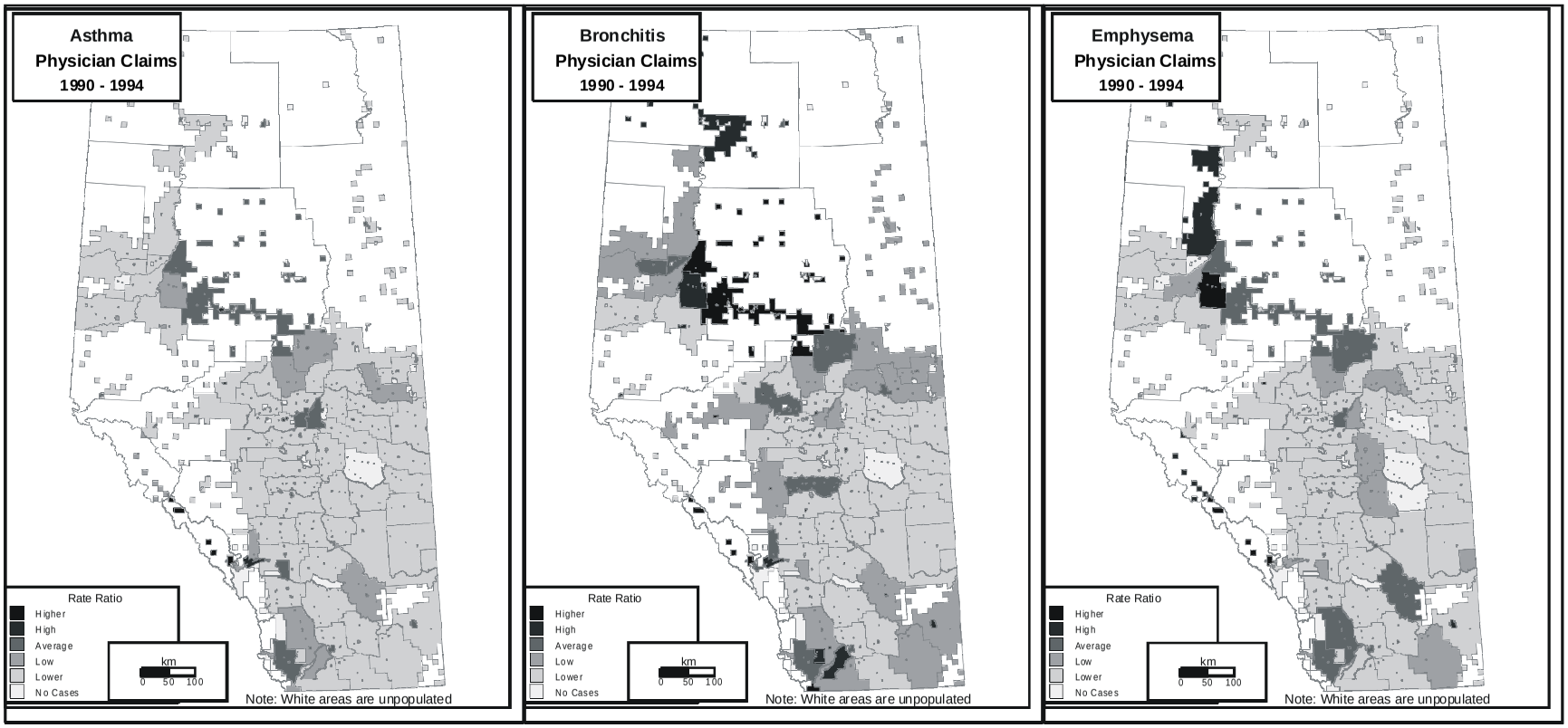
E.3.3 Geographic Distribution of Asthma, Bronchitis and Emphysema in Alberta, 1990 -1994

To describe the geographic distribution of rates of physician visits for asthma, bronchitis and emphysema in the whole province, the 5-year combined age-standardized rates during 1990-1994 were estimated for each Census Sub-Division. It was shown that communities in the North (Census Division 17 and 19), have relatively higher rates of physician visits for the diagnostic categories of asthma, bronchitis, and emphysema, with some communities in Southern Alberta (Census Division 15) also presenting higher rates. Strathcona County appears above provincial average for asthma (8,555.5 vs. 7403.5) and low for bronchitis (3,620.3 vs. 4,793.6) and emphysema (562 vs. 719.3). The geographic distribution of the three diseases for the whole province during 1990-1994 is illustrated in Map 1. Although the age-standardized rate ratio of asthma in Strathcona County falls into the average category, it is still greater than one (SRR =1.16). Fort Saskatchewan is not easily visible at this level of detail.

The geographic patterns of rates of mortality and hospital admissions for the three diseases (data not shown) are similar, with regional variations. It should be kept in mind that, despite efforts to increase the number of observations, for some small communities the rates were still estimated based on fewer than five records, and are therefore unstable. In practice, a minimum of five observations is often considered to be the minimum acceptable for estimating rates. While the small number may be a drawback for this type of analysis, the consistent pattern of relatively higher rates of physician visits for the three respiratory diseases in the studied communities suggests a reflection of a real pattern.

The regional variations of rates of mortality, hospital admissions and physician visits among the four cities studied are examined in the following sections.

Physician Visits for Selected Respiratory Diseases in Alberta, 1990-1994



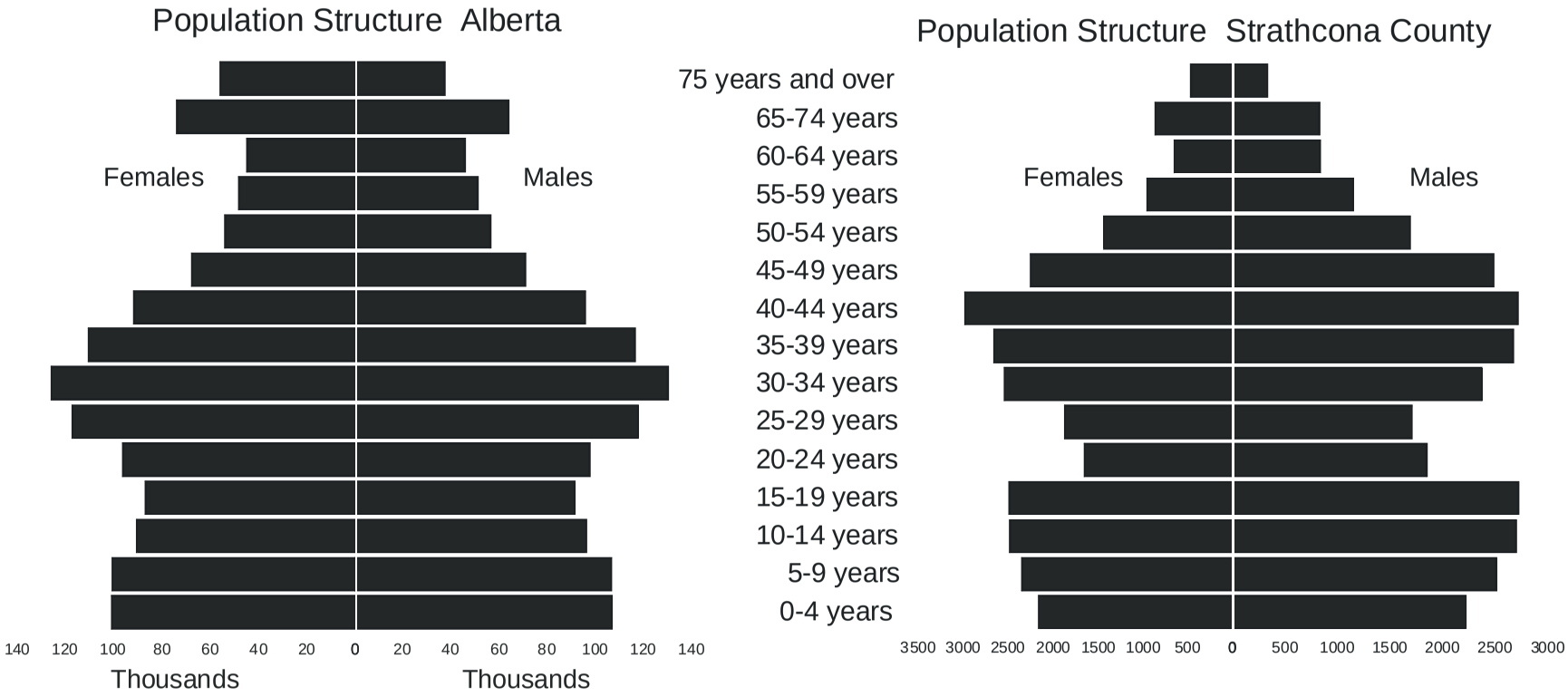
F. THE HEALTH IMPACT OF RESPIRATORY DISEASES IN STRATHCONA COUNTY AND FORT SASKATCHEWAN

F.1 Demographic Information

A listing of the 1991 population distribution by sex and age-group for the selected four cities/areas and the province as a whole is available in Appendix A-1. For all ages combined, the male:female ratio is 1.01 for the province, 1.03 for Strathcona County and Fort Saskatchewan, 0.98 for Edmonton, and 1.08 for Fort McMurray. The age composition of the populations vary considerably. Edmonton has a similar age distribution to the province, with a slightly higher proportion of people aged 65 years and over. Compared to Edmonton and Fort Saskatchewan, the proportion of the population over 65 years in Strathcona County is much lower. In Fort McMurray, this proportion is even lower, accounting for less than 1/8 of that of Edmonton.

The population pyramids in Figure 9 show the population distribution by 5-year age-groups and sex in Strathcona County and Alberta. In Alberta, the population peak is in the 25 to 39 years of age. In Strathcona County the population peak is in the 40 to 49 years age-group. A second peak is observed in the 10 to 19 years age-group in Strathcona County and in the 0 to 9 years age category for Alberta

Figure 7 Population Pyramids for Strathcona County and Alberta 1991



F.2 Mortality from Respiratory Diseases

Mortality rates from chronic respiratory disorders vary by sex and age. The relative proportion of deaths from chronic respiratory disorders by sex, age group and geographic region is shown in Table 1. The relative proportion of mortality from asthma, chronic bronchitis and emphysema shows variations across the four geographic areas. Most asthma deaths occur in the population aged 65 years and over, followed by those in the 15 to 64 years age group and children from 0 to 14 years old. Among children, the M:F ratio is approximately 2:1. No deaths from bronchitis and emphysema are reported for this age group. About 89% of deaths from bronchitis and 87% from emphysema occur in the elderly. In this age-group, the M:F ratio is 2:1 for bronchitis and 2.7:1 for emphysema.

Table 2 presents the age-standardized mortality rates from respiratory diseases by sex and geographical region. Although small regional differences in the mortality rates of asthma, bronchitis and emphysema can be observed, it is not feasible to make a meaningful statistical inference due to small number of cases. Compared to Edmonton, the age-standardized mortality in Strathcona County appears higher, but the large standard error for the age adjusted rate in Strathcona County indicates that this variation could be due to random error.

Figure 10 presents the age-standardized mortality rates from asthma with 95% confidence intervals. Although there may appear to be differences in the mortality rates from asthma in Ft. Saskatchewan, Strathcona County, Edmonton and Ft. McMurray when compared to the provincial average, these differences are not statistically reliable ($p>0.05$). These observations are further illustrated in Figure 11. The differences in the age-standardized rates between each of the regions and the province range from -1.46 to 2.72 per 100,000 person-years, the lower limit of 95% confidence interval is below the zero for all four regions. It should be noted that the mortality rates in Fort Saskatchewan and Ft. McMurray are based on fewer than five cases over a ten year period, and due to the large standard error this finding can not be reliably interpreted.

Table 1 Distribution of Deaths from Selected Respiratory Diseases by, Sex, Age Group and Geographic Region in

Disease	Sex	Age Group (year)	Alberta		Edmonton		Strathcona County		Ft. Saskatchewan		Ft. McMurray	
			N	%	N	%	N	%	N	%	N	%
Asthma	M	0-14	17	7.0	4	6.4	0	-	-	-	0	-
		15-64	93	38.3	23	37.1	3	60.0	60.0	33.3	1	100.0
		65+	133	54.7	35	56.5	2	40.0	40.0	66.7	0	-
	F	0-14	8	3.1	0	-	0		-	-	0	-
		15-64	91		28	36.8	2	50.0	50.0	100.0	1	100.0
		65+	158	35.4	48	63.2	2	50.0	50.0	-	0	-
Bronchitis	M	0-14	0	61.5	0	-	0	-	-	-	0	-
		15-64	26	-	8	12.9	0	-	-	-	0	-
		65+	233	10.0	54	87.1	2	100.0	100.0	-	1	100.0
	F	0-14	0	90.0	0	-	0	-	-	-	0	-
		15-64	19	-	10	31.2	0	-	-	-	1	-
		65+	118	13.9	22	68.8	2	100.0	100.0	100.0	0	-
Emphysema	M	0-14	0	86.1	0	-	0	-	-	-	0	-
		15-64	90	-	16	10.3	2	-	16.7	-	0	100.0
		65+	649	12.2	139	89.7	10	16.7	83.3	-	1	-
				87.8				83.3				
	F	0-14	0	-	0	-	0	-	0	-	0	-
		15-64	43		11	17.2	1	16.7	0	-	0	-
		65+	238	15.3	53	82.8	5	83.3	1	100.0	1	100.0
				84.7								

Table 2 Age-Standardized Mortality Rates[1] of Selected Respiratory Diseases by, Sex, Age Geographic Region in Alberta, 1985-1994

Disease	Sex	Alberta		Edmonton		Strathcona County		Ft. Saskatchewan		Ft. McMurray	
		Rate	SE[2]	Rate	SE	Rate	SE	Rate	SE	Rate	SE
Asthma	M	2.5 (243)	0.14	2.4 (62)	0.30	2.7 (5)	1.51	(3)	4.74	1.1 (1)	1.97
	F	2.2 (257)	0.15	2.8 (76)	0.32	2.7 (4)	1.57	1.8 (1)	1.98	0.5 (1)	5.54
Bronchitis	M	2.5 (259)	0.15	2.5 (62)	0.32	2.3 (2)	1.61	0 (0)	-	7.5 (1)	7.66
	F	1.4 (137)	0.12	1.2 (32)	0.22	2.3 (2)	1.63	2.2 (1)	2.34	0 (0)	-
Emphysema	M	7.1 (739)	0.26	6.3 (155)	0.51	9.6 (12)	2.95	0 (0)		0.7 (1)	1.77
	F	2.8 (281)	0.17	2.4 (64)	0.31	6.2 (6)	2.70	2.6 (1)	2.76	6.1 (1)	8.18

[1]. Expressed as the numb er of death per 100 000 person- years during 1985-1994, adjusted by the age distribution of the 1991 Canadian population. [2]. Standard error of the age-adjusted rate.

Fig. 8 Age-Standardized Mortality rates with 95% Confidence Intervals for Asthma By Geographic Region in Alberta, 1985-1994

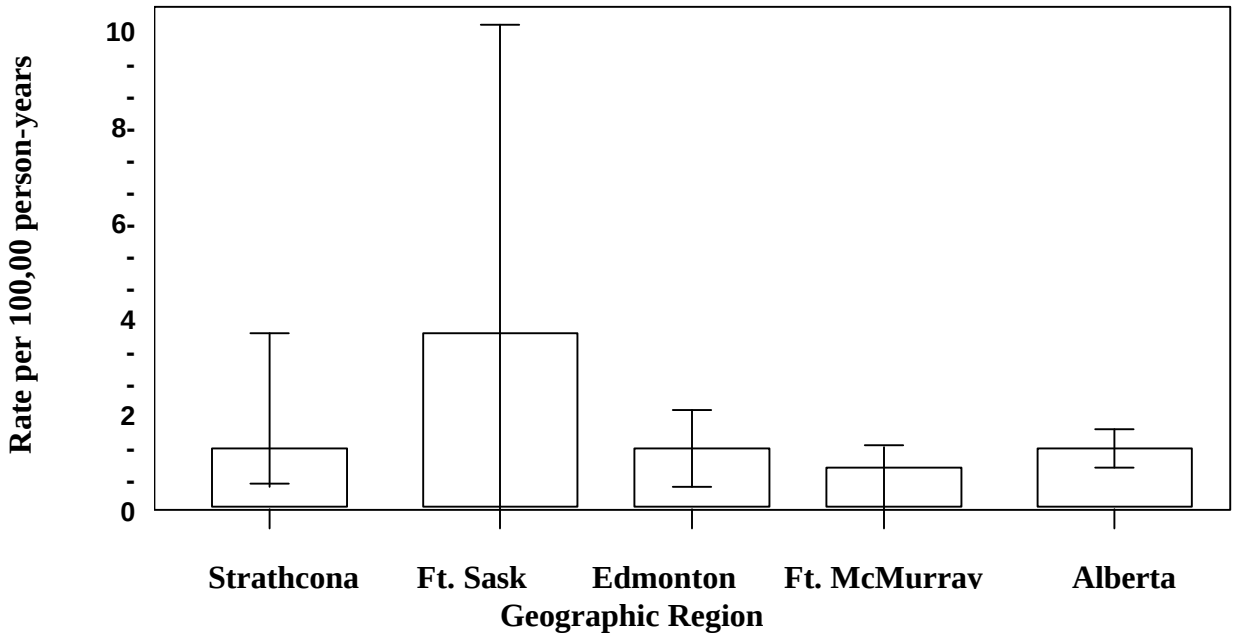
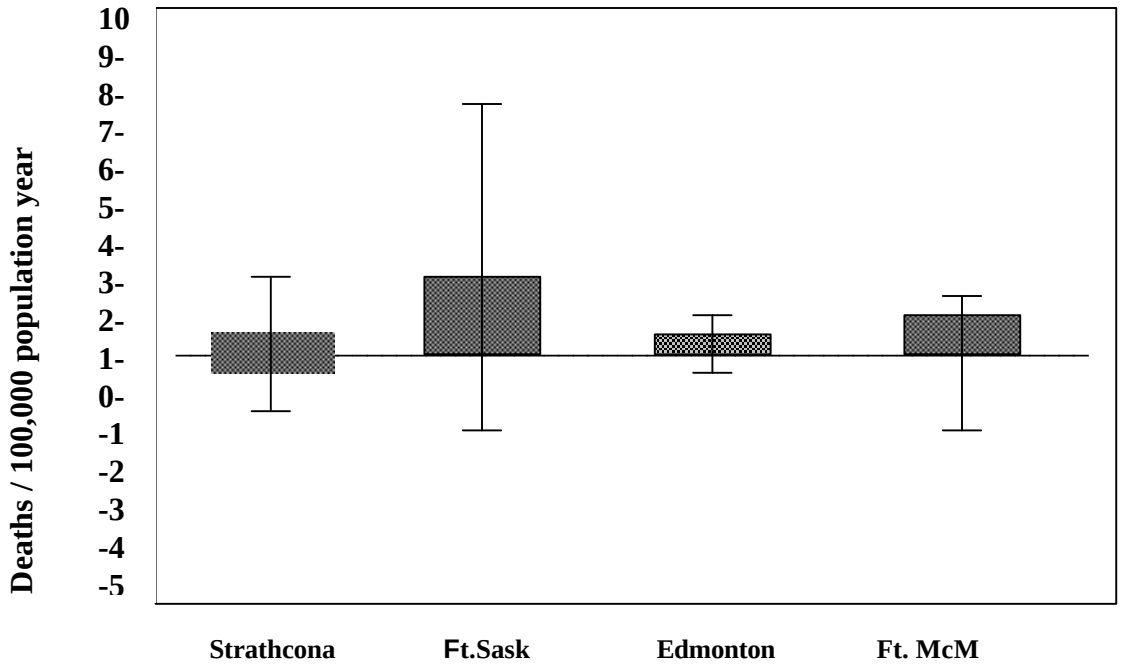


Figure 9
Differences in Age Standardized Mortality Rates with 95% Confidence Interval for Asthma Communities vs. Alberta



F.3 HOSPITAL ADMISSIONS FOR RESPIRATORY DISEASES

As expected, hospital admissions from selected respiratory diseases vary by sex and age within the population. Table 3 presents the relative proportion of hospital admissions for asthma, bronchitis and emphysema by sex, age-group and geographic region. The proportion of hospital admissions from asthma, chronic bronchitis and emphysema shows variations across the four geographic areas. Most asthma admissions occur in children aged 0-14 years, followed by adults 15 to 64 years and seniors 65 years and over. The relative proportion of hospital admissions in males aged 0-14 years is higher (67.4 percent) than in females (40.1 percent). About 50% of hospital admissions due to bronchitis and 75% attributed to emphysema occur in seniors. Among the elderly, the M:F ratio is 1.2:1 for bronchitis and 1.9:1 for emphysema.

To compare the geographic distribution between the four regions, five-year age-standardized rates were used. Table 4 presents the age-standardized rate of hospital admission by sex and geographic region. The rates from asthma, bronchitis, and emphysema vary by region. Compared to Edmonton, the rates of asthma hospital admissions are lower in Strathcona County for both males and females, though the difference for females may be due to chance alone. In contrast, the rates of asthma hospital admissions in Ft. Saskatchewan and Ft. McMurray are higher than Edmonton for both males and females, but the difference among males in Ft. Saskatchewan is not statistically reliable. The number of hospital admissions for emphysema is small for most of the communities. No large regional differences are found for males or females.

The geographic variations of the three diseases are further illustrated in Map2. Compared to the provincial average, the age-standardized rate of asthma is low in Strathcona County (SRR=0.61) and Edmonton (SRR=0.74) and average in Ft. Saskatchewan (SRR =1.09). The geographic distribution of bronchitis rates of hospital admissions are similar to asthma. The rate of hospital admissions is low in Edmonton (SRR=0.41), lower in Strathcona County (SRR=0.28) and above average in Ft. Saskatchewan (SRR=1.44). The age-standardized rate of emphysema hospital admissions is different. The rates are average in Edmonton (SRR=0.86) and low in Strathcona County (SRR=0.83) and Ft. Saskatchewan (SRR=0.84). These observations are supported by the results in Table 4.

Table 3 Distribution of Hospital Admissions from Selected Respiratory Diseases by, Sex, Age Group and Geographic Region in Alberta, 1990-1994

Disease	Sex	Age Group (year)	Alberta		Edmonton		Strathcona County		Ft. Saskatchewan		Ft. McMurray	
			N	%	N	%	N	%	N	%	N	%
Asthma	M	0-14	17	7.0	4	6.4	0	-	-	-	0	-
		15-64	93	38.3	23	37.1	3	60.0	60.0	33.3	1	100.0
		65+	133	54.7	35	56.5	2	40.0	40.0	66.7	0	-
	F	0-14	8	3.1	0	-	0		-	-	0	-
		15-64	91		28	36.8	2	50.0	50.0	100.0	1	100.0
		65+	158	35.4	48	63.2	2	50.0	50.0	-	0	-
Bronchitis	M	0-14	0	61.5	0	-	0	-	-	-	0	-
		15-64	26	-	8	12.9	0	-	-	-	0	-
		65+	233	10.0	54	87.1	2	100.0	100.0	-	1	100.0
	F	0-14	0	90.0	0	-	0	-	-	-	0	-
		15-64	19	-	10	31.2	0	-	-	-	1	-
		65+	118	13.9	22	68.8	2	100.0	100.0	100.0	0	-
Emphysema	M	0-14	0	86.1	0	-	0	-	-	-	0	-
		15-64	90	-	16	10.3	2	-	16.7	-	0	100.0
		65+	649	12.2	139	89.7	10	16.7	83.3	-	1	-
	F	0-14	0	87.8	0	-	0	83.3	0	-	0	-
		15-64	43	-	11	17.2	1	-	0	-	0	-
		65+	238	15.3	53	82.8	5	16.7	1	100.0	1	100.0
				84.7				83.3				

Table 4 Age-Standardized HospitalAdmissonss Rates[1] of Selected Respiratory Diseases by Sex, Age Geographic Region in Alberta, 1990-1994

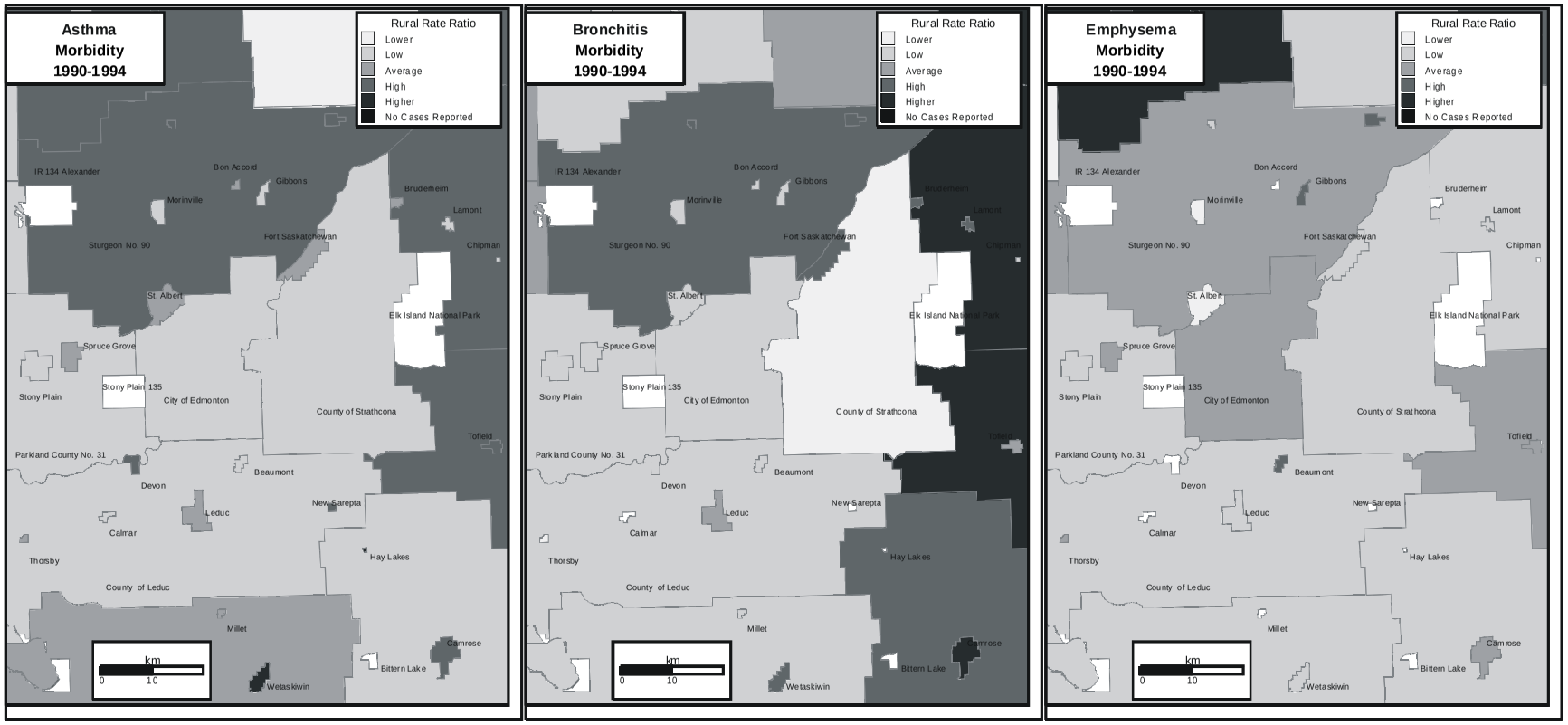
Disease	Sex	Alberta		Edmonton		Strathcona County		Ft. Saskatchewan		Ft. McMurray	
		Rate	95%C1[2]	Rate	95%C1	Rate	95%C1	Rate	95%C1	Rate	95%C1
Asthma	M	238.2 (15,876)	234.4-241.9	185.2 (2,849)	178.4-192.1	140.7 (193)	118.6-162.8	290.2 (91)	228.1-352.3	276.1 (208)	207.7-344.7
	F	242.0 (15,369)	238.2-245.9	169.4 (2,588)	162.8-175.9	152.6 (200)	128.0-177.2	238.5 (80)	185.0-291.8	346.6 (182)	259.8-431.5
Bronchitis	M	72.9 (4,135)	70.3-74.8	34.0 (447)	30.7-37.0	17.0 (13)	606-27.0	67.5 (14)	31.2-102.9	199.8 (82)	116.1-283.4
	F	67.7 (3,785)	65.5-69.9	24.2 (332)	21.5-26.7	23.6 (19)	11.6-35.1	138.0 (32)	88.1-187.9	138.4 (51)	72.7-204.0
Emphysema	M	25.8 (1,342)	24.4-27.2	21.2 (262)	18.5-23.6	23.0 (12)	9.4-36.2	16.8 (3)	0.0-35.7	14.1 (2)	0.0-38.5
	F	15.7 (789)	14.5-16.7	15.2 (201)	13.0-17.2	10.8 (6)	1.6-19.8	19.7 (5)	1.9-37.3	0 (0)	-

1.. Expressed as the number of hospital admissions per 100 000 person-years during 1990-1994, adjusted by the age distribution of the 1991 Canadian population.

2. 95 percent confidence interval of the age-adjusted rate.

This page is left intentionally blank.

Map 2 Age-Standardized Rate Ratio of Hospital Admissions for Selected Respiratory Diseases in Strathcona County and Nearby Regions 1990-1994



F.4 Physician Visits for Respiratory Diseases

F.4.1 Population Distribution

Similar to hospital admission rates, rates of physician visits for selected respiratory diseases also vary by age and sex. Table 5 presents the relative proportion of physician visits attributed to diagnoses of asthma, bronchitis, and emphysema by sex, age group and geographic areas. About 42% of asthma visits occur in children, 47% in those aged 15-64 years and 10% in seniors. For children, the relative proportion of hospital admissions in males is higher (51.1%) than in females (32.5%). Most physician visits for bronchitis occur in the group aged 15-64 years, followed by children and the elderly. The M:F ratio is 0.7:1 in the 15-64 years age-group but greater than one in the other two age-groups. Over 67% of physician visits for emphysema occur in seniors 65 years and over, and about 3% in children 0-14 years old. Among the elderly, the M:F ratio is 1.9:1. The proportion of physician visits for the three diseases also shows variations across the four geographic areas. These variations are displayed in Table 6.

F.4.2 Geographic Distribution

To compare the geographic distribution of rates in the four study areas, the five-year rates were used. Table 6 presents the age-standardized rates of physician visits by sex and geographic region. The rates of asthma, bronchitis, and emphysema vary by region. Compared to Edmonton, the age-standardized rates of asthma physician visits are slightly higher in Strathcona County and Ft. McMurray for both males and females. The rates in Ft. Saskatchewan are comparable to those in Edmonton. In contrast, the rates of bronchitis and emphysema are slightly lower in Strathcona County for both males and females. In Ft. McMurray the rates are also lower, but the difference among females is not statistically reliable. The rates of bronchitis in Ft. Saskatchewan are significantly higher among both males and females. The pattern of the age-adjusted rates of emphysema physician visits are similar. The rates for both males and females are significantly lower in Strathcona County and Ft. McMurray. In Ft. Saskatchewan, no appreciable differences are found for males or females.

Map 3 shows that the age-standardized rate ratios of physician visits for asthma, bronchitis, and emphysema in Strathcona County, Edmonton, and Ft. Saskatchewan vary from the nearby regions.

Map 3 Age-Standardized Rate Ratio of Physician Visits for Selected Respiratory Diseases in Strathcona County and Nearby Regions, 1990-1994

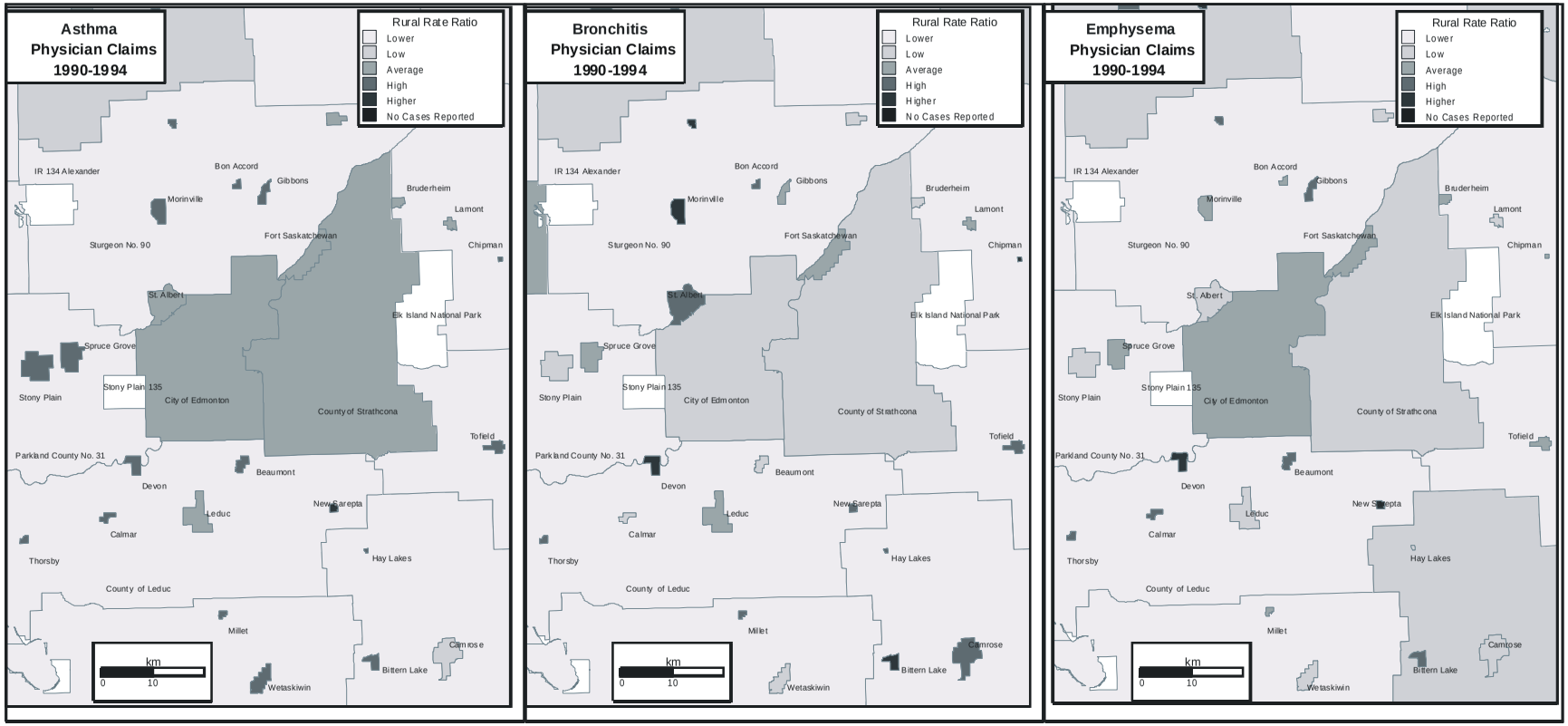


Table 5 Distribution of Physician Visits from Selected Respiratory Diseases by, Sex, Age Group and Geographic Region in Alberta, 1990-1994

Disease	Sex	Age Group (year)	Alberta		Edmonton		Strathcona County		Ft. Saskatchewan		Ft. McMurray	
			N	%	N	%	N	%	N	%	N	%
Asthma	M	0-14 15-64 65+	248,103 188,303 49,427	51.1 38.8 101.1	59,400 51,645 12,384	48.1 41.8 10.1	6,169 4,932 762	52.0 41.6 6.4	1,298 944 266	51.8 37.6 10.6	3,811 2,683 150	57.4 40.4 2.2
	F	0-14 15-64 65+	152,003 261,891 53,491	32.5 56.0 11.4	35,285 71,266 15,038	29.0 58.6 12.4	3,695 6,877 876	32.3 60.1 7.7	778 1,435 224	31.9 58.9 9.2	2,568 3,300 286	41.7 53.6 4.6
Bronchitis	M	0-14 15-64 65+	88,463 131,354 58,742	31.8 47.1 21.1	14,112 26,679 12,822	26.3 49.8 23.9	1,263 2,559 513	29.1 59.0 11.8	358 535 262	31.0 46.3 22.7	494 1,196 85	27.8 67.4 4.8
	F	0-14 15-64 65+	73,909 179,820 55,006	23.9 58.2 17.8	11,426 33,557 13,439	19.6 57.4 23.0	1,083 3,145 443	23.2 67.3 9.5	320 694 244	25.4 55.2 19.4	426 1,347 111	22.6 71.5 5.9
Emphysema	M	0-14 15-64 65+	1,455 12,855 32,700	3.1 27.3 69.6	345 3,792 8,341	2.7 30.4 66.9	22 181 243	4.9 40.6 54.5	6 63 157	2.6 27.9 69.5	12 47 33	13.0 51.1 35.9
	F	0-14 15-64 65+	1,133 9,042 17,398	4.1 32.8 63.1	303 2,776 4,952	3.8 34.6 61.7	9 120 159	3.1 41.7 55.2	4 75 55	3.0 56.0 41.0	7 38 19	10.9 59.4 29.7

Table 6 Age-Standardized Rates[1] of Physician Visits for Selected Respiratory Diseases by Sex, Age Geographic Region in Alberta, 1990-1994

Disease	Sex	Alberta		Edmonton		Strathcona County		Ft. Saskatchewan		Ft. McMurray	
		Rate	95%C1	Rate	95%C1	Rate	95%C1	Rate	95%C1	Rate	95%C1
Asthma	M	7,441.3 (485,833)	7,421.4-7,461.3	8,157.5 (123,429)	8,114.3-8,200.7	8,459.4 (11,863)	8,304.-8,614.6	8,083..8 (2,508)	7,776.8-8,390.7	8,574.5 (6,644)	8,251.6-8,897.7
		7,321.6 (467,385)	7,301.3-7,342.1	7,892.8 (121,589)	7,850.0-7,935.7	8,564.4 (11,448)	8,397.0-8,731..8	7,955.7 (2437)	7,641.1-8,270.4	9,928.1 (6,154)	9,544.3-10,311.9
Bronchitis	F	4,515.2 (278,559)	4,498.8-4,451.5	3,716.2 (53,613)	3,685.4 3,747.0	3,442.5 (4,335)	3,331.6-3,553.4	4,309.7 (1,155)	4,061.9 4,557.6	3,163.8 (1,775)	2„917.1-3,410.6
		5,021.1 (308,735)	5,003.7-5,038.5	3,907.1 (58,422)	3,876.0-3,938.0	3,731.8 (4,671)	3,612.5-3,851.1	4,650.2 (1,258)	4,390.6-4,910.2	3,694.3 (1,884)	3,363.4-4,026..5
Emphysema	M	888.9 (47,010)	881.0-896.7	978.9 (12,478)	962.1-995.6	629.0 (446)	567.0 691.1	1,127.3 (226)	983.7 1,270.9	509.8 (92)	369.4-650.2
		529.2 (27,576)	523.0-535.4	592.0 (8,031)	579.1-604.8	463.1 (288)	404.9-521.4	592.0 (134)	579.1 962.1	284.6 (64)	185.7-383.5

1.. Expressed as the number of hospital admissions per 100 000 person-years during 1990-1994, adjusted by the age distribution of the 1991 Canadian population.

2. 95 percent confidence interval of the age-adjusted rate.

The rate of asthma physician visits is lover for most communities in surrounding areas in Edmonton. Although the gender-combined rate ratios for Edmonton (SRR=1.09), Strathcona County (SRR=1.16) and Ft Saskatchewan (SRR=1.08) are in the range of provincial average, the variations in this range are evident in the Table 6. It shows that, compared to the provincial average, the age-standardized rate of physician visits for asthma in Edmonton, Strathcona County and Ft. Saskatchewan are higher for both males and females.

The patterns of the geographic distribution of physician visits for bronchitis are different from asthma. Table 6 shows that, compared to the provincial average, rates of physician visits are low in Edmonton and Strathcona County for both males and females. In Ft. Saskatchewan, the rate appears low also, but the difference for males is not statistically reliable. These variations are further illustrated in Map 3. For emphysema, the rates are low in Strathcona County (SRR=0.78) and comparable in Edmonton (SRR=1.09) and Ft. Saskatchewan (SRR=1.20).

F.4.3 Changes in Diagnostic Patterns of Asthma and Bronchitis

With the increasing awareness of asthma among the public and health care providers, more asthma cases may be diagnosed. A preliminary analysis of the physician visit data shows that the age-standardized rate of asthma physician visits in Alberta slightly increases from 1990 to 1994. During the same period the standardized rate of physician visits for bronchitis was steadily decreasing (Figure 12). Between 1990 and 1994 the age-standardized rate of asthma physician visits in Strathcona County increased about 1100 per 100,000 person-years for males, and 1260 per 100,000 person-years for females. These numbers are almost identical to the decrease observed in the rate of physician visits for bronchitis during the same time period (Figure 13).

Fig. 10 Age Standardized Rate of Annual Physician Visits for Selected Respiratory Diseases in Alberta

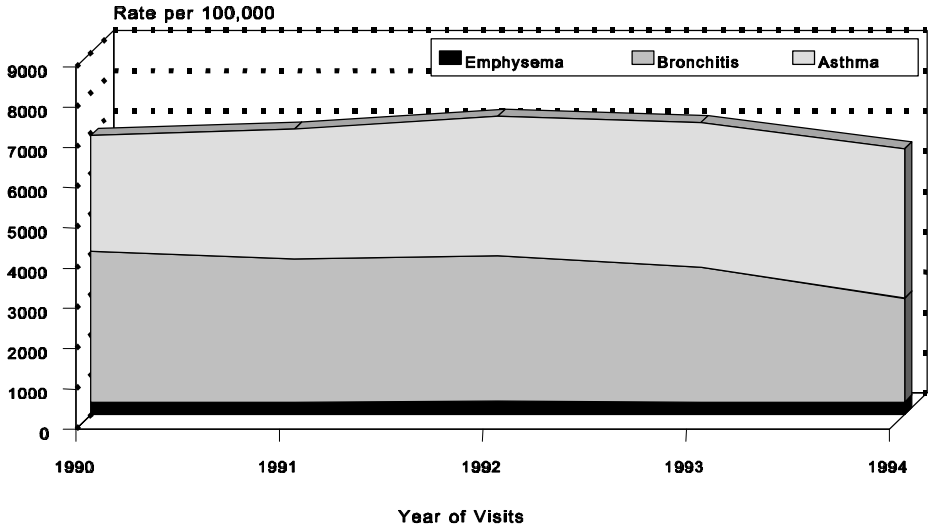
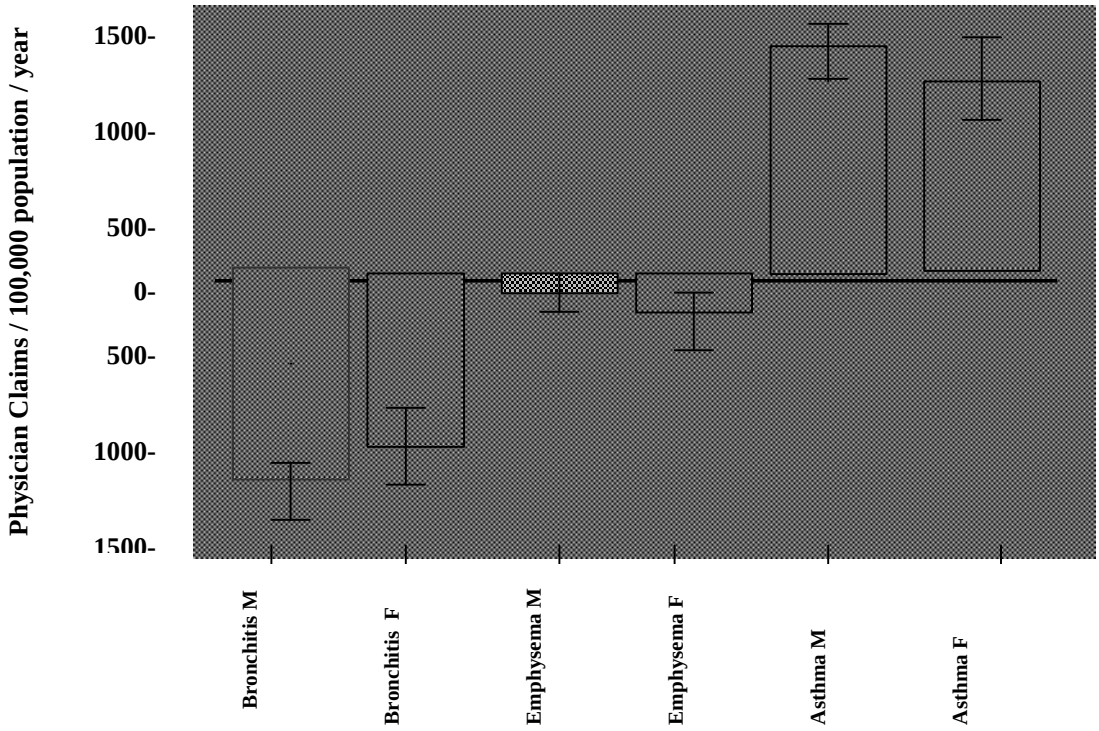


Figure 11
Differences in Age Standardized Rates
Strathcona County vs. Alberta Health



G. DISCUSSION AND RECOMMENDATION

This report provides an overview of the impact of selected respiratory disorders on the health of Albertans. The major findings are discussed below.

G.1 The Impact of Selected Respiratory Diseases

Asthma, bronchitis and emphysema have a significant impact on the health of Albertans and the level of impact varies by gender, age group, geographic area and disease.

Among the three diseases studied, asthma generates the highest rate of physician visits and hospital admissions. As shown by the low mortality, asthma is rarely fatal. Children, especially those aged 0-4 years, are most affected by asthma, resulting in a high rate of physician visits and hospital admissions. However, children rarely died from this disease; most asthma deaths occur among the elderly.

Gender differences are evident, and vary by age group for both asthma and bronchitis. Among children aged 0-14 years, more males than females see a doctor and are hospitalized. With increasing age, however, asthma and bronchitis become more frequent among females. Emphysema is a disease of the elderly, and the higher rates of physician visits and hospital admissions among males are likely a reflection of the higher incidence of emphysema in this group.

Bronchitis ranks as the second highest category for physician visits and hospital admissions and emphysema is the third. Over 70% of bronchitis physician visits and hospital admissions occur among the adult population. Emphysema is very rare among children. Over 67% of emphysema physician visits and 74% of hospital admissions from emphysema occur among people aged 65 years and over. Among the three diseases studied, emphysema shows the highest mortality rate. During the ten-year period (1985-1994), 1,020 deaths recorded emphysema as the underlying cause of death among Albertans.

G.2 Time Trends and Seasonality

The observed decrease in asthma mortality rate during the period 1950-1992 in Alberta may be attributed to several factors. Improved medical treatment and access to health services over the past 43 years have contributed to this decrease. In addition, increased wareness of asthma, and patient compliance

with prevention and treatment programs are also important factors (Carr et al., 1992).

The study of seasonal variations of asthma provides further insight into factors that may trigger acute asthma episodes. Possible explanations of these patterns include (Health Effect Institutes, 1995; Sears et al., 1995; Mao et al., 1990: Schwartz et al., 1996; Wilkins et al., 1993.):

- seasonal covariation with cyclical patterns of acute respiratory infections,
- variations in levels of environmental substances (pollen, dust, mite, particulate, airway irritants),
- weather-related factors (temperature, wind, humidity),
- agricultural activities (use of fertilizers, herbicides, pesticides, fungicides, crop, harvest), and
- social activity patterns.

G.3 REGIONAL VARIATIONS OF SELECTED DISEASES

Three measures were used to compare the regional differences in asthma, bronchitis and emphysema. There is no evidence that mortality and hospital admission rates for asthma and other respiratory diseases are significantly higher in Strathcona County than in other areas of the province. Although the rate of physician visits for asthma in Strathcona County is increasing, this may be due to a diagnostic shift. In other words, cases previously diagnosed as bronchitis are now more likely to be diagnosed as asthma. This is shown by the fact that the combined rate of physician visits for respiratory diseases (emphysema, bronchitis and asthma) has remained relatively stable. However, the relative proportion of asthma visits has increased while bronchitis visits have been decreasing.

In the same token, the slight increase, relative to the provincial level, in the rate of asthma physician visits in Ft. Saskatchewan is probably due, in part, to the diagnostic shift from bronchitis to asthma. Compared to Edmonton, Ft. Saskatchewan has higher rates of hospital admissions. Differences in emergency room and hospital admission practices may be contributing factors. The observed mortality rate in Ft. Saskatchewan is based on fewer than five cases over a ten year period and no valid inferences can be made.It has to be emphasized that this is a descriptive study. Many factors that may affect the findings of the study are not assessed or controlled for. Thus, an attempt to make a causal inference is not appropriate. The rates of mortality, hospital admissions and physician visits may depend upon several factors, such as

- the underlying incidence and prevalence of disease studied,
- severity of disease,
- diagnostic patterns among physicians,
- public and individual awareness of disease,

- accessibility to physician/hospital services,
- patterns of seeking medical services among population groups,
- practice patterns of physicians, emergency rooms and/or hospitals, and
- disease reporting and coding practices.

G.4 Strengths and Limitations

In order to properly interpret the results of the study, it is important to understand the strengths and limitations of using health information that has been collected for administrative purposes (Vollmer et al, 1994; Roos et al, 1982):

G.4.1 Strengths of the Study

1. Study design: The measurement of health status is often a challenge. Three measures were used in this study: rates of mortality, hospital admissions and physician visits. Some of the limitations of using a single measure may be, to some degree, compensated for in this design.

2. Number of observations and efficiency: The large number of observations/records and the cost efficiency of using administrative data are evident. Despite this, rates within small subgroups of population in specific areas can be unstable.

3. Coverage of the population: Data on Vital Statistics, Hospital Morbidity and Physician Claims cover virtually the entire population of the province.

4. Data are available.

G.4.2 Limitations of the Study

Limitations in conducting this type of study may include (1) accuracy of diagnosis, (2) completeness of information desired, and (3) proper population at risk as denominator.

1. Accuracy of diagnosis: Errors in diagnosis, data entry and coding are potential sources of inaccuracy of data on diagnosis.

2. Completeness of data desired: Using administrative data for scientific studies is a recent development. This data was originally collected for other purposes and may not necessarily meet the needs of scientific studies without extensive verifications. For example, information such as the residence postal code and geographic codes are often incomplete. Also, patients who do not seek health care services are not included.

3. Appropriate population for denominator: To estimate rates properly, both the numerators and the denominators must be accurate. Although rates estimated based on the census population may allow valid comparisons over time and across provinces, estimations on certain population subgroups may not be as accurate as expected due to rounding and lack of data. Populations between census years have to be estimated.

4. Updated information: There is often a lag period between data entry into the system and data availability for use. Further, administrative data were collected/reported for each fiscal year. Thus, to get updated and completed data for each calendar period/year is difficult. Despite an effort to include all records of calendar periods 1990-1994 in the present study, some data for this period (early 1990 and late 1994) may not have been complete.

5. Limitations in mapping: While identifying the potential risk for the smallest geographic unit may be desirable, it can be difficult to symbolize/present the data on a regular page for small communities. In addition, the categorization of risk is often a trade-off between precision and readability. The classification scheme used for mapping in this report was developed to ensure readability and comparability of data across disease categories and data sets. Sometimes, two regions in the same category may be less similar than two regions shown with different symbols. Overall, however, these categories are adequate to illustrate overall variability of the data. These mapping limitations are compensated for by presenting the actual values, tables and charts.

G.5 Major Findings

1. Overall, the mortality rate of asthma in Alberta and across Canada has been decreasing since 1950. Since 1972, rates have remained low, though fluctuations are apparent.

2. Children under the age of five are more likely to be seen by physicians or hospitalized for asthma but rarely die from this disease. Bronchitis primarily targets children less than five years of age and adults 65 years and over. Emphysema has the strongest impact on older adults, especially males.

3. Seasonal patterns in physician visits and hospital admissions for asthma are more pronounced among children and are the highest in March and September and lowest in July and August.

4. There is no evidence of significantly higher rates of mortality and hospital admissions from asthma, bronchitis and emphysema in Strathcona County and Ft. Saskatchewan. Although the rates of physician visits for asthma appear to be higher in both communities, this increase is off set by the decrease of bronchitis during the study period.

5. The diagnostic shift among disease categories is an important phenomenon, which must be considered when assessing population health.

G.6 Recommendations

1. Continue the on-going surveillance and monitoring of population health using mortality, hospital morbidity, and physician visits in assessing health status of the population.

2. Expand the study to include the incidence of respiratory (and other) disorders in specific risk groups (e.g., children).

3. Expand the study to include the analysis of ambient air quality parameters in relation to health status.

4. If community concerns persist, implement a monitoring program to include personal exposure and health effects assessment.

5. Ensure the timely dissemination of monitoring results to the communities.

6. Clarify the contribution of the diagnostic shift phenomenon to the observed changes in the patterns of respiratory disorders in Alberta.

BIBLIOGRAPHY

1. Balaban, D. J. (1992). Epidemiology and Prevention of Selected Chronic Illness. B. J. Cassens Preventive Medicine (2nd ed., pp.143-4) Philadelphia/Baltimore/Hong Kong/London/Munich Sydney/Tokyo: A Waverly Company.

2. Carr, W., Zeitel, L., & Weiss, K. (1992). Variations in Asthma Hospitalizations and Deaths in New York City. American Journal of Public Health, 82(1), 59-65.

3. Carriere, K. C., & Roos, L. L. (1994). Comparing standardized rates of events. Am J Epidemiol, 140, 472-478.

4. Cloutier, M. M. (1996). Pulmonary Diseases. P. H. Dworkin Pediatrics (3rd ed., pp. 395-413). Philadelphia/Baltimore/Hong Kong/London/Munich/Sydney/Tokyo: A Waverly Company.

5. Fiel, S. B. (1994). Pulmonary Diseases. A. R. Myers Medicine (2nd ed.pp. 61-95). Philadelphia/Baltimore/Hong Kong/London/ Munich/Sydney/Tokyo: A Waverly Company.

6. Good, C., & Hessel, A. P. (1996). Asthma Prevalence Study Results for the Mistahia Region of Northern Alberta. Edmonton: Alberta Lung Association.

7 Health Effects Institute. (1995). Particulate Air Pollution and DailyMortality: Replication and Validation of Selected Studies. MA: Graphic Supervisors.

8. Hessel, P. A., Svenson, L., Nguyen, T.-H., Patel, A., Michaelchuk, D., & Melenka, L.(1995). Physician & Hospital Utilization for Asthma in Alberta, 1992/93. Edmonton:Alberta Lung Association.

9. Mao, Y., Semenciw, R., Morrison, H., & Wigle, D. T. (1990). Seasonality in Epidemics of Asthma Mortality and Hospital Admission Rates, Ontario, 1979-86. Canadian Journal of Public Health, 81, 226-228.

10. Matthay, R. A., & Arroliga, A. C. (1996). Chronic Airways Diseases. J. C. Bennett, & F. Plum. Textbook of Medicine (20th ed., pp. 381-388). Philadelphia/London/Toronto/Montreal/Sydney/ Tokyo: W.B. Saunders Company.

11. Moon, J., Smith, T. J., Tamaro, S., & et al. (1984). Trace Metals in Scalp Hair of Children and Adult Occupants of Three Albertan Indian Villages, Fort McKay Indian Band.

12. Roos, L. L., Roos, N. P., Cageorge, S. M., & Nicol, J. P. (1982). How good are the data? Reliability of one health care data bank. Med Care, 20, 266-276.

13. Schwartz, J., Spix, C., Toulmoumi, G., Bacharova, L., & etc. (1996). Methodological issues in studies of air pollution and daily counts of deaths or hospital admissions. J Epidemiol Commune Health, 50(Suppl 1), S3-S11.

14. Sears, M. R. (1995). Changing patterns in asthma morbidity anmortality. J Invest Allergol Clin Immunol, 5(2), 66-72.

15. Snider, E. L. (1983). Twin Buttle Environmental Health Study. Edmonton: Alberta Social Services and Community Health -Urban Research and Consulting Ltd.

16. Spitzer, W. O., & et al. (1986). The Southwestern Alberta Medical Diagnostic Review. Edmonton: Alberta Community and Occupational Health - Alberta Government/Industry Acid Deposition Research Program.

17. Wilkins, K., & Mao, Y. (1993). Trends in rates of admission to hospital and death from asthma among children and young adults in Canada during the 1980s. Can Med Assoc. J, 148(2), 185-190.

APPENDIX

Table A - 1

Distribution of Population by Sex, Age Group for Selected Geographic Regions in Alberta, 1991

Geographic Region	Age Group (year)	Male		Female		Male : Female Ratio
		N	%	N	%	
Strathcona County	0 -14	7,425	25.9	7,000	25.1	1.06
	15-64	20,155	70.2	19,530	70.1	1.03
	65+	1,140	4.0	1,335	4.8	0.85
Fort Saskatchewan	0 -14	1,615	26.3	1,520	25.6	1.06
	15-64	4,160	67.7	3,905	65.7	1.07
	65+	370	6.0	520	8.7	0.71
Fort McMurray	0 -14	4,895	27.1	4,790	28.7	1.02
	15-64	12,985	71.9	11,665	70.0	1.11
	65+	170	0.9	220	1.3	0.77
Edmonton	0 -14	67,385	22.1	63,675	20.4	1.06
	15-64	213,480	70.0	213,465	68.5	1.00
	65+	24,305	8.0	34,435	11.1	0.71
All Province	0 -14	308,275	24.1	292,750	23.1	1.05
	15-64	868,565	68.0	845,085	66.6	1.03
	65+	100,320	7.9	130,230	10.3	0.77