Métis Nation of Alberta | University of Alberta

EPIDEMIOLOGICAL AND HEALTH SERVICES INDICATORS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE AMONG MÉTIS IN ALBERTA

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INJURY PREVENTION CENTRE
KNOWLEDGE. LEADERSHIP. ACTION.

MÉTIS NATION of ALBERTA

TABLE OF CONTENTS

LIST OF FIGURES

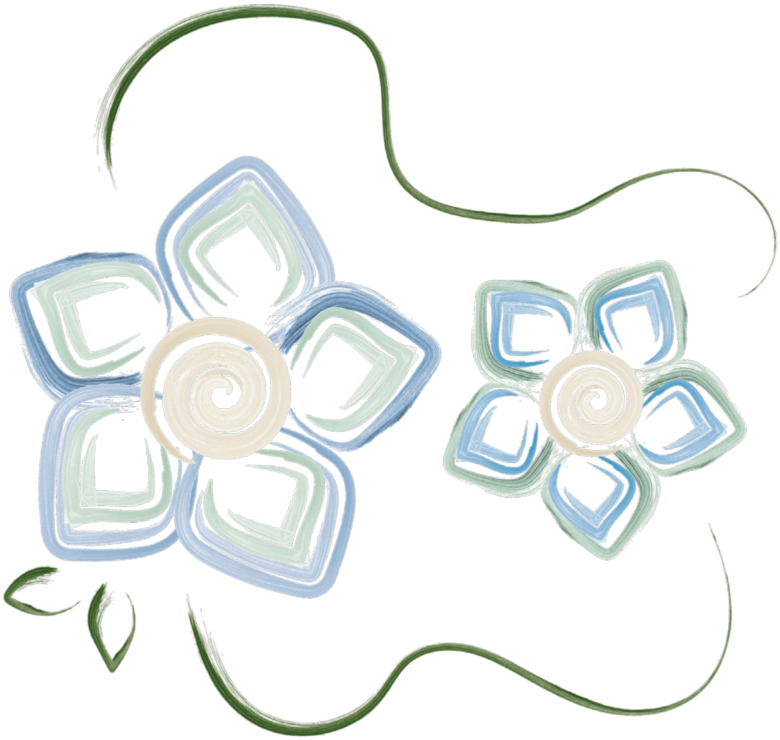
LIST OF TABLES

PRESIDENT'S MESSAGE

I would like to present you all with our health report "Epidemiological and Health Services Indicators of Chronic Obstructive Pulmonary Disease among Métis in Alberta." The highlight of this report is that Métis people experience a higher incidence of COPD, and experience more flare ups which consequently cause more visits to the Emergency Department. This report supplies us with the evidence needed to inform new health strategies and to apply for additional funding. Thank you to all our members who have already consented to being a part of our health surveillance program; it is because of your commitment that we can continue to develop evidence-informed solutions.

Audrey Poitras

Audrey Poitras,
President, Métis Nation of Alberta



MINISTERS' MESSAGES

COPD is a disease that affects our members disproportionately. Understanding how COPD affects our community is important in our goal of finding better ways of supporting Métis people in Alberta with COPD and preventing others from getting the illness. I would like to thank our members who have consented to participate in our Health Surveillance Program. I would also like to encourage our members to continue to participate in health research because this evidence can inform us on what kinds of services and programs are needed to improve Métis health across the province.

Sylvia Johnson

Sylvia Johnson,
Minister; Health, Children, and Youth

EXECUTIVE SUMMARY: EPIDEMIOLOGICAL AND HEALTH SERVICES INDICATORS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE AMONG MÉTIS IN ALBERTA

Background: Chronic Obstructive Pulmonary Disease (COPD) is a major respiratory disease that involves gradual obstruction of the airway. Symptoms include shortness of breath, a chronic cough, and mucus/saliva in the airway. COPD is largely caused by smoking and as the condition progresses can make activities of daily living, such as walking up stairs, difficult.

Methods: The data for this report was gathered using administration health databases in Alberta from 2002-2010. Métis people were identified using the Métis Nation of Alberta (MNA) registry. After the identification of Métis Albertans, all personal information was removed and all data was reported in aggregate to ensure confidentiality.

Main findings: The prevalence of COPD among the Métis in Alberta is 1.59-1.67 times greater than the non-Aboriginal population. Métis Albertans also have 1.2-1.85 times more new cases per year when compared to the non-Aboriginal population. Métis people living with COPD are 1.22 times more likely to visit the Emergency Department for symptom exacerbations. However, it was found Métis people were hospitalized less often. Métis people in Alberta also had a substantially lower risk of dying from COPD (0.41) than the non-Aboriginal population.

Conclusion: Higher smoking rates among the Métis people in Alberta could be a major contributing factor for the higher prevalence and incidence of COPD. Exploration of smoking prevention and smoking cessation programs for Métis Albertans should become a focus. Poor adherence to therapies or inappropriate treatment may lead to uncontrolled symptoms leading to greater representation in the Emergency Department. Further examination of culturally appropriate care and educational interventions need to occur in order to provide better care to those Métis living with COPD. In the near future, the MNA is hoping to examine the evidence of various services and to have focused group discussions with community members living with COPD to understand what types of services would be of most value and meaningful to them.

LIST OF ABBREVIATIONS

AHCIP	Alberta Health Care Insurance Plan
CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
df	Degrees of freedom
DM	Diabetes mellitus
ED	Emergency department
HR	Hazard ratio
ICD	International Classification of Diseases
ICD-9	International Classification of Diseases, Ninth Revision
ICD-10-CA	International Classification of Diseases, Tenth Revision; enhanced Canadian version
IHD	Ischemic heart disease
IRR	Incidence rate ratio
MACAR	Morbidity and Ambulatory Care Reporting
MNA	Métis Nation of Alberta
MNO	Métis Nation of Ontario
PHN	Personal health number
PR	Prevalence ratio
RR	Risk ratio/rate ratio
SES	Socioeconomic status

What does good health look like? We sent out a call to Métis youth to illustrate healthy lifestyles. The below image is a submission from Myles. To Myles, a healthy lifestyle is achieved by eating a healthy, balanced diet with friends and family.

BACKGROUND AND RATIONALE

Chronic Obstructive Pulmonary Disease (COPD) is a major respiratory disorder, largely caused by smoking and characterized by progressive, not fully reversible airway obstruction and increasing frequency and severity of exacerbations.[1] COPD is one of the five leading causes of morbidity and mortality worldwide and a main driver of health inequalities.

Much has been written from an epidemiological perspective about the gap between Aboriginal and non-Aboriginal populations in Canada in their health status and access to health services.[2-6]

Overall, respiratory diseases constitute the fourth leading cause of death among Aboriginal peoples in Canada[7] and a prominent cause of morbidity and health services use.

Evidence on the burden of COPD among Métis in Canada is derived from cross-sectional surveys or analysis of administrative data with short follow-up periods. Results from the 2008 Canadian Community Health Survey[8] suggest that Métis are twice as likely to develop bronchitis or emphysema when compared with the non-Aboriginal population, with females most at risk.[8]

Data from the Aboriginal Peoples Survey, suggest that 6% of adult Métis reported having been told by a health professional that they had chronic bronchitis.[9] Métis women were more likely than Métis men to report having chronic bronchitis (8% and 5%, respectively).[9] There were no differences in the prevalence of chronic bronchitis among Métis living in urban or rural areas. Across Canada, only half of Métis adults with chronic bronchitis reported receiving treatment for the condition.

Only a few longitudinal studies based on administrative health data[10-13] have shed light on the problems associated with COPD among Métis in Canada.

The Manitoba Centre for Health Policy in collaboration with the Manitoba Métis Federation conducted an analysis of administrative health data of the Métis population in Manitoba for the year 2006 and found that Métis have a higher prevalence of a cluster of respiratory conditions (including asthma, chronic or acute bronchitis, emphysema, and chronic airway obstruction) compared to the general Manitoban population.[12]

A retrospective cohort study with linkage between the Métis Nation of Ontario citizenship registry and Ontario administrative health data compared the incidence, prevalence, mortality rates and health services use for COPD between Métis and non-Métis in Ontario for the years 2007 and 2008.[13]

In this study, prevalence and incidence of COPD were significantly higher in the Métis than in the non-Métis population during both years of study. Analysis of all-cause mortality for the year 2007 showed that Métis with COPD had lower mortality rates compared with COPD cases among the non-Métis population (4.5 per 100 persons).[13] Similar results were obtained for the analysis of 2008 data.[13] Health services utilization data from the study suggested that there were no significant differences between Métis and non-Métis in overall or COPD-specific primary care visits; however, the mean number of specialist visits was lower among the Métis.[13] The study also reported that Emergency Department (ED) visits among individuals diagnosed with COPD were more frequent in Métis compared to the non-Métis population, while there were no significant differences in COPD-ED specific visits.[13] Finally, hospitalizations among individuals diagnosed with COPD were higher among Métis compared with the non-Métis population. There were no differences in COPD-specific hospitalizations between the two groups.[13]

The two studies that have been conducted in Alberta have focused their analyses to Registered First Nations peoples in the province; reported on specific health services outcomes for COPD (i.e., ED and ambulatory visits[10,11]) and have assessed COPD and asthma combined.[10] These two studies provide a limited picture of the true burden of COPD among Aboriginal peoples in the province and do not fill the gaps in our knowledge about how COPD affects Métis people in Alberta.

Alberta has the largest Métis population in Canada. There were 96,865 Albertans who identified themselves as Métis in the 2011 National Household Survey.[14] By 2011, 43.5% of Métis in Alberta lived in metropolitan areas; 26.6% in urban, non-metropolitan areas and 29.9% in settlements and rural areas.[15]

There is a need of comprehensive epidemiological studies profiling the epidemiology and patterns of health services use for COPD among Métis living in Alberta, and how these indicators compare to those of non-Aboriginal Albertans.

The research presented in this report is the most comprehensive longitudinal analysis of eight years of administrative health data to examine the epidemiology and health services utilization patterns of COPD among Métis in Alberta.

The identification of how COPD impacts Métis in the province, constitutes an important step towards addressing potential health inequalities and identifying the areas in which specific approaches to improve their respiratory health status and access to health services for COPD are needed in this population.

OBJECTIVES

This report presents the results of three retrospective analytical cohort studies based on linkage of provincial administrative health databases from April 1st, 2002 to March 31st, 2010. The objectives of this research were:

1. To evaluate and compare the prevalence and incidence of COPD among Métis relative to the non-Aboriginal population in Alberta.

2. To evaluate and compare all-cause mortality rates in individuals with COPD among Métis relative to a non-Aboriginal population with COPD in Alberta.

3. To evaluate and compare the patterns of health services use (i.e., hospitalizations and ED visits) in individuals with COPD among the Métis relative to a non-Aboriginal population with COPD in Alberta.

OVERVIEW OF RESEARCH METHODS

Retrospective cohort studies based on linkage of administrative health databases in Alberta (Canada).

Data Sources

De-identified individual-level, longitudinal data, by fiscal year (April 1st of a given year to March 31st of the subsequent year) from 2002 to 2010, were obtained from the following administrative health databases under the custodianship of Alberta Health:

- The Alberta Health Care Insurance Plan (AHCIP) Registry;
- The Morbidity and Ambulatory Care Reporting (MACAR) system;
- The Alberta Physician Claims Assessment System;
- Alberta Vital Statistics; and
- The Métis Nation of Alberta (MNA) Registry.

Administrative health databases contained demographic information (AHCIP population registry), data on all acute and elective hospital discharges using the International Classification of Diseases, 10th Revision; enhanced Canadian version (ICD-10-CA) for diagnosis coding[16] (Morbidity and Ambulatory Care Reporting System), claims for services provided by fee-for-service physicians and physicians paid under alternate payment plans with diagnostic fee codes based on the International Classification of Diseases, 9th Revision (ICD-9)[17] (Alberta Physician Claims Assessment System), and deaths that occur within the province (Alberta Vital Statistics). Additionally, the Métis Nation of Alberta (MNA) Identification Registry includes citizenship information for members of the Métis Nation of Alberta.

Deterministic data linkage across the AHCIP, MACAR, Physician Claims, and Vital Statistics databases was based on an encrypted unique personal health number (PHN). Probabilistic linkage was used to obtain an encrypted PHN for persons in the MNA registry and this encrypted PHN was then directly linked to the other datasets.

Study Population

The eligibility criteria for this study were individuals with constant registration in the AHCIP from fiscal years 2002 to 2010, who were at least 35 years of age at the beginning of each year. For the definition of the study cohorts, Métis were individuals identified in the MNA identification registry. Non-Aboriginals were individuals in the AHCIP registry without an alternate premium arrangement field for Registered First Nations or Inuit, and not included in the MNA registry. Métis not included in the MNA registry were considered part of the non-Aboriginal population because there is no reliable method to identify them within the general population.[18] All Métis who met the eligibility criteria were included in the Métis cohort. Random samples of eligible non-Aboriginals were selected from the AHCIP/population registry for a ratio of five non-Aboriginals per Métis included.

Identification of COPD Cases

The definition recommended by the Canadian Chronic Disease Surveillance System-Chronic Respiratory Disease Working Group was used to identify COPD cases in the study population: individuals aged 35 years and older at the time of diagnosis who have at least two physician claims with an ICD-9 code (491, 492, 496) of COPD in the first diagnostic field of the Alberta Physician Claims Assessment System in a two-year period, or one recording of an ICD-10-CA code (J41-J44) of COPD in any diagnostic field in the hospital discharge abstract ever, whichever comes first. The two physician claims must have been on different days; and, when the case definition was met by two physician claims, the date of diagnosis was the date of the second physician claim when the case definition was met.[19]

Statistical Outcomes Reported

Prevalence and Incidence of COPD:

Annual COPD prevalence for Métis and non-Aboriginal cohorts was calculated from fiscal years 2002 to 2010. Prevalence estimates were expressed as percentages. Annual COPD incidence rates in the study cohorts were calculated from fiscal years 2002 to 2010 and for the entire study period. All incidence rates were expressed as COPD cases per 1,000 person-years.

All COPD estimates were adjusted by age and sex using the direct standardization method[20] and the 1991 Canadian Census population as reference.[21]

Unadjusted prevalence ratios (PR) per fiscal year were calculated. Poisson regression models were fitted for each fiscal year to adjust PRs for covariates at baseline (sex, age, area of residence and socioeconomic status [SES]). Unadjusted incidence rate ratios (IRR) were calculated for every fiscal year and for the entire study period. Poisson regressions adjusted the IRRs by covariates at baseline, using person-time as the offset in the models. The non-Aboriginal cohort was the reference category in all analyses.

Mortality:

All-cause mortality rates were calculated as the total number of deaths among new COPD cases during fiscal years 2005/2006 to 2009/2010. Mortality rates were expressed as number of deaths per 1,000 person-years. Kaplan-Meier curves and Log-rank tests were used to compare differences in survival between the cohorts. Cox proportional-hazard regression models[22] were used to estimate mortality hazard ratios (HR) after COPD diagnosis in the Métis cohort relative to the non-Aboriginal reference group while adjusting for age, sex, SES, area of residence, and presence of comorbidities at baseline. A first-order interaction term for Aboriginal status and age at COPD diagnosis was included in the models to evaluate the relationship between Aboriginal status and mortality given COPD across age groups.

Health Services Use:

Annual, all-cause and AECOPD hospitalization and ED visit rates were calculated from fiscal years 2002/2003 to 2009/2010 for Métis and non-Aboriginal cohorts with COPD. Unadjusted rate ratios (RR) with 95% CI were calculated for the entire study period for all-cause and AECOPD hospitalization and ED visits using the non-Aboriginal population as the reference group. Poisson regressions were conducted to adjust the RRs by age group, sex, socioeconomic status, area of residence, and presence of comorbidities at baseline using person-time as the offset in the models.[23]

All epidemiological and health services estimates were reported with 95% confidence intervals (CI), and two-sided p-values less than 0.05 represented statistical significance. Statistical analyses were performed using Predictive Analysis Software Statistics for Mac® (PASW® version 18.0, IBM SPSS, Somers NY).

Ethics Statement

Ethics approval was obtained from the University of Alberta's Health Research Ethics Board in Edmonton, Alberta (Canada) (MS2_Pro 00010415). Individual patient consent was not required; however, patient records/information were anonymized and de-identified prior to analysis. The research proposal for this study was presented to the Public Health Surveillance Advisory Committee Meeting of the MNA in

November 2009. Similarly, the research proposal was presented to an open forum under the MNA conference “Moving Forward Together: Building Strong, Healthy and Safe Métis Communities” in March 2010. Finally, the research proposal received official endorsement from the MNA.

RESULTS

Prevalence of COPD

Standardized annual COPD prevalence estimates were higher in Métis than in the non-Aboriginal group (Figure 1). Annual unadjusted and adjusted PRs for COPD in the Métis cohort were compared to the reference group of non-Aboriginals. Unadjusted COPD prevalence rates were not statistically significant different to those of non-Aboriginals. After adjusting for age, sex, socioeconomic status and area of residence, COPD prevalence was significantly higher among Métis compared to the reference group of non-Aboriginals in every year of the study. Compared to the non-Aboriginal group, Métis were between 1.59 to 1.67 times more likely to have COPD from 2002 to 2010.

Incidence of COPD

Age- and sex-standardized COPD incidence rates showed some fluctuations over time in the Métis group compared to those in the non-Aboriginal cohort (Figure 2). During fiscal years 2002/2003 to 2009/2010, the standardized COPD incidence density rate of the Métis (8.6 per 1,000 person-years; 95% CI: 8.3, 8.8 per 1,000 person-years) was higher than that of the non-Aboriginal group (5.5 per 1,000 person-years; 95% CI: 5.4, 5.6 per 1,000 person-years).

Métis had between 1.2 to 1.85 times more incident COPD cases per 1,000 person-years than the non-Aboriginal group over the study period. After adjusting for important sociodemographic factors (Figure 3), we found that Métis had a significantly higher number of new COPD cases than the non-Aboriginal group (IRR 1.49; 95% CI: 1.32, 1.69).

Mortality

A total of 225 Métis and 974 non-Aboriginal individuals with COPD were followed from fiscal years 2005 to 2009. Table 2 shows the baseline characteristics of the cohorts and the crude and age- and sex- standardized all-cause mortality rates or each cohort with COPD. Non-Aboriginals with COPD had higher crude and age- and sex-standardized all-cause mortality rates than Métis with COPD.

Five-year survival of the Métis and non-Aboriginal cohorts following a diagnosis of COPD is illustrated in Figure 4 along with 95% CI bands around the curves. The median survival times after a COPD diagnosis could not be determined as fewer than 50% of individuals in the cohorts died by the end of the 5-year observation period. Compared to non-Aboriginals, Métis with COPD had significantly better survival 5 years after being diagnosed with COPD (log-rank test = 21.73, df = 3; $p < 0.0001$).

Unadjusted HRs showed that, compared to the non-Aboriginal group, the hazard of dying during the study period was significantly lower in Métis (HR = 0.35; 95% CI: 0.26, 0.49) after a diagnosis of COPD (Figure 5). After adjusting for socioeconomic factors and the presence of comorbidities at the time of COPD diagnosis, significantly lower mortality hazard remained for the Métis (HR = 0.41; 95% CI: 0.25, 0.65) compared to the non-Aboriginal group.

For individuals aged between 35 and 64 years of age, there were no significant differences in the hazard of death following a COPD diagnosis among Métis (HR = 0.91; 95% CI: 0.46, 1.80) compared to the non-Aboriginal cohort. For individuals aged 65 years and over, the hazard of death was significantly lower for the Métis (HR = 0.24; 95% CI: 0.11, 0.49) relative to the non-Aboriginal group.

Health Services Use

Hospitalizations

When annual all-cause hospitalization rates were examined over time (Figure 6 6), the Métis group showed lower all-cause hospitalization rates compared to those in the non-Aboriginal cohort. All-cause hospitalization rates for the entire study period in the Métis cohort with COPD (397.9 hospitalizations per 1,000 person-years; 95% CI: 364.7, 435.5) were significantly lower than those in the non-Aboriginal group (516.9 hospitalizations per 1,000 person-years; 95% CI: 498.5, 535.0).

Figure 7 summarizes the unadjusted and adjusted all-cause hospitalization RRs in the Métis cohort with COPD compared to the non-Aboriginal reference group. Both unadjusted and adjusted RR indicated that Métis with COPD had significantly lower all-cause hospitalization rates (RR = 1.21; 95% CI: 1.16, 1.27) than non-Aboriginals.

Emergency Department Visits:

For the entire study period, all-cause ED visit rates in the Métis cohort with COPD were significantly higher (1801.2 ED visits per 1,000 person-years; 95% CI: 1730.1, 1875.4) than those in the non-Aboriginal group (1460.1 ED visits per 1,000 person-years; 95% CI: 1429.2, 1492.3) (Figure 8).

Figure 9 summarizes the unadjusted and adjusted RRs for all-cause ED visits in the cohort of Métis with COPD compared to the non-Aboriginal reference group.

The unadjusted RR showed that Métis with COPD had significantly higher all-cause ED visit rates (RR = 1.07; 95% CI: 1.02, 1.12) compared to non-Aboriginals. After adjusting for sociodemographic and clinical factors, all-cause ED visit rates per 1,000 person-years in Métis were significantly lower (RR = 0.94; 95% CI: 0.90, 0.98) than those of the non-Aboriginal cohort.

DISCUSSION

This report presented the results of three cohort studies that analyzed the differences between Métis and a non-Aboriginal cohort in the prevalence, incidence, mortality, and health services use (i.e., hospitalizations and emergency department [ED] visits) for COPD based on longitudinal health administrative data from Alberta.

Prevalence and Incidence of COPD

Compared to the non-Aboriginal population, Métis in Alberta have a higher prevalence and higher incidence rates of COPD after adjusting for sex, age group, socio-economic status, and area of residence. Results of this analysis are similar to other longitudinal studies conducted in Canada that have compared the prevalence of COPD between Métis and non-Métis populations.[12,13] Comparisons of COPD incidence between Métis and non-Aboriginal populations in the scientific literature, albeit scarce, have also identified a higher incidence of COPD in Métis compared to non-Métis.[13]

All-cause Mortality after Being Diagnosed with COPD

The study that assessed all-cause mortality following a diagnosis of COPD found that all-cause mortality of Métis in Alberta was significantly lower compared to the non-Aboriginal group.

In line with previous studies,[24-26] age at time of COPD diagnosis was an important effect modifier of the relationship between Métis status and mortality following a COPD diagnosis. While mortality hazards following a COPD diagnosis did not differ between Métis and non-Aboriginal peoples at younger ages, lower mortality hazards were identified among Métis aged 65 years and over compared to their non-Aboriginal counterparts.

Results of this study are similar to those reported in a retrospective analysis of all-cause mortality in Métis with COPD registered in the Métis Nation of Ontario in which Métis had lower all-cause mortality rates compared to a non-Métis population with COPD.[13]

Hospitalizations and Emergency Department Visits Following a Diagnosis of COPD

We examined differences in the rates of hospitalizations and ED visits following a diagnosis of COPD between cohorts of Métis and a non-Aboriginals. Métis with COPD had significantly lower rates of hospitalizations and ED visits for all causes compared to non-Aboriginals with COPD after adjusting for important sociodemographic factors and comorbidities.

These results contrast with those of the only other retrospective cohort study published in Canada that compared hospitalization and ED visit rates between Métis and non-Aboriginal individuals diagnosed with COPD.[13] The study found a higher mean number of hospitalizations and ED visits among Métis diagnosed with COPD compared to the general population.[13] Differences between the two studies in the outcomes selected, observation periods, sample sizes, and a variety of factors that are determinants of quality of care in COPD could potentially explain the discrepancies in their findings. For example, if hospitalizations for ambulatory-care sensitive conditions such as COPD are a measure of the performance of primary health services, the patterns of less hospitalization among Métis with COPD may result from inequalities in access to care.

Other potential explanatory factors of how Métis access health care services to receive treatment for COPD include cultural differences, perception of health services, and level of health literacy. Evidence from qualitative research have established that, as a result of past histories of abuse and discrimination, and prior negative experiences with the health care system, Aboriginal peoples may not seek medical care at rates which would be expected of Canadians in the general population, among whom biomedicine is understood culturally as the primary accepted mean of disease diagnosis and treatment.

In summary, the studies presented in this report provide evidence of a gap between Métis and non-Aboriginal populations in Alberta in the epidemiology of COPD (incidence and prevalence) and the rates of health services utilization (i.e., hospitalizations and ED visits) once they are diagnosed with COPD.

While there is an important body of literature worldwide informing that income, socio-economic status, social position, and geographic location are key determinants for a broad array of adverse COPD health outcomes,[27-34] more research is needed to expand our knowledge about the role of these factors to explain potential inequalities in respiratory health affecting Métis.

Strengths of this Research

Research presented in this report is the first study in Alberta to provide a comprehensive longitudinal assessment of the epidemiology and health services use in COPD among Métis compared to the non-Aboriginal population.

The longitudinal, population-based cohort design with database linkage is a cost-efficient and valid method to evaluate the differences in the outcomes of interest between Métis and non-Aboriginal cohorts. This research used an algorithm to identify COPD cases that has been previously validated, with acceptable specificity and positive and negative predictive values.

Another strength of the study is the comprehensive methods to identify individuals in the Métis cohort. By linking administrative data between the Métis Nation of Alberta (MNA) citizenship registry and administrative health databases, this study is one of the first of its kind in Canada that identified Métis from administrative databases.

Limitations

As with all research that is observational in nature, there are a number of limitations inherent to the quality of administrative data and underreporting of key information and potential bias in the selection of the study cohorts.

The effect of potential confounders including family history, smoking status and behaviour, exposure to second hand smoke, body mass index, treatments, and clinical measures of lung function, and COPD severity were not fully adjusted for in the multivariate analyses because no direct information on these factors is captured in administrative health databases.

Additionally, data captured in administrative databases did not permit to assess how distal social factors and potential health care system- and provider-related characteristics might account for the differences in outcomes between Métis and the non-Aboriginal cohorts. For example, rates of health services use may have differed between the study populations due to factors that may not be related to health but to accessibility of treatment services, and medical or administrative decisions that bear on the number and length of stay in the services. This research also falls short to acknowledge the role that traditional diagnosis and medicine practices can play in health services outcomes in COPD.

Misclassification bias affecting the status of exposure (i.e., being Métis) was not entirely eliminated in the study. For example, an individual who was classified in the non-Aboriginal group may have been in fact, a Métis without citizenship registration under the MNA. It is also possible that Métis individuals registered with the MNA may be different (in demographic or clinical terms) than non-registered Métis in the province.

Not all (perhaps as low as 30%) Métis in the province are members of the MNA and therefore, a substantial number of non-MNA Métis were left out from our study or were misclassified in the non-Aboriginal group.

Misclassification bias in the study may have led to undercounting of approximately one-third of Métis peoples in the province. If anything, the magnitude of the differences in epidemiological indicators of COPD between Métis and the non-Aboriginal cohort has likely been underestimated as a result of misclassification of non-MNA Métis, for had we had the correct classification, such differences would have been more precise.

Study Significance and Implications for Métis, Health Care Professionals, and Policy Makers

Notwithstanding the above limitations, this research is one of the first studies in Canada and the first one in Alberta that provided the most comprehensive evidence to date on the epidemiology and health services use for COPD among Métis.

From a broader perspective, the results support the view that Aboriginal peoples in Canada should not be regarded as a monolithic ethnic group when examining how COPD epidemiological estimates compare to those of non-Aboriginal peoples in the province. COPD-related inequalities compared to the non-Aboriginal population in the province are not homogeneous across all Aboriginal peoples; their determinants of respiratory health status vary widely, as does reliance on traditional- versus Western-style health care practices to manage exacerbations and chronic care. Therefore, inequalities in their respiratory outcomes must be understood within the diverse contexts within which Aboriginal communities live. These factors should be taken into account when designing and implementing prevention, diagnosis, and treatment programs to reduce the burden of COPD among Métis in Alberta.

Results of this study have important implications for Métis communities, health care professionals, and policy makers in the province. For Métis communities, it is important to acknowledge that the design, conduction, and interpretation of this research are grounded in a Western paradigm of research that does not reflect Aboriginal worldviews about respiratory health and disease. By acknowledging this, we recognize the limitations inherent to the research approach and the commitment to avoid imposing non-Aboriginal values in the interpretation of the study results and the implications for Métis communities in Alberta.

In light of this, Métis communities should decide which elements of this research have the potential to contribute to their own decision-making process when setting priorities to suit their own health care needs. Similarly, it is expected that Aboriginal knowledge can make significant contributions to our understanding of how COPD burdens the lives of Aboriginal communities and what type of Aboriginal-lead initiatives can be implemented to address the inequalities in the respiratory health status of Métis peoples that were identified.

A first step in this direction would be the dissemination of this research through Métis health forums and other events held by the Métis Nation of Alberta in the province. The objective would be to engage the Métis community in a discussion of how Western knowledge on Métis respiratory health (predicated through data and statistics) can interplay with Indigenous knowledge (based on narratives and experience) to improve respiratory health outcomes for Métis communities.

The results of this study have several important practical implications for respiratory specialists and other health professionals who treat Métis patients with COPD. Non-Aboriginal health care professionals need to understand how Métis interpret their illness experience of COPD and how they respond to therapeutic recommendations. It is recommended that health care professionals working on COPD evaluate whether their treatment plans, education, and pulmonary rehabilitation programs are acceptable to the cultural, social, and economic circumstances of their Métis patients.

The results of this study are also relevant from a policy makers' perspective. Policy makers involved in the planning of respiratory health services delivered to Aboriginal peoples in the province need to receive these results and collaboratively identify areas for which specific interventions may be tailored for Métis to improve their respiratory health status and outcomes.

Research results can inform research and action plans within the strategic priorities considered in the Alberta's Health Research and Innovation Strategy. These initiatives can be assessed and implemented through the works of the Alberta Health Services Respiratory Health Strategic Clinical Network. The adoption of the "Two-Eyed Seeing" model advocated by the Canadian Institute of Health Research Institute of Aboriginal Peoples' Health to integrate traditional knowledge and community approaches to healing with Western scientific approaches for the evaluation and implementation of health interventions for COPD is one way of addressing this issue.[34,36]

It is important for policy makers to understand that the impact of COPD among Métis peoples cannot be explained as an outcome arising exclusively from "wrong" individual health behaviours (i.e., smoking). There is a need to look beyond individual responsibility and examine the role of the social environment and the political and economic influences under which respiratory diseases such as COPD develop.

Results of this research, albeit of epidemiological nature, should be interpreted in the context of historical experiences of colonization, acculturation, and trans-generational trauma as important distant factors underlying inequalities in the epidemiology and health services use for COPD between Aboriginal and non-Aboriginal peoples.

Similarly, the role of government and intersectoral policies, including those at the health care system level, should be recognized as intermediate determinants of the respiratory health status of Aboriginal peoples. Attention to processes and pathways for the development of respiratory diseases like COPD in Métis peoples is critical for planning and executing strategies to tackle health inequalities in respiratory health status.

CONCLUSIONS

The research presented in this report provides a comprehensive picture of how COPD affects Métis in Alberta. Métis in Alberta have higher prevalence and incident rates of COPD than non-Aboriginal peoples. The mortality hazard five years after being diagnosed with COPD is lower in Métis compared to non-Aboriginal individuals. Given a diagnosis of COPD, Métis had lower hospitalization and ED visit rates than non-Aboriginals. Reasons for the differences in the epidemiology and health services use for COPD between Métis and non-Aboriginal populations in Alberta should be further explored within a framework of social determinants of health to effectively influence modifiable risk factors.

The results constitute an important step towards tackling potential health inequalities and identifying the areas in which specific approaches are needed to improve respiratory health status and access to health services for COPD in Métis.

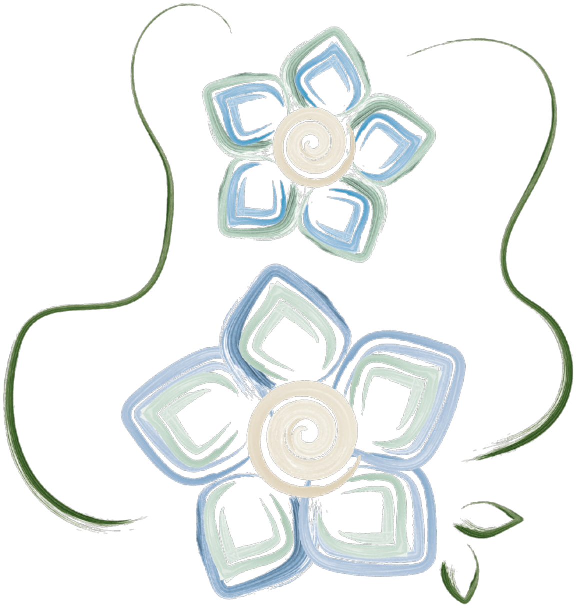


Table 1. Annual unadjusted and adjusted prevalence rate ratios of COPD among Métis in Alberta, Canada; fiscal years 2002/2003 to 2009/2010

Fiscal year	Métis	
	COPD PR (95% CI)	
	Unadjusted	Adjusted*
2002 - 2003	1.11 (0.94, 1.32)	1.60 (1.34, 1.91)**
2003 - 2004	1.04 (0.89, 1.22)	1.59 (1.35, 1.87)**
2004 - 2005	1.03 (0.89, 1.19)	1.61 (1.39, 1.86)**
2005 - 2006	1.03 (0.91, 1.18)	1.61 (1.41, 1.85)**
2006 – 2007	1.07 (0.95, 1.21)	1.68 (1.48, 1.91)**
2007 – 2008	1.07 (0.96, 1.20)	1.67 (1.48, 1.88)**
2008 – 2009	1.07 (0.96, 1.19)	1.63 (1.45, 1.83)**
2009 - 2010	1.1 (0.99, 1.21)	1.61 (1.44, 1.80)**

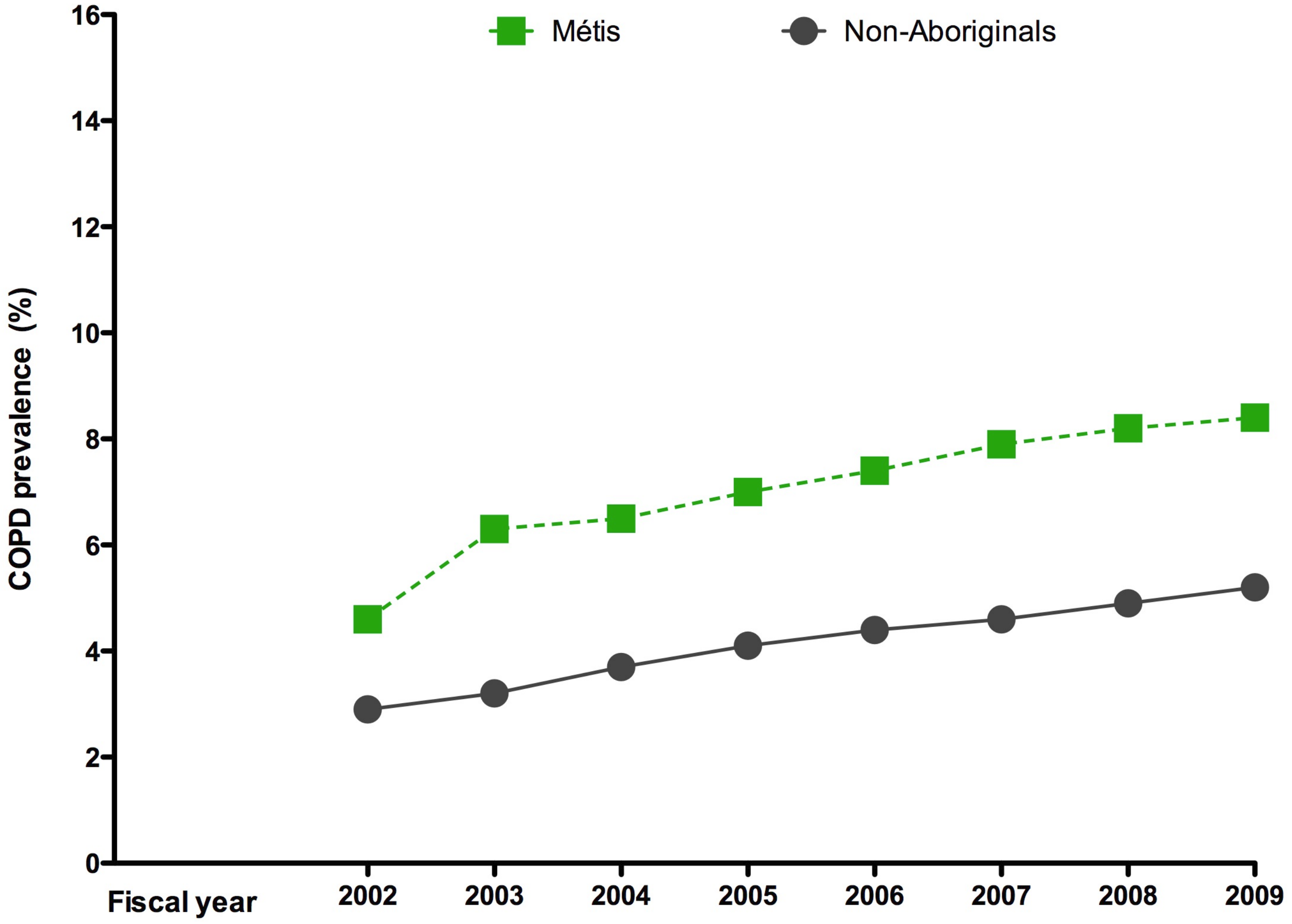
Reference group: Non-Aboriginal population;
* Adjusted for sex (male, female), age group (35-44 years, 45-54 years, 55-64 years, 65-74 years, 75 years and over), socioeconomic status proxy (full subsidy, partial subsidy, no subsidy), area of residence (urban rural, remote); ** p<0.001
CI = confidence interval; COPD = chronic obstructive pulmonary disease; PR = prevalence ratios

Table 2. Baseline characteristics of Métis and non-Aboriginal populations diagnosed with COPD in Alberta, Canada; fiscal years 2005/2006 to 2009/2010

	Métis	Non-Aboriginals
N	225	974
Male (%)	60.4%	55.1%
Age groups (%)		
35-54 yr	59.1	37.2
≥ 65 yr	40.9	62.8
Area of residence (%)		
Urban	52.0	68.5
Rural	38.7	28
Remote	9.3	3.5
Subsidy level (%)		
Full/Partial	60.9	72.6
None	39.1	27.4
COPD comorbidities (%)		
Hypertension	17.3	18.1
IHD	13.3	11.2
Asthma	7.6	8.2
DM	8.0	8.7
Osteoporosis	3.1	5.2
Deaths (all causes) (%, n)	8.4 (19)	22.0 (214)
Person-time (yr)	518.6	2021.9
Crude mortality rate (per 1,000 person-yr) (95% CI)	37.7 (20.6, 67.9)	105.8 (102.7, 136.4)
Age-and sex- standardized mortality rate (per 1,000 person-yr) (95% CI)	35.9 (32.4, 39.4)	73.6 (71.2, 76.0)

95% CI = 95% confidence interval; COPD = chronic obstructive pulmonary disease; DM = diabetes mellitus; IHD = ischemic heart disease; yr(s) = years

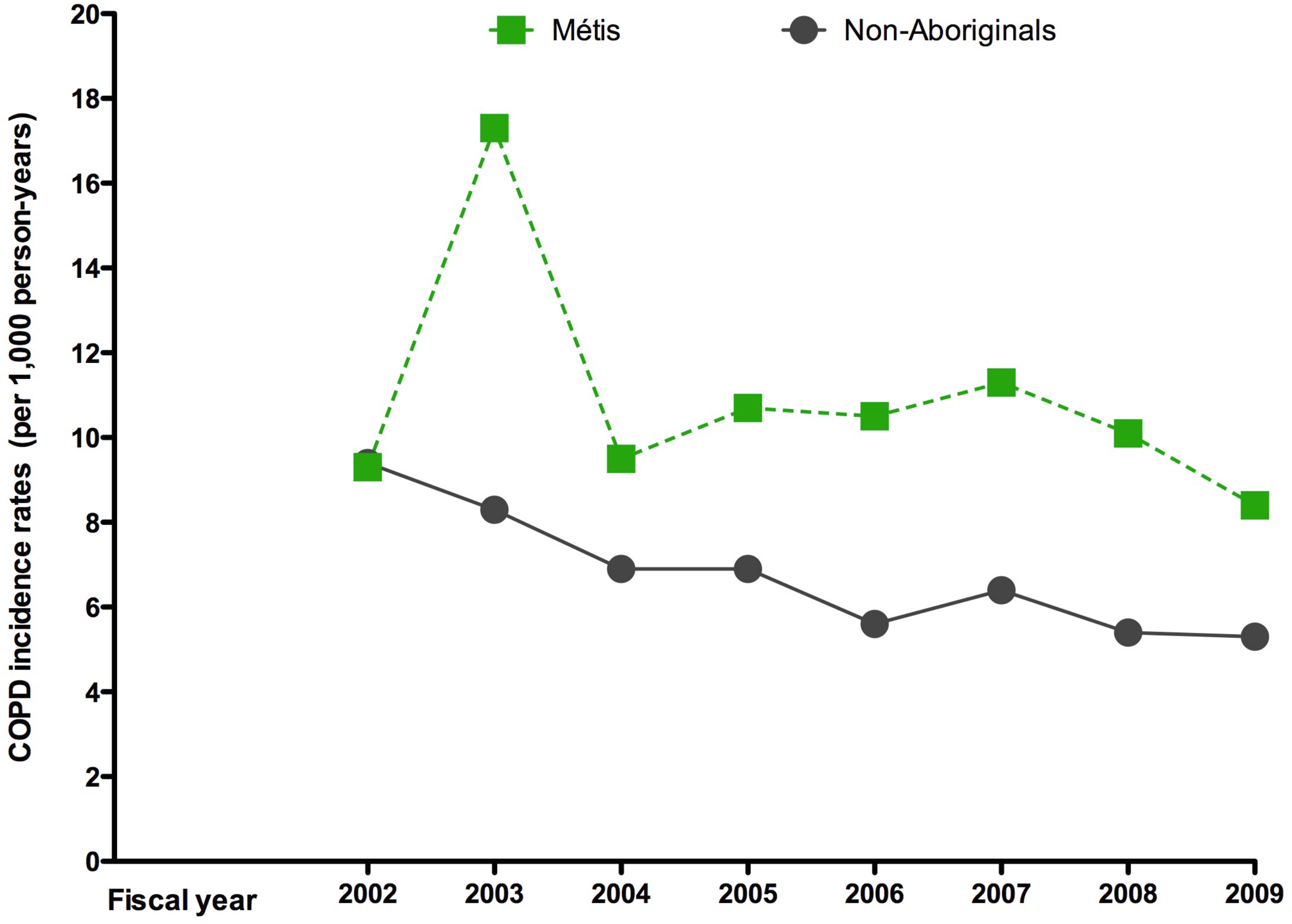
Figure 1. Annual age- and sex-standardized COPD prevalence rates in Métis and non-Aboriginal cohorts in Alberta, Canada; fiscal years 2002/2003 to 2009/2010



Métis	4.6	6.3	6.5	7.0	7.4	7.9	8.2	8.4
Non-Aboriginals	2.9	3.2	3.7	4.1	4.4	4.6	4.9	5.2

COPD = chronic obstructive pulmonary disease

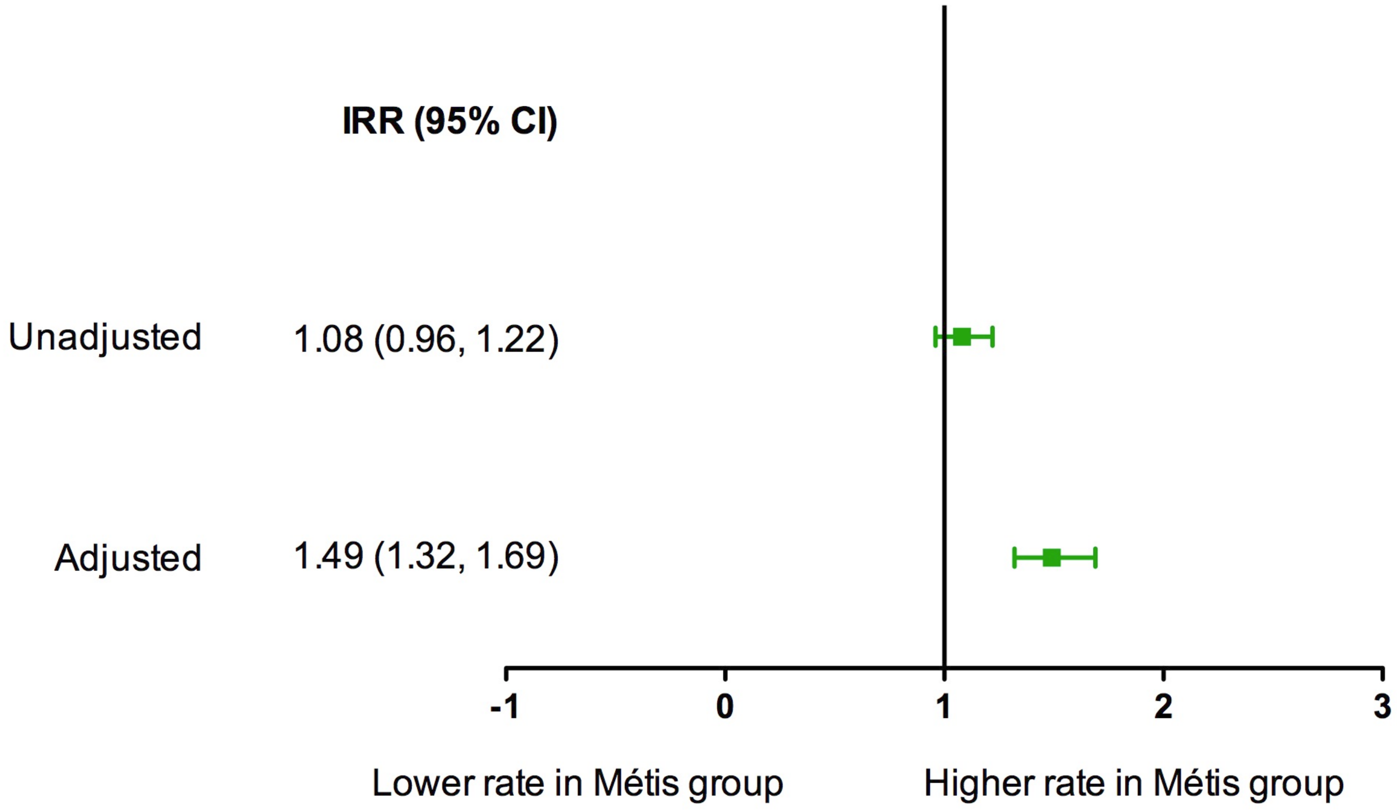
Figure 2. Annual age- and sex-standardized COPD incidence rates in Métis and non-Aboriginal cohorts in Alberta, Canada; fiscal years 2002/2003 to 2009/2010



Métis	9.3	17.3	9.5	10.7	10.5	11.3	10.1	8.4
Non-Aboriginals	9.4	8.3	6.9	6.9	5.6	6.4	5.4	5.3

COPD = chronic obstructive pulmonary disease

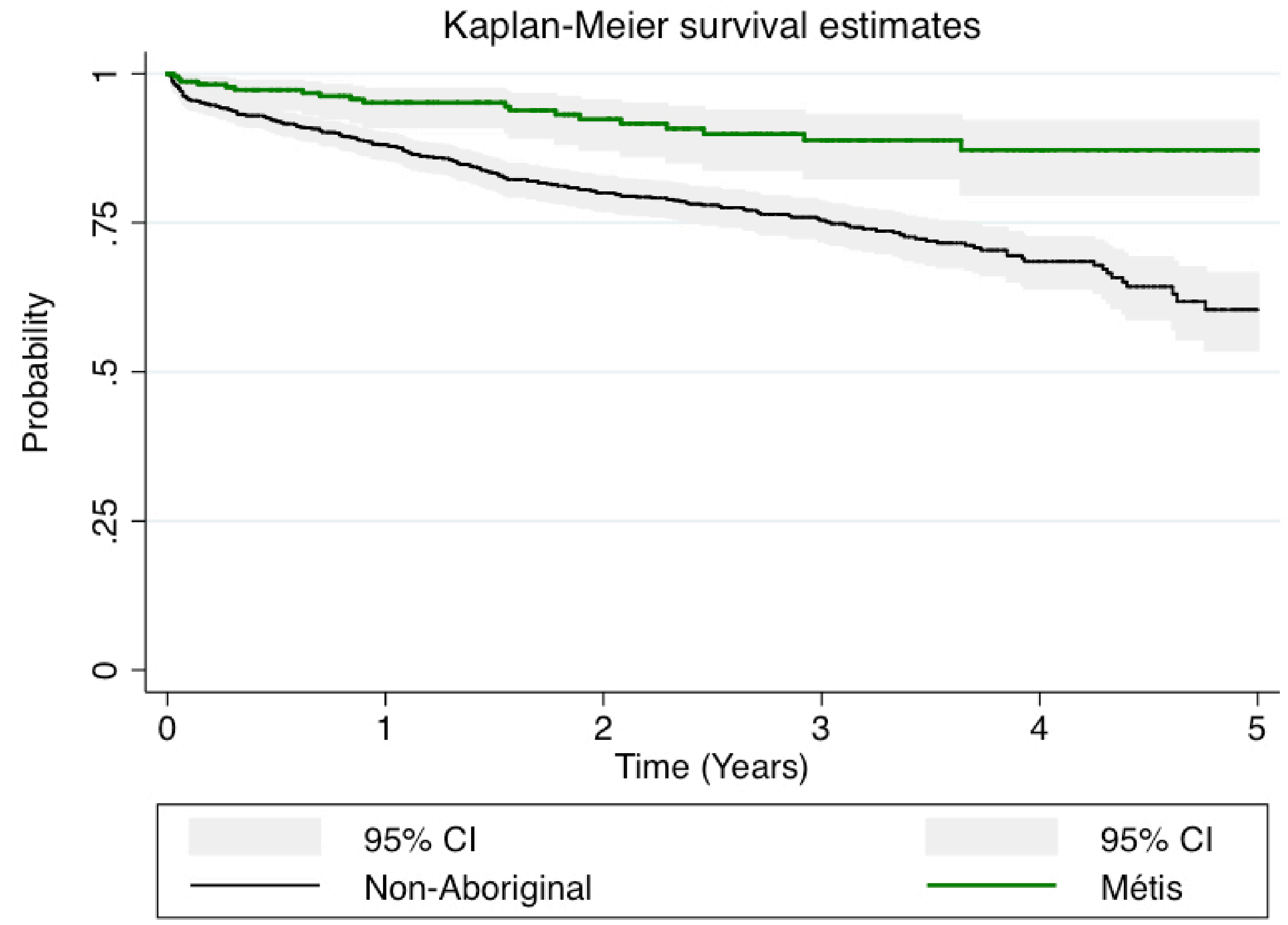
Figure 3. Unadjusted and adjusted COPD incidence-density rate ratios for Métis using the non-Aboriginal group as the reference group



Notes: Estimates adjusted for sex (male, female), age group (35-44 years, 45-54 years, 55-64 years, 65-74 years, 75 years and over), socioeconomic status proxy (full subsidy, partial subsidy, no subsidy), and area of residence (urban rural, remote).

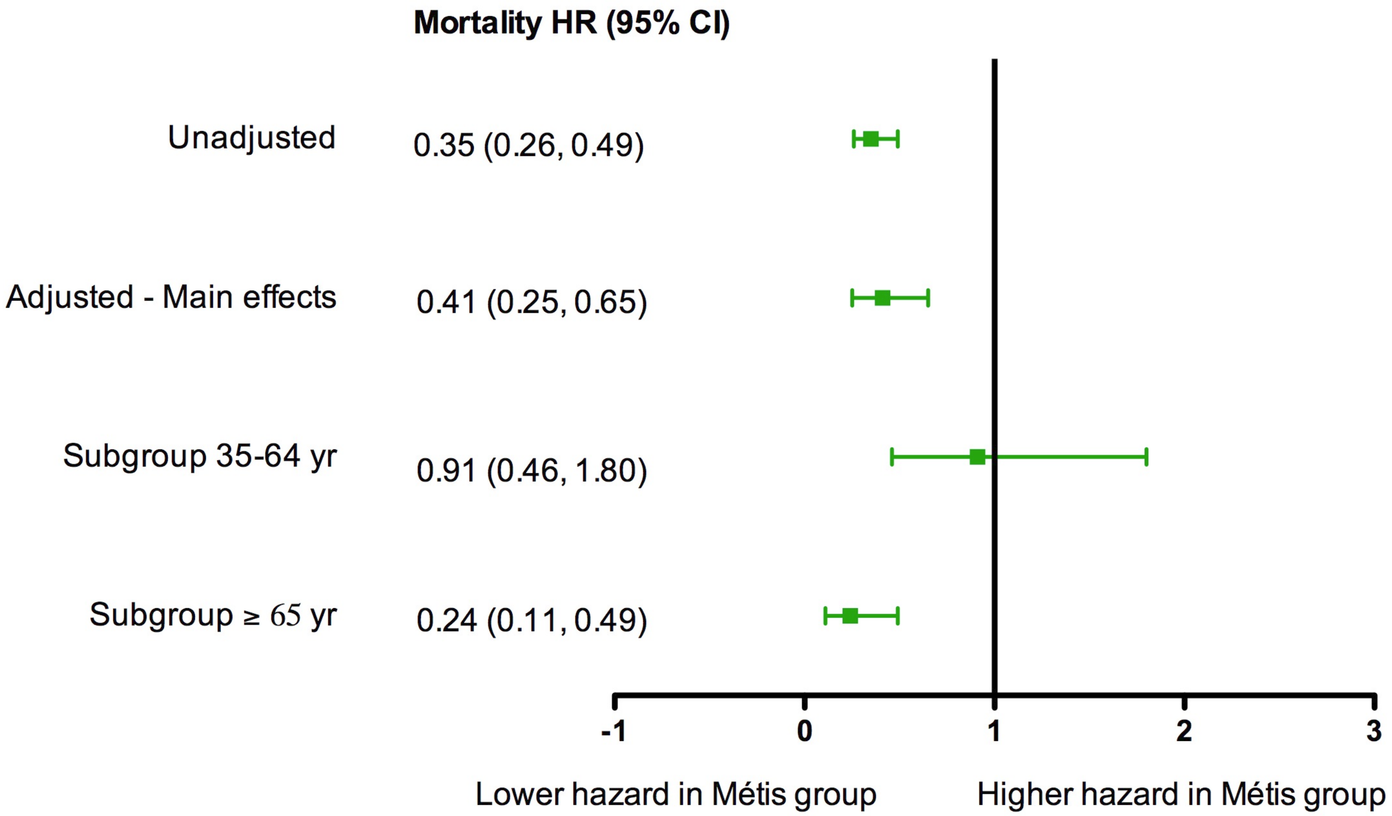
Reference group: Non-Aboriginal population; CI = confidence interval; COPD = chronic obstructive pulmonary disease; IRR = incidence rate ratio.

Figure 4. Five-year survival time of Métis and non-Aboriginal groups diagnosed with COPD in Alberta, Canada; fiscal years 2005/2006 to 2009/2010



95% CI = 95% confidence interval

Figure 5. Mortality hazard ratios five years after a diagnosis of COPD in the Métis cohort



Notes: The main-effects model and the model with the interaction term were adjusted for sex (male, female), age group (35-64 years, 65 years and over), socioeconomic status proxy (full/partial subsidy, no subsidy), area of residence (urban rural, remote), and presence of comorbidities (hypertension, ischemic heart disease, asthma, diabetes mellitus, osteoporosis).

Reference group: Non-Aboriginal population; 95% CI = confidence interval; HR = hazard ratio

Figure 6. Annual all-cause hospitalization rates in Métis and non-Aboriginal groups with COPD in Alberta, Canada; fiscal years 2002/2003 to 2009/2010

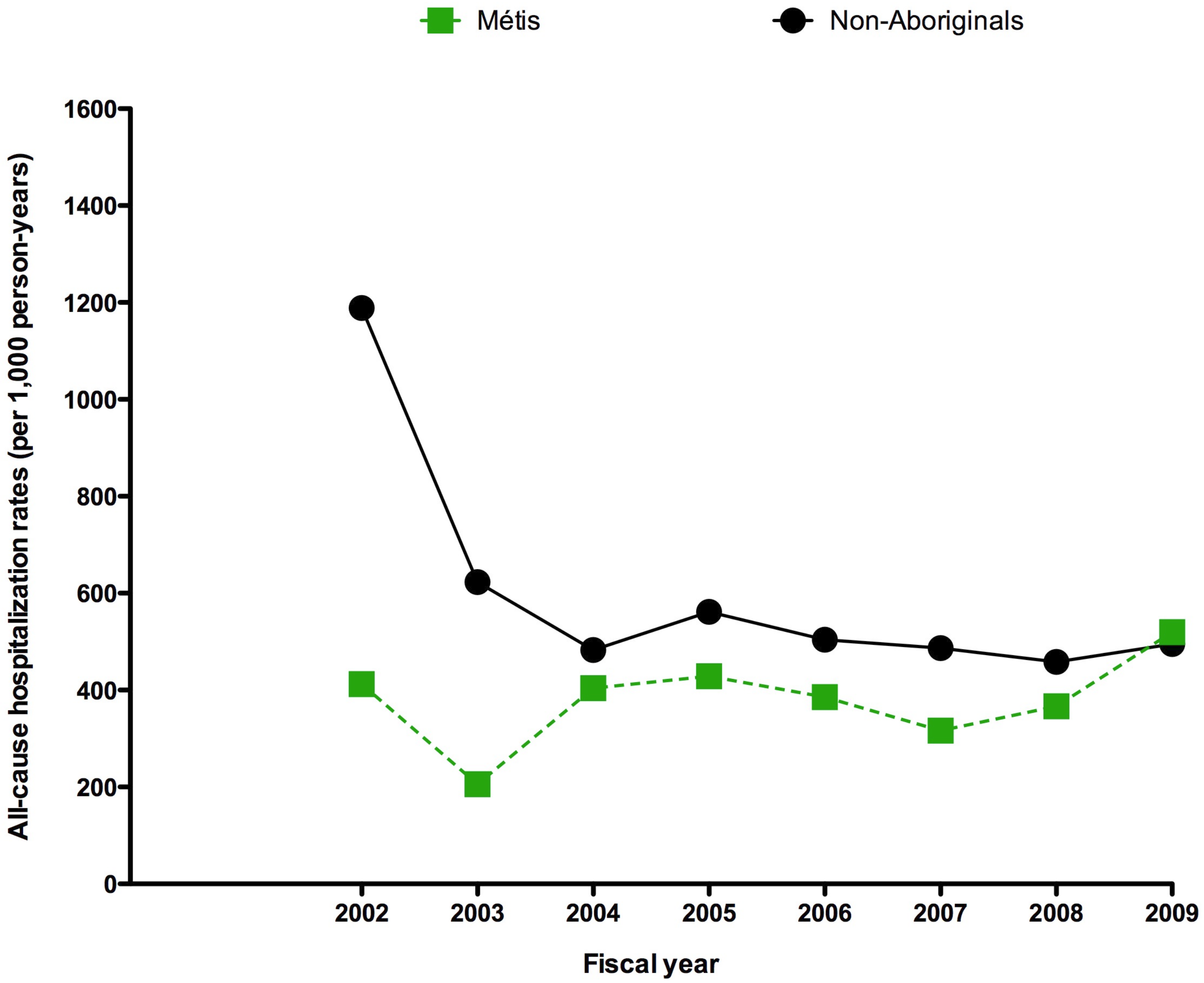
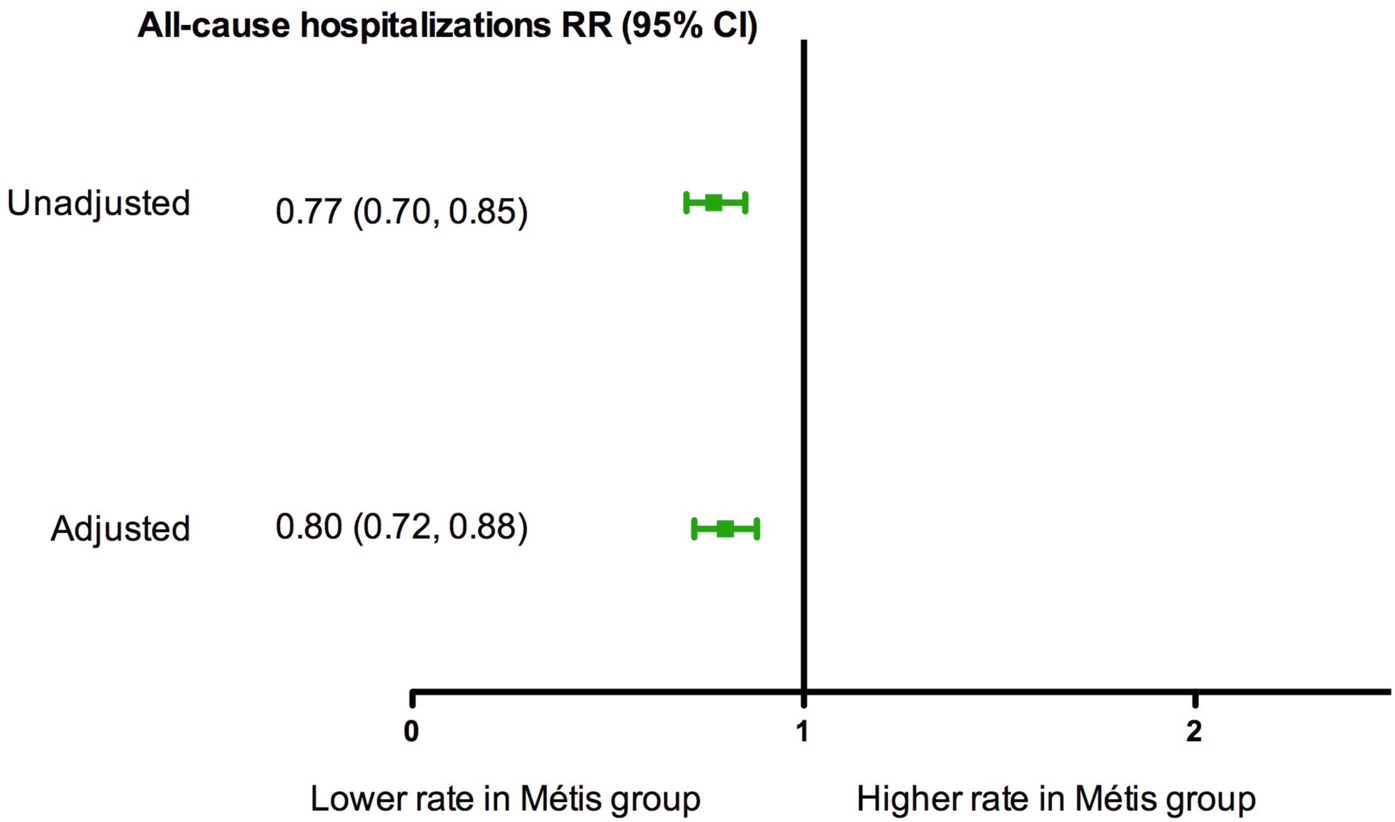
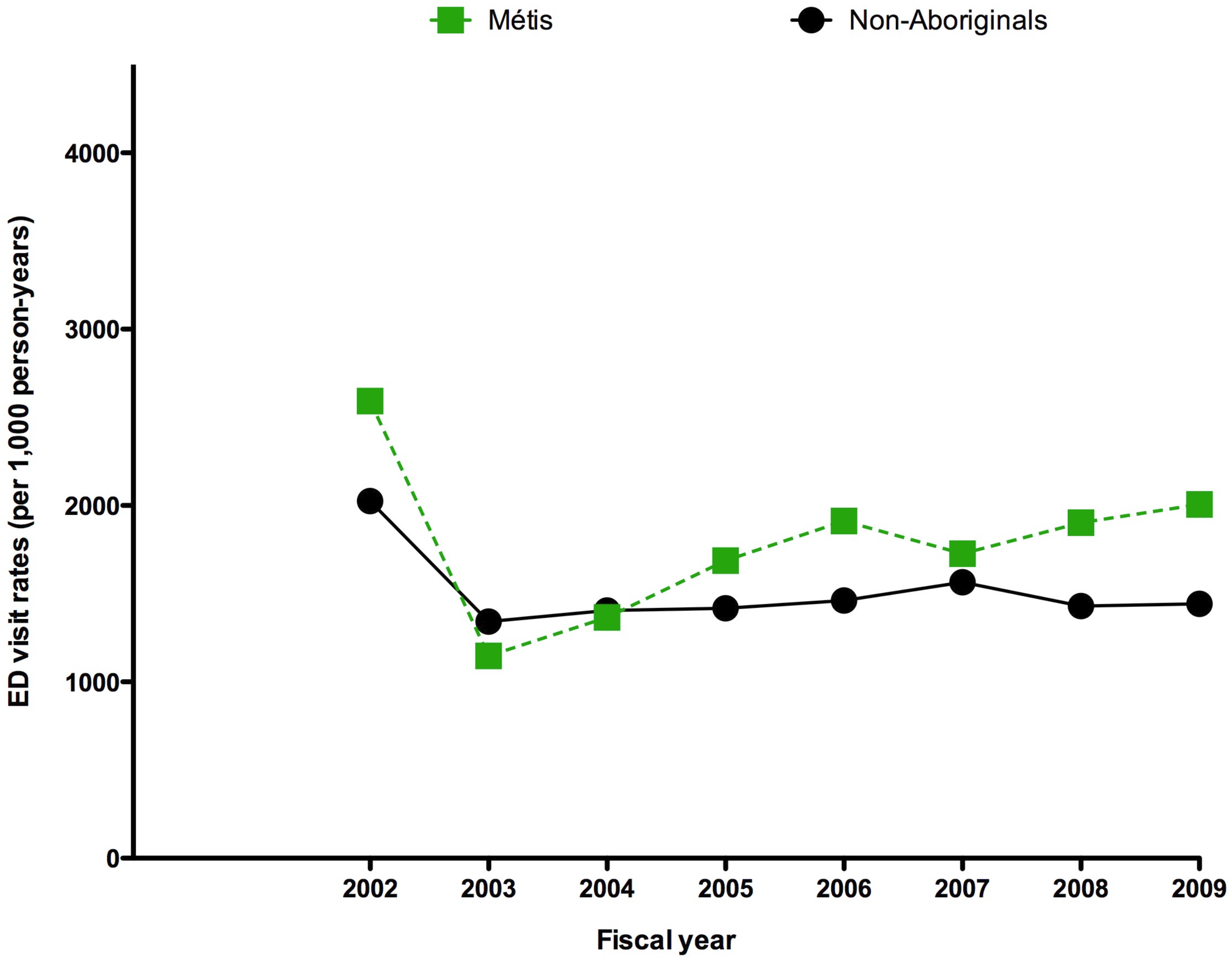


Figure 7. All-cause hospitalization rate ratios in Métis with COPD in Alberta, Canada; fiscal years 2002/2003 to 2009/2010



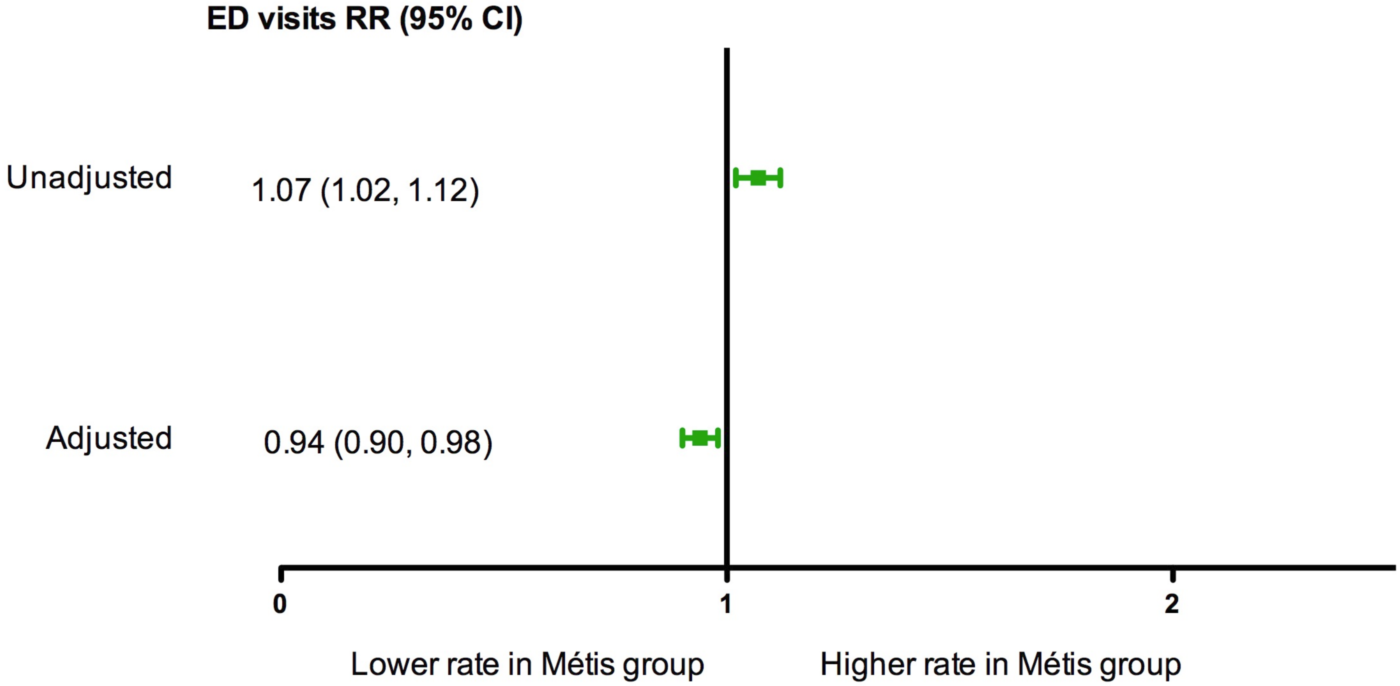
95% CI = 95% confidence interval; RR = rate ratio

Figure 8. Annual rates of all-cause ED visits in Métis and non-Aboriginal groups with COPD in Alberta, Canada; fiscal years 2002/2003 to 2009/2010



ED = emergency department

Figure 9. Rate ratios of all-cause ED visits in Métis with COPD in Alberta, Canada; fiscal years 2002/2003 to 2009/2010



95% CI = 95% confidence interval; COPD = chronic obstructive pulmonary disease; ED = emergency department; RR = rate ratio

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