

# Incidence of Asthma, COPD, Diabetes, and Hypertension in Saskatchewan



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## Summary:

This snapshot report highlights incidence trends and regional variations for four chronic diseases (asthma, COPD, diabetes and high blood pressure) in Saskatchewan.

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## Purpose

The purpose of this report is to present incidence information for four chronic diseases in Saskatchewan between the 2001/02 and 2010/11 fiscal years: asthma, chronic obstructive pulmonary disease (COPD), diabetes, and hypertension.

Incidence trends at the provincial level, and five-year average incidence estimates for comparison of disease burden in each regional health authority are presented.

## Chronic Disease Relative Risks

Incidence is defined as the number of new cases detected in the population at risk for the disease during a specific period. Incidence provides information about the risk of contracting a disease, whereas prevalence indicates how widespread the disease is. Differences in incidence rates may be attributed to differences in underlying risk factors of a disease, or in differences related to the ability of detecting the disease. It is therefore an indicator of primary and secondary prevention.

If individuals have more than one chronic disease then having one chronic condition may increase the risk of developing another chronic disease. An indicator related to rela-

tive risk is the incidence rate ratio (IRR). The IRR is the ratio of the incidence rate of a chronic condition among Saskatchewan residents who met the case definition of another chronic condition in any previous fiscal year, to the incidence rate among the population without that other condition. This indicator is useful for secondary and tertiary prevention planning.

Table 1 shows incidence rate ratios related to the four chronic diseases as exposures for each other. Note that IRR is not reported for asthma, since most asthma develops very early in life, before any of the other conditions become prevalent.

**Table 1: Five-year Age-standardized Incidence Rate Ratios and 95% confidence limits.**

Saskatchewan, 2006/07-2010/11		Incident Condition		
		COPD	Diabetes	Hypertension
Condition Prevalent in any Previous Year	Asthma (all ages)	3.8 ±0.13	1.4 ±0.05	1.3 ±0.04
	COPD (ages 35 years and older)	N/A	1.5 ±0.11	1.3 ±0.05
	Diabetes (age 1 year and older)	1.5 ±0.06	N/A	2.9 ±0.08
	Hypertension (ages 20 years and older)	1.5 ±0.05	3.3 ±0.15	N/A

- Saskatchewan residents 35 years of age or older with asthma are about four times more likely to be diagnosed with COPD than those without asthma.
- Saskatchewan residents 20 years of age or older with hypertension are more than three times more likely to be diagnosed with diabetes than those without hypertension.
- Saskatchewan residents 20 years of age or older with diabetes are about three times more likely to be diagnosed with hypertension than those without diabetes.
- Other relative risks such as from asthma and COPD to diabetes or hypertension or from diabetes and hypertension to COPD are more moderate and range from a 30% to 50% increase relative to those without the other condition.
- Chronic disease relative risks are influenced by many causes, including shared risk factors such as smoking and obesity or health service uses, which are beyond the scope of this report.

# Asthma

Asthma is a chronic inflammatory disease of the airways that is characterized by wheezing, coughing, chest tightness, and shortness of breath. It is thought to be caused by a combination of genetic and environmental factors such as exposure to allergens, tobacco smoke, and viral respiratory infections.

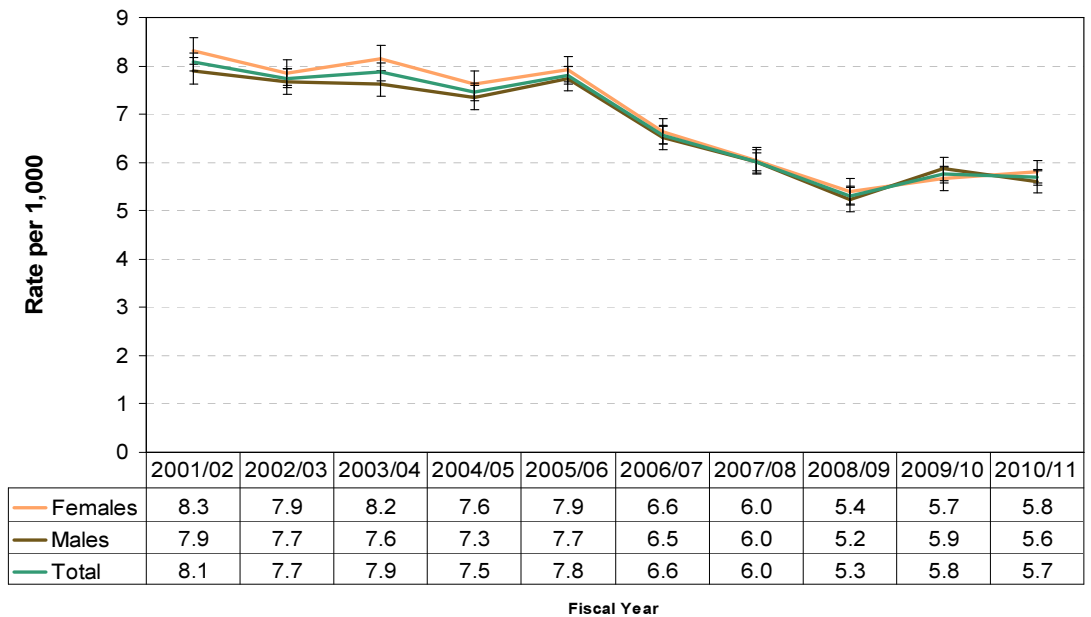
Management of asthma includes identification and avoidance of triggers that cause asthma attacks, as well as use of quick-relief medications to treat acute symptoms and long-term control medications to prevent further exacerbation.

For surveillance purposes, the asthma case definition requires that an individual must have EITHER:

- One or more inpatient hospital separations with a diagnosis of ICD-9 code 493 or ICD-10-CA codes J45, J46 in any field of the hospital separation records; OR
- Two or more physician claims with a diagnosis of ICD-9 493 within two years.

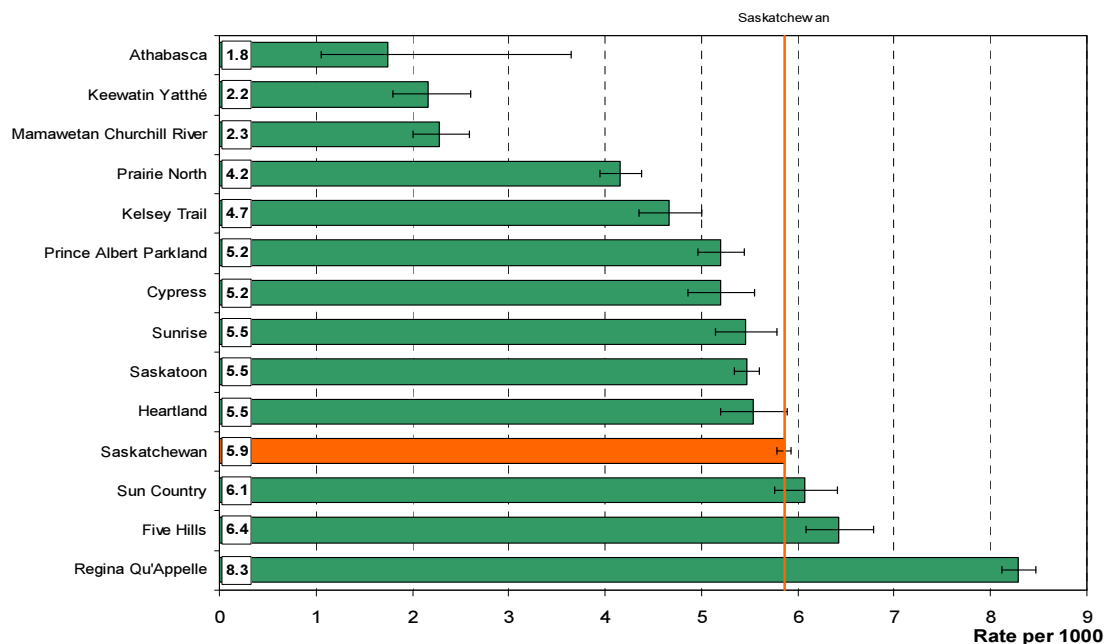
The asthma case definition applies to all ages.

**Figure 1: Asthma (all ages) - Age-Standardized Incidence Rates, Saskatchewan, 2001/02 to 2010/11**



- Between 2001/02 and 2005/06 the age-standardized asthma incidence rate did not change significantly.
- Between 2005/06 and 2008/09 the age-standardized asthma incidence rate decreased significantly by about 25%.
- The age-standardized asthma incidence rate was significantly higher in 2009/10 and 2010/11 than in 2008/09.
- Female age-standardized asthma incidence was higher than male asthma incidence in each year except 2007/08 and 2009/10.

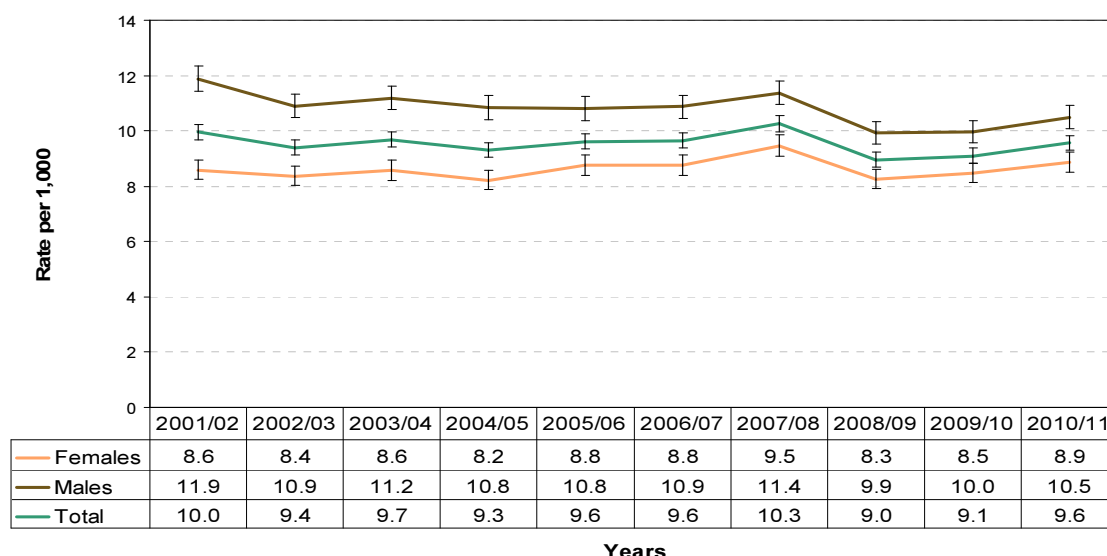
**Figure 2: Asthma (all ages) - Average Annual Age-standardized Incidence Rates by SK Health Region, 2006/07- 2010/11**



- Asthma incidence is significantly lower than Saskatchewan in the Athabasca, Keewatin Yatthé, Mamawetan Churchill River, Prairie North, Kelsey Trail, Prince Albert Parkland, Cypress, Sunrise, and Saskatoon health regions.
- The asthma incidence rate is significantly higher than Saskatchewan in the Five Hills and Regina Qu'Appelle health regions.

# Chronic Obstructive Pulmonary Disease (COPD)

**Figure 3: COPD (ages 35 years and older) - Age-Standardized Incidence Rates, Saskatchewan, 2001/02 to 2010/11**

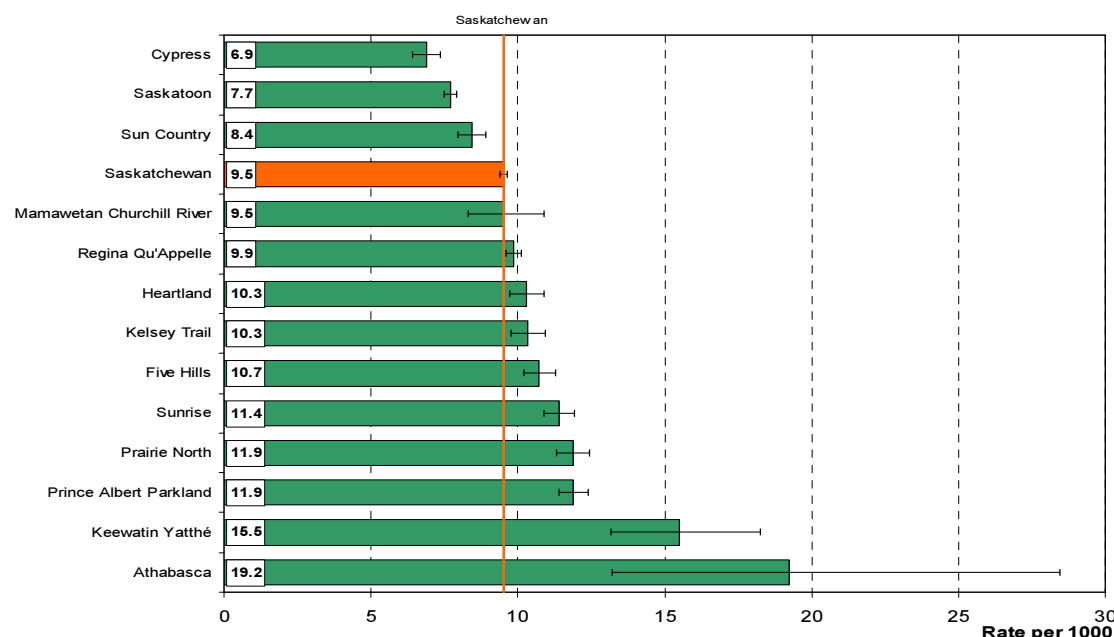


- Age-standardized COPD incidence rates in Saskatchewan show little change from year to year in most years. Exceptions are 2007/08 which had a significantly higher COPD incidence rate than each of the previous five years, and the following year 2008/09 which had a significantly lower

COPD incidence rate than each of the previous five years.

- The male age-standardized COPD incidence rate was significantly higher than the female rate in each year.

**Figure 4: COPD (ages 35 years and older) - Average Annual Age-standardized Incidence Rates by SK Health Region, 2006/07-2010/11**



- COPD age-standardized incidence rates are significantly lower than Saskatchewan in the Cypress, Saskatoon, and Sun Country health regions.
- COPD incidence is significantly higher than Saskatchewan in the Heartland, Kelsey Trail, Five Hills, Sunrise, Prairie North, Prince Albert Parkland, Keewatin Yatthé, and Athabasca health regions.

Chronic bronchitis and emphysema, together with similar respiratory illnesses, are collectively known as chronic obstructive pulmonary disease (COPD). COPD is characterized by progressive and chronic airflow limitation that is not fully reversible and is most commonly diagnosed in individuals 35 years of age and older. COPD is largely preventable as the majority of cases are caused by smoking.

Important management strategies are smoking cessation, vaccinations for respiratory organisms, rehabilitation, and drug therapy (often using inhalers).

For surveillance purposes, the COPD case definition requires that an individual must have EITHER:

- One or more inpatient hospital separations with a diagnostic code ICD-9 491, 492, 496 or ICD-10-CA J41-J44 in any field of the hospital separation records; OR
- One or more physician claims with a diagnostic code ICD-9 491, 492, 496

The COPD case definition applies to individuals 35 years of age and older.

# Diabetes

Diabetes is characterized by the body's inability to sufficiently produce and/or use insulin – a hormone produced by the pancreas that assists with the conversion of glucose (sugar) into energy.

Diabetes increases the risk of heart disease and stroke, blindness, kidney disease, peripheral nerve problems, and amputation. These risks may be reduced by controlling blood sugar with a healthy diet, exercise, weight loss and medications.

For surveillance purposes, the diabetes case definition requires that an individual must have EITHER:

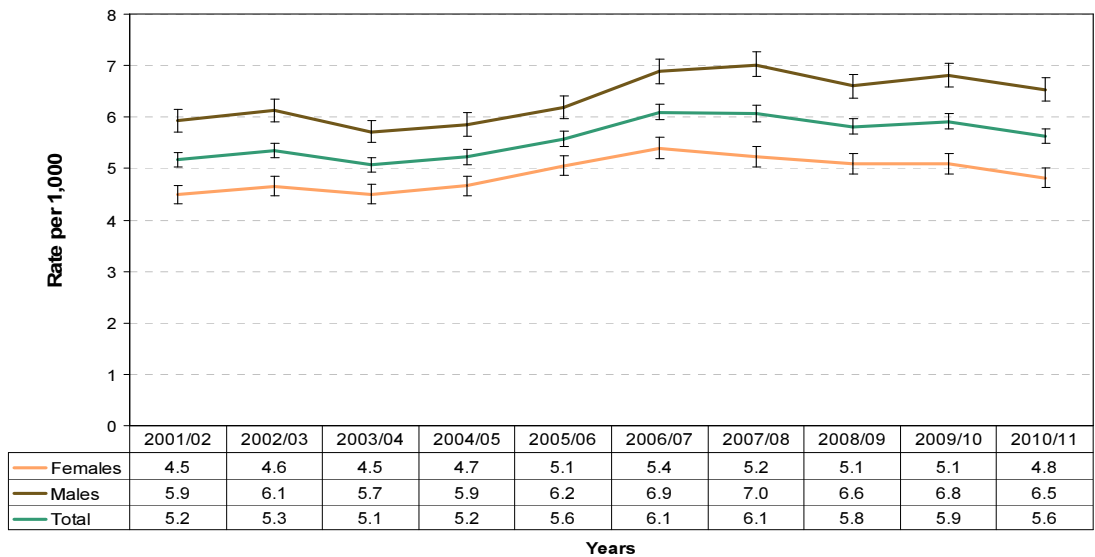
- One or more inpatient hospital separations with an ICD-9 code 250 or an equivalent ICD-10-CA code E10 to E14, selected in any field of the hospital separation records; OR
- Two or more physician claims with a diagnostic code ICD-9 250 within two years.

These diagnostic codes include both type 1 and type 2 diabetes.

The case definition does not include temporary gestational diabetes. Therefore, the case criteria exclude females aged 10 to 54 diagnosed with diabetes 120 days preceding or 180 days after any pregnancy-related hospital visit (as identified by a set of obstetric diagnostic codes).

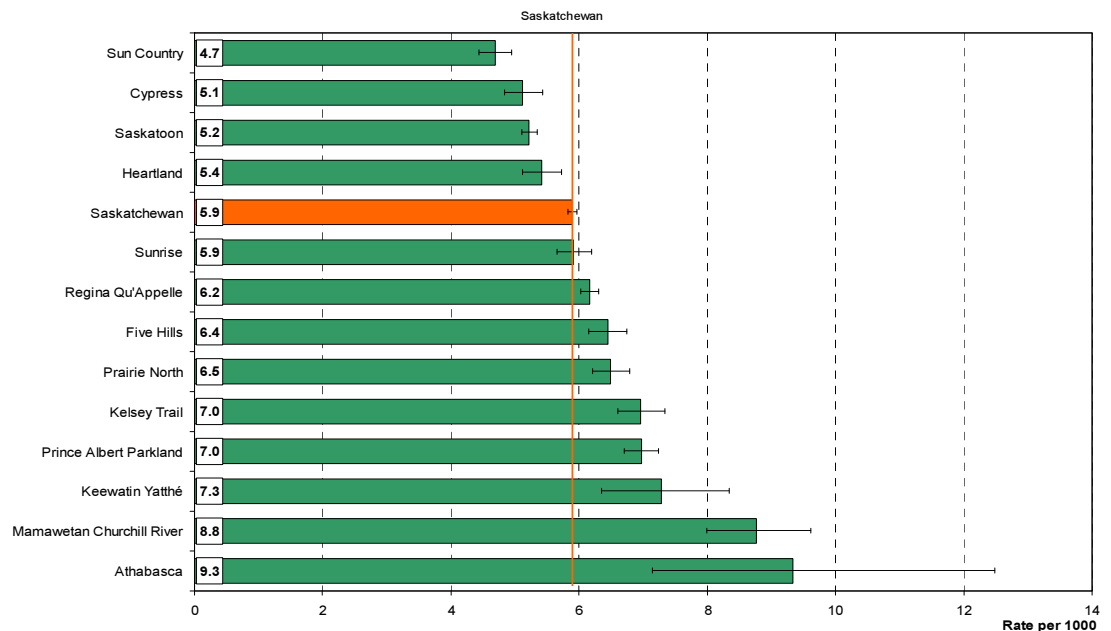
The diabetes case definition applies to individuals one year of age and older.

**Figure 5: Diabetes (age 1 year and older) - Age-Standardized Incidence Rates, Saskatchewan, 2001/02 to 2010/11**



- Between 2001/02 and 2004/05 the age-standardized diabetes incidence rate did not change significantly.
- There was a significant increase in diabetes incidence from 2004/05 to 2005/06 and again to 2006/07.
- Between 2006/07 and 2010/11 the age-standardized diabetes incidence rate did not change significantly from year to year.
- The male age-standardized diabetes incidence rate was significantly higher than the female rate in each year.

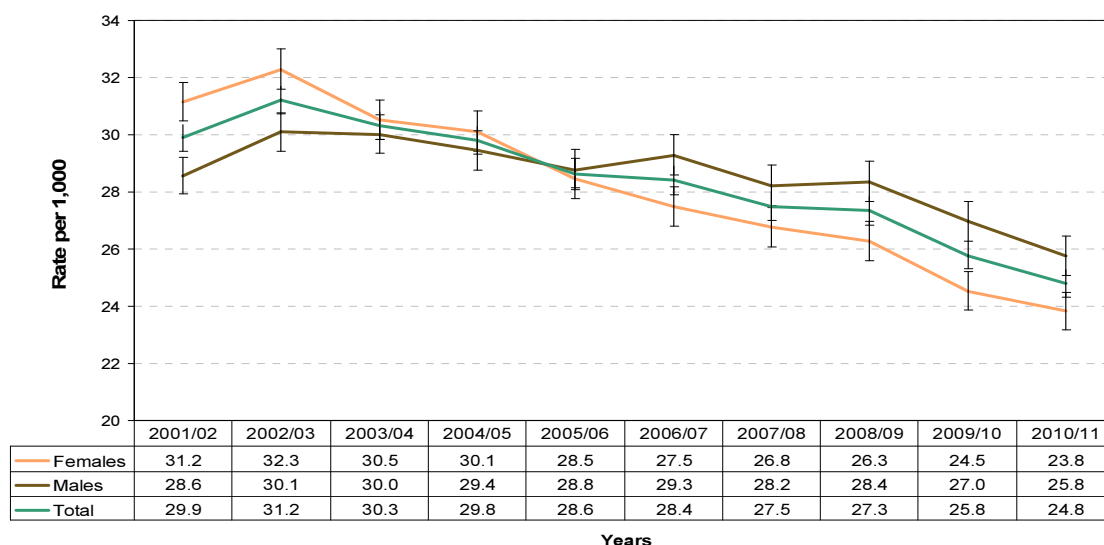
**Figure 6: Diabetes (age 1 year and older) - Average Annual Age-standardized Incidence Rates by SK Health Region, 2006/07-2010/11**



- Diabetes age-standardized incidence rates are significantly lower than Saskatchewan in the Sun Country, Cypress, Saskatoon, and Heartland health regions .
- Diabetes incidence is significantly higher than Saskatchewan in the Regina Qu'Appelle, Five Hills, Prairie North, Kelsey Trail, Prince Albert Parkland, Keewatin Yatthé, Mamawetan Churchill River, and Athabasca health regions .

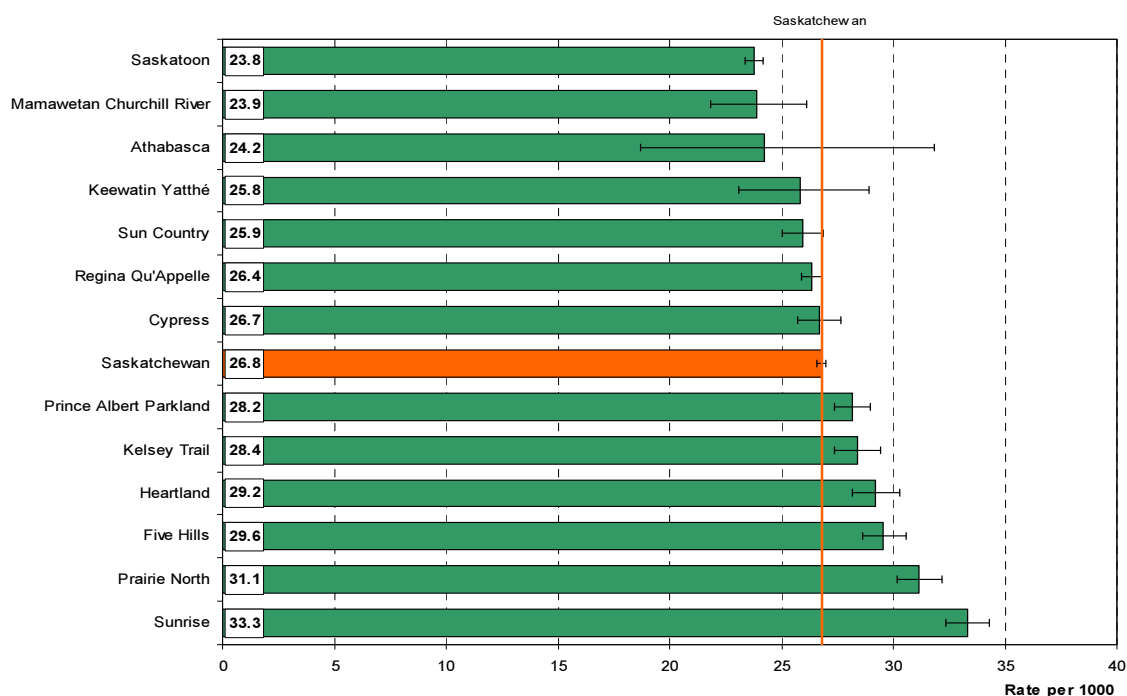
# Hypertension

**Figure 7: Hypertension (ages 20 years and older) - Age-Standardized Incidence Rates, Saskatchewan, 2001/02 to 2010/11**



- The age-standardized hypertension incidence rate has been decreasing in each year since 2002/03, with statistically significant year to year decreases in 2005/06, 2009/10, and 2010/11.
- The hypertension incidence rate has decreased by 21% between 2002/03 and 2010/11.
- The female hypertension incidence rate was higher than the male rate between 2001/02 and 2004/05 and lower between 2005/06 and 2010/11.
- Between 2002/03 and 2010/11, the female hypertension incidence rate has decreased by 26% while the male rate has decreased by 14%.

**Figure 8: Hypertension (ages 20 years and older) - Average Annual Age-standardized Incidence Rates by SK Health Region, 2006/07-2010/11**



- Hypertension age-standardized incidence rates are significantly lower than Saskatchewan in the Saskatoon and Mamawetan Churchill River health regions.
- Hypertension incidence is significantly higher than Saskatchewan in the Prince Albert Parkland, Kelsey Trail, Heartland, Five Hills, Prairie North, and Sunrise health regions.

Hypertension occurs when systemic arterial blood pressure is consistently high for long periods of time.

If left untreated, hypertension can increase the risk of stroke, coronary heart disease, dementia, heart and kidney failure.

People with hypertension may reduce their risk of complications by controlling blood pressure with a healthy diet, exercise, weight loss, smoking cessation, reducing alcohol intake, and anti-hypertensive medications.

For surveillance purposes, the hypertension case definition requires that an individual must have EITHER:

- One or more inpatient hospital separations with a diagnosis of ICD-9 codes 401, 402, 403, 404, 405 or ICD-10-CA codes I10, I11, I12, I13, I15, selected in any field of the hospital separation records; OR
- Two or more physician claims with a diagnostic code ICD-9 401-405 within two years.

These diagnostic codes include both essential and secondary hypertension.

The case definition does not include temporary pregnancy-induced hypertension. Therefore, the case criteria exclude females aged 10 to 54 diagnosed with hypertension 120 days preceding or 180 days after any pregnancy-related hospital visit (as identified by a set of obstetric diagnostic codes).

The hypertension case definition applies to individuals 20 year of age and older.

# Summary / Conclusion

- Asthma and hypertension age-standardized incidence rates decreased significantly whereas the diabetes incidence rate increased significantly and the COPD incidence rate stayed relatively stable during the 10 years of observation.
- Differences between males and females are not consistent for the four diseases: the male incidence rate is higher for COPD and diabetes for the entire observation period, and for hypertension in the most recent five years only, while female incidence is higher for asthma and hypertension in the first four years of observation.
- There are few consistent regional differences among the four diseases: Saskatoon Health Region had a significantly lower age-standardized incidence rate of all four condi-

tions compared to the province, and Cypress had significantly lower incidence of three conditions. On the other hand, Five Hills Health Authority had a significantly higher age-standardized incidence rate of all four conditions, and Kelsey Trail, Prairie North, and Prince Albert Parkland had significantly higher incidence of three conditions than Saskatchewan.

- Chronic conditions can be risk factors for each other. In particular, asthma increases the risk of COPD by about four times, and diabetes and hypertension increase the risk for each other by about three times. The elevated risk of diabetes among people with hypertension is of particular concern due to the high prevalence of hypertension, and is likely affected by obesity and other risk factors.

## Technical Notes

### Method:

Chronic disease estimates are based on the case definitions and infrastructure of the Canadian Chronic Disease Surveillance System (CCDSS), with support of the Public Health Agency of Canada. This method is based on linkage of administrative data sources including:

- Person Health Registry System: includes all residents eligible for Saskatchewan Health benefits and provides the annual population base, demographic, and coverage information.
- Hospital services: includes records of inpatient separations and day surgeries for patients treated in hospitals. Out-of-province hospital separations for Saskatchewan health beneficiaries are also captured.
- Medical services: includes physician and nurse practitioner service claims.

Ascertainment of chronic disease cases in the CCDSS starts with the 1995/96 fiscal year.

### Calculations:

- Five-year average incidence rates are based on the combined incidence counts of each year between 2006/07 and 2010/11.
- Age standardization allows comparisons to be made among regions that have populations with different age distributions or comparisons over time by accounting for an ageing population. To adjust for differences in population age distributions across regions and the resulting effect on rates, the rates are age-adjusted using the 1991 Canadian population as a reference. Adjustment is

done via the direct method, using five-year age groups to age 85 years and older.

- To facilitate comparisons, 95% confidence intervals (CIs) of all age-standardized rates and rate ratios were calculated when the rate is greater than zero. The CI includes the true value for the estimated rate 19 times out of 20. An incidence rate difference was considered statistically significant if there was no overlap of confidence intervals.

### Limitations:

- Administrative data do not capture undiagnosed chronic diseases.
- Persons with physician diagnosed chronic conditions may be excluded if they receive their care in a setting where services are not billed on a fee-for-service basis. Services delivered by physicians in salaried or contractual arrangements may or may not be captured if service information is not submitted consistently through "shadow billing".
- Case ascertainment is sensitive to changing diagnostic criteria and to changes in billing practices. These changes may cause significant short-term fluctuations in incidence estimates.
- Any system which tracks lifelong diseases over many years on an individual basis will tend to accumulate false positives. This is because a case, once identified, is carried forward from year to year. Even if false positives are extremely rare, they will still inevitably comprise an increasing proportion of reported cases over time.