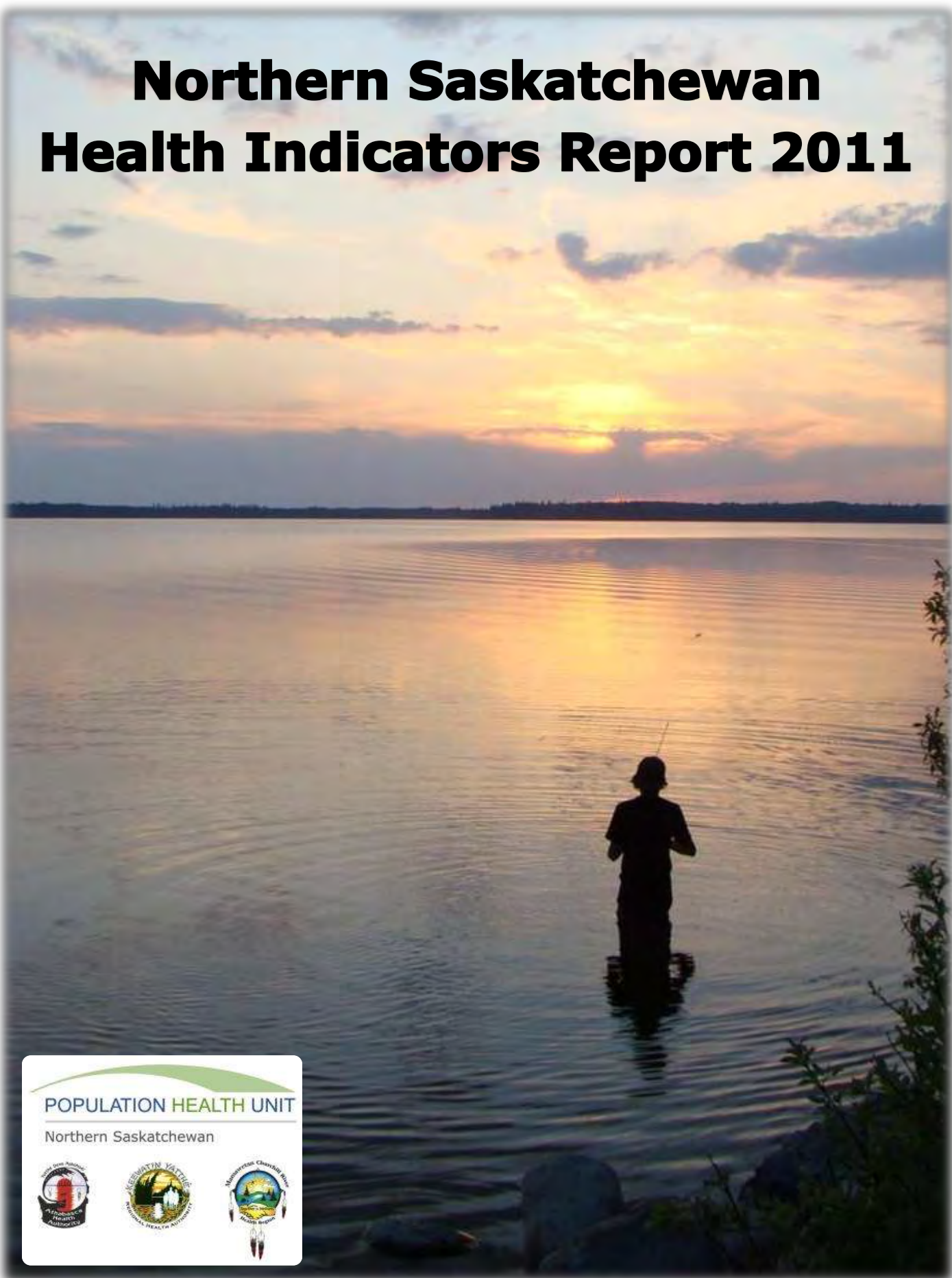


Northern Saskatchewan Health Indicators Report 2011



POPULATION HEALTH UNIT

Northern Saskatchewan



Northern Saskatchewan Health Indicators Report 2011

Athabasca Health Authority
Keewatin Yatthé Health Region
Mamawetan Churchill River Health Region

Produced by the Population Health Unit

Box 6000
La Ronge, SK
S0J 1L0

Dr. James Irvine, Medical Health Officer
Brian Quinn, Nurse Epidemiologist
Donna Stockdale, Director

December 2011

Copyright © 2011 by Population Health Unit

Suggested reference:

Irvine J, Quinn B, Stockdale D. Northern Saskatchewan Health Indicators Report 2011. Athabasca Health Authority and Keewatin Yatthé and Mamawetan Churchill River Regional Health Authorities. Population Health Unit, La Ronge, 2011.

Copies of the document can be downloaded from the Population Health Unit website
www.populationhealthunit.ca

Acknowledgements

We would like to acknowledge staff from the Athabasca Health Authority, Keewatin Yatthé Health Region, Mamawetan Churchill River Health Region, Population Health Unit and our many partners including the Saskatchewan Ministry of Health, Saskatchewan Cancer Agency, Saskatchewan Ministry of Education, Saskatchewan Ministry of Justice, Saskatchewan Government Insurance for their contributions to the creation of this report, which included the use of their data, insightful consultations and valuable feedback. We would also like to thank the board members for the three northern health authorities for their encouragement and support throughout the process.

Photo credits

Andrew Carolus, Annette McCann, Athabasca Health Authority, Barb Biliske, Brian Quinn, Dale West, Donna Stockdale, Linda Mikolayenko, Lisa Friesen, Northern Healthy Communities Partnership, Patricia Skalicky, Stephanie Young, Susan Halland, Trudy Connor, and Warren Kelly.



This report provides a picture of the health and living circumstances in northern Saskatchewan to community members as well as the organizations, agencies, and community groups that provide services or supports in the area. It can add to the knowledge and wisdom of community members and leadership by providing information on how health indicators and health determinants have changed over time, and how northern Saskatchewan compares with other parts of Saskatchewan or other northern areas of Canada. This information is meant to assist in actions to maintain and improve our strengths across the north or meet our continuing or emerging common challenges and to allow us all to benefit in the prosperity and healthfulness of the north and of the province. Health, social and economic developments go hand in hand.

The goal of the report is to provide a benchmark or a sign-post of where we've been, where we are, and where we may be headed. Ultimately we wish for a healthy and wealthy population – healthy in mind, body and spirit; wealthy, not just in monetary terms, but in terms of spirit, family, belonging and connectedness with the land and the environment.

While this report is termed a “health” indicators report, many of the indicators and health determinants are the culmination and interaction of many individual, community, organization and society actions. For example, our economy, our education system, our environment, and the strength of our families all play a role in the wellness of our population. Our health system also plays a role, especially in the treatment or supports for those with illness, but we all play a role in providing a safe and supportive environment that supports our children to grow up healthy and whole.

It must be emphasized that northern people are remarkably resilient and as individuals and communities live with the reality of these health indicators, the strengths as well as the challenges; northerners see themselves in the context of their family and community. Sometimes the statistics will confirm some of the things already well known by community members, and health and human services workers. Other times, looking at information on health statistics may cause us to ponder; to think about why things are this way or how has this occurred. They are like ‘holding up a mirror’ which can provide clarity to the situation and to the priorities for action and change.

Northern Saskatchewan people know of the value of working together. There are many circumstances in our past and present, which are remarkable examples of people and communities pulling together to deal with challenges. This pulling together has crossed community, race and jurisdictional boundaries. Continued collaboration is required among Métis, First Nations, and non-Aboriginal communities, as well as First Nations, municipal, provincial and federal governments.

We encourage you to share this report with others, reflect on what it means to you, and discuss and act with others on what needs to be done – as individuals, as communities, as organizations and as governments. The value of this report will be determined by the actions generated.

Yours in health,

A handwritten signature in black ink, appearing to read 'James Irvine', is written over a light blue grid background.

Dr. James Irvine
Medical Health Officer

TABLE OF CONTENTS

INTRODUCTION	6
<u>Summary.....</u>	<u>8</u>
<u>Northern comparisons</u>	<u>12</u>
<u>Data sources</u>	<u>13</u>
<u>Data presentation</u>	<u>14</u>
COMMUNITY CHARACTERISTICS.....	18
<u>Geographic profile.....</u>	<u>18</u>
<u>Environment.....</u>	<u>19</u>
<u>Partnerships and political profile.....</u>	<u>21</u>
Age-sex distribution	26
Population change.....	27
Births.....	28
Population predictions	29
Dependency ratio.....	30
Aboriginal population.....	31
Population density.....	33
Mobility	34
NON-MEDICAL DETERMINANTS OF HEALTH.....	40
<u>Income and social status</u>	<u>43</u>
<u>Education and literacy</u>	<u>52</u>
<u>Employment</u>	<u>60</u>
<u>Physical environment.....</u>	<u>62</u>
Housing.....	62
Water	64
<u>Water fluoridation</u>	<u>65</u>
Air	66
Animal bites.....	68
<u>Dog bites.....</u>	<u>69</u>
<u>Social environment.....</u>	<u>70</u>
40 Developmental Assets	70
Lone parent families	72
Community belonging.....	73
Civic participation.....	74
Language	74
Income inequality	75
Crime.....	76
<u>Personal health practices</u>	<u>78</u>
Smoking.....	78
Drinking alcohol.....	81
Physical activity	82
Health related fitness	84
Breastfeeding practices	86
Dietary practices	87
HEALTH STATUS	94
<u>Well-being.....</u>	<u>95</u>
Self-rated health.....	95
<u>Mortality.....</u>	<u>96</u>
Total mortality	96
Major causes of mortality	98

Potential years of life lost (PYLL)	102
Life expectancy	104
Morbidity and chronic conditions	105
Hospitalizations	105
<i><u>Total hospitalizations</u></i>	<i><u>105</u></i>
<i><u>Major causes of hospitalizations</u></i>	<i><u>107</u></i>
Mental health	109
<i><u>Satisfaction with life</u></i>	<i><u>109</u></i>
<i><u>Self-rated mental health</u></i>	<i><u>110</u></i>
<i><u>Perceived life stress</u></i>	<i><u>111</u></i>
Injuries	112
<i><u>Introduction</u></i>	<i><u>112</u></i>
<i><u>Injuries and violence (all causes)</u></i>	<i><u>113</u></i>
Mortality from injuries	113
Premature deaths from injuries	114
Self-reported injuries	117
<i><u>Specific causes of injury</u></i>	<i><u>117</u></i>
Mortality	117
Hospitalizations	118
Suicide	121
Injuries from motor vehicle traffic collisions (MVTC)	124
Alcohol related health conditions	126
Obesity	127
Diabetes	129
Circulatory or cardiovascular disease (heart and stroke)	132
<i><u>Cardiovascular risk factors</u></i>	<i><u>136</u></i>
Cancer	137
<i><u>Cancer Prevention</u></i>	<i><u>146</u></i>
Respiratory disease	148
Activity limitation	150
Self-reported pain	152
Arthritis	153
Family health (maternal and child health)	154
Birth rates	154
Teen pregnancy	156
Perinatal health determinants	158
Newborns and their health	159
<i><u>Births</u></i>	<i><u>159</u></i>
<i><u>Congenital anomalies</u></i>	<i><u>159</u></i>
<i><u>Infant mortality</u></i>	<i><u>160</u></i>
<i><u>Perinatal mortality</u></i>	<i><u>162</u></i>
<i><u>Early neonatal mortality</u></i>	<i><u>163</u></i>
<i><u>Birth weight</u></i>	<i><u>163</u></i>
<i><u>Oral health in children</u></i>	<i><u>165</u></i>
Communicable or infectious diseases	166
Diarrheal diseases	167
Vaccine preventable diseases (VPD)	168
Hepatitis A	169
Childhood immunizations	170
Sexually transmitted infections	171
HIV	174
Hepatitis C	177

Tuberculosis.....	180
Emerging issues in communicable and infectious diseases.....	182
<u>Influenza</u>	<u>182</u>
<u>Antimicrobial resistance</u>	<u>185</u>
<i>Methicillin-resistant staphylococcus aureus (MRSA)</i>	185
<u>West Nile virus</u>	<u>187</u>

Introduction



INTRODUCTION

The purpose of this report is to provide a comprehensive overview of the population of northern Saskatchewan including important community characteristics, the determinants of health (the things that influence our health), and some indicators about the health status and well-being of the people of northern Saskatchewan. This report is the third of the major health indicator reviews for northern Saskatchewan since the creation of the northern Health Districts/Authorities.

Health Indicator: *A health indicator is a characteristic of an individual, population, or environment which is subject to measurement (directly or indirectly) and can be used to describe one or more aspects of the health of an individual or population.*

Health Status: *A description and/or measurement of the health of an individual or population at a particular point in time against identifiable standards, usually by reference to health indicators.*

Determinants of Health: *The range of personal, social, economic and environmental factors which determine the health status of individuals or populations.*

(World Health Organization, 1998)

Our health care system plays a role in our health, but it is only one of many factors that contribute to health. There are also many groups, agencies, organizations, levels of government, and individuals that have an influence on health. Our health is affected by our income and social status, social support networks, education and literacy, employment and working conditions, social environments, physical environments (both natural and built), personal health practices and coping skills, healthy child development, biology and genetics, health services, gender and culture. These are the determinants of health. Improvements in health stem from improvement in the determinants of health. This can be achieved through community leadership, education, recreation, economic development, community development, and groups or individuals that work to preserve or enhance our environment, preserve our culture, traditional values, language, and identity. Many health indicators are influenced more by our community-based groups and their health enhancing activities than they are by the health sector acting alone. You will notice that throughout the report there are health indicators for situations where treatment or supports can assist someone with an illness. For some conditions, treatment options can be limited. In order to truly make a difference, working together across communities and sectors will be required to prevent these illnesses and to promote health.

The framework for this health indicator report was based on two premises: a broad definition of health which includes physical, mental, emotional, and spiritual health, and a population health approach which emphasizes the root causes that have an impact on health. Looking at indicators of health or illness, which is more often the data that is available, is one way we can discover areas for special attention and action. Unfortunately, it is not possible to describe a complete picture of the health and living circumstances of northern Saskatchewan residents. Indicators are less available for the positive aspects of northern life, such as the beauty of our environment, the wisdom and resilience of the elders, the potential of our youth, and our willingness to work together. Work continues to be done across Canada in this area; where available, that information is provided in this report.

Following the distribution of our 2004 report, many groups and organizations, in addition to the health authorities, found that the information assisted them in their assessment, planning, priority setting, proposal writing, program development, advocacy or evaluation for their health-enhancing activities. Northern university and high school students used the report for projects and reports. Based on feedback from our previous report and on new information sources, we have expanded the sections on the social environment and the comparisons of the health status in northern Saskatchewan with that of other northern Canadian regions.



Summary

Community Characteristics

Our geography

- The area described as northern Saskatchewan is roughly the northern half of the province and is contained within the boundaries of the Keewatin Yatthé Health Region (KYHR), Mamawetan Churchill River Health Region (MCRHR) and the Athabasca Health Authority (AHA).
- Much of the traditional land of the First Nations that are associated with the Meadow Lake Tribal Council and the Prince Albert Grand Council is located within the northern health regions/authorities, and some within adjoining southern health regions.
- MCRHR, KYHR and AHA are the three largest of the 13 health authorities/regions in Saskatchewan.
- Northern Saskatchewan is home to three ecological regions: the taiga shield, boreal shield, and boreal plains.

Our people

- Close to 36,000 people live in over 70 communities spread out across northern Saskatchewan. Almost half the population (approximately 46%) lives in First Nations communities (on-reserve).
- Northern Saskatchewan continues to have a young growing population.
 - Between 1995 and 2010, the total population increased by 16.5%.
 - In 2010, 32% of the population was under 15 years of age. Only 4.5% was over age 65.
 - The northern birth rate is almost double the provincial rate.
 - Over 85% of the population in northern Saskatchewan identify themselves as Aboriginal (22% Métis and 62% First Nations – predominately Cree and Dene), compared to fewer than 15% in the province of Saskatchewan.

Non-medical Determinants of Health

- Health is influenced by many factors beyond medical care, such as socioeconomic factors.
- Significant health disparities exist within northern Saskatchewan, and between northern Saskatchewan and Saskatchewan as a whole. Inequities start with the significant differences in social determinants of health.

Economic

- Median income in 2006 was less than 60% of the provincial median income.
- Close to one in four families are considered to have low income; this is almost 2.5 times greater than in the province as a whole.
- The cost of healthy food has remained substantially greater in northern Saskatchewan compared to locations in southern Saskatchewan.



Education and employment

- There are increasing numbers of high school graduates. However, the proportion of the northern population aged 25-29 years who completed high school was 46% in 2006, which is substantially lower than the provincial rate of 80%.
- The long-term unemployment rate is over four times the provincial rate and there is a growing potential workforce.

Physical environment

- The north is an area of beautiful natural environment with lots of trees, lakes and other natural resources.
- Housing issues include almost four times the proportion of homes requiring major repair, and over 10 times the rate of crowding compared to the province.

Social environment

- Individuals living off-reserve in northern Saskatchewan report higher levels of “community belonging” than in Saskatchewan and Canada as a whole.
- Over 40% of the population speaks an Aboriginal language at home: Cree, Dene, or Michif.
- Crime rates are higher in northern Saskatchewan than across the province.


Personal health practices

- Over 40% of those aged 12 years and over living off-reserve smoke tobacco. This is about double the provincial rate. Between 45% and almost 75% of women smoked during their pregnancy in northern Saskatchewan, depending on the area.
- Rates of physical activity in the off-reserve population are slightly greater in northern Saskatchewan than in all of Saskatchewan.
- Immunization coverage for children off-reserve in northern Saskatchewan is about the same as the coverage within Saskatchewan.

Health Status

Mortality

- Life expectancy is increasing, but is still five years shorter than in the province.
- The infant death rate has been improving, but remains substantially higher than the provincial rate. Deaths from congenital anomalies have decreased by almost half in the past 25 years.
- The leading causes of death are injuries, cancers, and circulatory diseases.
- Premature deaths from injuries have been decreasing but remain the major cause of premature death (44% of premature deaths are due to injuries) with rates over twice as high as in the province.
- Suicides make up 25% of injury deaths in northern Saskatchewan with rates three times as high as in the province.

- 
- About two-thirds of motor vehicle collision deaths involved drivers who had been drinking alcohol.

Chronic diseases

- Over 65% of the people living off-reserve aged 18 and over are considered overweight or obese.
- Diabetes prevalence rates are the highest in the province when they are calculated to account for the much younger age structure of the northern population.
- The impacts of circulatory diseases like heart disease are increasing, partly due to an increasing population in the older age groups.
- Rates of cancer in northern Saskatchewan for males are lower than for the province, but the female rate is the same for northern and southern Saskatchewan.
- The top types of cancer are breast cancer and lung cancer in females and prostate and lung cancer in males, while lung cancer is by far the leading cause of cancer deaths for both males and females.
- Lung cancer rates are greater compared to the province, though rates of breast and colorectal cancer are slightly lower. Rates of prostate cancer are significantly lower in northern Saskatchewan. Cervical cancer rates are decreasing.


Communicable diseases

- Remarkable improvements have been seen in northern Saskatchewan's rates of diarrheal diseases, hepatitis A, and many vaccine preventable diseases. However, sporadic outbreaks of some infections remain a concern.
- Rates of sexually transmitted infections, tuberculosis and hepatitis C remain substantially elevated in northern Saskatchewan. Chlamydia rates are over five times greater (2008), tuberculosis rates over 90 times greater (2010), and hepatitis C rates are over two times greater (2007) than the rates in Saskatchewan or Canada. On average, 40% of the individuals with TB in northern Saskatchewan live off-reserve. HIV is continuing to emerge as an increasing issue in Saskatchewan – north and south. The northern incidence rate is now about equal to the provincial rate, with about seven new cases being diagnosed across the north each of the last several years (2008-2010).

Working together to maintain and improve the health of northerners

The health and living circumstances described in this report emphasize the importance of working together across sectors, and across communities in a variety of areas.

1. Social determinants (multi-sector involvement including economic development, social services, provincial and federal governments)
 - Supports for early childhood development and education
 - Poverty reduction (early childhood, youth and adult education and training)
 - Housing
 - Economic development that coincides with social and personal development to avoid increasing health disparities across the north and to assist with overall prosperity of the north
 - Partnerships and advocacy for social improvements to reduce health inequity

- 
2. Health behaviours (multi-sector involvement along with health and community leadership – “making healthy choices easier”)
 - Supports for tobacco and substance abuse reduction / prevention
 - Supports for physical activity and healthy eating
 - Healthy alternatives for youth in our communities (activities, supports, education, future employment possibilities)
 3. Health services and programs (treatment, care and prevention)
 - Supports for infant health starting in pregnancy and including the family and continuing with early childhood development
 - Injury prevention
 - Chronic disease and cancer prevention (active living, healthy eating, decreased tobacco use)
 - Tuberculosis and HIV prevention including early diagnosis, treatment and supportive services, substance use prevention and reduction strategies, along with harm reduction
 - Community-focused comprehensive programs and services including areas of primary care, mental health and addictions, chronic disease (diabetes, heart disease, stroke, cancer), prenatal and infant care, youth services promoting self-esteem and mental well-being, tobacco reduction and substance abuse, physical activity, and sexual wellness
 - Coordination of health care services across jurisdictions to provide continuity of care, and coordination with other human services programs to provide social supports for vulnerable populations across the north
 - Patient-focused care based on northern people, culture and geography

We must remain conscious of the important link between the health of the population and economic development. Strategies to reduce social inequities and decrease health disparities will be required to maximize northern prosperity.

Dr. James Irvine

Northern comparisons

In this report we make comparisons with other northern Canadian regions that have somewhat comparable geography, population and socioeconomic conditions. Statistics Canada has created ten health region peer groups, using twenty-four social and economic determinants of health including:

- basic demographics (i.e., population change, Aboriginal status, and demographic structure),
- living conditions (i.e., socioeconomic characteristics, housing, and income inequality),
- working conditions (i.e., labour market conditions).

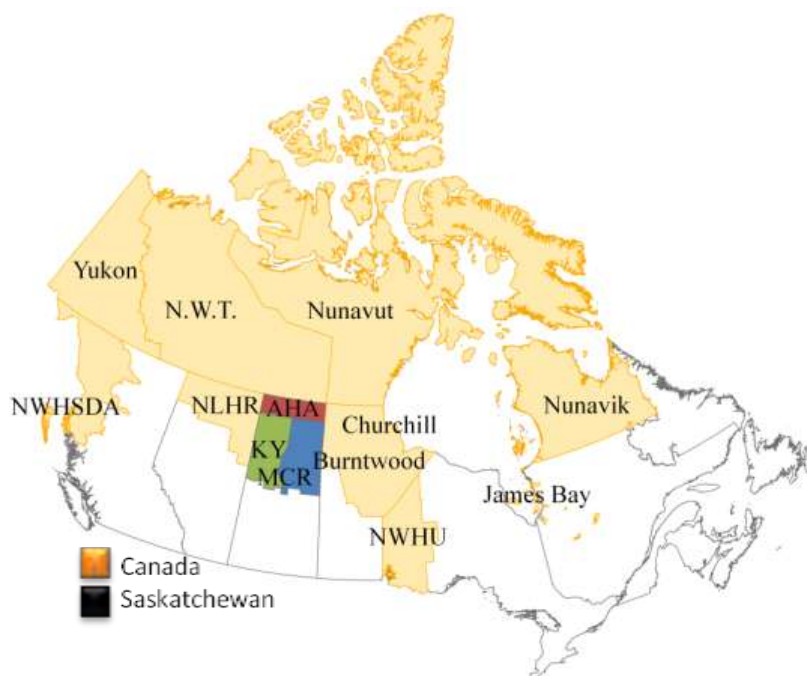
The Statistics Canada peer group including northern Saskatchewan consists of:

- James Bay Cree Region, QC
- Nunavik Region, QC
- Burntwood/Churchill, MB
- Mamawetan Churchill River/Keewatin Yatthé/Athabasca, SK
- Nunavut

We have also used Canada, Saskatchewan, as well as several other northern regions that belong to other peer groups for comparison including:

- Yukon
- Northwest Territories (NWT)
- Northern Lights Health Region, AB (NLHR)
- Northwestern Health Unit, ON (NWHU)
- Northwest Health Service Delivery Area, BC (NWHSDA)

Figure 1 Map of comparison groups used throughout the report





Data sources

1. **2003, 2005, 2007-2008 and 2009-2010 Canadian Community Health Survey (CCHS)** – The CCHS is a cross-sectional survey that collects information related to health status, health care utilization and health determinants for the Canadian population aged 12 and over. Excluded from the survey are individuals living on First Nation Reserves and on Crown Lands, institutional residents, full-time members of the Canadian Forces and residents of certain remote regions. The CCHS provides estimates at the health region level for 121 of the 133 health regions across Canada. In Northern Saskatchewan, the two health regions of Mamawetan Churchill River and Keewatin Yatthé and the Athabasca Health Authority are grouped together for one off-reserve north wide estimate. Prior to 2007, data collection occurred every two years on an annual basis, available for 2001, 2003 and 2005. In 2007, major changes were made to the survey allowing for a yearly file, as well as a combined two year file. However, due to a small sample size, data will only be presented from the combined two year file for 2007-2008 and 2009-2010 for northern Saskatchewan. Some CCHS data will be identified with an (*) indicating the Coefficient of Variation (CV) is between 16.6-33.3% signifying high variability in the results and caution needed for interpretation.
2. **2006 Census** – This report contains information from the 2006 Census on the demographics and non-medical determinants of health for Canada, Saskatchewan, Census Division 18, AHA, KY, MCR, as well as some other northern Canadian regions. Census Division 18 includes the three northern health authorities plus the Cumberland House Cree Nation and the Cumberland House northern village. Most of the information is based on a 20% sample of the population; however, 100% of the households on First Nations' reserves were surveyed wherever possible.
3. **2006 Census Aboriginal Population Profile** – These profiles present demographic and non-medical determinants of health information from the 2006 Census specifically on the Aboriginal identity population for various communities in Canada where the Aboriginal identity population is 250 or more. The Aboriginal identity population comprises those persons who reported identifying with at least one Aboriginal group, that is, North American Indian, Métis or Inuit, and/or those who reported being a Treaty Indian or a Registered Indian, as defined by the Indian Act of Canada, and/or those who reported they were members of an Indian band or First Nations.
4. **Saskatchewan Ministry of Health** – The Saskatchewan Ministry of Health provided extensive data on hospital utilization, which we have analyzed and interpreted for this report. They also provided some population health measures and vital statistics, such as infant mortality, leading causes of mortality, birth rates, and diabetes prevalence.
5. **Additional Sources** – Other databases, indicators and reports
 - a. Population Health Unit (PHU) in-house northern health authority data
 - b. Saskatchewan Cancer Agency (SCA)
 - c. Saskatchewan Ministry of Environment
 - d. Saskatchewan Ministry of Justice
 - e. Saskatchewan Government Insurance
 - f. Statistics Canada
 - g. Other reports



Data presentation

Throughout the report information is presented in a variety of ways, including raw numbers, crude or unadjusted rates, age-adjusted or age-standardized rates, as well as standardized incident or standardized mortality ratios.

When we present raw numbers, we are able to show exactly what is happening in a particular region during a certain time period. For example, there were 75 cases of male lung cancer in northern Saskatchewan between 1998 and 2007.

It is difficult to compare two populations of very different population sizes, however, when using raw numbers, as one group will have a huge number compared to the other. This discrepancy may imply that a particular condition is not an important issue in the smaller community. For example, between 1998 and 2007, there were 3,572 cases of male lung cancer in Saskatchewan compared to only 75 in northern Saskatchewan. To avoid this problem, we will often express the number of cases per 100,000 population. For example, between 1998 and 2007, there were 42 cases of male lung cancer per 100,000 population in northern Saskatchewan compared to 70 cases per 100,000 in Saskatchewan as a whole. This is known as an “unadjusted” or “crude” rate and is a good indicator of actual frequency of the condition of interest within the two regions.

When comparing different populations such as northern Saskatchewan and the total Saskatchewan population, we are comparing two populations with very different age structures. The Saskatchewan population, with its greater proportion of elders, would be expected to have a higher crude rate of male lung cancer, as lung cancer is more common in older age groups. In order to make a fair comparison between two or more populations that have different age structures, an epidemiologic tool is used to adjust the rates. These new rates are referred to as “age-adjusted” or “age-standardized” rates, which really indicate the “risk” of developing lung cancer, as it illustrates the rates that would occur if the compared groups had the same age-group characteristics. For example, when we take age into account using age-standardized rates, we find that there were 98 cases of lung cancer per 100,000 northern males compared to Saskatchewan’s 54 cases per 100,000 males.

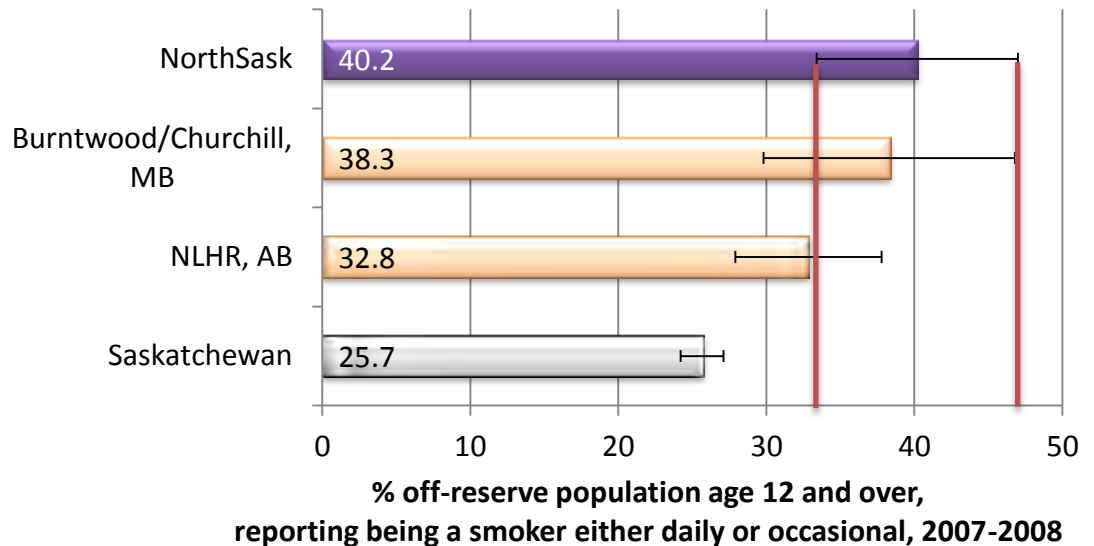
Sometimes there are too few cases of a particular disease to accurately calculate an age-standardized rate. In this case, we can account for differing age structures by calculating a standardized incidence ratio (SIR) (or standardized mortality ratio for deaths) instead. This essentially provides the same information as the age-standardization described above, but uses different methods and is interpreted slightly differently. Using age-standardization described above, we end up with two rates and can see if one is higher than the other. With the SIR, we end up with a ratio and need to compare it against 1. For example, the SIR compares the actual number of male lung cancer cases in northern Saskatchewan to the number of cases that would be expected if the northern Saskatchewan had the same age-specific rates as Saskatchewan. A ratio of 1 would indicate that the number of cases of male lung cancer that occurred in the north was the same as what would be expected, while a ratio of less than 1 would indicate that there were fewer cases than expected, and a ratio of greater than 1 would indicate that there were more cases than expected. Using the same example, the northern SIR for male lung cancer was 1.42 indicating there are more cases of male lung cancer in northern Saskatchewan than would be expected compared to Saskatchewan males. Throughout the report it is clearly marked as to how the data is presented.

Regardless of the type of rate we are using, there is a degree of uncertainty with all estimates. One way that we show this level of uncertainty is by displaying 95% confidence intervals (CI). The 95% confidence interval displays the range of values within which the true value would fall

95% of the time (e.g. 19 times out of 20). Generally, rates for smaller populations or for rare diseases tend to have greater uncertainty and thus wider confidence intervals than larger populations or common diseases.


If we look at the figure shown below, we can see that the rate of daily or occasional smoking in northern Saskatchewan off-reserve population aged 12 and over in 2007-2008 was 40.2%. However, we accept that there is uncertainty with this estimate and the “true” rate is either slightly above or below this estimate. As indicated by the error bars on the chart, the confidence interval for this estimate indicates that 95% of the time the “true” rate would fall somewhere between 33.4 and 47%. As confidence intervals and statistical tests have similar foundations, confidence intervals can be valuable tools when comparing statistical differences between two groups. In general, a statistical difference refers to a “true” difference or one that is unlikely to occur by chance alone. There are three possible interpretations when comparing statistical differences between two groups using 95% confidence intervals, which are described using the figure below.

Figure 2 Daily or occasional smokers, off-reserve population aged 12 and over, by region 2007-2008



Source: StatsCan (CCHS - Health Indicators), Prepared by PHU July 2009

1. **95% Confidence Intervals (CIs) do not overlap** – For example, the daily or occasional smoking rate in northern Saskatchewan was 40.2 (95% CI: 33.4 – 47) while Saskatchewan’s rate was 25.7 (95% CI: 24.2 – 27.1). The CIs of the two rates do not overlap, suggesting a statistically significant difference between the two rates.
2. **95% CI of one rate contains the point estimate of the other rate** – For example, the daily or occasional smoking rates of northern Saskatchewan and Burntwood/Churchill in 2007-2008 were 40.2 (95% CI: 33.4 – 47) and 38.3 (95% CI: 29.8 – 46.8), respectively. The CIs of the rate for northern Saskatchewan includes the point estimate (38.3) for Burntwood/Churchill suggesting no statistically significant difference between the two rates.
3. **95% CIs overlap but the 95% CI of one rate does not include the point estimate of the other** – For example, the daily or occasional smoking rates of northern Saskatchewan and NLHR in 2007-2008 were 40.2 (95% CI: 33.4 – 47) and 32.8 (95% CI: 27.1 – 38.5), respectively. The CIs overlap, but the point estimate for NLHR (32.8) is not within the CI for northern Saskatchewan (33.4 – 47), suggesting a statistically significant difference.



27.9 – 37.8), respectively. The confidence intervals of the two rates overlap but the 95% CI of the northern Saskatchewan rate does not contain the point estimate of the NLHR rate, indicating a formal statistical test is needed to test for statistical significant differences.

Throughout the report, the phrase “significant difference” is only used when referring to a statistically significant difference. If the difference is not statistically significant, other language such as substantial is used. However, it should be noted that just because a difference is not statistically significant, does not mean it is not clinically important. For example, northern rates often have a large degree of uncertainty due to having a small population, and thus statistical significance cannot always be found. However, if we see a large discrepancy between the northern rate and provincial rate consistently over time, we are confident that the difference seen is “true” and should be examined. On the other hand, a statistical difference does not necessarily mean a clinically important difference. For example, if numbers are large enough one could find a statistically significant difference between two smoking rates of 25% and 25.1%; however this may not be a clinically relevant difference.

Throughout the report information for Northern Saskatchewan is presented in several ways. In most cases, information includes all residents in northern Saskatchewan, while in some cases, it refers only to those individuals living off-reserve (including non-Aboriginal, Métis and First Nations individuals). We have indicated in the title of the graph or the text when the information is limited to those living off-reserve.

Data for time periods are presented in several ways in this report. Data for non-calendar years are presented with a forward slash (e.g. 2004/5 indicating one full year beginning in 2004 and ending in 2005). Non-calendar years used in this report includes school years, immunization seasons, and fiscal years). Single calendar years are written out using a four digit format (e.g. 2004); multiple year time periods are written out with a hyphen (e.g. 2004-2005, indicating the two-year time period from 2004 to 2005); and time periods including two multiple year periods are written out fully (e.g. 2004-2005 to 2006-2007, indicating the two-year time period of 2004 to 2005 to the two year time period of 2006 to 2007).

Community Characteristics



COMMUNITY CHARACTERISTICS

A community's most important resource is its people. The undertakings of the health authorities are influenced by the number of people, the rate of growth, the number of people in the various age groups, their geographic distribution, the environment they live in, and how groups of people are affiliated and work together. The structure and changes occurring in a population provide valuable information to identify and plan for health services. The following section describes the geographic profile, community partnerships and political profile, and population profile within northern Saskatchewan.

Geographic profile

There are complex interactions between individuals and their geography that can ultimately impact health status (Dummer, 2008). This can include differences in the access to health services, exposure to health risks, and ability to participate in health promoting activities as a result of population dispersion, varying climates, and diverse environments.

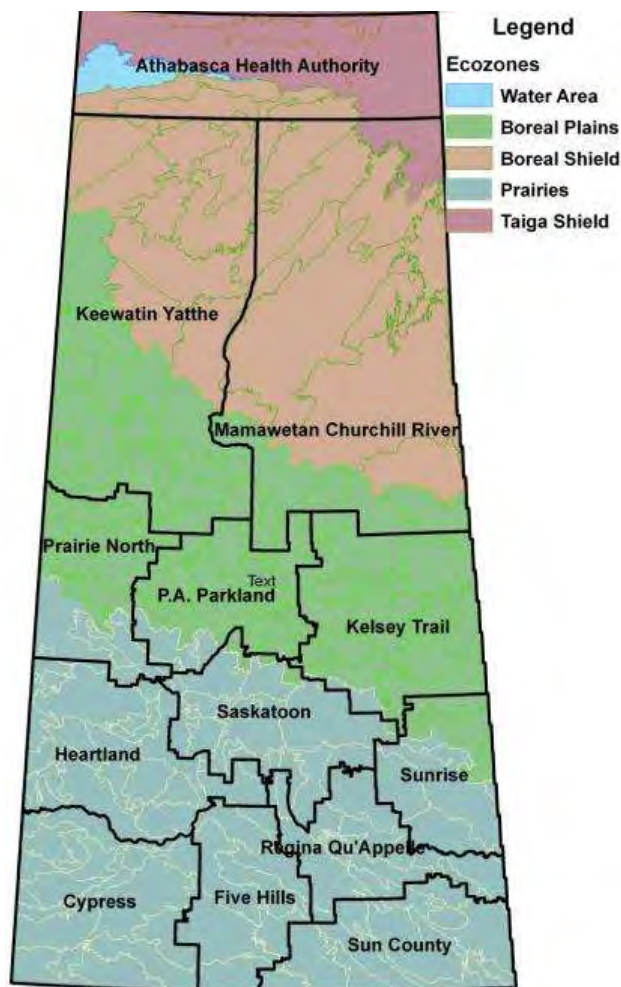
Northern Saskatchewan is made up of two health regions, Keewatin Yatthé (KYHR) and Mamawetan Churchill River (MCRHR), and the Athabasca Health Authority (AHA). It is roughly equivalent to Census Division 18, excluding Cumberland House, which is within the Kelsey Trail Health Region.



MCRHR, KYHR and AHA are the three largest health regions/authorities in Saskatchewan, together covering approximately 47% of the provincial surface area (307,180 of 649,630 square kilometres).

Environment

Figure 3 The ecological regions in Saskatchewan, 2002

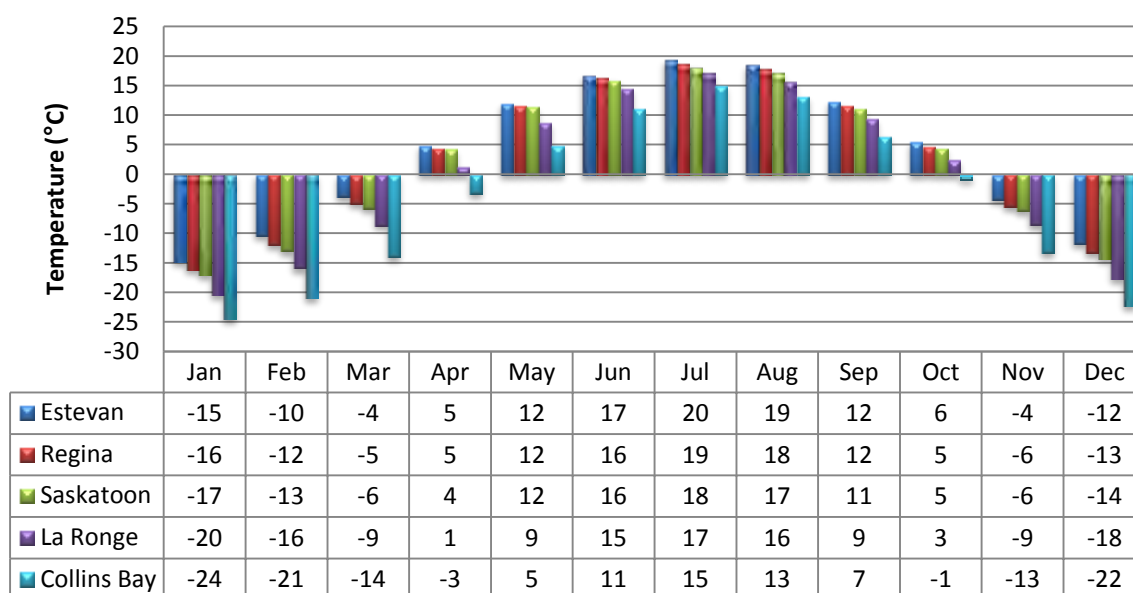


Source: Government of Canada NRC, Prepared by PHU Aug 2010

Northern Saskatchewan is home to three ecological regions. The taiga shield, characterized by flat or rolling hills and a variety of plants and animals, covers the most northern area. The middle section of northern Saskatchewan is boreal shield, which is largely rolling hills, coniferous trees in the north, and broadleaf trees in the south. The land is home to a large amount of swamps and wetlands, as well as waterways. The southern part of northern Saskatchewan is boreal plains. In contrast, the southern portion of the province is characterized mainly by boreal plains and prairies.



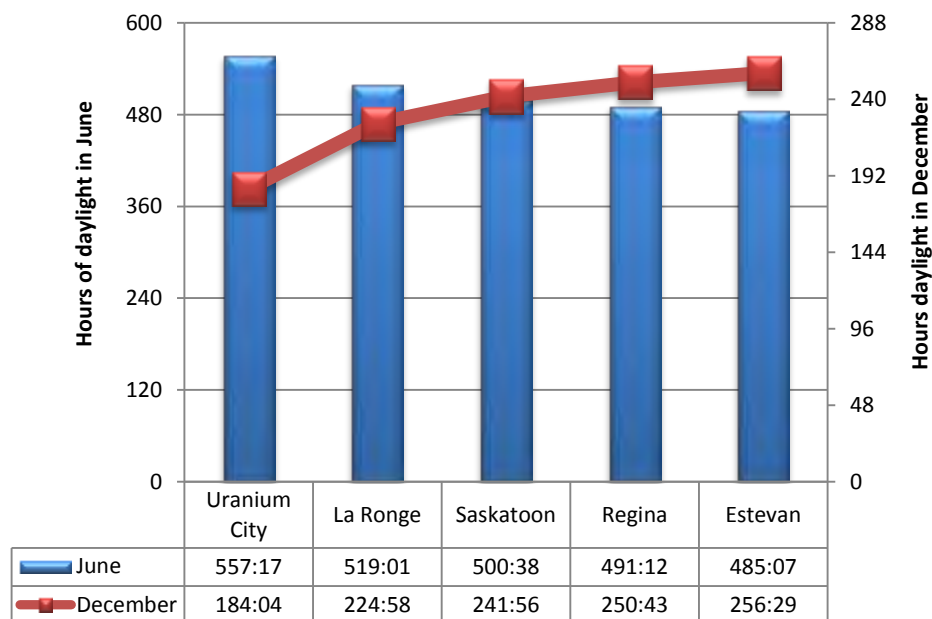
Figure 4 Average monthly temperatures, selected Saskatchewan communities, 1971-2000



Source: Environment Canada, Prepared by PHU June 2009

There is a clear gradient in average temperatures across Saskatchewan, with the warmest temperatures occurring in the south and the coolest in the north. For example, Estevan, in the southeast corner, is 2 to 6 °C warmer than La Ronge, in the southern portion of the north, and 5 to 10 °C warmer than Collins Bay, in the northeast corner of the province.

Figure 5 Daylight hours in June and December 2000 in selected communities of Saskatchewan



Source: www.cavu.com/sunset.html, Prepared by PHU June 2009

The average number of daylight hours per month by community is shown by the red line for December and by the blue bar for June. There is a clear gradient in the number of daylight hours across Saskatchewan. Across the province, the difference in sunlight hours between Uranium City and Estevan is over 70 hours, more than 2 hours per day. Within northern Saskatchewan, Uranium City gets about 40 more daylight hours in June than La Ronge, over 1 hour per day. In the winter months, Uranium City gets about 40 hours less daylight per month than La Ronge.

Partnerships and political profile

In northern Saskatchewan, there has been a long history of working together, through cross-jurisdictional, intersectoral, and community partnerships which are listed below.

1. Health

Multiple jurisdictions provide health services in the north including:

- Regional health authorities, with the authority provided through the Ministry of Health:
 - Keewatin Yatthé
 - Mamawetan Churchill River
- Athabasca Health Authority, a unique partnership of federal, provincial, and First Nations health authorities
- First Nations, with transfer of authority for the administration of health services from the federal government to individual northern First Nations. Some services are provided through the grouping of various First Nations:
 - Meadow Lake Tribal Council
 - Prince Albert Grand Council
- For some specialized services, both the northern health authorities and First Nations have a co-management partnership through:
 - Population Health Unit – Northern health authorities
 - Northern Inter-Tribal Health Authority – First Nations



2. Governments

- First Nations Governments: six of the 12 First Nations associated with the Prince Albert Grand Council and five of the nine First Nations associated with the Meadow Lake Tribal Council are within this northern area of Saskatchewan (First Nations Bands of Saskatchewan, Indian and Northern Affairs Canada).
- Métis Regions: Northern Regions I, II and III; Eastern Region I. These regions cover AHA, KYHR and MCRHR plus Cumberland House (Metis Nation of Saskatchewan, 2010).
- Municipal: Thirty-five northern municipalities work together through the Saskatchewan Association of Northern Municipalities, also known as New North (Saskatchewan Association of Northern Municipalities). In addition to the communities in AHA, KYHR and MCRHR this includes the Northern Village of Cumberland House.
- Provincial: Two provincial constituencies cover the northern area: Cumberland and Athabasca (Elections Saskatchewan). Regional health authorities are part of the Northern Human Services Partnership which provides coordination amongst various provincial government departments and other authorities (also includes Cumberland House area).
- Federal: The region is covered by the electoral district of Desnethé-Missinippi-Churchill River (DMCR).



3. Environment

- Saskatchewan Ministry of Environment
- Northern Mines Monitoring Secretariat and Northern Saskatchewan Environmental Quality Committees

4. Education

- School Divisions
 - Northern Lights
 - Creighton
 - Ile a la Crosse
- Northlands College: Western, Eastern and Central Regions
- First Nations Education
 - Prince Albert Grand Council
 - Meadow Lake Tribal Council

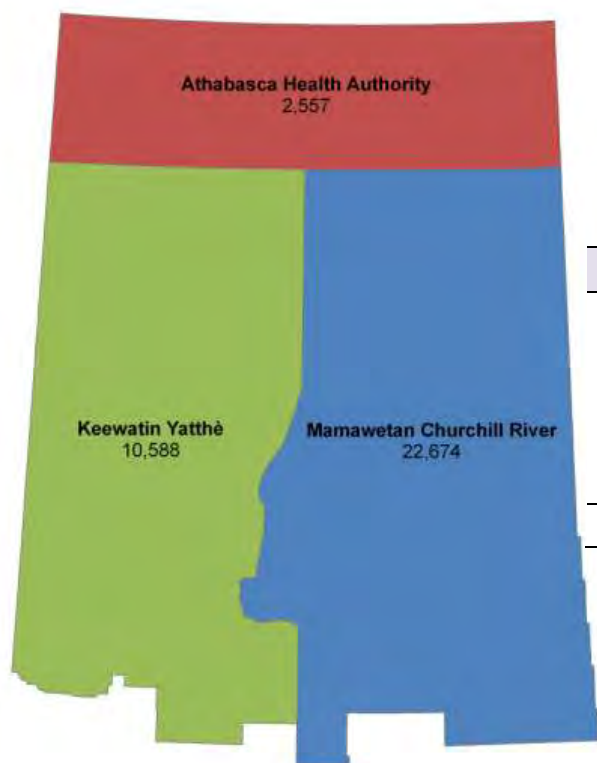
5. Industry

- Community Vitality Monitoring Partnership Steering Committee is made up of representatives from the northern health authorities, Northern Mines Monitoring Secretariat, Areva, and Cameco.

6. Note: While Cumberland House is within the Kelsey Trail Health Region, there are many affiliations with the northern regions, including Northern Lights School Division, Northern Municipalities, and Environmental Quality Committees for example.



Figure 6 Population profile of northern Saskatchewan, 2010



Northern Saskatchewan made up approximately 3.3% of the Saskatchewan population in 2010. This proportion increased from 2.7% in 1981 to 3.0% in 1995 and finally 3.3% in 2010. The largest health authority in northern Saskatchewan is MCRHR, with a population of 22,674, followed by KYHR at 10,588 and AHA at 2,557.

Location	Population
Athabasca Health Authority	2,557
Keewatin Yatthé Regional Health Authority	10,588
Mamawetan Churchill River Regional Health Authority	22,674
Northern Saskatchewan	35,819
Saskatchewan	1,070,477

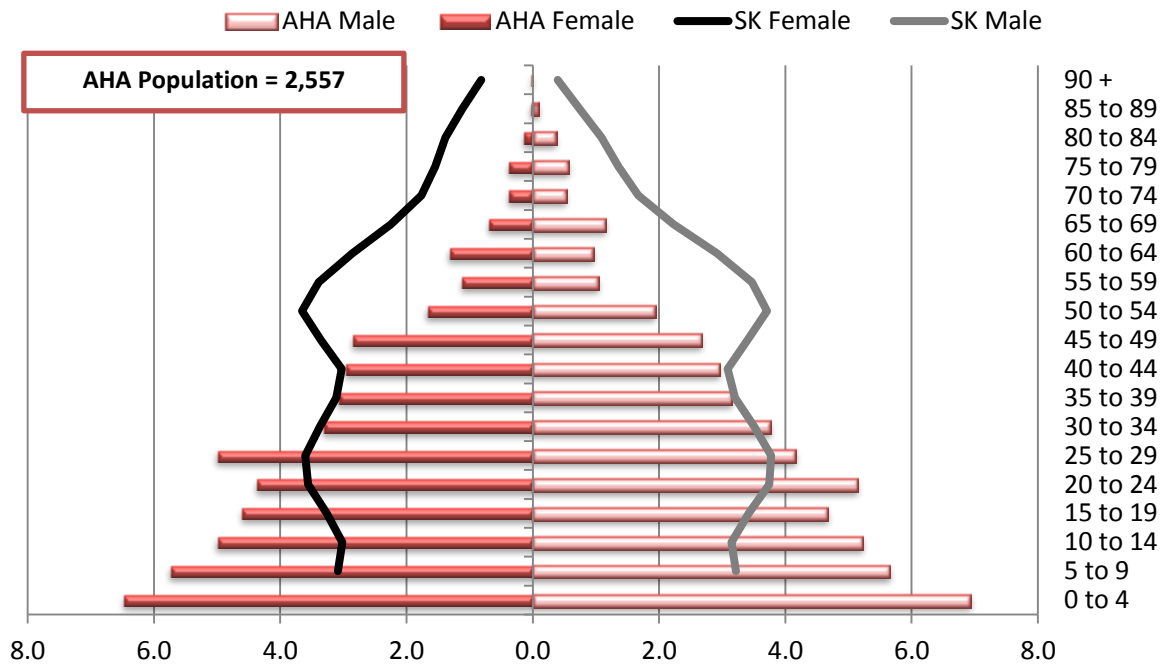
Source: Saskatchewan Covered Population 2010

Close to 36,000 individuals live in over 70 communities spread out across northern Saskatchewan.

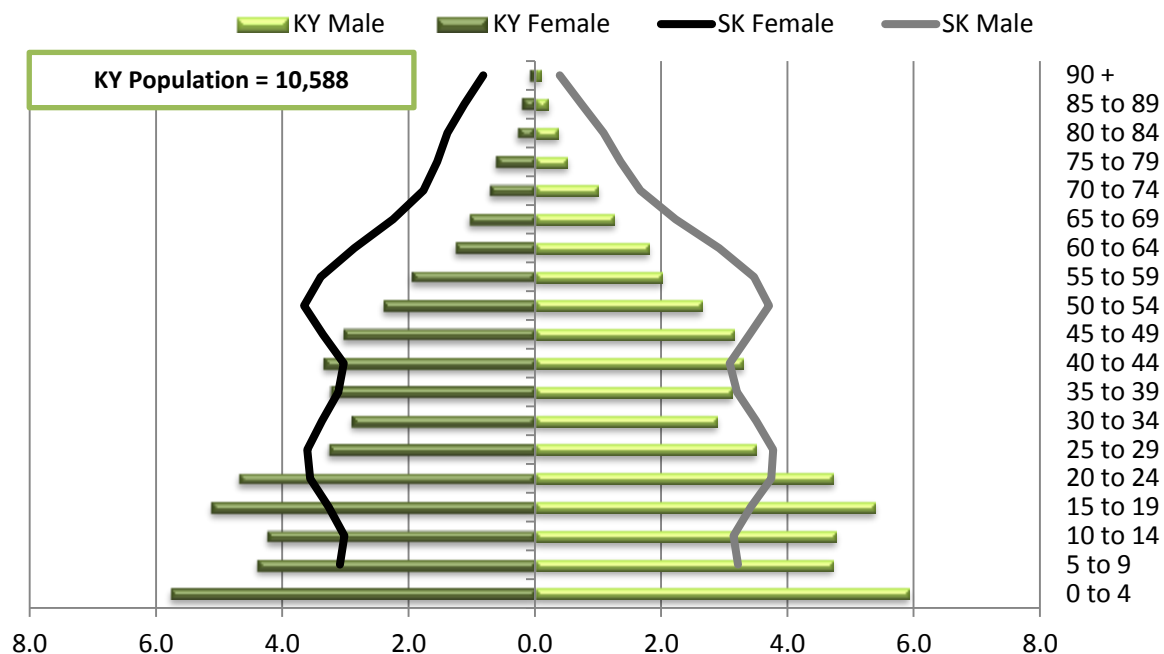


Figure 7 Population pyramids (for on and off-reserve populations), percent of population by sex and age group, 2010

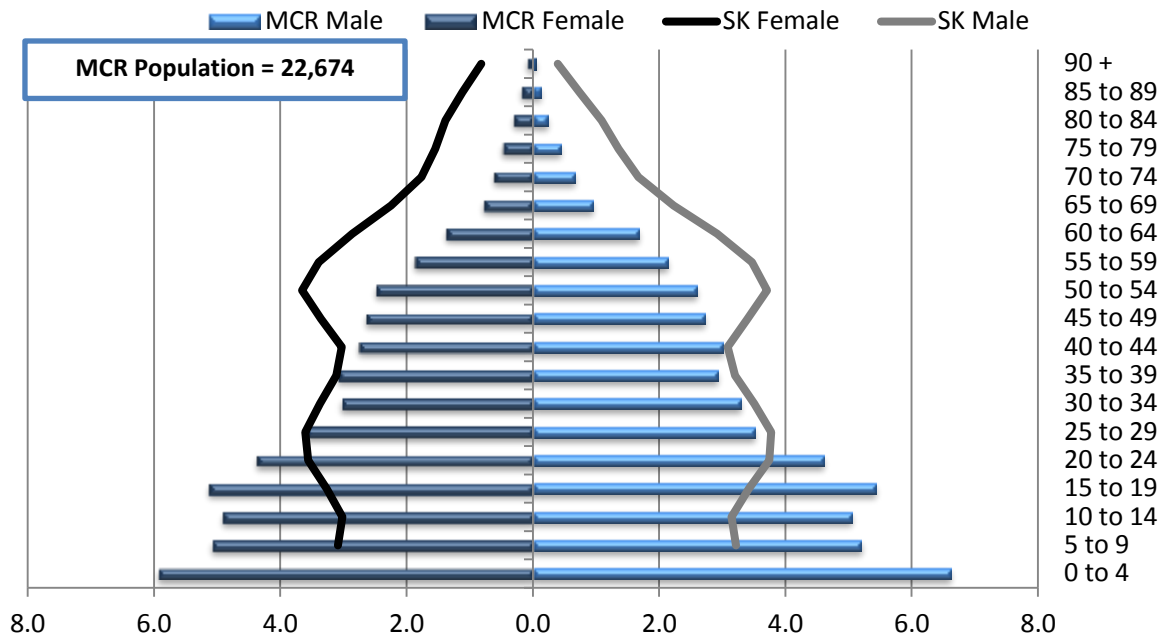
Population pyramids show the age and sex make-up of various populations. In this case the northern health authority populations are displayed by the coloured bars and the province is represented by the lines, each broken down by sex and five-year age categories. The northern health authorities have larger proportions of their populations in the younger age categories where the bars extend past the lines. On the other hand, most of Saskatchewan's population is in the middle and older age groups where the lines are further from the bars.



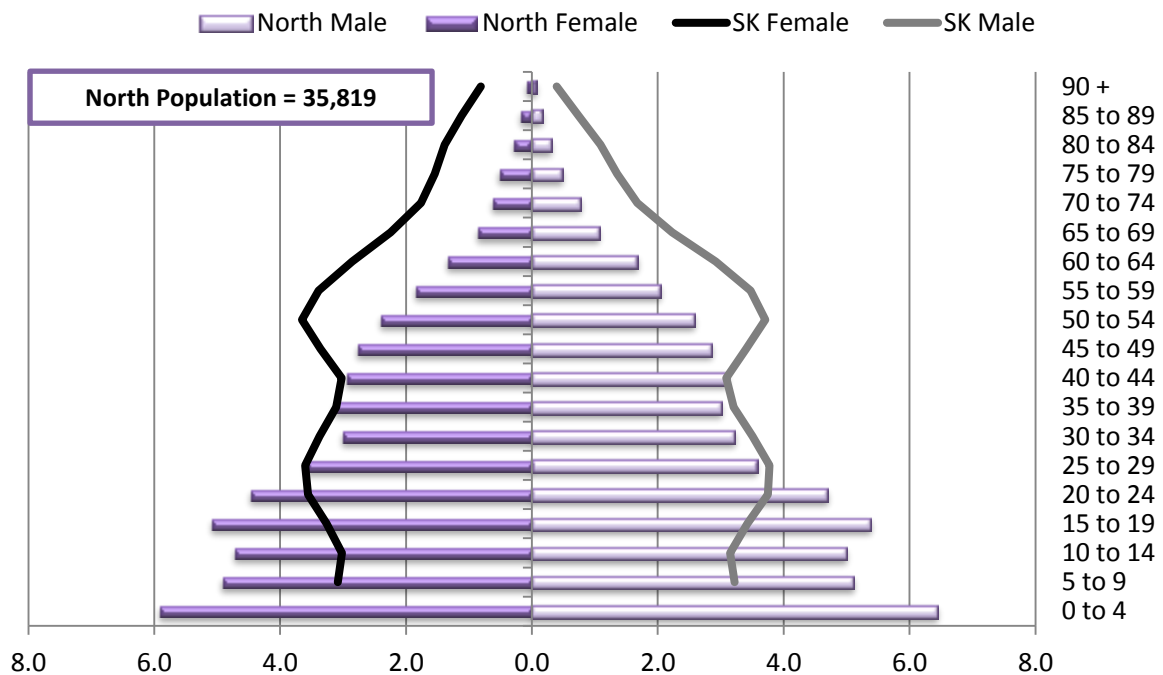
Source: Sask Covered Population 2010, Prepared by PHU Mar 2011



Source: Sask Covered Population 2010, Prepared by PHU Mar 2011



Source: Sask Covered Population 2010, Prepared by PHU Mar 2011

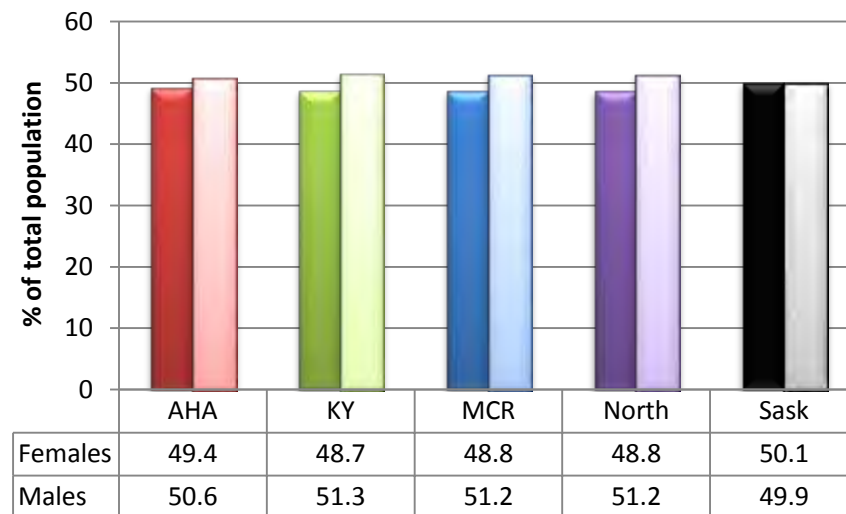


Source: Sask Covered Population 2010, Prepared by PHU Mar 2011

Age-sex distribution

There are more males than females in each of the northern authorities, whereas females outnumber males in the whole province.

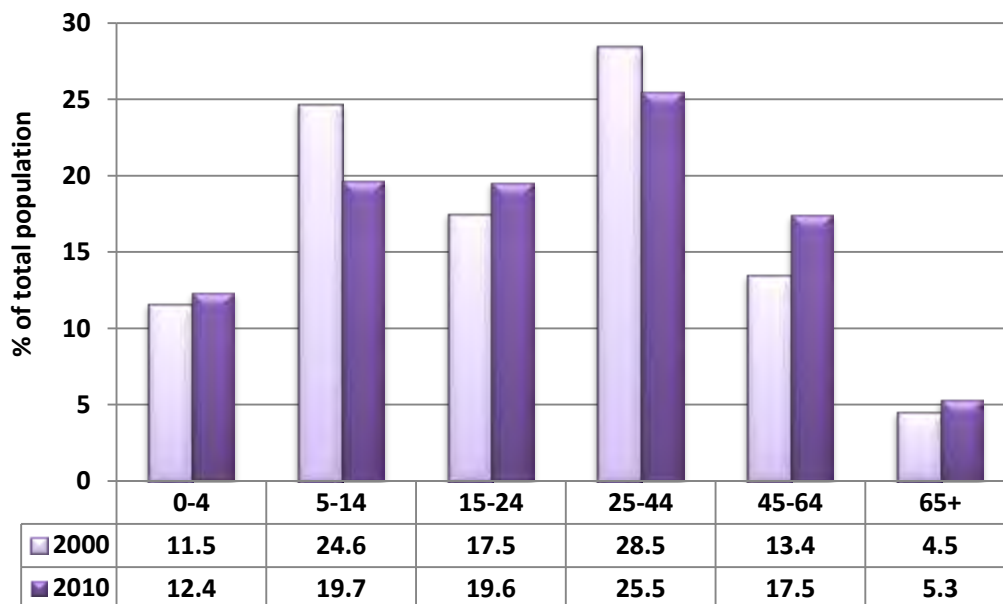
Figure 8 Population by gender and sex, northern Saskatchewan health authorities, 2010



Source: Sask Covered Population 2010, Prepared by PHU Mar 2011

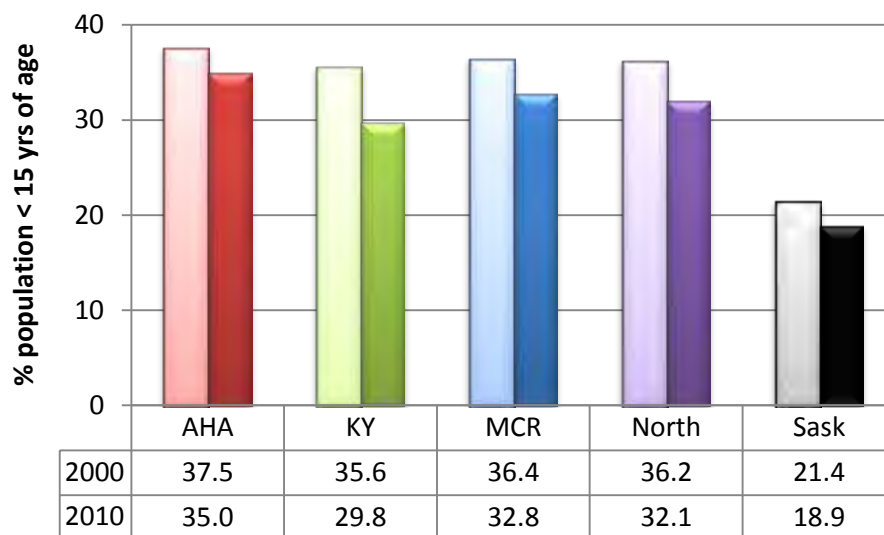
Northern Saskatchewan continues to have a young, growing population. Between 1999 and 2009, the total population in northern Saskatchewan increased by 6.6%, from 33,587 to 35,819. In 2010, 32.1% of the population was under 15 years of age, compared to 36.2% of in 2000. The proportion of the population aged 25 to 44 years decreased, while those aged 15 to 24 years, 45 to 64 years and 65+ increased. In 2010, the north had a younger population compared to the whole province; in Saskatchewan only 18.9% of the population was less than 15 years and 14.2% were over 65 years.

Figure 9 Northern Saskatchewan population by broad age group, 2000 and 2010



Source: Sask Covered Population 2010, Prepared by PHU Mar 2011

Figure 10 Population less than 15 years of age by northern Saskatchewan health authority, 2000 and 2010



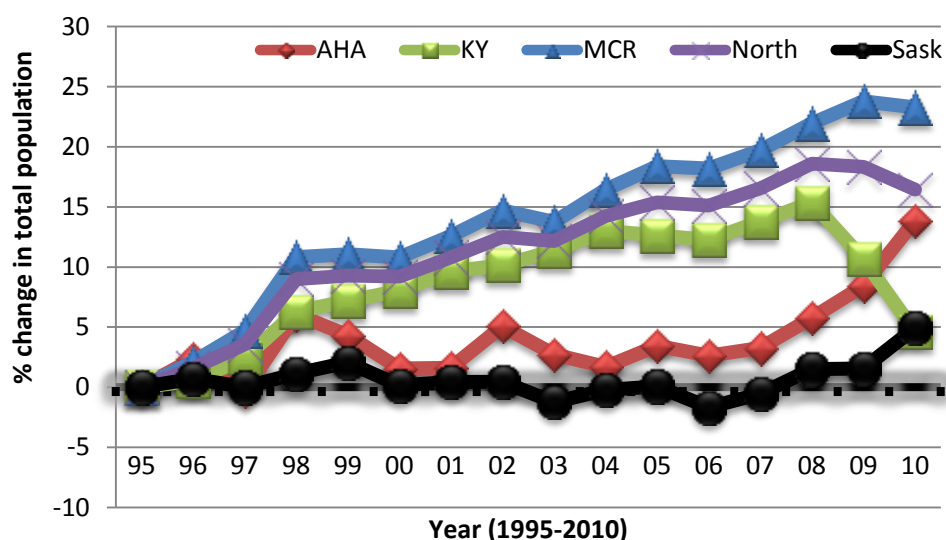
Source: Sask Covered Population 2010, Prepared by PHU Mar 2011

Between 2000 and 2010, the proportion of the northern population under 15 years of age decreased. AHA had the smallest decrease (2.5%), while the KYHR had the largest decrease (5.8%). The decrease in the percent of population under 15 years of age in the north (4.1%) was nearly twice the decrease in all of Saskatchewan (2.5%).

Population change

Total population growth is a key factor when considering overall health planning for the three northern health authorities. As a population becomes larger, health service needs also increase.

Figure 11 Population change, northern health authorities and Saskatchewan, 1995-2010

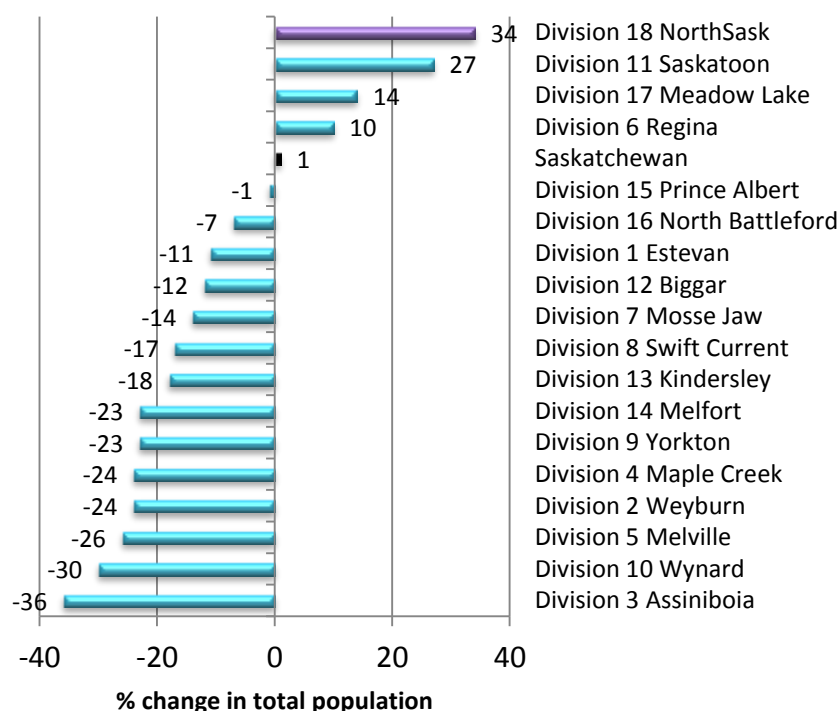


Source: Sask Covered Population 2010, Prepared by PHU Mar 2011

According to the Saskatchewan Ministry of Health, the population in northern Saskatchewan increased from 30,758 individuals in 1995 to 35,819 in 2010, a 16.5% increase. In comparison, the Saskatchewan population increased by 4.9%, from 1,020,378 individuals in 1995 to 1,070,477 in 2010.

Figure 12 Population growth by census division in Saskatchewan 1981-2006

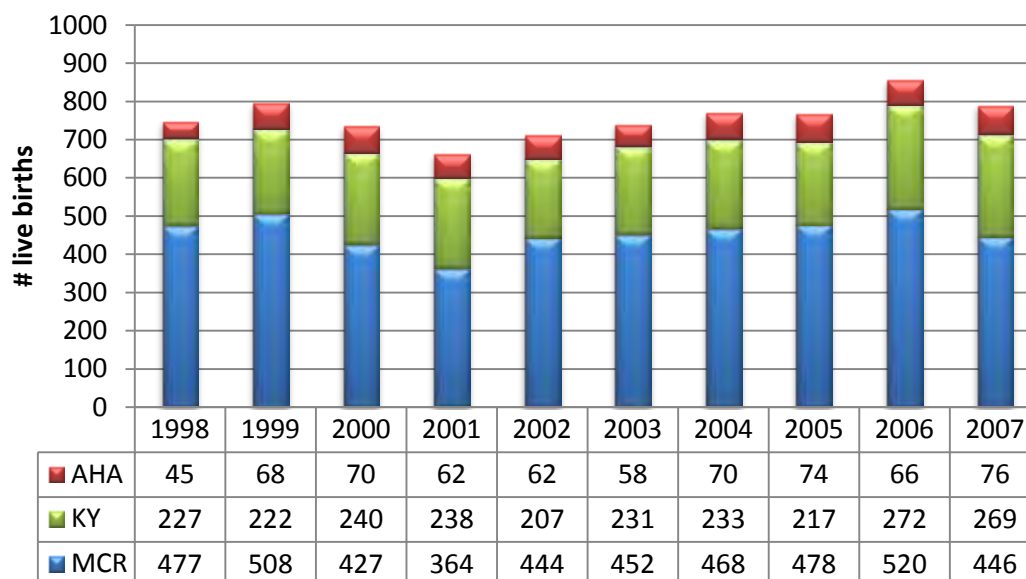
One of Statistics Canada's population groupings is by census division, defined as a "group of neighbouring municipalities joined together for the purposes of regional planning and managing common services, such as police or ambulance services" (Statistics Canada). Census Division 18 encompasses the three northern health authorities, as well as the two communities of Cumberland House and Cumberland House Cree Nation. While the population of Saskatchewan as a whole increased by 1% during 1981-2006, northern Saskatchewan had a 34% rise. This increase was unmatched by any other Saskatchewan census division, including Regina and Saskatoon. New information will be coming out in the 2011 Census that will illustrate whether or not these trends have continued.



Source: Northern Saskatchewan Regional Training Needs Assessment 2008-9 (Census 1981-06), Prepared by PHU May 2008

Births

Figure 13 Number of births by northern health authority and year, 1998-2007

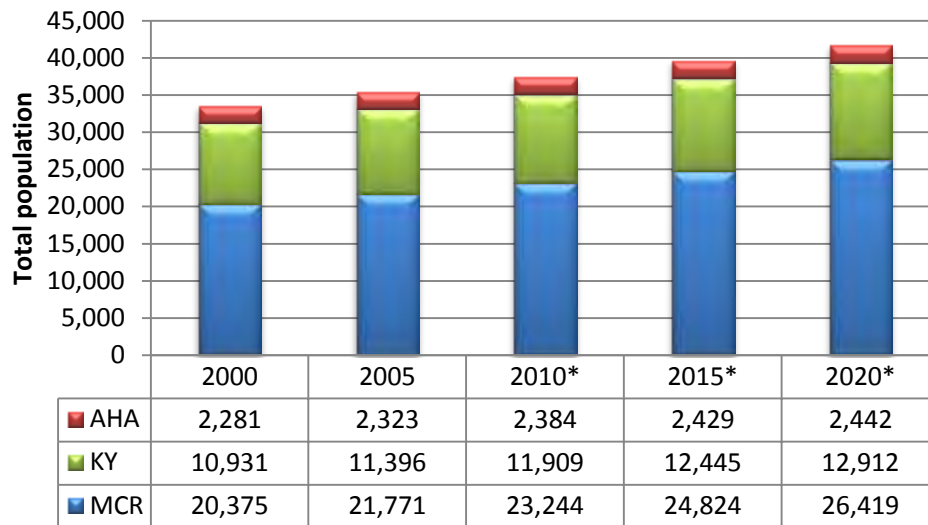


Source: SaskHealth, Prepared by PHU Sept 2009

The number of births has an impact on the growth of the population as well as the type and range of health and community services required. Although there were some year-to-year fluctuations, on average there were 760 births annually in the north between 1998 and 2007.

Population predictions

Figure 14 Population projections, northern Saskatchewan, 2010-2020



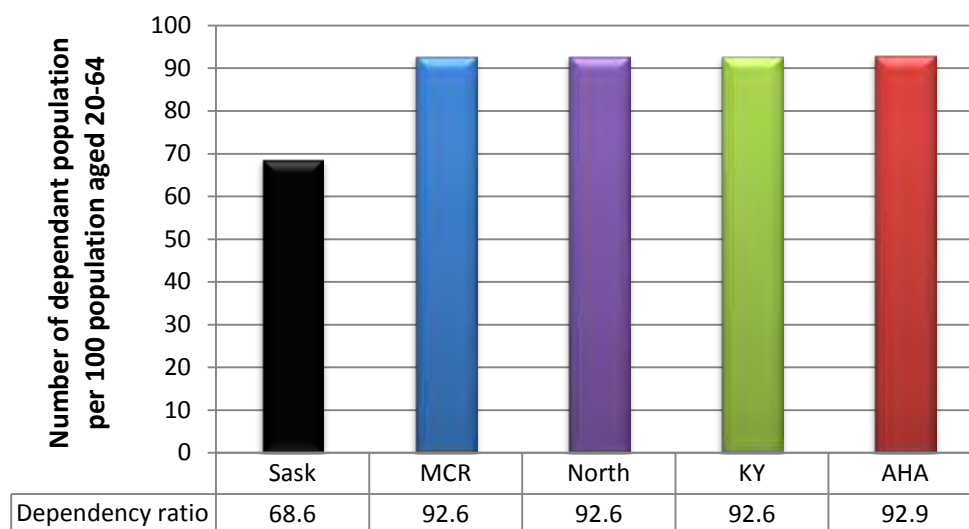
Source: Sask Covered Pop 2000-5, Vital stats 2001-5, Prepared by PHU Nov. 2007 * projected

The population of northern Saskatchewan is expected to continue to increase over the next decade. Between 2005 and 2020, the north is expected to increase its population by 17.7%, from 35,490 to 41,773 individuals. The greatest increase is expected in MCRHR (21.3%), followed by KYHR (13.3%) and AHA (5.1%).



Dependency ratio

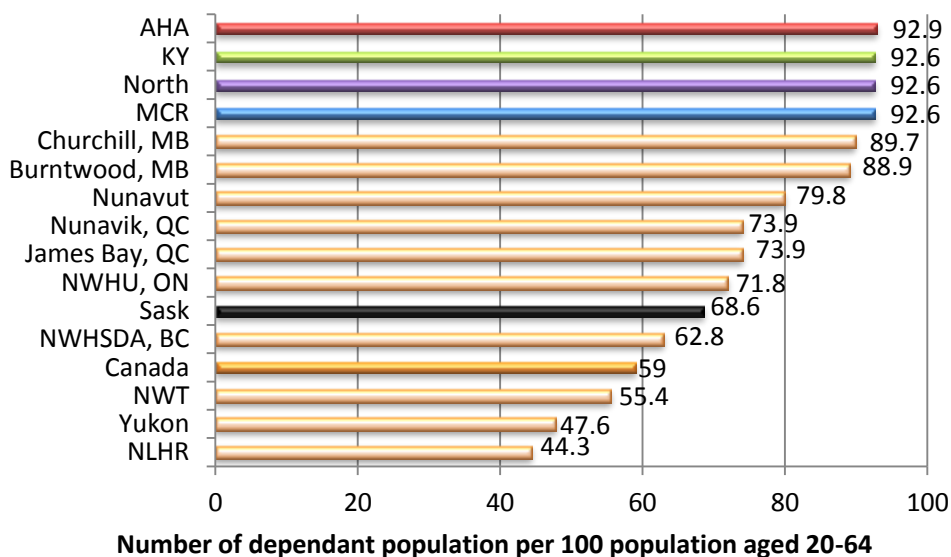
Figure 15 Dependency ratio by northern Saskatchewan health authority, 2010



Source: Statistics Canada 2010, CANSIM table 109-5326, Prepared by PHU June 2011

Dependency ratio is the ratio of the combined child population (aged 0 to 19) and elderly population (aged 65 and over) compared to the working age population (aged 20 to 64). This ratio is usually presented as the number of dependents for every 100 people in the working age population. Canadians aged 65 and over and those under age 20 are more likely to be socially and/or economically dependent on working-aged Canadians, and they may also put additional demands on health services. MCRHR along with KYHR and AHA have the highest dependency ratios of all health authorities in Canada. Most of the dependency ratio in the north is attributable to the under 20 population, which makes up over 40% of the northern population. In comparison, Saskatchewan's dependency ratio is more affected by the elder population, which makes up approximately 15% of its population.

Figure 16 Dependency ratio by northern region in Canada 2010



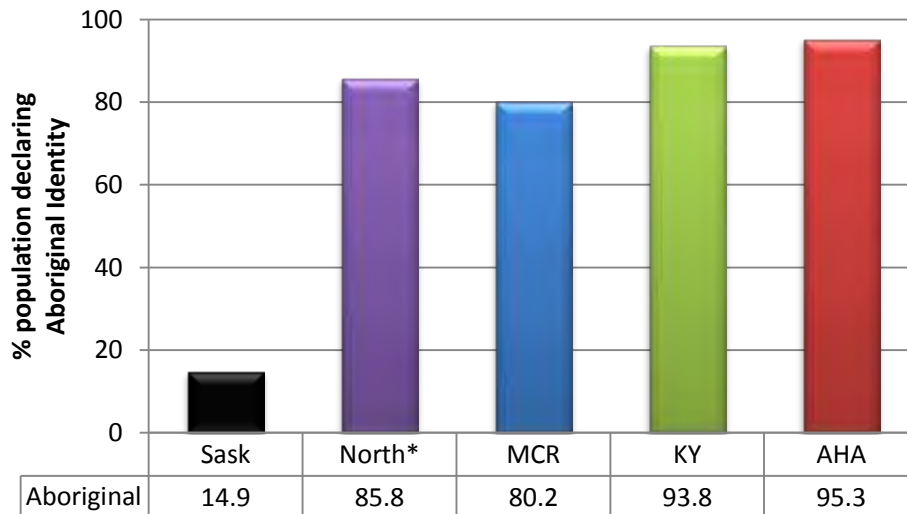
Source: Statistics Canada 2010, CANSIM table 109-5326, Prepared by PHU June 2011

Other northern regions with dependency ratios similar to northern Saskatchewan include Churchill, Burntwood, and Nunavut, while James Bay, Nunavik, and the NWHU have similar ratios to Saskatchewan, and NWHSDA, NWT, NLHR and the Yukon have ratios closer to the Canadian dependency ratio.

Aboriginal population

In the Canadian Census, the Aboriginal identity population is composed of those persons who reported identifying with at least one Aboriginal group, "First Nations", "Métis" or "Inuit", and/or who reported being a Treaty Indian or a Registered Indian, as defined by the Indian Act of Canada, and/or who were members of an Indian Band or First Nations. Northern Saskatchewan is a rich mix of people and cultures with a high proportion of Aboriginal people including Cree, Dene and Métis. Over 85% of northern Saskatchewan people identify themselves as Aboriginal, compared to fewer than 15% in the whole province. The proportion of Aboriginal people in the northern health authorities ranges from 80.2% in MCRHR to 95.3% in AHA.

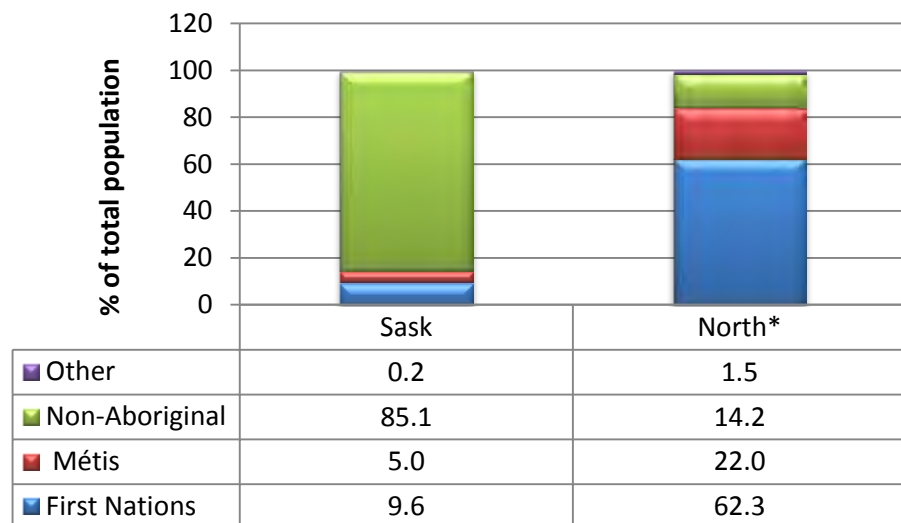
Figure 17 Population declaring Aboriginal identity, Saskatchewan and northern Saskatchewan, 2006



Source: Census 2006, prepared by PHU July 2008 * Div 18 used as North

Figure 18 Population by Aboriginal identity, northern Saskatchewan and Saskatchewan, 2006

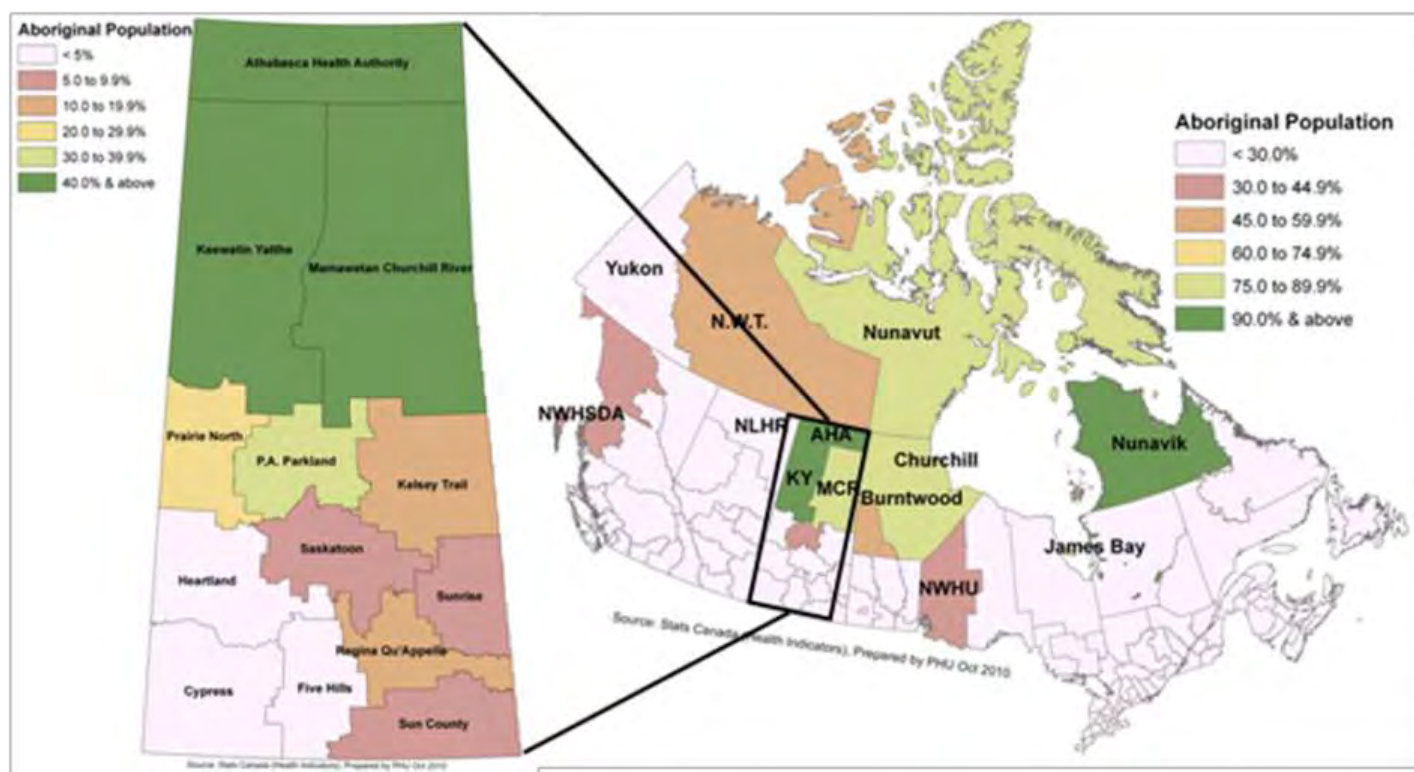
Over 20% of people in northern Saskatchewan identify themselves as Métis, over 60% as First Nations, and fewer than 15% as non-Aboriginal. In contrast, 85% of the total Saskatchewan population self-identifies as non-Aboriginal, 5% as Métis, and fewer than 10% as First Nations.



Source: 2006 Census Ab profile, Prepared by PHU March 2008 * Div 18 used as North

Over 85% of the population of northern Saskatchewan identify themselves as Aboriginal (22% Métis and 62% First Nations – predominately Cree and Dene), compared to less than 15% in the province of Saskatchewan.

Figure 19 Aboriginal population by Canadian health authority, 2006

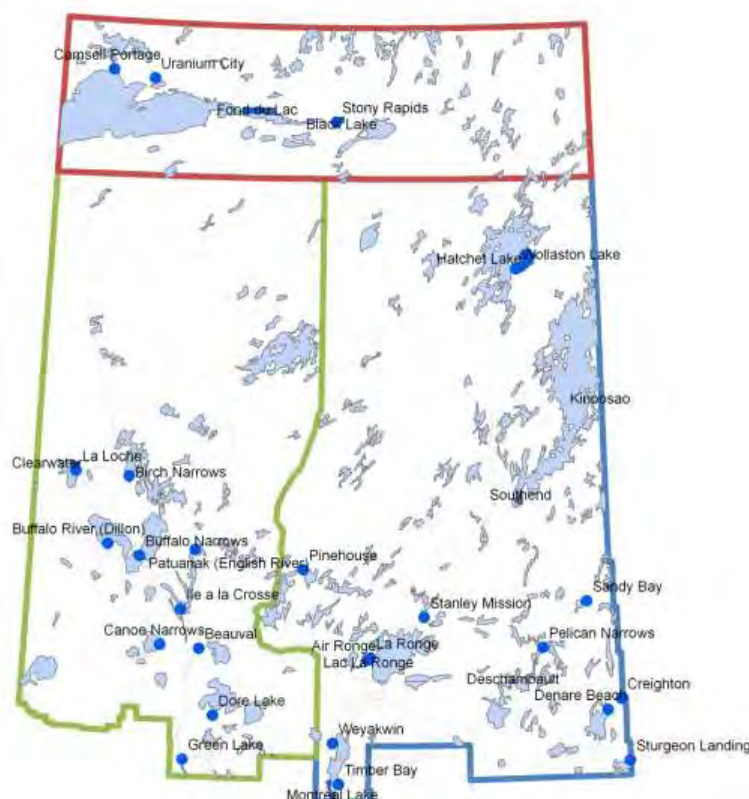


The proportion of the northern Saskatchewan population that self-identifies as Aboriginal is similar to some northern Canadian regions but is substantially higher than others. Similar proportions are seen in James Bay, Nunavik, Nunavut and Burntwood, whereas much smaller proportions are seen in others such as Churchill, N.W.T., NWHU, NWSDA, Yukon, and NLHR. Within Saskatchewan, the proportion of the population that self-identify as Aboriginal is far greater in the northern health authorities than in any of the southern health regions.

Saskatchewan HA	%	Canadian HA	%
Athabasca Health Authority	95.3	James Bay, QC	96.5
Keewatin Yatthé	93.8	AHA	95.3
Mamawetan Churchill River	80.2	KY	93.8
P.A. Parkland	35.6	Nunavik, QC	91.3
Prairie North	29	Nunavut	85
Kelsey Trail	14.4	MCR	80.2
Regina Qu'Appelle	11.6	Burntwood, MB	76.1
Saskatoon	9.3	Churchill, MB	55.9
Sunrise	8.5	Norman, MB	50.5
Sun Country	5.1	N.W.T.	50.3
Five Hills	4.4	Prince Albert Parkland, SK	35.6
Heartland	2.8	NWHU, ON	32
Cypress	2.4	NWSDA, BC	30
		Yukon	25.1
		NLHR, AB	19
		Other Canadian HA's	0.4-29

Population density

Figure 20 Map of selected communities within the northern Saskatchewan health authorities, 2011



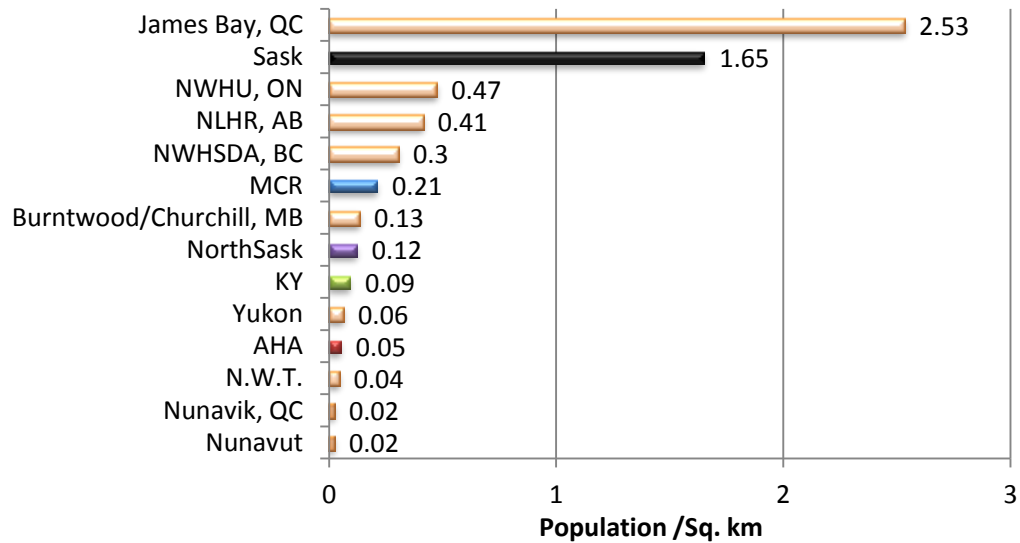
Northern Saskatchewan has a small population spread over a large geographic area. This has a great influence on how services and programs are delivered. The three northern health authorities are the largest in the province. The population density of northern Saskatchewan is 0.12 people/square kilometre or about 12 people per 100 square kilometres, compared to 165 per 100 square kilometres in all of Saskatchewan.

Figure 21 Population density by health authority, Saskatchewan, 2010

Name	2010 Covered Population	Surface Area (sq. km)	Population Density (people/sq.km)
Athabasca Health Authority	2,557	59,680	0.04
Keewatin Yatthé	10,588	113,600	0.09
Northern Saskatchewan	35,819	307,180	0.12
Mamawetan Churchill River	22,674	133,900	0.17
Kelsey Trail	39,837	47,400	0.84
Cypress	44,302	45,240	0.98
Heartland	41,629	41,770	1.00
Saskatchewan	1,070,477	649,630	1.65
Sun County	55,144	33,240	1.66
Five Hills	55,068	27,700	1.99
Sunrise	56,807	24,800	2.29
Prince Albert Parkland	79,237	31,570	2.51
Prairie North	77,745	29,950	2.60
Saskatoon	318,503	34,120	9.33
Regina Qu'Appelle	266,386	26,660	9.99

Source: GIS Unit April 2004, Covered Population 2010

Figure 22 Population density by northern regions in Canada, 2006

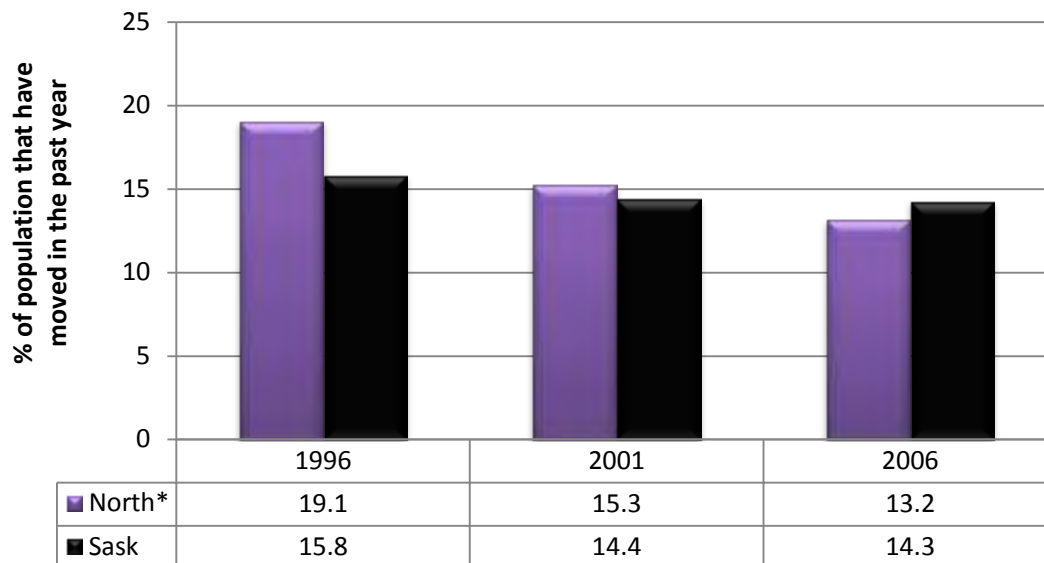


Source: Census 2006, Prepared by PHU August 2009

In looking at other territories and regions in Canada, Nunavut and Nunavik have the lowest population densities with NWT and AHA close to the same density. In northern Saskatchewan, there are 0.12 persons per square kilometre, compared to 1.65 persons per square kilometre in Saskatchewan. AHA has a population density of 0.05 persons per square kilometre.

Mobility

Figure 23 One-year mobility, population aged 1 year and over, northern Saskatchewan and Saskatchewan, 1996-2006

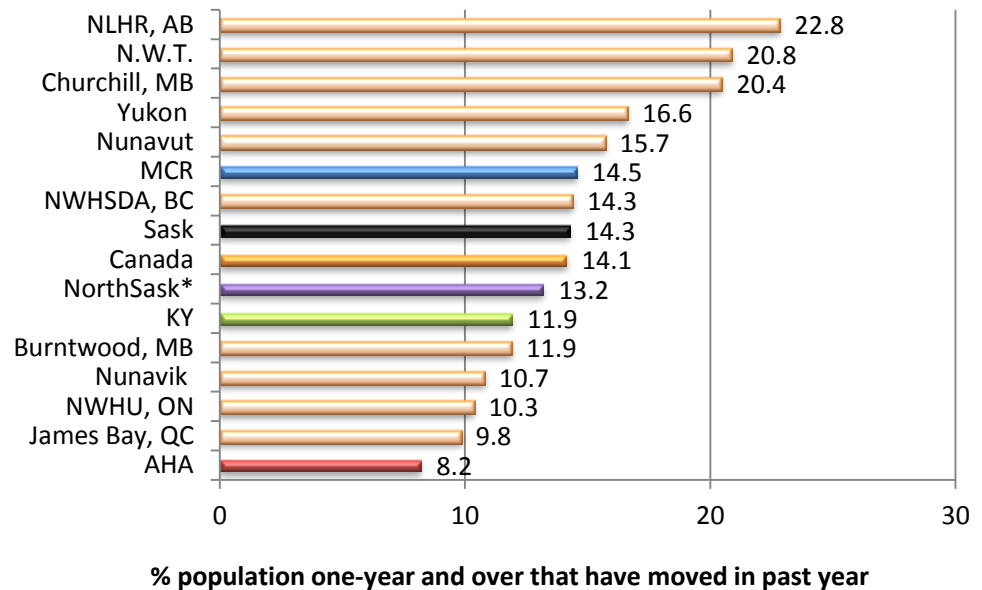


Source: Census 2006, Prepared by PHU Dec, 2007 * Div 18 used for NorthSask

One-year mobility is defined as the percentage of people who have moved from their address of the previous year. Mobility in northern Saskatchewan is slightly lower than the provincial or national rates. The rate of the population that had moved in the past year was 13% for northern Saskatchewan, and 14% for Canada and Saskatchewan. One-year mobility has been decreasing in northern Saskatchewan since 1996.

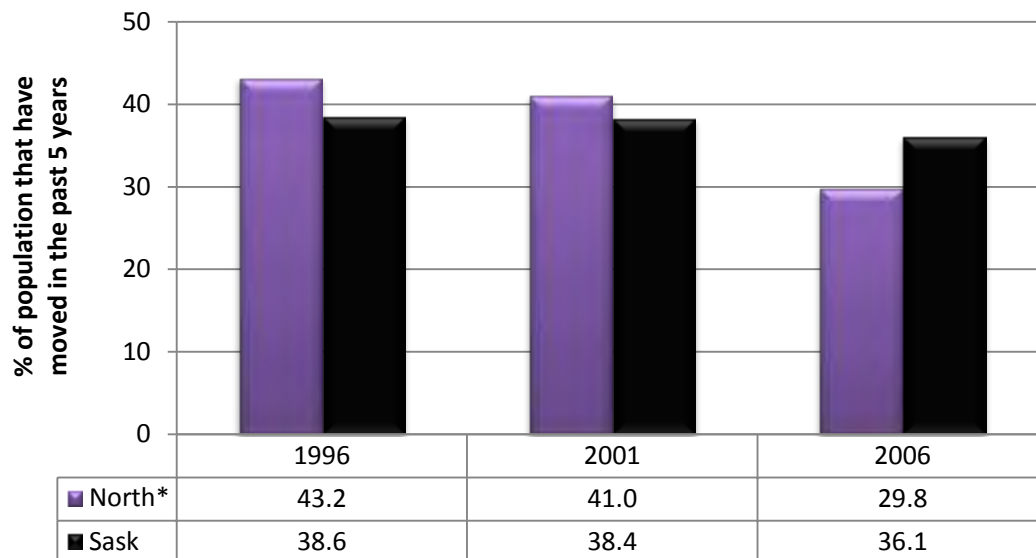
Figure 24 One-year mobility, population aged 1 year and over, by northern region, 2006

In 2006, the rate of the population aged one-year and over that had moved in the past year in northern Saskatchewan was slightly lower than the provincial or national rates. The Athabasca Health Authority had the lowest one-year mobility of all northern comparators while the Northern Lights Health Region (NLHR) in Alberta had the highest.



Source: Census 2006, Prepared by PHU Feb 2009 * Div 18 used as North

Figure 25 Five-year mobility, population aged 5 years and over, northern Saskatchewan and Saskatchewan, 1996-2006

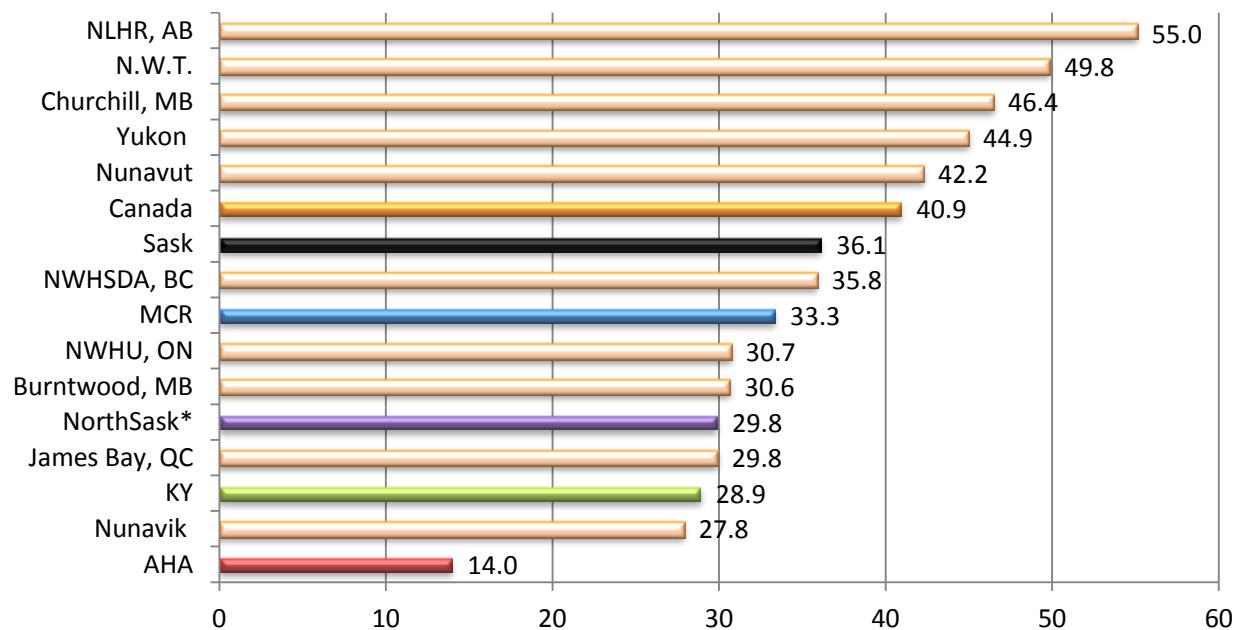


Source: Census 2006, Prepared by PHU Dec, 2007 * Div 18 used for NorthSask

Five-year mobility is defined as the percentage of people who have moved from their address in the previous five years. Five-year mobility has been decreasing since 1996 in northern Saskatchewan. Data from 2006 shows that northern Saskatchewan now has lower five-year mobility than the province as a whole. Only 30% of northern Saskatchewan residents moved in the previous five years, while the provincial rate is 36% and the national rate is 40%.



Figure 26 Five-year mobility, population aged 5 years and over, by northern region, 2006



% population aged five years and over that have moved in past 5 years

Source: Census 2006, Prepared by PHU Feb 2009 8 Div 18 used as North

Northern Saskatchewan also has lower five-year mobility than many other northern comparator regions. NLHR had the highest five-year mobility rate amongst the northern comparators. MCRHR had the highest five-year mobility rate within northern Saskatchewan, while AHA had the lowest.

References

- Dummer, T. J. (2008). Health geography: supporting public health policy and planning. *Cmaj*, 178(9), 1177-1180.
- Elections Saskatchewan. *Provincial Constituencies (Map)*. Retrieved June 22, 2010, from <http://www.elections.sk.ca/provincialmaps/pdfs/prov-map.pdf>
- First Nations Bands of Saskatchewan. *Tribal Councils of Saskatchewan*. Retrieved June 22, 2010, from <http://www.sicc.sk.ca/bands/>
- Indian and Northern Affairs Canada. *First Nations of Saskatchewan (Map)*. Retrieved June 22, 2010, from <http://www.ainc-inac.gc.ca/ai/scr/sk/fni/pubs/fnl-eng.pdf>
- Metis Nation of Saskatchewan. (2010).
- Statistics Canada. *Census Dictionary*. Retrieved June 22, 2010, from <http://www12.statcan.ca/census-recensement/2006/ref/dict/geo008-eng.cfm>

Non-medical Determinants of Health





NON-MEDICAL DETERMINANTS OF HEALTH

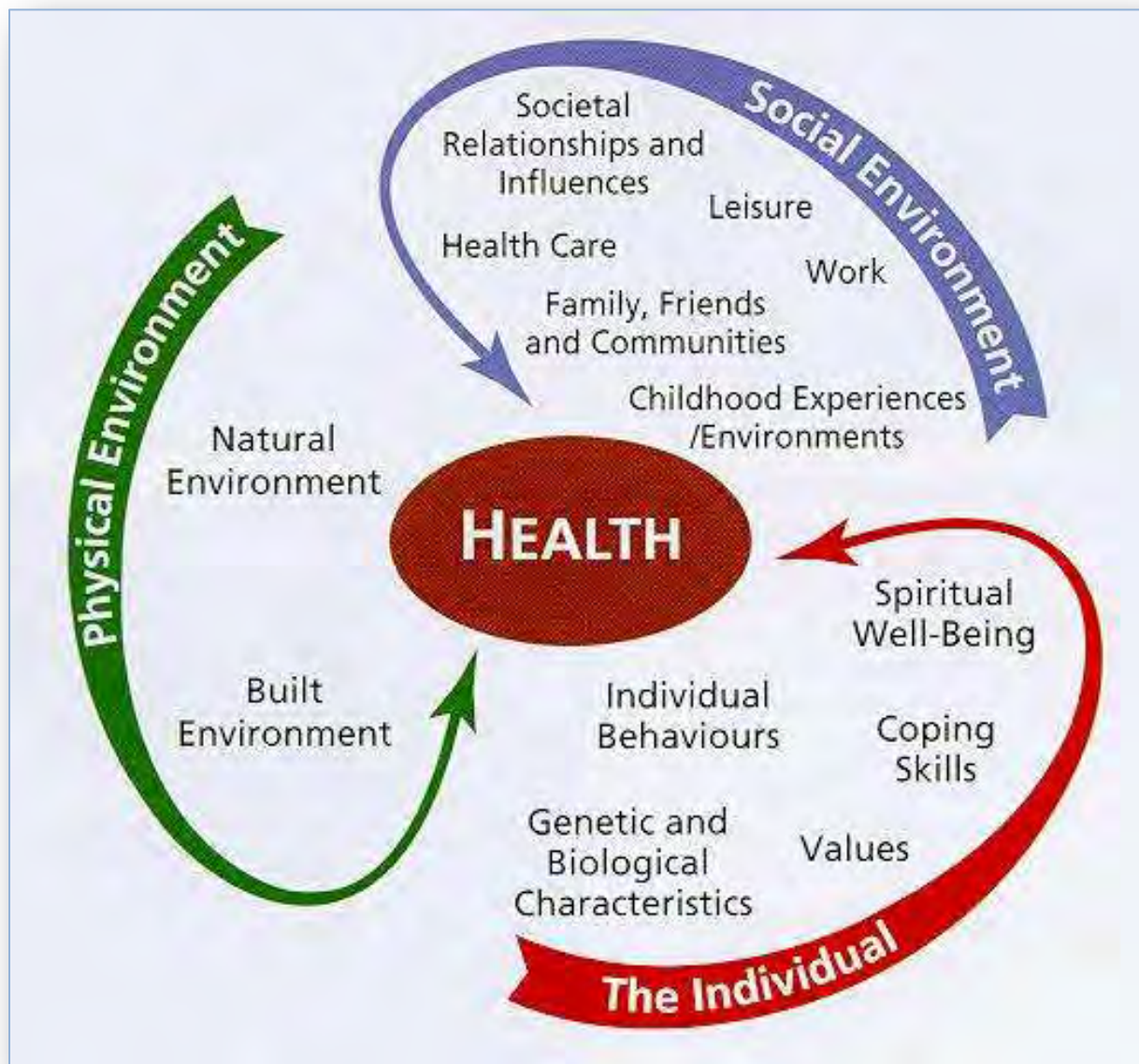
Our understanding of what determines our health has expanded over the last several decades. Initially, there was great emphasis on access to medical care and genetic predisposition. However, this understanding has switched to a much broader appreciation of the many factors that help determine the health of individuals and communities. These factors are defined as the determinants of health. In Canada, there are 12 factors recognized as the key determinants of health, including income and social status, social support networks, education and literacy, employment and working conditions, social environments, physical environments including both the natural and built environments, personal health practices and coping skills, healthy child development, biology and genetic endowment, health services, gender and culture (Public Health Agency of Canada, 2003).

There are many ways that these determinants can impact the health of the population (Public Health Agency of Canada, 2003). For example, advanced education can provide individuals with the skills and knowledge for problems solving, as well as easier access to higher paying jobs. Support from families and friends can help individuals deal with adversity and provide a greater sense of life satisfaction and well-being. The physical environment can determine an individual's level of exposure to factors in the air, water, food and soil, as well as influence their physical and psychological well-being. Personal health practices can help individuals prevent diseases, promote self-care and develop greater self-reliance. As well, some individuals can also face additional health risks due to the cultural marginalization and stigmatization they encounter.

Some of these relationships between individual health and the health determinants are very complex. For example, intuitive thinking led many to believe that the main effect of higher income and social status was to improve an individual's access to physical health benefits including safe housing and nutritious foods. As well, some believed income and social status were merely a proxy for the known disease risk factors, such as smoking and elevated blood pressure, since these risk factors were known to be higher in the economically disadvantaged. Although these may be important benefits of income and social status, the landmark "Whitehall" study on British civil servants clearly illustrated that income and social status had far greater effects than on these factors alone. Van Rossum et al (van Rossum, Shipley, van de Mheen, Grobbee, & Marmot, 2000) examined nearly 20,000 male civil servants over 25 years and found a clear gradient between employment grade and risk of mortality. If income and social status were related simply to impoverishment, the difference in the risk of mortality would be seen only when comparing individuals that are impoverished with individuals that are not. However, the gradient was found across all four employment grades, with the risk of mortality increasing from the top grade, "administrative", to the second grade, "professional", and onwards through to the "clerical" and "other" employment grades. The van Rossum study (van Rossum et al., 2000) also examined the relationship between employment grade and risk of mortality adjusted for major risk factors. If income and social status was simply a proxy for known risk factors, then it would be expected that the difference in mortality risk would disappear after controlling for these factors. However, after adjusting for age, smoking, systolic blood pressure, plasma cholesterol concentration and glucose intolerance, the risk of mortality was still nearly twice as high in the "other" employment grade compared to the "administrative" employment grade. In fact, the known risk factors only explained approximately one-third of the employment grade differences in total mortality. Leonard Syme (Syme, 2004) has suggested that some of this unexplained effect is due to the individuals' "control over (their own) destiny". According to Syme (Syme, 1998, 2004), a person with lower social class has fewer opportunities, resources, skills and training to influence events that affect their lives. Regardless of exactly how income and social status impact health, it is clear the relationship is strong and very complex.

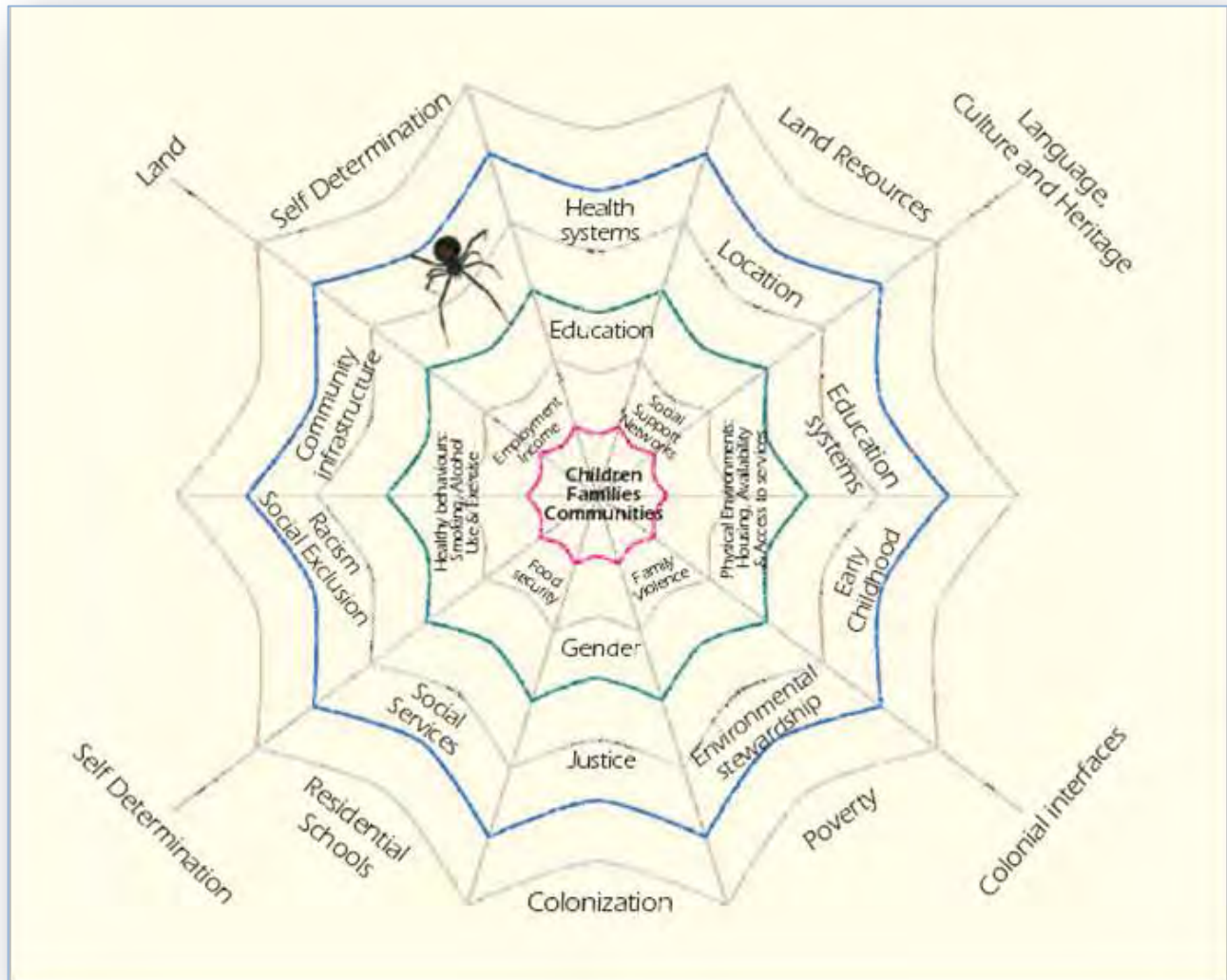
It has also been recognized that determinants do not act in isolation from one another, but rather interact with each other to have combined and interrelated effects on the health of the population. This is most notable for chronic diseases such as diabetes, heart disease and cancer, which have multiple risk factors and usually require many years to develop. This extended development period provides ample time for the determinants of health to be involved in complex interactions with each other, the individual, and the environment in the development of the disease. Therefore, care must be taken to look at a variety of health determinants to get a more complete picture of the root causes of diseases.

Figure 27 The determinants of health



Source: Saskatchewan Provincial Health Council (Saskatchewan Provincial Health Council, 1996);
Adapted from "Health Impact Assessment Guidelines", B.C. Ministry of Health

Figure 28 Web of Being: Social determinants and indigenous peoples' health



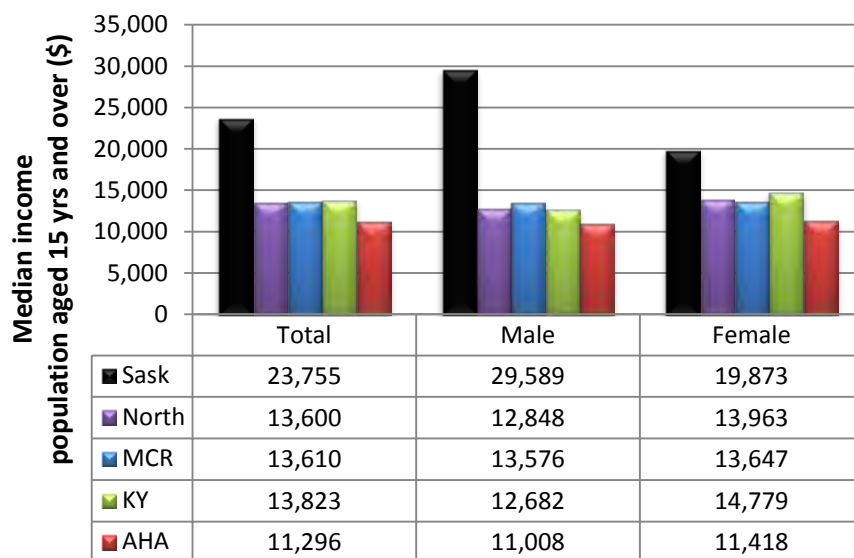
Source: Canadian UNICEF Committee (2009). Canadian Supplement to The State of The World's Children 2009. Aboriginal children's health: Leaving no child behind.

There are determinants of health that are more closely linked to the Aboriginal peoples, including self-determination, culture and heritage, and colonization. The "Web of Being: Social determinants and indigenous peoples' health" model, pictured above, illustrates these unique determinants. It has been said that "this conceptualization of the social, economic and historical determinants of health is anchored in Aboriginal ways of knowing and being, particularly notions of interconnectivity and holism..." (Canadian UNICEF Committee, 2009).

The following section will describe many of the non-medical determinants of health including income and social status, education and literacy, employment, physical environment, social environment, and personal health practices, in relation to northern Saskatchewan.

Income and social status

Figure 29 Median personal income, population 15 and over, by sex and region, 2005

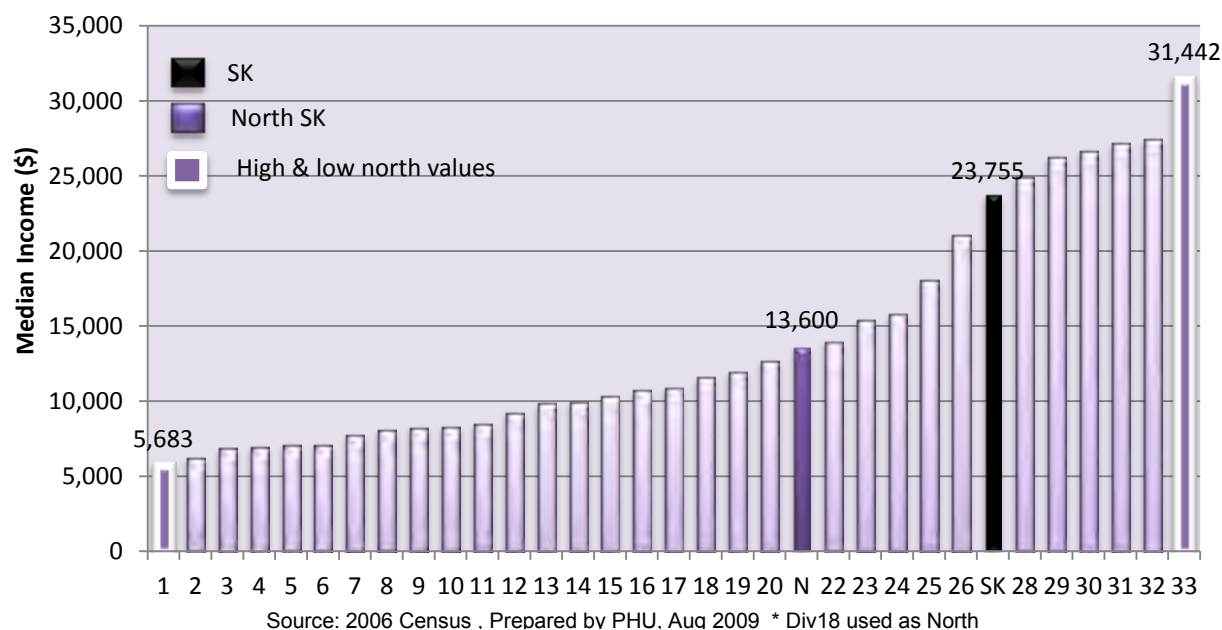


Source: Census 2006, Prepared by PHU July 2008 (Div. 18 was used as NorthSask)

The median income divides the population into two halves based on their income levels for persons who had income. Half of the population have incomes less than the median and half the population have incomes greater than the median. The median income in northern Saskatchewan is much lower than the provincial median income. All three northern health authorities have similar median incomes. The difference in median incomes between males and females is less pronounced than the disparity between the north and the whole province.

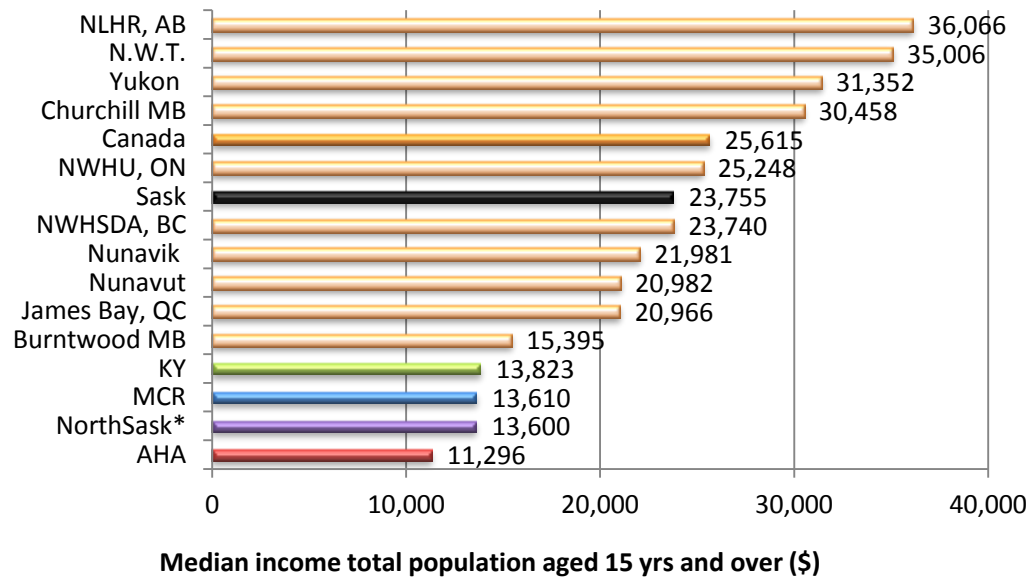
Median income in northern Saskatchewan in 2006 was less than 60% of the provincial median income.

Figure 30 Range of median incomes for northern Saskatchewan communities, population aged 15 and over, 2005



It is important to examine the range of incomes across the north as needs of higher income communities will be very different than lower income communities. In 2005, a handful of northern communities had median incomes greater than the provincial median, with the highest value being over \$31,000. On the other hand, approximately two thirds of northern communities had median incomes below the northern median with the lowest value being less than \$6,000.

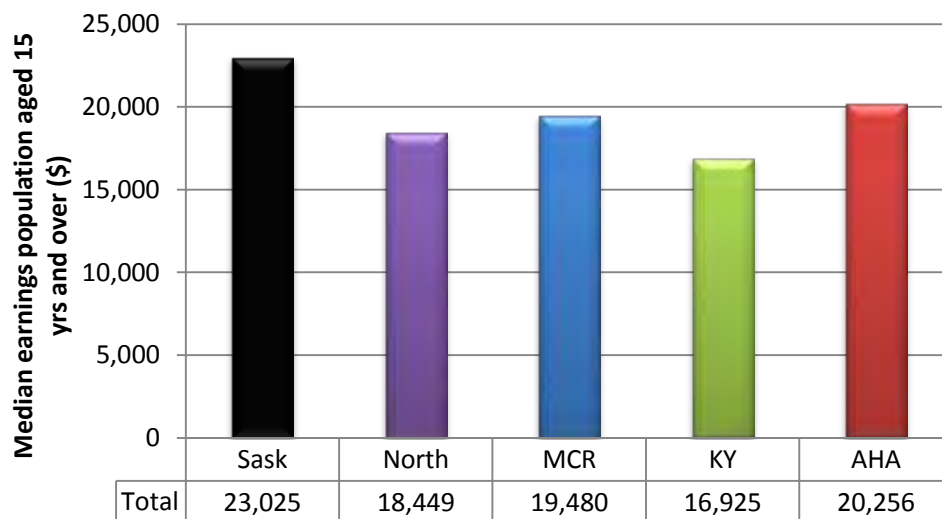
Figure 31 Median before tax income, population aged 15 years and over, by northern region, 2005



Source: Census 2006, Prepared by PHU Feb 2009 (* NorthSask is Div. 18)

The median before-tax income of people living in northern Saskatchewan was over \$10,000 less than the provincial median, and over \$12,000 less than the national median in 2006. The median incomes of the three northern Saskatchewan health authorities were also below all of the other selected northern regions in Canada.

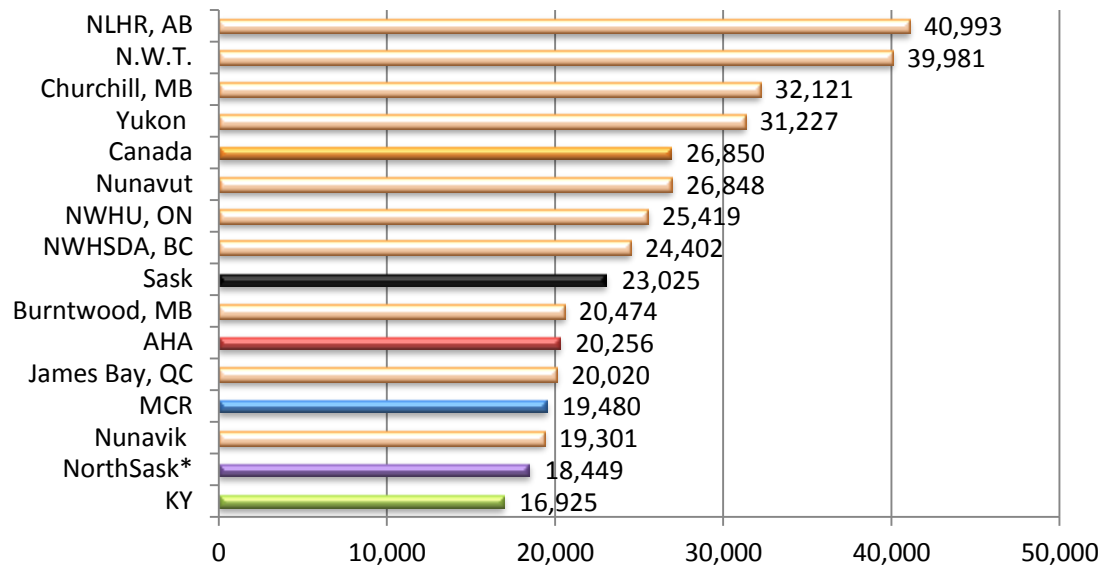
Figure 32 Median earnings, population aged 15 years and over, Saskatchewan and northern health authorities, 2005



Source: Census 2006, Prepared by PHU July 2008 (Div. 18 was used as NorthSask)

Earnings are defined by Statistics Canada as the total income received by persons 15 years of age and over during the 2005 calendar year from wages and salaries, net income from a non-farm unincorporated business and/or professional practice, and/or net farm self-employment income. The median earnings were lower for northern Saskatchewan than they were for Saskatchewan as a whole. Within the north, the highest earnings were in AHA, and the lowest were in KYHR.

Figure 33 Median earnings, population aged 15 years and over with earnings, by northern region, 2005



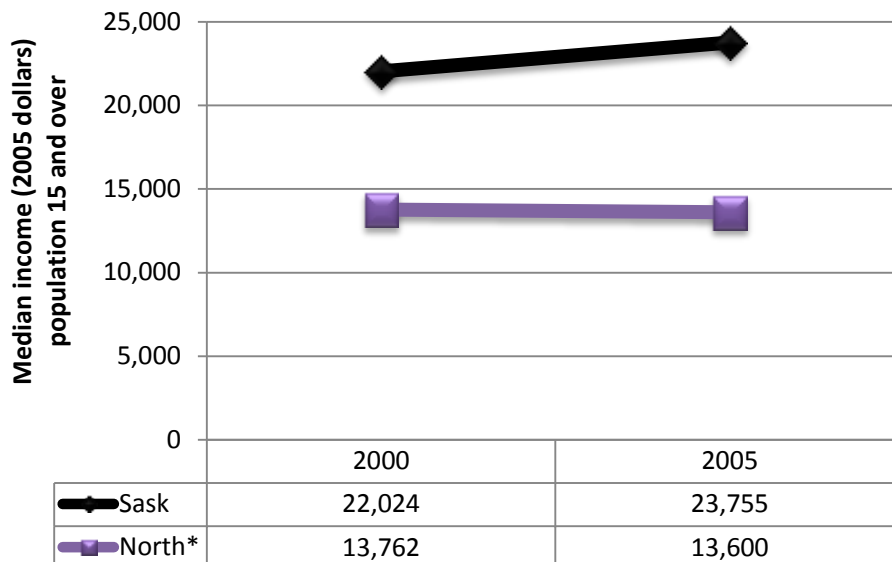
Median earnings total population aged 15 yrs and over (\$)

Source: Census 2006, Prepared by PHU Feb 2009 (* NorthSask is Div. 18)

Northern Saskatchewan had relatively low median earnings compared to the provincial and national median earnings. Median earnings for Nunavik, James Bay, and Burntwood were similar in the northern Saskatchewan health authorities, while NWHSDA, NWHU, Nunavut, Yukon, Churchill, NWT, and NLHR all had higher median earnings.



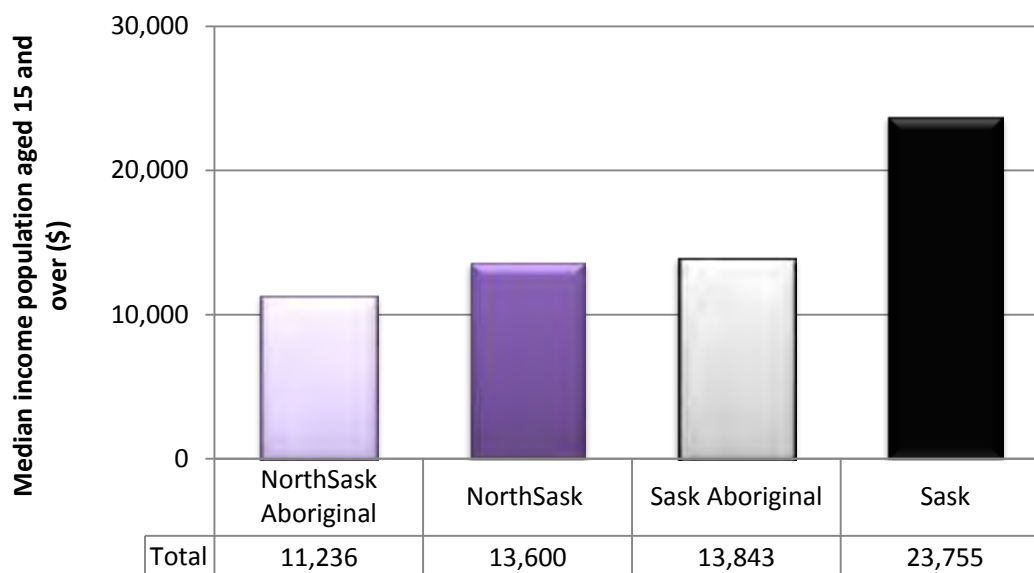
Figure 34 Median income of persons reporting income North Saskatchewan and Saskatchewan 2000-2005



Source: Census 1996-2006, Prepared by PHU June 2009 * Div. 18 used for North

Between the years 2000 and 2005, the median income (adjusted for inflation) increased by around \$1,700 for the Saskatchewan population. In northern Saskatchewan, median income dropped by about \$160 over this time period, increasing the disparity in income between the north and Saskatchewan between 2000 and 2005.

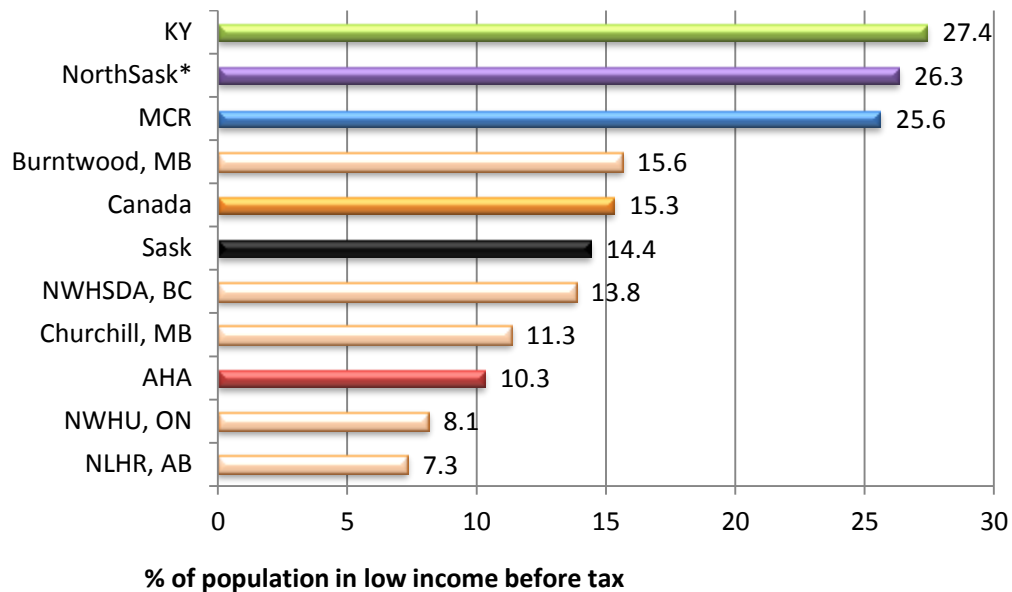
Figure 35 Median income, 15 years and older, by Aboriginal status northern Saskatchewan and Saskatchewan, 2005



Source: 2006 Census, Prepared by PHU June 2008, * Div. 18 used for NorthSask values

There are two clear gradients in incomes across Saskatchewan, with Aboriginal people and northerners (both Aboriginal and non-Aboriginal) having lower median incomes than their provincial and non-Aboriginal counterparts.

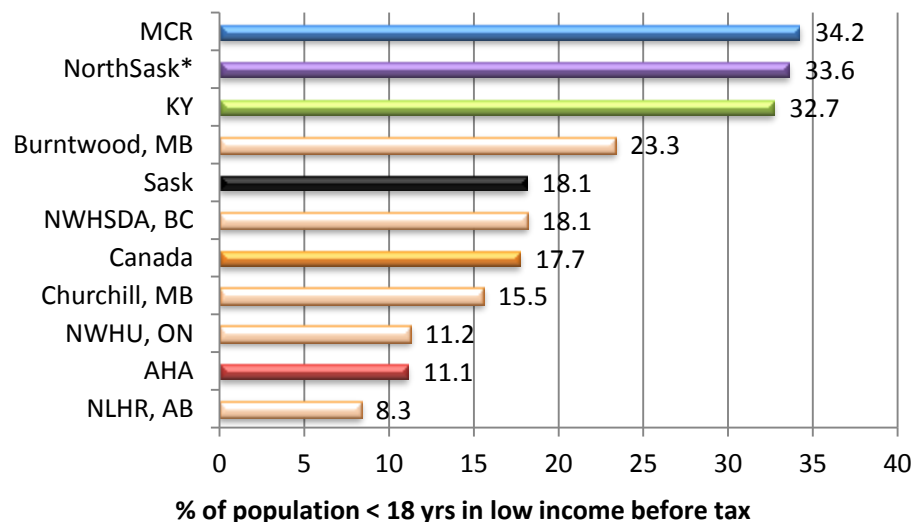
Figure 36 Proportion of the population, off-reserve, living with low income before tax, by northern region, 2005



Source: Census 2006, Prepared by PHU Feb 2009 (* NorthSask is Div. 18)

Northern Saskatchewan had a high percent of the off-reserve population classified as living with low income before tax in 2005. The rate of population living with low income before tax in northern Saskatchewan (26%) was 1.7 to 1.8 times higher than the national or provincial rates. As the data for individuals living on First Nations reserves was excluded in the Census, many of the other northern regions across Canada have no data available.

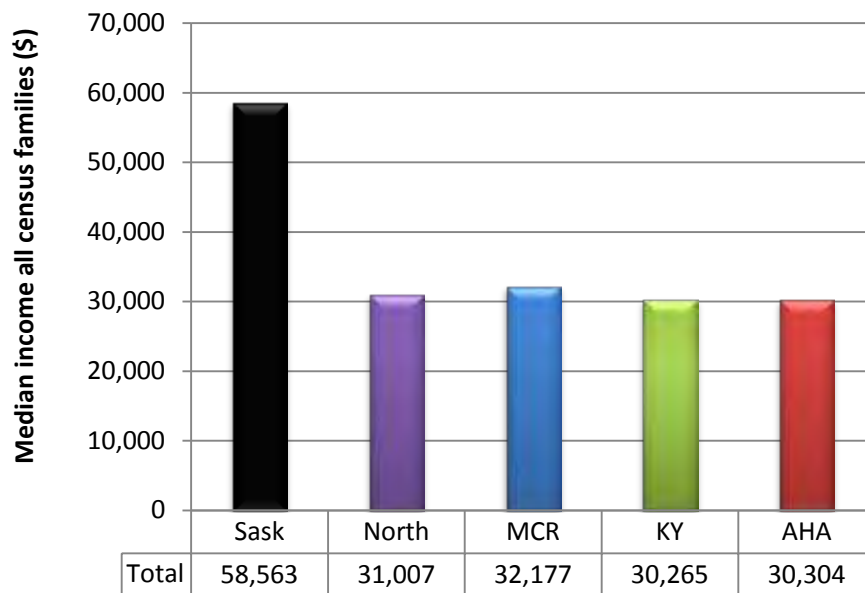
Figure 37 Proportion of the population aged 17 and under, off-reserve, living with low income before tax, by northern region, 2005



Source: Census 2006, Prepared by PHU Feb 2009 (* NorthSask is Div. 18)

Northern Saskatchewan had a high percent of the off-reserve population under 18 years classified as living with low income before tax in 2005. The rate of the population living with low income before tax in northern Saskatchewan (34%) was close to twice the national or provincial rates. Burntwood Manitoba had the closest rate to the three northern Saskatchewan authorities, whereas NWHSDA, Churchill, NWHU and NLHR had rates similar to Canada and AHA. However, it should be pointed out that the exclusion of individuals living on reserves has likely affected the rates in many of the northern regions.

Figure 38 Median family income by northern Saskatchewan health authority, 2005



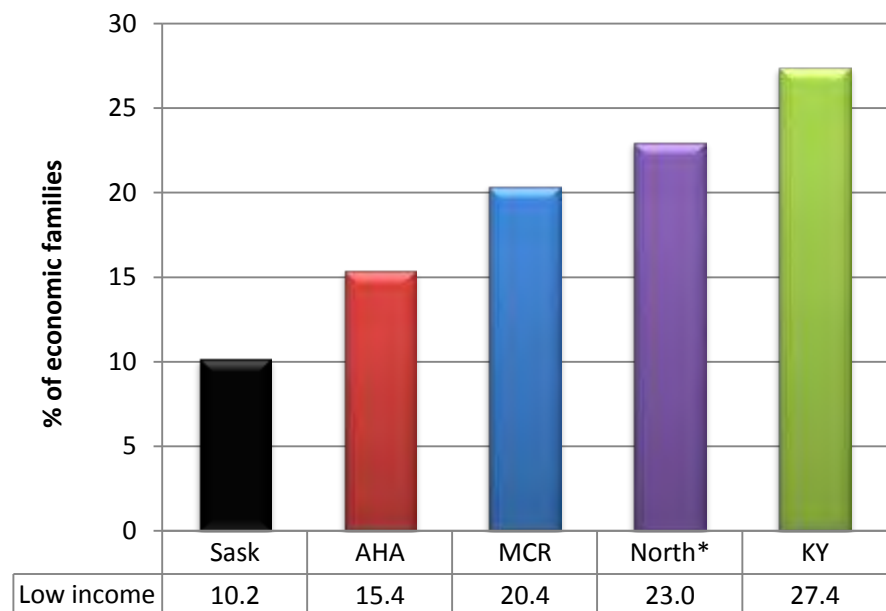
Source: Census 2006, Prepared by PHU July 2008

According to Statistics Canada, a census family refers to a married couple (with or without children of either or both spouses), a couple living common-law (with or without children of either or both partners) or a lone parent of any marital status, with at least one child living in the same dwelling. A couple may be of opposite or same sex. Children in a census family include grandchildren living with their grandparent(s), but with no parents present. Family income refers to the sum of the total incomes of all family members 15 years of age and over during the calendar year of 2005 from all sources (e.g.

wages and salaries, child benefits, Old Age Security pension and Guaranteed Income Supplement, Employment Insurance benefits). The median family income in northern Saskatchewan was almost half of the provincial median income in 2005.

Figure 39 Incidence of low income, off-reserve, in economic families, northern Saskatchewan health authorities, 2005

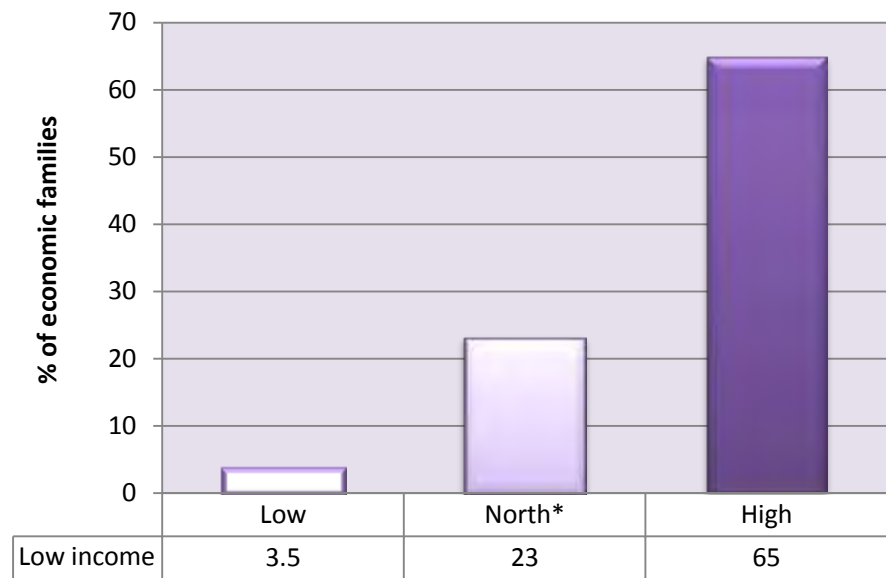
According to Statistics Canada an economic family refers to a group of two or more persons who live in the same dwelling and are related to each other by blood, marriage, common-law or adoption. A couple may be of opposite or same sex. Low income cut-offs represent income levels at which families or persons not in economic families spend 20% more than average of their before tax income on food, shelter and clothing. These cut-offs are based on family and community size. Data for institutionalized individuals and individuals living on First Nations reserves are excluded for this indicator. In the north, the percent of economic families living with low income was more than double that in the whole province in 2005.



Source: 2006 Census , Prepared by PHU, Aug 2009 (* Division 18 used for North)

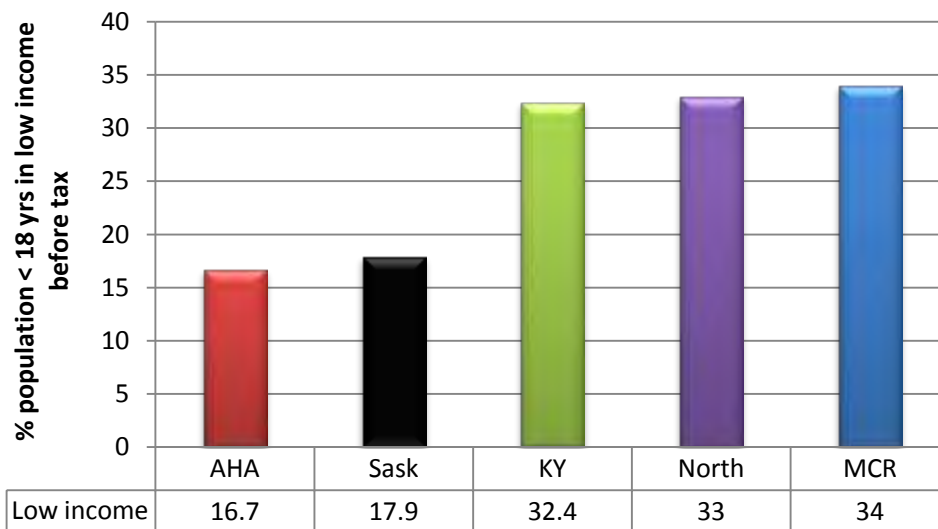
Figure 40 Range of community proportions of low income economic families in northern Saskatchewan off-reserve communities, 2005

Twenty-three percent of economic families in northern Saskatchewan are considered to have low income; however, this proportion can vary widely between individual northern communities. The prevalence of low income families ranges from as little as 3.5% in one community, to a high of 65% in another. These differences in the prevalence of low income families across the northern communities contribute to substantial differences in health status and service needs. It is important to note that this indicator excludes communities with fewer than 100 economic families.



Source: 2006 Census , Prepared by PHU, Aug 2009 * Div18 used as North

Figure 41 Children aged 17 and under in low income economic families, off-reserve, northern Saskatchewan health authorities, 2005

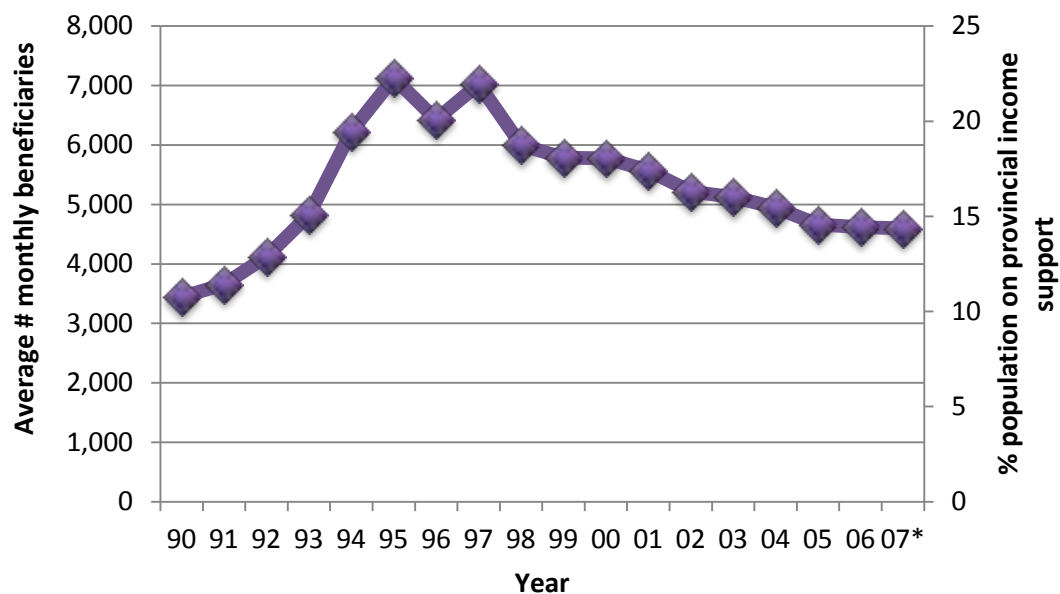


Source: Census 2006, Prepared by PHU July 2008 (Div. 18 was used as NorthSask)

Children in poverty are at risk for a wide variety of health and social issues. The measure of “Children in Low-Income Families” (income for the year prior to the Census) refers to the population of children aged 17 and under, living in economic families with incomes below Statistics Canada’s low-income cut-offs (LICO). The cut-offs represent levels of income where people spend disproportionate amounts of money for food, shelter, and clothing. LICOs are based on family and community size. Data

for institutionalized individuals and individuals living on First Nations reserves are excluded for this indicator. Compared to Saskatchewan as a whole, the northern Saskatchewan health authorities have higher rates of children living in low income families. The one exception to this is AHA, which has rates that are slightly lower than the province. It is important to note that the off-reserve population makes up a very small percentage of the total AHA population.

Figure 42 Proportion of the northern Saskatchewan population on provincial social assistance, 1990-2007

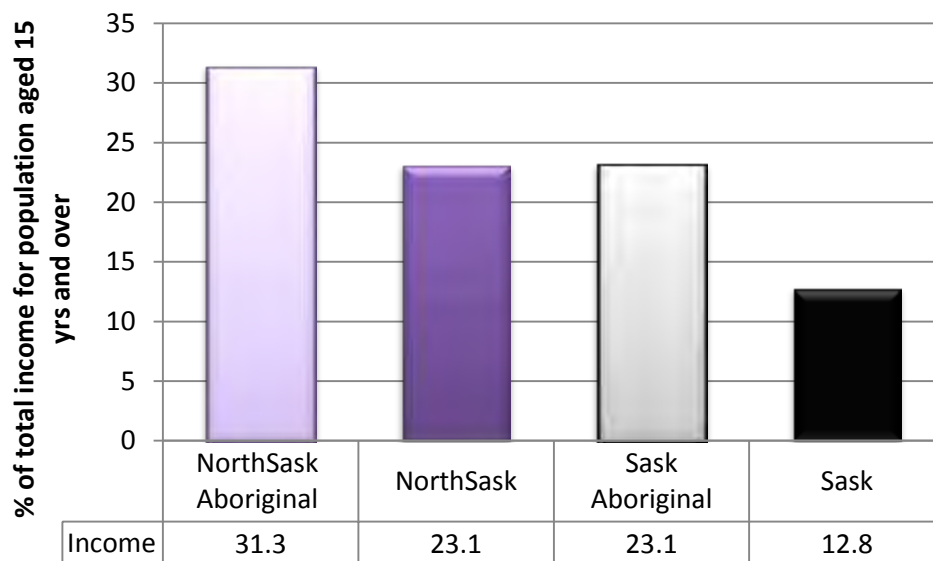


The percent of the northern Saskatchewan population on provincial social assistance has decreased slightly over the past decade. Since 2005, the average number of monthly beneficiaries stabilized to around 4,800, or just fewer than 15% of the population on provincial income support.

Source: Sask Government Income Assistance Division 2007, Covered Population 1990-2007, Prepared by PHU Jan 2008 (*2007 = Jan-Oct)

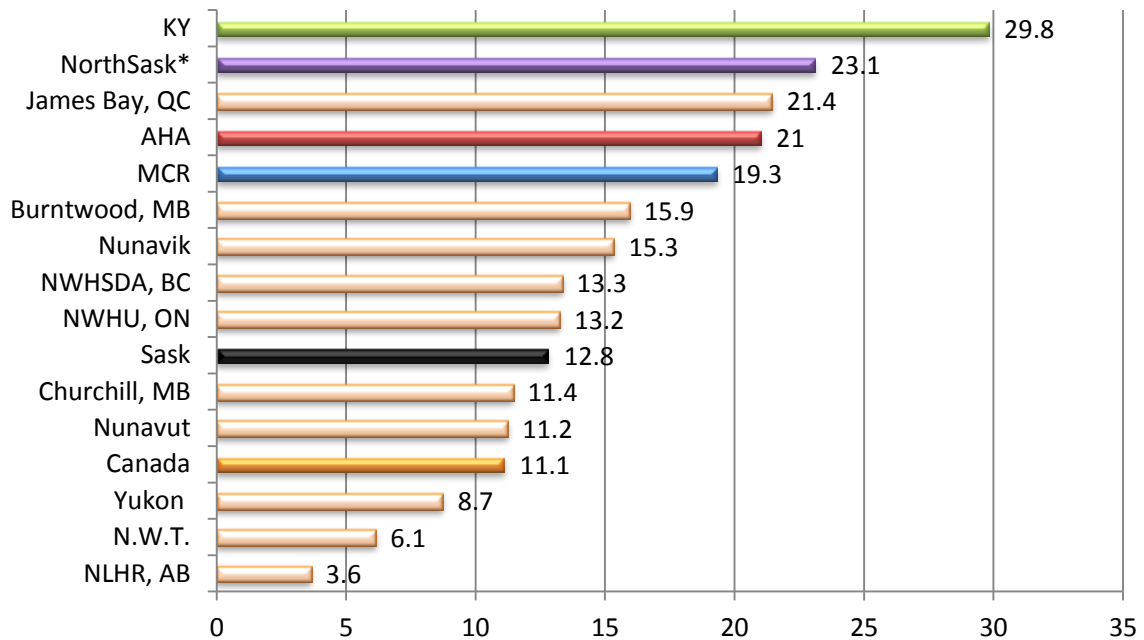
Figure 43 Government transfer income as % of total income by Aboriginal status, northern Saskatchewan and Saskatchewan, 2005

Government transfer income refers to total income from all transfer payments received from federal, provincial, territorial or municipal governments during the calendar year 2005. This includes income from a variety of sources (Old Age Security pension, Guaranteed Income Supplement, Canada or Quebec Pension Plan benefits, Employment Insurance benefits, Child benefits, etc.) for the population aged 15 and over. When we examine the proportion of total income from government transfers across Saskatchewan, we can see two major trends. Generally, individuals in the north receive a higher portion of their total income from government transfers as compared to their provincial counterparts. As well, within a particular region (e.g. northern Saskatchewan or the province as a whole), the Aboriginal population receives a greater portion of its income from government transfers compared to the population of that region as a whole.



Source: 2006 Census, Prepared by PHU June 2008, * Div. 18 used for NorthSask values

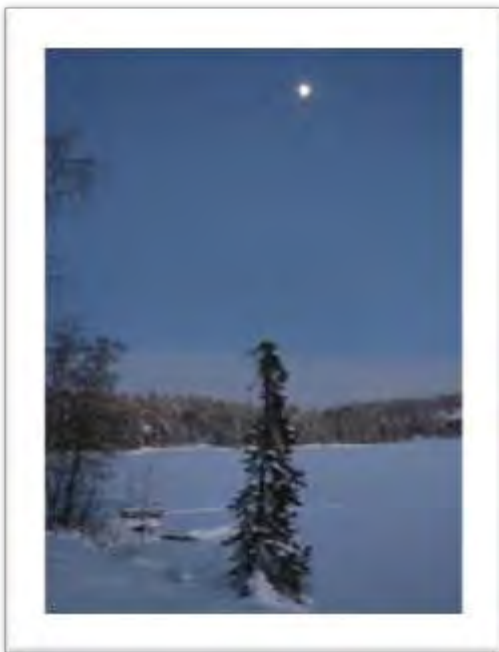
Figure 44 Proportion of total income from government transfers, population aged 15 and over, by northern region, 2005



% of total income from government transfers population 15 and over

Source: Census 2006, Prepared by PHU Feb 2009 (* NorthSask is Div. 18)

Northern Saskatchewan receives 23% of its total income from government transfers. This is almost twice as high as the provincial rate, and more than twice as high as the national. James Bay has a similar proportion of government transfer, whereas the other northern regions have far less of their total income coming from government transfer.

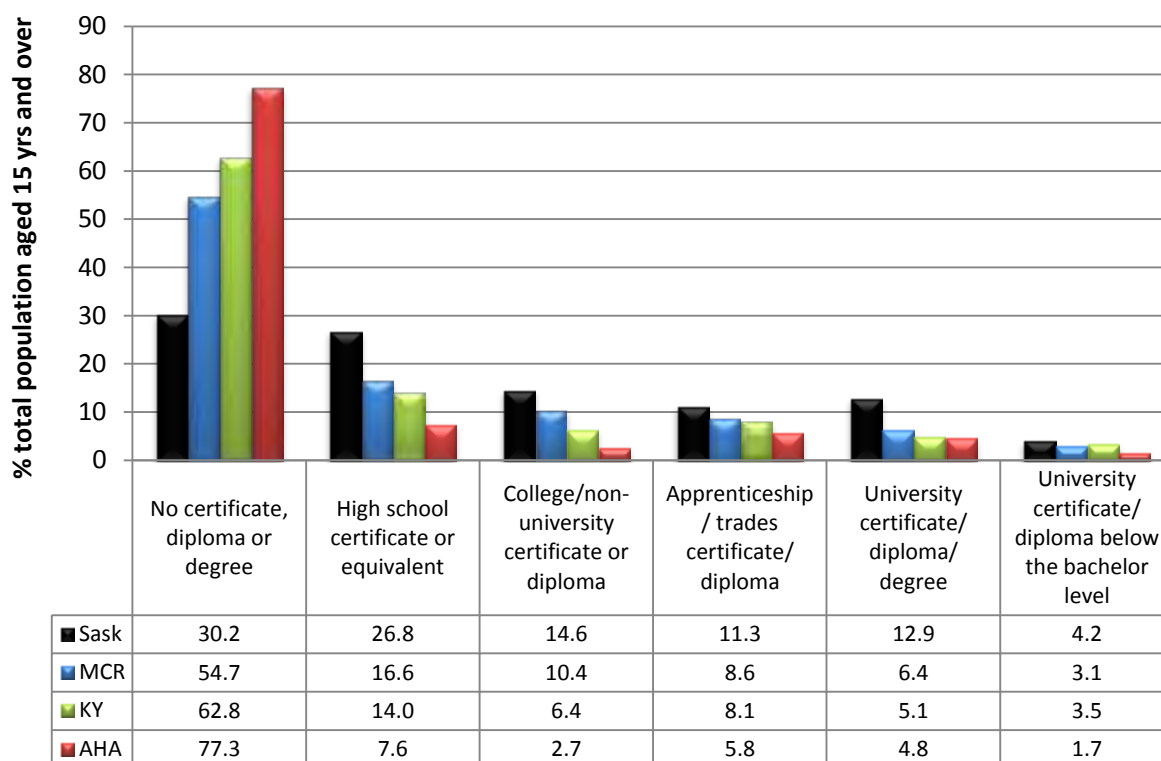


Education and literacy

Education has long been known as an important determinant of health. The exact connection is not clearly understood but could be attributable to various factors. Increased education could provide individuals with the skills and knowledge for problem solving, as well as easier access to higher paying jobs with better job security. Higher levels of education are also related to improved literacy, lower levels of poverty, and reduced food insecurity (Government of Canada, 2008). Additionally, children from lower socioeconomic backgrounds are more likely to begin school with lower social, language and literacy skills than their peers, putting them at a disadvantage throughout their time in the educational system (Marmot, 2010).



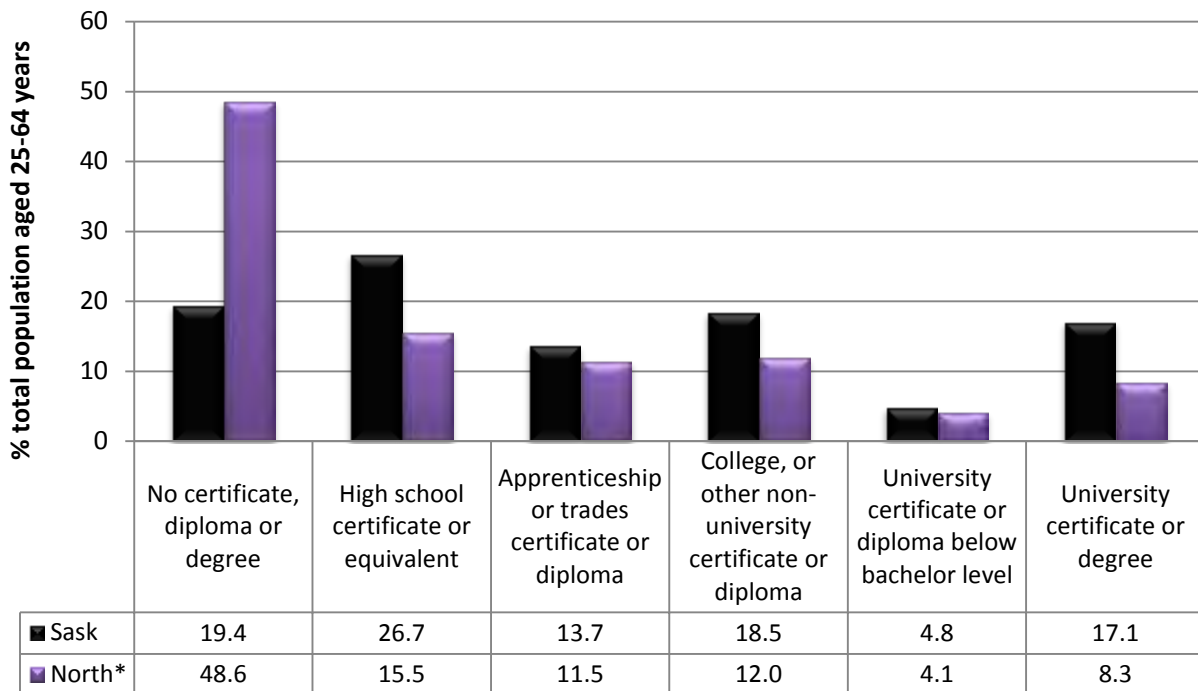
Figure 45 Levels of education, population aged 15 years and over, by northern health authority, 2006



Source: 2006 Census, Prepared by PHU July 2008

Education levels in northern Saskatchewan are dramatically lower than those in the province. Northern Saskatchewan has higher rates of individuals with no certificate, diploma or degree, and lower rates of individuals with all types of educational qualifications (high school, college certificate or diploma, apprenticeship certificate or diploma, university certificate, diploma or degree and university certificate or diploma below the bachelor level). AHA has the lowest levels of education in all of northern Saskatchewan.

Figure 46 Levels of education, population aged 25-64 years, northern Saskatchewan and Saskatchewan, 2006

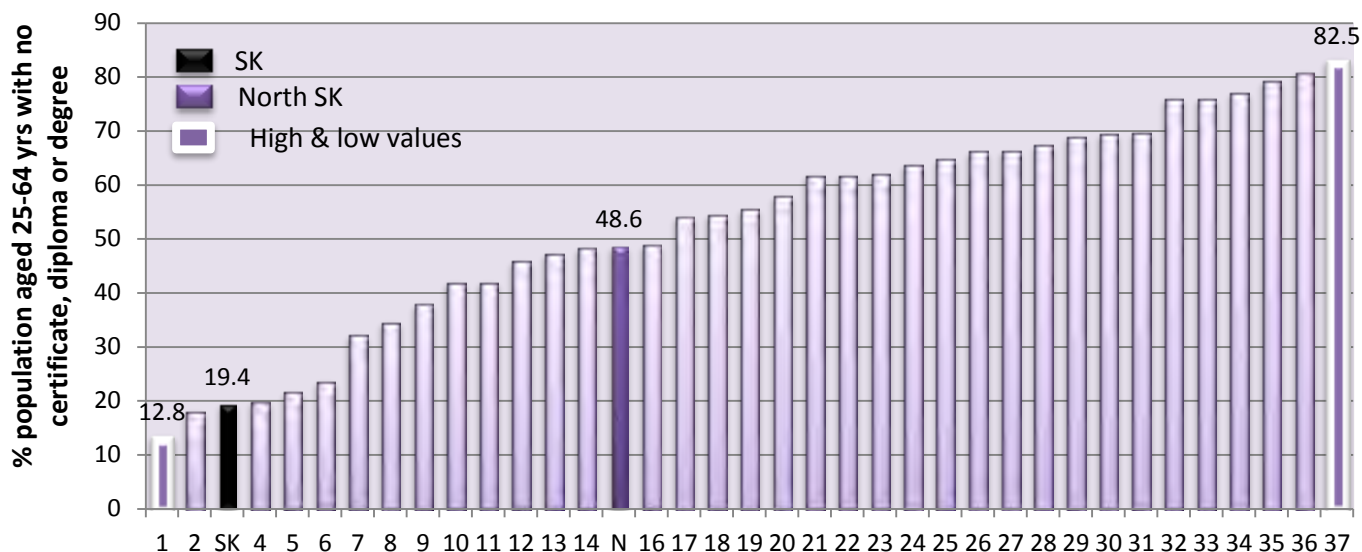


Source: 2006 Census. Prepared by PHU Aug 2009 * Div 18 used for North

Northern Saskatchewan had more than double the provincial rates of individuals without a certificate, diploma or degree in 2006. Northern Saskatchewan had less than half the provincial rate of those with a university certificate or degree, and close to half the provincial rate of those with a high school certificate or equivalent.



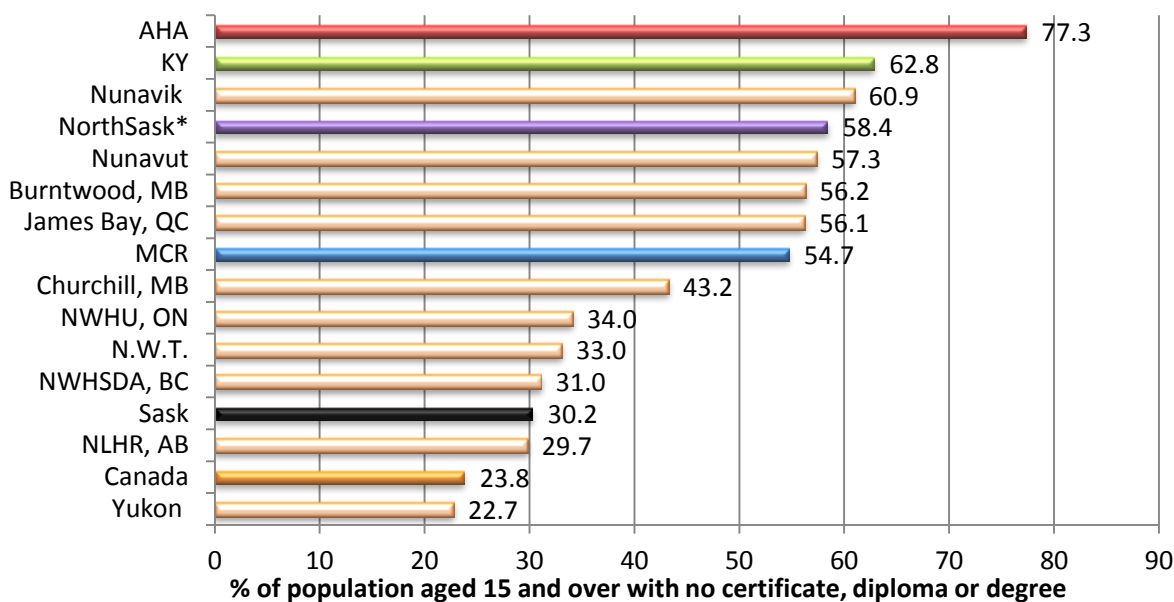
Figure 47 Range of education levels, population aged 25-64 years, northern Saskatchewan communities, 2006



Source: 2006 Census , Prepared by PHU, Aug 2009 * Div18 used as North for communities with > 40 people aged 25-64 yrs

It is important to examine the range of education levels across the north, as needs of communities with lower educational attainment will be different than communities with higher educational attainment levels. In 2006, a handful of northern communities had similar or even lower rates than the province in the proportion of the population aged 25-64 years that had no certificate, diploma, or degree. However, approximately two thirds of northern communities had rates that were greater than the overall northern Saskatchewan rate, with the highest rate being over 4 times the provincial rate.

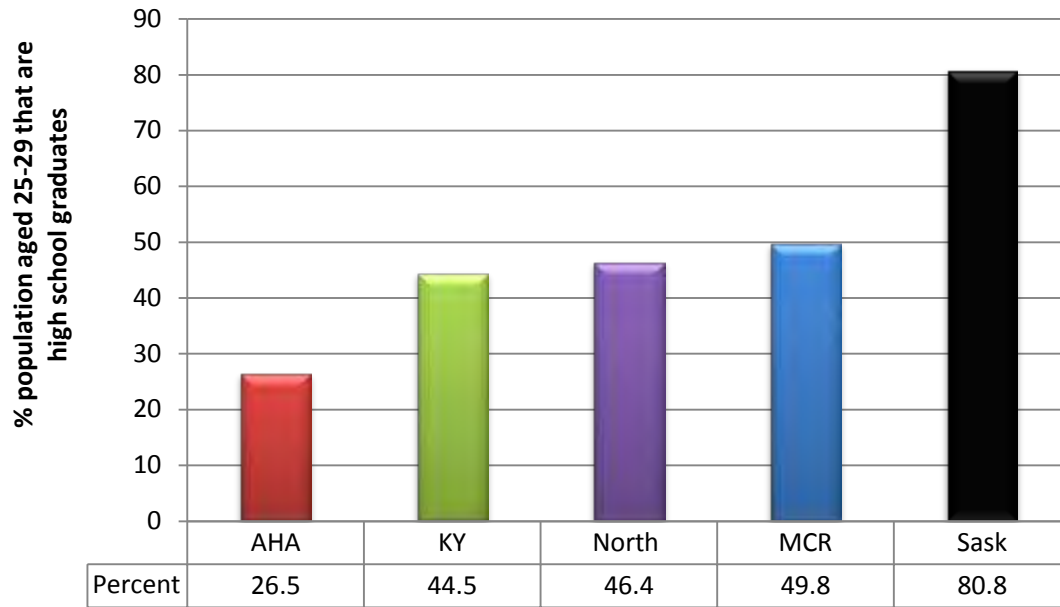
Figure 48 Population aged 15 and over with no certificate, diploma or degree, by northern region, 2006



Source: Census 2006, Prepared by PHU Feb 2009 * Div 18 used as North

The northern Saskatchewan health authorities had some of the highest proportions of the population aged 15 and over with no certificate, diploma or degree. Among the northern comparators AHA, KYHR and Nunavik had the highest proportions, while Yukon and NLHR had the lowest.

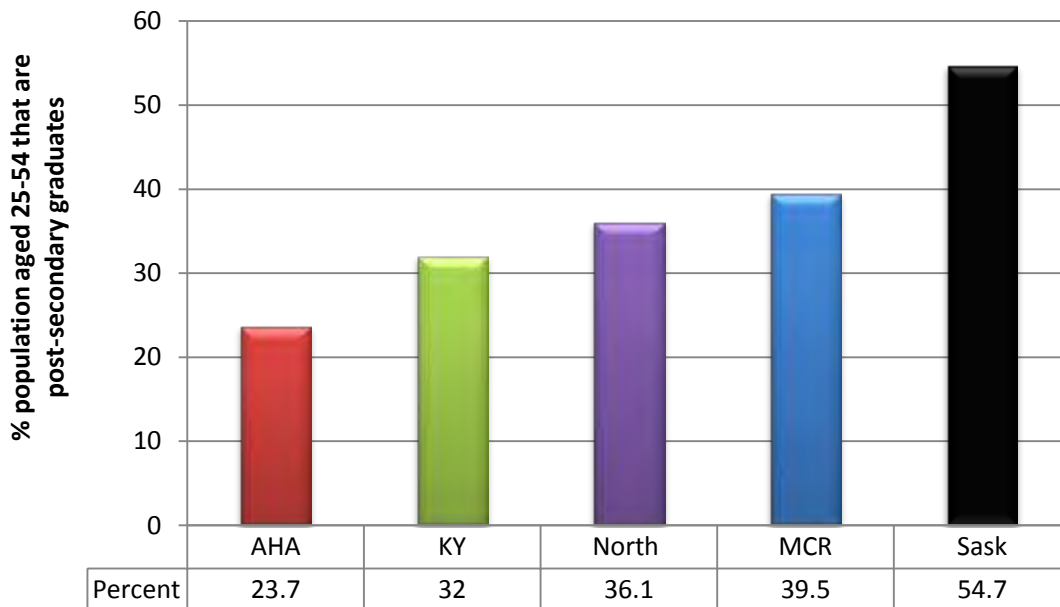
Figure 49 High school graduates aged 25-29, 2006



Source: Census 2006, Prepared by PHU June 2008

Northern Saskatchewan had a substantially lower percent of the population aged 25-29 who were high school graduates compared to the whole province. AHA had the lowest percent of the population aged 25-29 who were high school graduates.

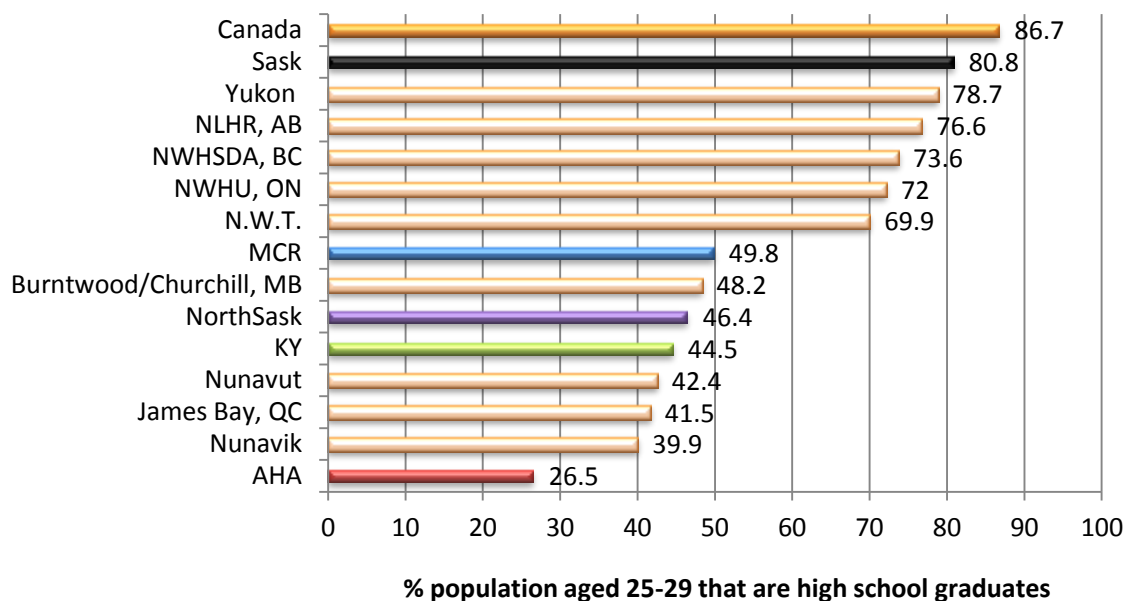
Figure 50 Post-secondary graduates aged 25-54, 2006



Source: Census 2006, Prepared by PHU June 2008

Northern Saskatchewan also had a lower percent of population aged 25-54 that were post-secondary graduates. Northern Saskatchewan's rate was 19% lower than the provincial rate. Within the north, there was also variation with AHA having the lowest rate and MCRHR having the highest rate.

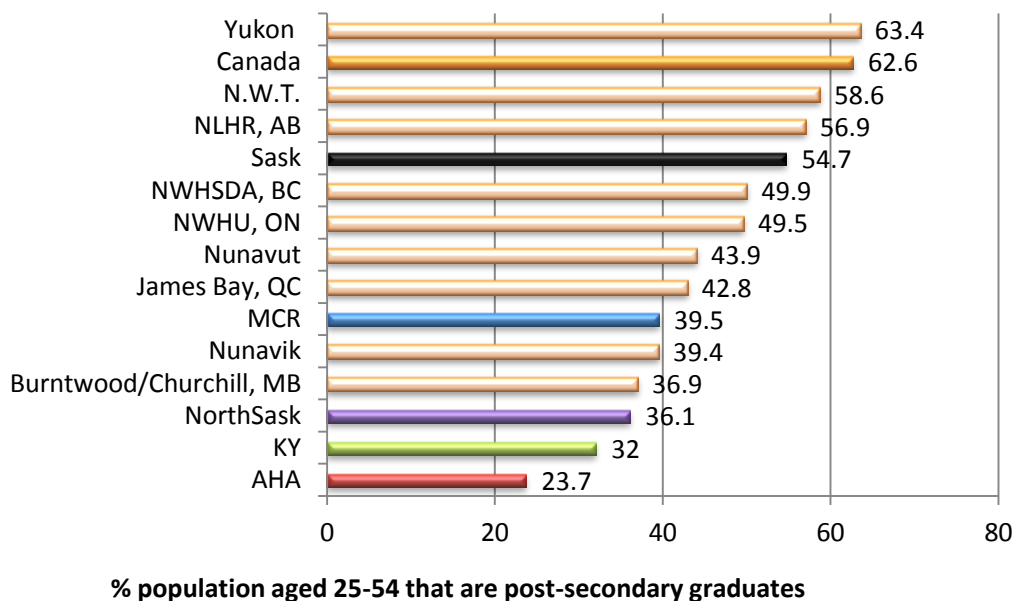
Figure 51 Population aged 25-29 years that are high school graduates, by northern region, 2006



Source: Census 2006, Prepared by PHU June 2008

Northern Saskatchewan health authorities had low rates of educational attainment, with only 25-50% of the population aged 25-29 years having graduated from high school compared to 80%-86% rates for the province and Canada in 2006. Compared to other northern regions, AHA rates were the lowest, while the Yukon had the highest.

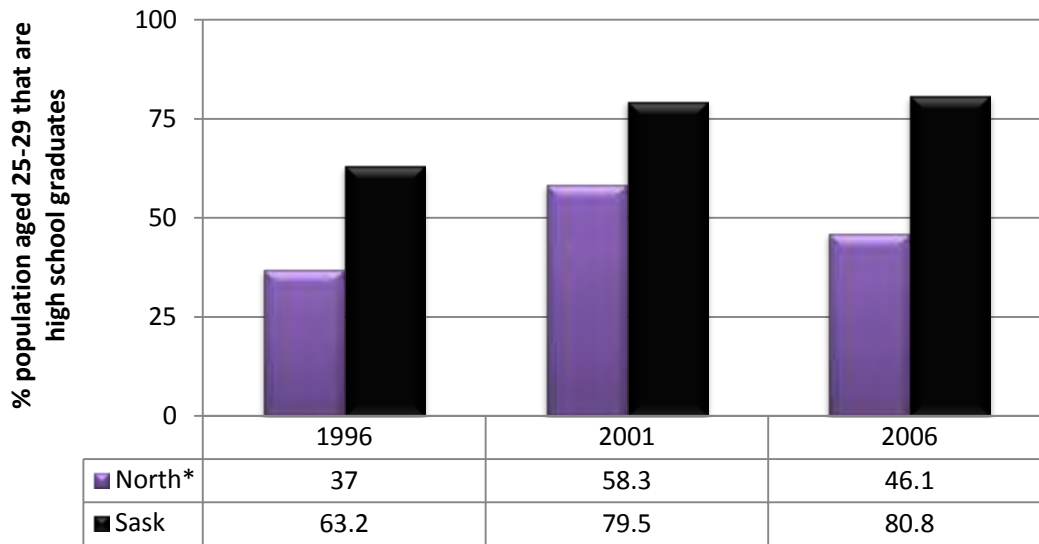
Figure 52 Population aged 25-54 years that are post-secondary graduates, by northern region, 2006



Source: Census 2006, Prepared by PHU June 2008

The northern Saskatchewan health authorities also had low rates of post-secondary graduation for the population aged 25 to 54 years in 2006. Ranging from 24%-40%, the northern Saskatchewan rates were substantially lower than both the provincial and national rates. Comparing the rates of the northern regions, AHA had the lowest rate while the Yukon had the highest.

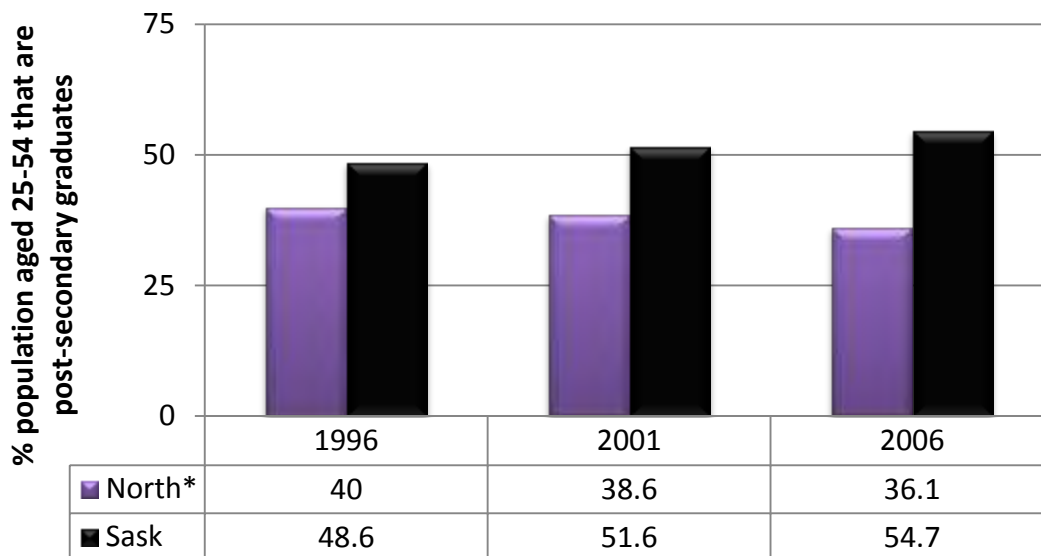
Figure 53 High school graduates aged 25-29, 1996-2006



Source: Census 1996-2006, Prepared by PHU June 2009 * NHSB was North in 1996

The percent of population aged 25-29 years graduating from high school increased in the province from 1996 to 2006. In northern Saskatchewan, however, there was an initial increase between 1996 and 2001, before a decrease in 2006. Prior to 1998 health services were provided in northern Saskatchewan by the Northern Health Services Branch (NHSB) which covered a geographic area that encompassed the current three northern health authorities, as well as the communities of Cumberland House and Cumberland House Cree Nation.

Figure 54 Post-secondary graduates aged 25-54, 1996-2006

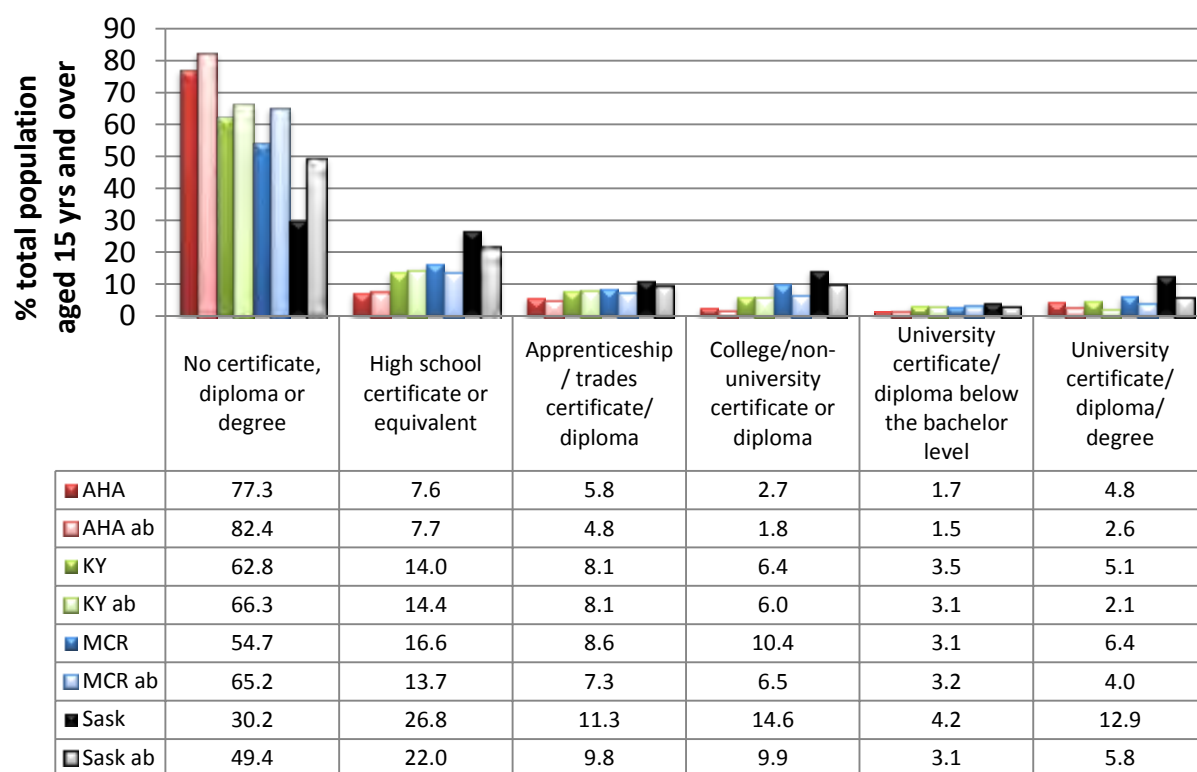


Source: Census 1996-2006, Prepared by PHU June 2009 * NHSB was North in 1996

The percent of population aged 25-54 that were post-secondary graduates increased in Saskatchewan from 1996 to 2006; however it decreased in northern Saskatchewan in the same time period.

Education levels in northern Saskatchewan remain below provincial levels. The proportion of northerners aged 25-29 years who graduated from high school has increased between 1996 and 2006, while the proportion of northerners aged 25-54 years who graduated from post-secondary school has declined.

Figure 55 Levels of education by Aboriginal identity, population aged 15 years and over, northern Saskatchewan and Saskatchewan, 2006



Source: 2006 Census, Prepared by PHU Feb 2010

It is important to look at differences within our populations for various indicators. When we examine the educational attainment levels of the three northern health authorities by Aboriginal status – those who self-identify as being Aboriginal or not, we notice some trends. Across the north, the Aboriginal population had attained lower education levels than the region as a whole in 2006. For example, the self-identified Aboriginal population in AHA had lower educational attainment levels than that attained in AHA as a whole. This same discrepancy was observed at the provincial level to a greater extent.



Figure 56 Average marks for selected 10 & 20 level courses, by student characteristic, Saskatchewan 2007/8

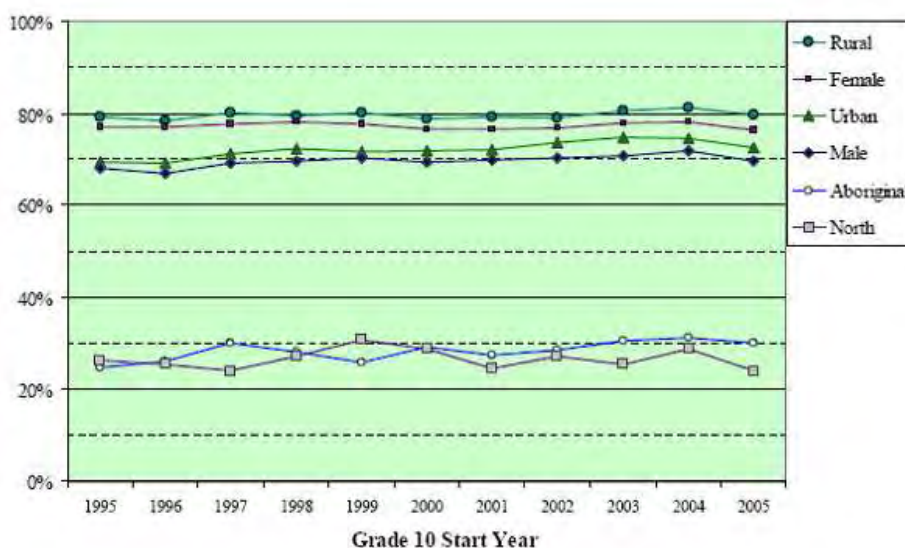
All of the factors contributing to northerners, particularly northern Aboriginal people having lower educational attainment, are unknown. However, one component to academic completion (certificates, diplomas, degrees, etc.) is academic achievement. Data from the Saskatchewan Education Core Indicators Report 2008 (Saskatchewan Ministry of Education, 2008) showed that northern non-Aboriginal students' average marks were lower than either urban or rural non-Aboriginal students in all selected high school courses in Saskatchewan in 2007/8. For both males and females, the self-declared Aboriginal

Non-Aboriginal	Urban		Rural		North	
	Male	Female	Male	Female	Male	Female
English Language Arts A10	67.9%	74.7%	69.1%	77.4%	62.8%	66.0%
English Language Arts B10	68.4%	75.4%	69.4%	77.7%	58.5%	61.9%
Science 10	68.7%	72.6%	69.7%	74.9%	68.3%	67.0%
Mathematics 10	69.1%	72.8%	70.7%	75.5%	59.9%	60.7%
English Language Arts 20	66.8%	75.3%	69.2%	79.4%	61.0%	71.0%
Biology 20	67.6%	73.0%	69.6%	77.7%	63.2%	61.3%
Mathematics 20	66.4%	70.6%	69.0%	75.0%	61.0%	61.6%
Self-declared aboriginal	Urban		Rural		North	
	Male	Female	Male	Female	Male	Female
English Language Arts A10	52.8%	58.4%	55.9%	61.5%	52.2%	57.7%
English Language Arts B10	53.1%	58.0%	55.5%	61.8%	50.5%	57.9%
Science 10	53.3%	56.2%	58.2%	60.8%	53.0%	57.1%
Mathematics 10	53.8%	56.4%	56.6%	59.6%	51.2%	53.9%
English Language Arts 20	54.5%	58.8%	56.5%	62.6%	53.0%	62.2%
Biology 20	55.4%	59.2%	57.2%	61.8%	57.3%	60.6%
Mathematics 20	54.8%	57.6%	57.4%	61.4%	55.1%	58.4%

Source: Saskatchewan Education Indicators Report 2008, Prepared by PHU June /2010

students from the north had lower marks in all of the selected courses compared to their non-Aboriginal counterparts in the north. This trend was also seen at the provincial level. The average marks for self-declared Aboriginal people were lower than the provincial average in all selected subjects, with northern self-declared Aboriginal males scoring the lowest in each selected subject.

Figure 57 Percent of Saskatchewan students completing grade 12 in three years or less after beginning grade 10, by student category, 1995/6 to 2005/6 grade 10 cohorts.



Between 1995 and 2005, 25 to 30% of Saskatchewan students who self-declared as Aboriginal or who resided in the north completed grades 10 through 12 in three years or less. In stark contrast, between 70 and 80% of the other Saskatchewan student categories completed grades 10 through 12 in three years or less.

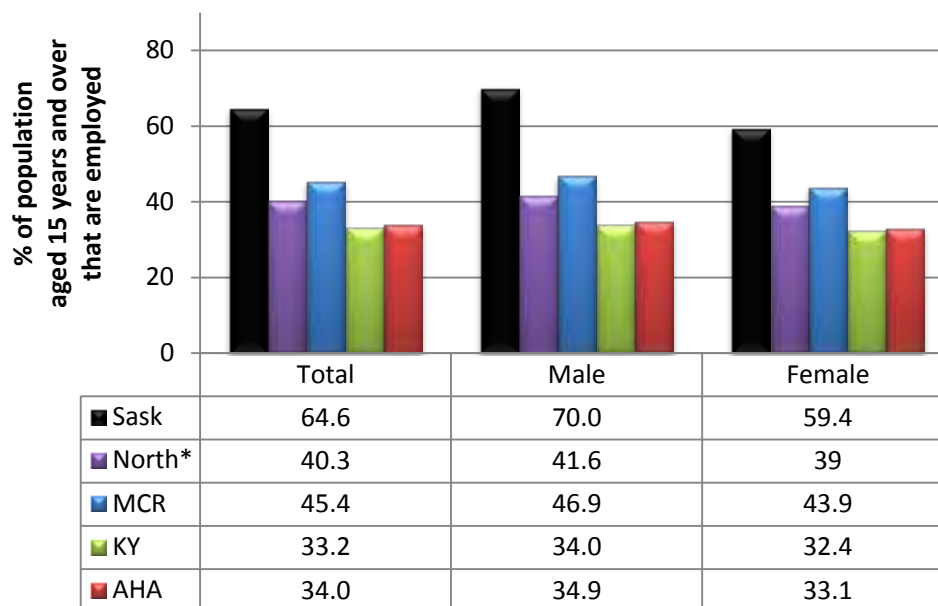
Source: Saskatchewan Ministry of Education (2008). (Saskatchewan Ministry of Education, 2008), Prepared by PHU June 2010.

Employment

Employment largely determines the income one can make, and health status is directly associated with income level (Government of Canada, 1999). People who are unemployed have an increased risk of long-term illness, mental illness and cardiovascular disease, as well as other health conditions (Marmot, 2010). Although the main benefit of employment is income, it also provides a sense of identity and purpose, social contacts and opportunities for personal advancement (Government of Canada, 1999). The type of employment and working conditions can also impact health (Commission on Social Determinants of Health, 2008).

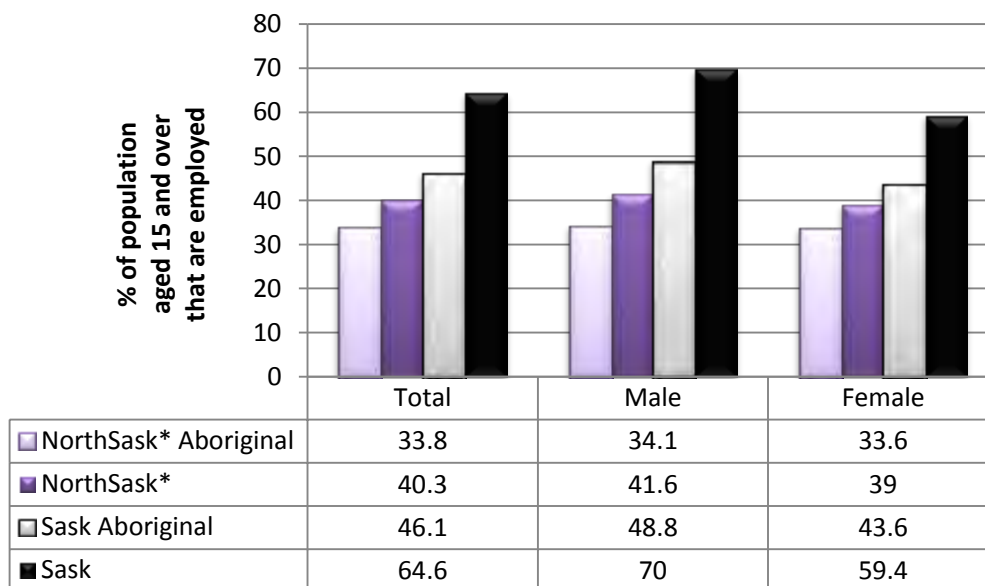
Figure 58 Employment rate aged 15 and up, by northern Saskatchewan health authority and sex, 2006

As used in the Census employment rate refers to the number of persons employed in the week prior to Census Day, expressed as a percentage of the total population 15 years and over, excluding institutional residents. Employment rates in northern Saskatchewan were lower than in Saskatchewan in 2006. Males and females in northern Saskatchewan had similar employment rates; however this was not the case in Saskatchewan, where males had higher employment rates than females.



Source: Census 2006, prepared by PHU July 2008 * Div 18 used as North

Figure 59 Employment rate by sex, Aboriginal people, northern Saskatchewan and Saskatchewan, 2006

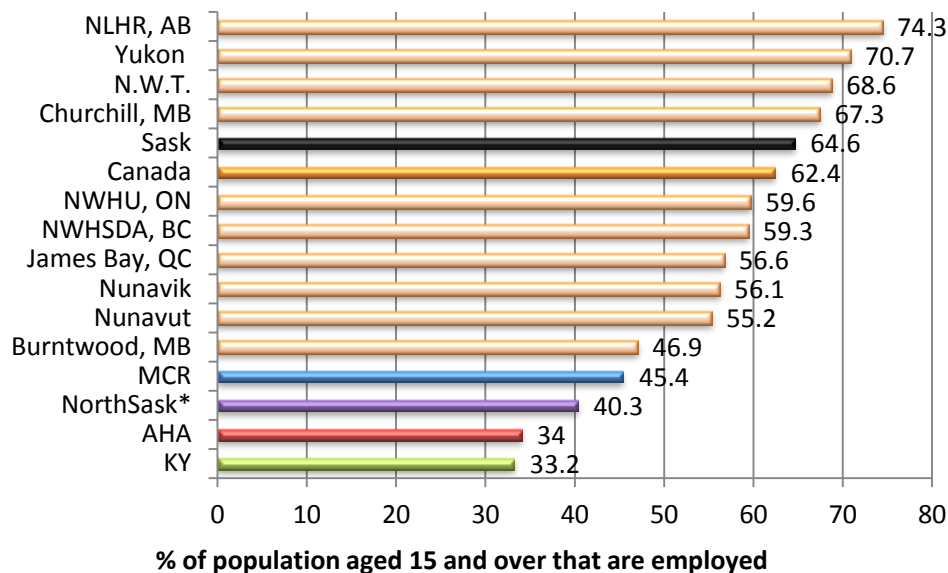


Source: 2006 Census, Prepared by PHU June 2008 * Div 18 used for North

Northern Saskatchewan Aboriginal people had lower employment rates when compared to all residents of northern Saskatchewan, Saskatchewan Aboriginal people, and all residents of Saskatchewan.

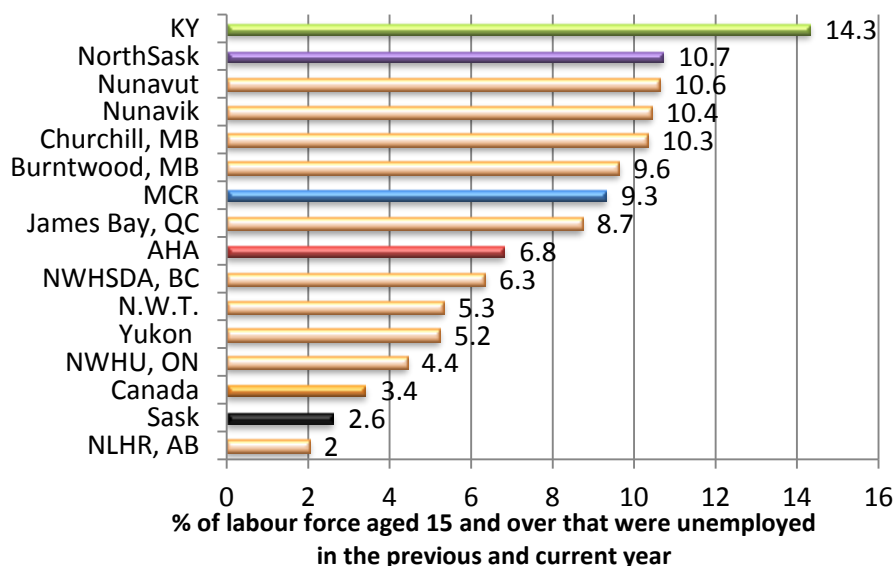
Figure 60 Employment rate, population aged 15 years and over, by northern region, 2006

Northern Saskatchewan had a low employment rate, when compared to other northern health regions in Canada. Only 40% of people aged 15 and over were employed in northern Saskatchewan, while the national rate was 62%, and the provincial rate was 65%. Rates in the three northern Saskatchewan health authorities were also lower than in all other selected northern regions.



Source: Census 2006, Prepared by PHU Feb 2009 * Div 18 used as North

Figure 61 Long-term unemployment rate aged 15 years and over by northern region 2006



Source: Census 2006, Prepared by PHU June 2008

Unemployed people tend to experience more health problems; thus long term unemployment could extend one's susceptibility to poor health. The long term unemployment rate is defined as the proportion of the labour force aged 15 and over who did not have a job at any time during the years of 2005 and 2006. The labour force consists of people who are currently employed, and people who are unemployed, but were available to work and had looked for work in the past four weeks. Northern Saskatchewan had amongst the highest rates of long term unemployment in the country in 2005 and 2006. Long term unemployment in northern

Saskatchewan was over triple the Canadian rate, and over 4 times the Saskatchewan rate. Compared to the other northern regions, KYHR had the highest rate; MCRHR's rate was similar to Nunavut, Nunavik, Churchill, Burntwood, and James Bay, while AHA had a rate similar to NWHSDA. NWT, Yukon, NWHU and NLHR had similar rates to the province of Saskatchewan and the country as a whole.

As reviewed in (Reading, 2007 pp.16): "According to Marmot, 'If the major determinants of health are social, so must be the remedies'. Therefore, the relationship between health status and SES [socioeconomic status] should be of concern to all policy makers, not merely those within the health sector". Furthermore, Reading suggests one way to address the issue of low SES is through education of children from disadvantaged families. "Clearly, developing strategies that speak to children and youth are crucial, as is targeting parents, where lifestyle patterns are mimicked and issues of socioeconomic status are transmitted" (p.17).

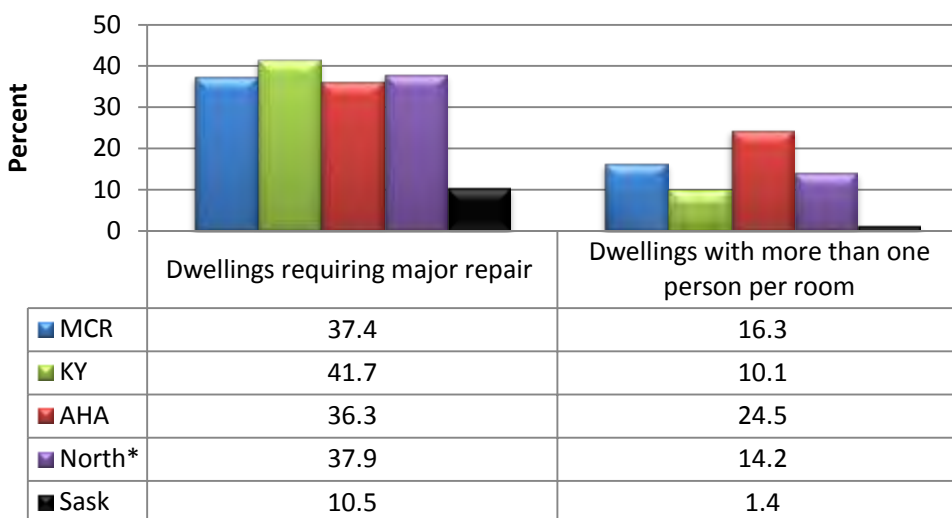
Physical environment

Housing conditions, access to fresh and clean water, and air quality are important factors in the physical environment that have an impact on health (Government of Canada, 2008). The physical environment can also contribute to levels of physical activity, safety in neighbourhoods and streets, and social isolation (National Collaborating Centre for Environmental Health, 2010).

Housing

Poor housing conditions, such as exposures to biological, chemical and physical substances, as well as a variety of housing characteristics are associated with health concerns (Moloughney, 2004). Overcrowding, heating and cooling systems, housing size and layout, indoor air quality, perception of safety, levels of moisture, noise (especially night time noise) and lighting have been associated with a variety of health concerns, including mental health issues, sleep, injuries, infectious diseases, non-infectious respiratory diseases, skin problems, and chronic diseases such as arthritis, hypertension, stroke and cardiovascular disease (Bonnefoy, 2004; Bryant, 2002; Moloughney, 2004).

Figure 62 Occupied private dwelling characteristics and crowding in homes by northern Saskatchewan health authority and Saskatchewan, 2006



Source: Census 2006, prepared by PHU July 2008 * Div 18 used as North

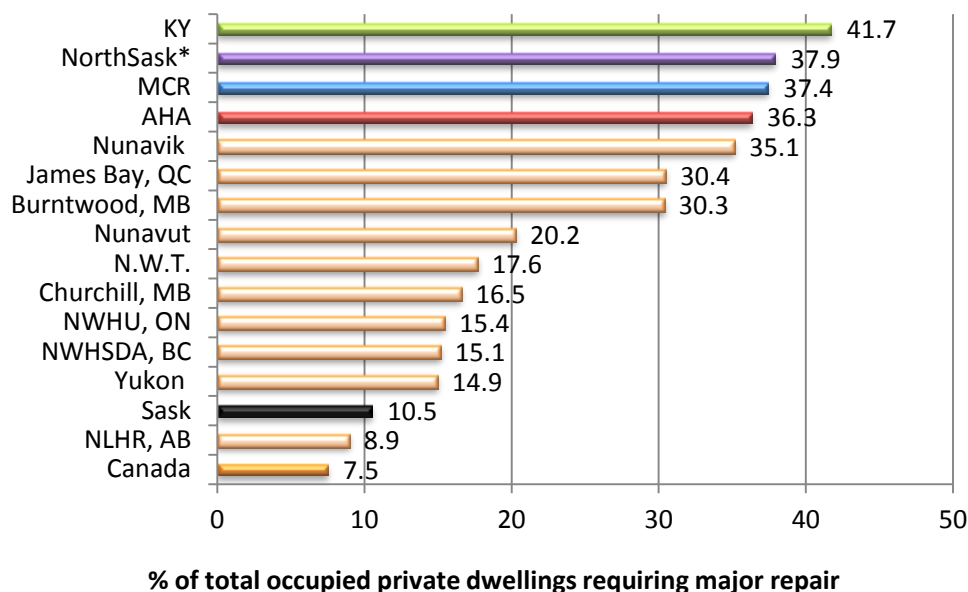
One of the data sources for housing characteristics is the Census from Statistics Canada. The Census asks people to classify their home as needing regular maintenance, minor repairs or major repairs. Regular maintenance refers to regular up-keep such as painting and furnace cleaning. Minor repairs include missing or loose floor tiles, bricks or shingles; defective steps, railing or siding. Major repairs include defective plumbing, electrical wiring, structural repairs, floors or ceilings.

The Census also collects information on crowding by examining the proportion of homes with more than one person per room. A 'room' is defined as an enclosed area within a dwelling suitable for year-round living, not counting bathrooms, halls, entrances and rooms used solely for business purposes.

In 2006, northern Saskatchewan had almost four times the proportion of dwellings requiring major repair as did Saskatchewan. Northern Saskatchewan also had 10 times the rate of crowding, with more than one person per room, compared to the province.

Northern Saskatchewan had almost four times the proportion of dwellings requiring major repair and 10 times the rate of crowding, with more than one person per room, compared to the province in 2006.

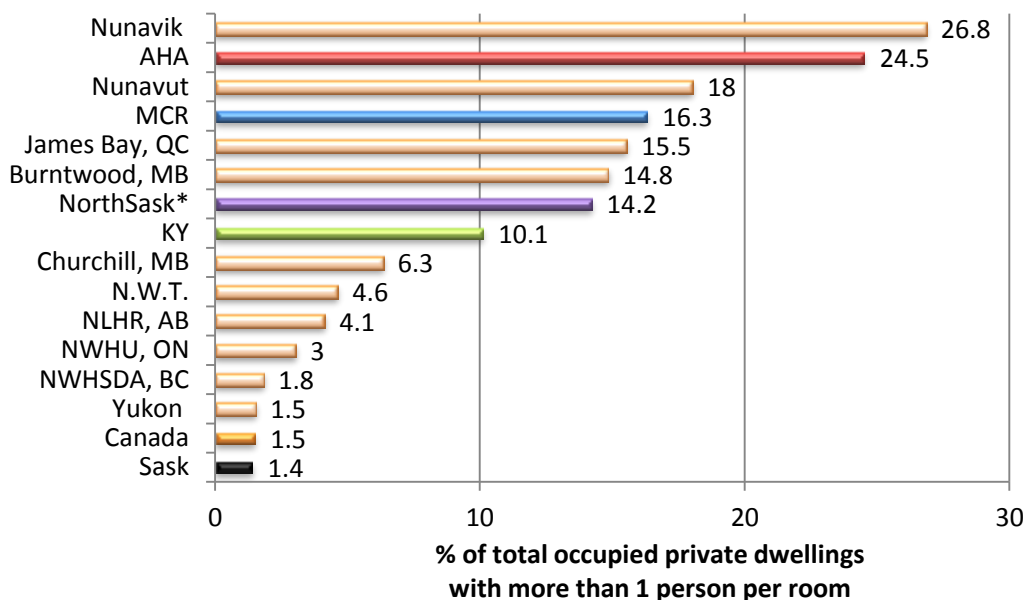
Figure 63 Proportion of occupied private dwellings requiring major repair by northern region, 2006



Source: Census 2006, Prepared by PHU Feb 2009 *Div 18 used as North

The northern Saskatchewan rate (38%) of occupied private dwellings requiring major repairs was five times the national rate in 2006. Each of the individual northern Saskatchewan authorities had higher rates than the other northern regions in Canada.

Figure 64 Proportion of occupied private dwellings with more than 1 person per room, by northern region, 2006



Source: Census 2006, Prepared by PHU Feb 2009 *Div 18 used as North

Northern Saskatchewan had high rates of overcrowding in 2006, with 14.5% of occupied private dwellings having more than one person per room. This rate was 10 times the national rate. Other northern regions with similar rates of overcrowding were Nunavik, Nunavut, James Bay, and Burntwood, while NWT, NLHR, NWHU, NWHSDA and Yukon had much lower rates.

Water

Clean, safe water that is readily available in our homes is an important factor for health. Safe water protects against waterborne diseases that can be spread through drinking water contaminated by human or animal activity. When used to wash hands, bodies, clothes and living spaces, an adequate water supply also helps prevent many other illnesses (such as skin infections, respiratory viruses like influenza).

More and more municipalities and First Nations communities are getting access to clean drinking water. The First Nations' drinking water is monitored by the First Nations' communities with assistance from their Environmental health officers. Northern municipalities own, operate, and monitor their drinking water facilities. Monitoring is done with the assistance of Saskatchewan Environment. The water testing results of each municipality in the province is available online through the SaskH2O website. In the municipal communities, Emergency Boil Water Orders (EBWOs) are issued by the regional health authority when a confirmed threat to public health exists (i.e. microbial contamination). Precautionary Drinking Water Advisories (PDWAs) may be issued by Saskatchewan Environment, or the regional health authority for small water systems, when drinking water quality problems may exist even though an immediate public health threat has not been identified. Usually a PDWA stays in place until any identified problem is rectified and water testing results indicate that the water is safe.



Small water systems include semi-private waterworks that have a flow of less than 18,000 litres per day. These include on-site water systems serving restaurants, motels, campgrounds, small parks, fishing/outfitting camps and municipal wells with no distribution system. These systems are regulated by regional health authorities.

Municipal water systems include municipal waterworks and all privately owned (publicly accessible) waterworks that have a flow rate of 18,000 litres or more per day. These systems are regulated by the Saskatchewan Ministry of Environment.

Figure 65 Number of PDWAs and EBWOs issued in northern Saskatchewan between January 1 and December 31, 2010

Water System	Emergency Boil Water Orders (EBWOs)	Precautionary Drinking Water Advisories (PDWAs)
Small water systems (N = 225)	8	15
Municipal water systems (N= 31)	1	29

Source: Sask H2O (<http://www.saskh2o.ca>) Prepared by PHU May 2011.

Between January 1 and December 31, 2010, there were eight EBWOs and 15 PDWAs issued among the 225 small water systems in northern Saskatchewan. For municipal (community) water systems in northern Saskatchewan, during the same time period, one EBWO and 29 PDWAs were issued. The one northern Saskatchewan municipal community with an emergency boil water order in 2010 had it in place for 16 days.

Figure 66 Number of northern municipalities with naturally elevated levels of various compounds in drinking water, Saskatchewan, 1995-2008

Compound	Northern Saskatchewan	Southern Saskatchewan	Saskatchewan
Uranium	0	28	28
Arsenic	0	4	4
Lead	0	1	1
Nitrate	0	1	1
Selenium	0	11	11
Trihalomethanes	12	100	112
Total	12	145	157

Source: Adapted from www.saskh2o.ca (Maps of naturally high element concentrations in drinking water). Prepared by PHU Feb 2010

Community water supplies are monitored by municipalities for various chemicals. For the results available for the period of 1995 to 2008, there were no northern Saskatchewan municipalities with elevated levels of uranium, arsenic, lead, nitrates or selenium. There were 12 communities which had a least one report of elevated trihalomethanes. Further information on a community by community basis is available on the SaskH2O website (www.saskh2o.ca).



Water fluoridation

Fluoride makes the outer layer of the teeth stronger and thus reduces dental cavities. The addition of fluoride to drinking water is a safe, effective and economical means of preventing dental caries in people of all age groups (The Canadian Dental Association, 2010). The optimal level of fluoride in drinking water is recommended to be 0.7 mg of fluoride per litre of water, while 1.5 mg/L is thought to be the maximum acceptable concentration and 0.3 mg/L or lower is thought to put children at higher risk of dental caries (Health Canada, 2007, 2009; The Canadian Dental Association, 2010).

Due to the strong benefits of water fluoridation and relatively low cost, many towns and cities put fluoride in the water in a controlled manner. Three northern Saskatchewan off-reserve communities have natural or added fluoride in their drinking water including La Ronge, Air Ronge and La Loche. Many other communities in northern Saskatchewan, where there is not adequate fluoride in the water, offer fluoride mouth rinse programs to school children. Mouth rinse programs are also available in most First Nations communities.

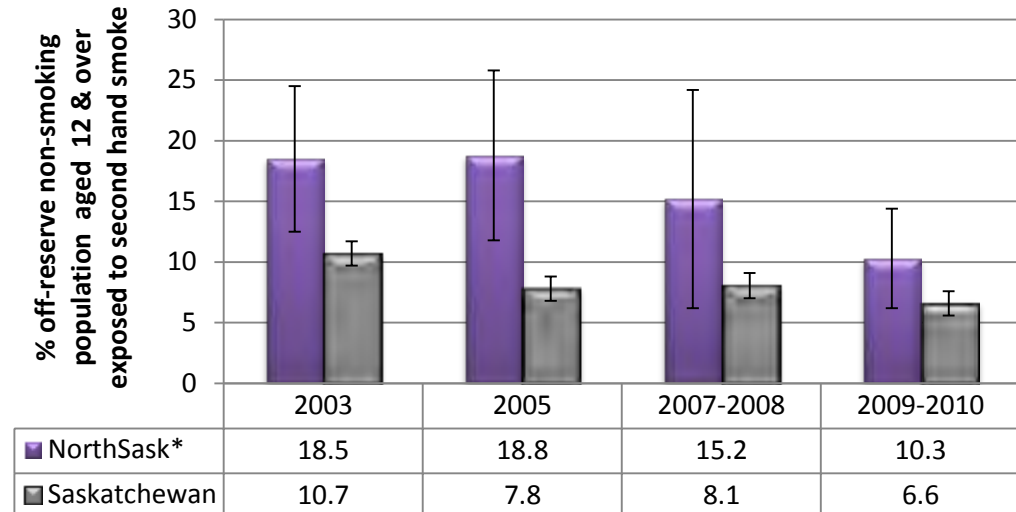
Air

Northern Saskatchewan is blessed with a picturesque natural environment and high air quality. Human health impacts of air quality are often localized and event-specific in nature, such as the seasonal impact of forest fire smoke. Communities or susceptible individuals may be evacuated as a precaution against the direct assault of fire but also because of the impact of smoke. Air pollution and environmental smoke exposure is related to exacerbation of cardiovascular disease and the aggravation of respiratory diseases (Government of Canada, 2008).

Indoor air quality is affected by overcrowding, environmental tobacco smoke, wood burning, and the storage of fuels and solvents in the homes (Saskatchewan Environment and Resource Management, 1999). Individuals smoking in the home, workplace or public places contribute to problems of air quality. There is stronger evidence now for the negative health effects of environmental tobacco smoke (also known as second hand smoke), including cancers of the lung, head and neck, breast, bladder and cervix; cardiovascular diseases including heart disease and stroke; respiratory diseases including chronic obstructive pulmonary disease (COPD), asthma, allergies and pneumonia; as well as other health risks including low birth weight, sudden infant death syndrome (SIDS), middle ear infections, periodontal disease and ulcerative colitis (Reardon, 2007).

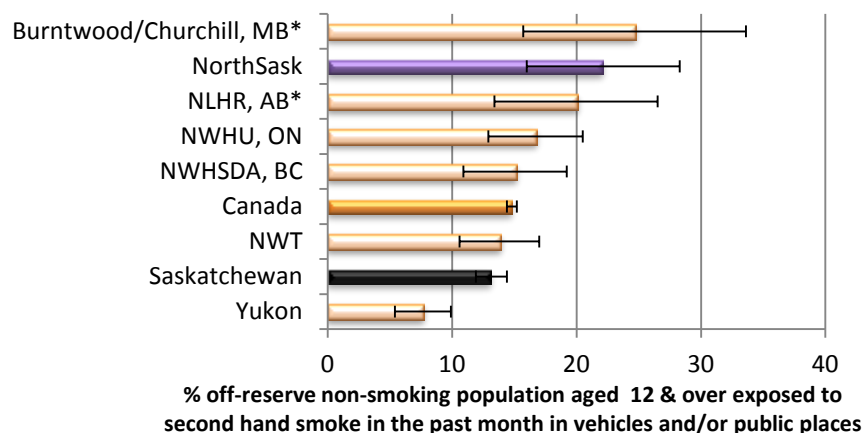
Figure 67 Exposure to second hand smoke at home, northern Saskatchewan and Saskatchewan, 2003 to 2009-2010

The percentage of the off-reserve non-smoking population aged 12 and over that is exposed to second hand smoke at home remained relatively stable across the north between 2003 and 2005, before starting to decline in 2007-2008. However it remained over 1.5 times the provincial rate in 2009-10.



Source: Statistics Canada (CCHS) CANSIM table 105-0501 & 105-0502, Prepared by PHU July 2011* caution CVs > 16.5

Figure 68 Non-smoking population aged 12 and over, off-reserve, reporting being exposed to second hand smoke in vehicles or public spaces, by northern region, 2009-2010

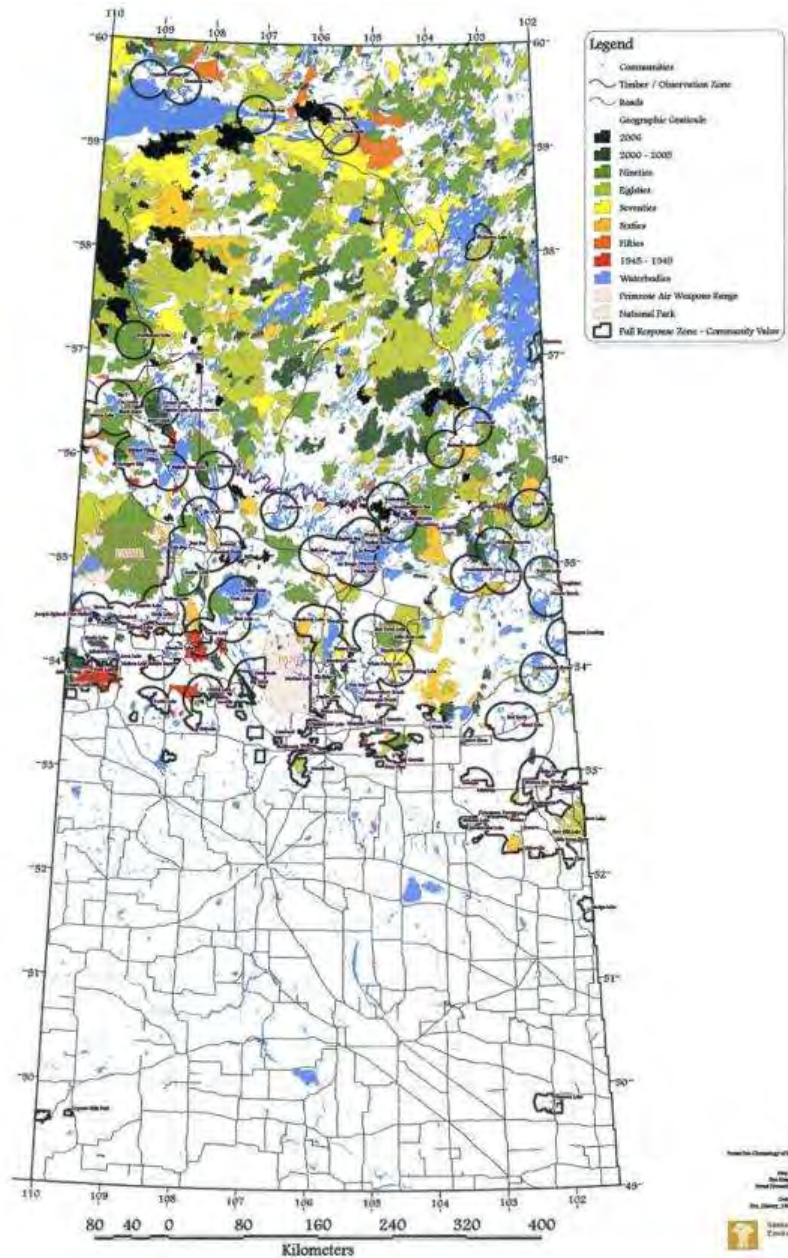


Northern Saskatchewan had the second highest rate of people being exposed to second hand smoke in vehicles or public places of all comparators in 2009-2010. At 22%, northern Saskatchewan rates were significantly higher than both Canadian (15%) and Saskatchewan (13%) rates in 2009-2010.

Source: Statistics Canada (CCHS) CANSIM table 105-0502, Prepared by PHU July 2011* caution CV > 16.5

Figure 69 Forest fires, 1,000 hectares and greater, in northern Saskatchewan, 1945-2006

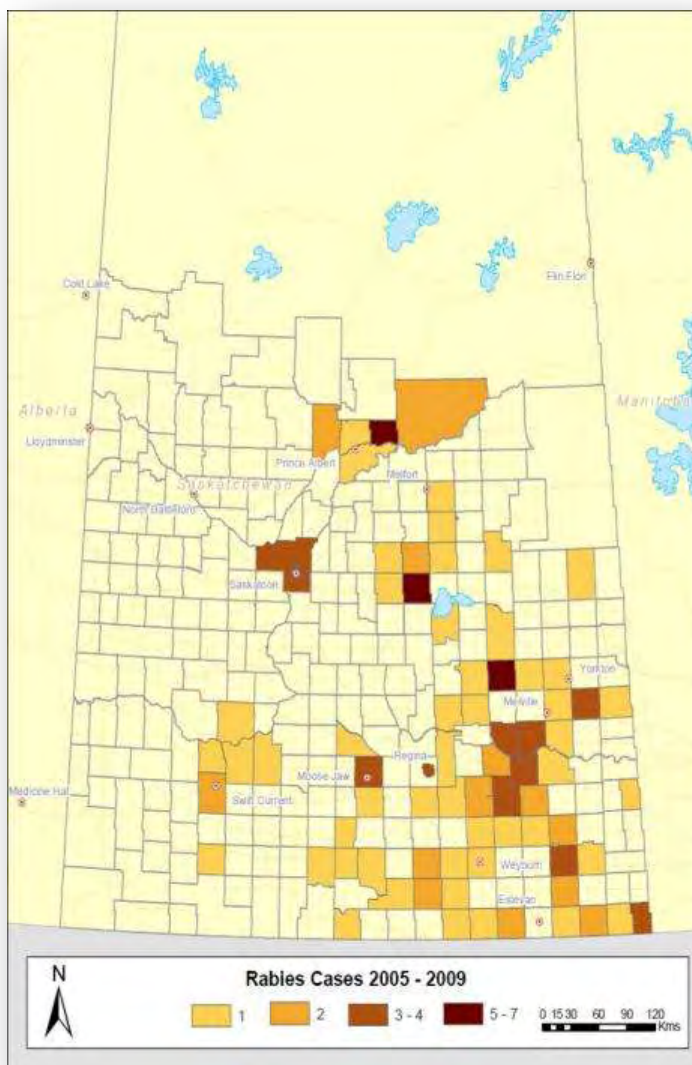
Much of northern Saskatchewan has been affected by fires over the past decades. The accompanying map shows the areas where forest fires occurred in Saskatchewan between 1945 and 2006. Forest fires can have an impact on health because of the threat to the community from the fire itself but also because of smoke. Communities, health agencies and other organizations need to consider both the threat of fire and smoke impacts in their emergency plans. Various studies have linked forest fire smoke exposures with increased respiratory hospitalizations or physician visits. A study in northern Saskatchewan revealed a small increase hospitalization during periods with increased numbers of hectares burnt, but the correlation was weak (Langford, 2006).



Animal bites

Animal bites are a concern because of the physical and emotional injury, especially in children, and also for the possible exposure to rabies. Rabies is a viral disease that can be spread to humans from animals through infected saliva entering the body through a wound, such as a bite (World Health Organization, 2005). Rabies is a serious health concern as without treatment, it inevitably leads to death. However, when proper treatment is initiated before the onset of symptoms, rabies can be prevented in essentially all cases (World Health Organization, 2005). Local public health offices, under the direction of their medical health officer, investigate animal bites across Saskatchewan for possible rabies exposure.

Figure 70 Rabies cases in animals in Saskatchewan, 2005-2009

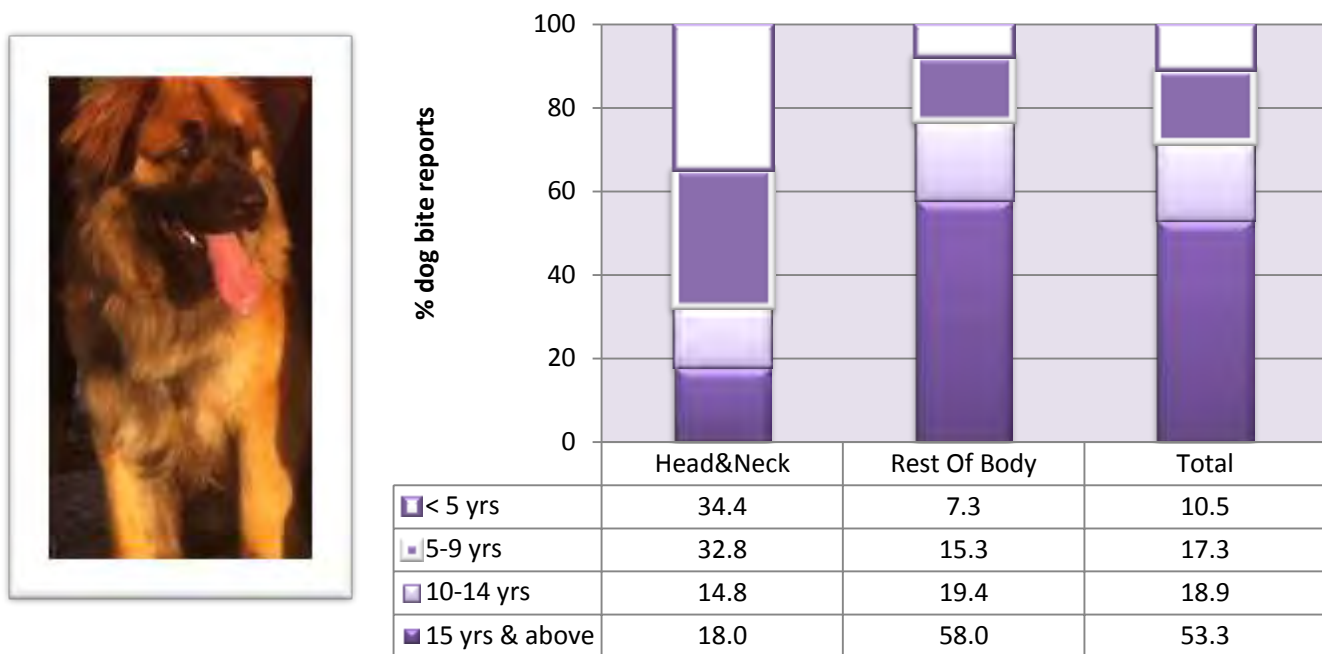


The Canadian Food Inspection Agency's map illustrates the number of positive animal cases of rabies found through animal bite investigations in Saskatchewan between 2005 and 2009. Most of the rabies cases were found in the south-eastern and eastern parkland locations and were associated with skunks in rural/suburban areas, and bats in urban areas. Rabies remains a concern in northern Saskatchewan because of the possibility of wild animals or pets being exposed in areas where rabies is more common and migrating or being brought into the area.

Dog bites

In northern Saskatchewan off reserve communities, dogs were involved in 95 percent of the animal bite investigations between 2004 and 2010. Although rabies exposure is the main concern, dog bites without rabies exposure can cause damage from the bite itself or by spreading other infections. In Canada, there are approximately 1-2 deaths each year from dog bites (Public Health Agency of Canada, 2005; Raghavan, 2008). Four general hospitals and the 10 children's hospitals across Canada participate in the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) database, which indicates there are at least 500 hospitalizations each year in Canada from dog bites (Public Health Agency of Canada, 2005). Dog bites that have led to hospitalizations are more common in children, especially boys, by known dogs (versus stray or unidentifiable dogs), and during times of increased interaction such as evenings, weekends and summer months (Public Health Agency of Canada, 2005). Similarly, dog bite fatalities are more common in children under 12, boys, involving known dogs, when children were unsupervised with the dogs, on private property, and in rural and remote regions (Raghavan, 2008). Of the 11 fatalities occurring in Canadian First Nations communities, seven (63.6%) were caused by free roaming dog packs (Raghavan, 2008).

Figure 71 Dog bite reports in off-reserve northern Saskatchewan communities, 2004-2010



Source: PHU, Prepared by PHU Mar 2011

In northern Saskatchewan off-reserve communities, there were between 60 and 100 dog bites reported from health centres and emergency departments each year between 2004 and 2010. Approximately 50% of the total bites and 80% of the bites to the head and neck occurred in children aged 14 and under. This is of great concern as young children are at increased risk of damage from dog bites and are least able to defend themselves.

Social environment

Social environments include the strength of social networks within families and across the community, recognition and celebration of diversity and culture, civic participation and volunteerism, as well as a sense of belonging and safety. A good social environment can reduce or prevent many potential risks to good health. Support from families and friends can help individuals deal with adversity and provide a greater sense of life satisfaction and well-being, as well as control over life circumstances (Public Health Agency of Canada, 2003). On the other hand, problems in the social environment have been shown to increase the risk of psychological distress and decrease both life expectancy and disability-free life expectancy (Orpana, Lemyre, & Gravel, 2009; Pampalon, Hamel, & Gamache, 2009).

40 Developmental Assets

The 40 Developmental Assets is a framework that identifies basic building blocks of human development (Search Institute Survey, 2010). These building blocks are known as “assets” and in general, the more assets youth have the more likely they are to engage in thriving behaviours (such as helping others, doing well in school and taking leadership roles) and less likely they are to engage in high-risk behaviours (such as violence, sexual activity, and drug use) (Search Institute Survey, 2010). Assets can be external or internal, illustrating the complexity of the interactions between individuals and their social environment. External assets are the positive developmental experiences that families, schools, neighbourhoods and communities provide young people (e.g. support, boundaries and creative activities), while internal assets are the positive commitments, skills, and values that form a young person’s inner guidance system that helps them make personal choices and actions (e.g. motivation, responsibility, cultural competence and self-esteem)(Search Institute Survey, 2010). Between September 2009 and January 2010, approximately 1,500 northern youth in grades 6 through 12 were surveyed to assess their asset levels.

Figure 72 Percent of northern youth, grades 6-12, reporting external assets, 2009-2010

Category	Asset Name (definition)	%
Support	Family support (Family life provides high levels of love and support)	72
	Positive family communication (Young person and parents communicate positively and young person is willing to seek parents' advice and counsel)	27
	Other adult relationships (Young person receives support from three or more non-parent adults)	29
	Caring neighbourhood (Young person experiences caring neighbours)	38
	Caring school climate (School provides a caring and encouraging environment)	29
	Parent involvement in schooling (Parents actively involved in helping young person succeed in school)	30
Empowerment	Community values youth (Young person perceives that adults in the community value youth)	20
	Youth as resources (Young people given useful roles in the community)	25
	Service to others (Young person serves in community for one or more hours per week)	53
	Safety (Young people feel safe at home, school and in neighbourhood)	45
Boundaries	Family boundaries (Family has clear rules and consequences and monitors young person's whereabouts)	24
	School boundaries (School provides clear rules and consequences)	56
	Neighbourhood boundaries (Neighbours take responsibility for monitoring young people's behaviour)	54
	Adult role models (Parents and other adults model positive responsible behaviour)	20
	Positive peer influence (Young person's best friends model responsible behaviour)	52
	High expectations (Both parents and teachers encourage the young person to do well)	54
Constructive use of time	Creative activities (Young person spends three or more hours per week in lessons or practice in music, theatre or other arts)	14
	Youth programs (Young person spends three or more hours per week in sports, clubs, or organizations at school and/or in community organizations)	49
	Religious community (Young person spends one or more hours per week in activities in a religious institution)	47
	Time at home (Young person is out with friends "with nothing special to do" two or fewer nights per week)	42

Figure 73 Percent of northern youth, grades 6-12, reporting internal assets, 2009-2010

Category	Asset Name (definition)	%
Commitment to learning	Achievement motivation (Young person is motivated to do well in school)	51
	School engagement (Young person is actively engaged in learning)	53
	Homework (Young person reports doing at least one hour of homework every school day)	31
	Bonding to school (Young person cares about her or his school)	58
	Reading for pleasure (Young person reads for pleasure three or more hours per week)	21
Positive values	Caring (Young person places high value on helping other people)	48
	Equality and social justice (Young person places high value on promoting equality and reducing hunger and poverty)	48
	Integrity (Young person acts on convictions and stands up for her or his beliefs)	57
	Honesty (Young person "tells the truth even when it is not easy")	66
	Responsibility (Young person accepts and takes personal responsibility)	62
	Restraint (Young person believes it is important not to be sexually active or to use alcohol or other drugs)	29
Social Competencies	Planning & decision making (Young person knows how to plan ahead and make choices)	21
	Interpersonal competencies (Young person has empathy, sensitivity, and friendship skills)	29
	Cultural competence (Young person has knowledge of and comfort with people of different cultural/racial/ethnic backgrounds)	23
	Resistance skills (Young person can resist negative peer pressure and dangerous situations)	25
	Peaceful conflict resolution (Young person seeks to resolve conflict non-violently)	36
Positive Identity	Personal power (Young person feels he or she has control over "things that happen to me")	25
	Self-esteem (Young person reports having high self-esteem)	42
	Sense of purpose (Young person reports that "my life has a purpose")	50
	Positive view of personal future (Young person is optimistic about her or his personal future)	73

Assessing the extent to which northern youth experience the developmental assets provides us with a better understanding of their reality. For instance, only 20% of northern youth perceive that adults in their community value youth and only 21% of northern youth report that they know how to plan ahead and make choices. However, 72% report that family life provides high levels of love and support and 73% report being optimistic about their futures. By understanding the reality of northern youth better, communities are provided with an opportunity to engage youth in a discussion and collaborate with youth to provide an intentional approach to asset building within existing programming and everyday interactions with youth. For further information on the results of 40 Developmental Assets in the north, individuals can access the executive summary of the full report online (Search Institute Survey, 2010) or contact their local health authority for regional results.

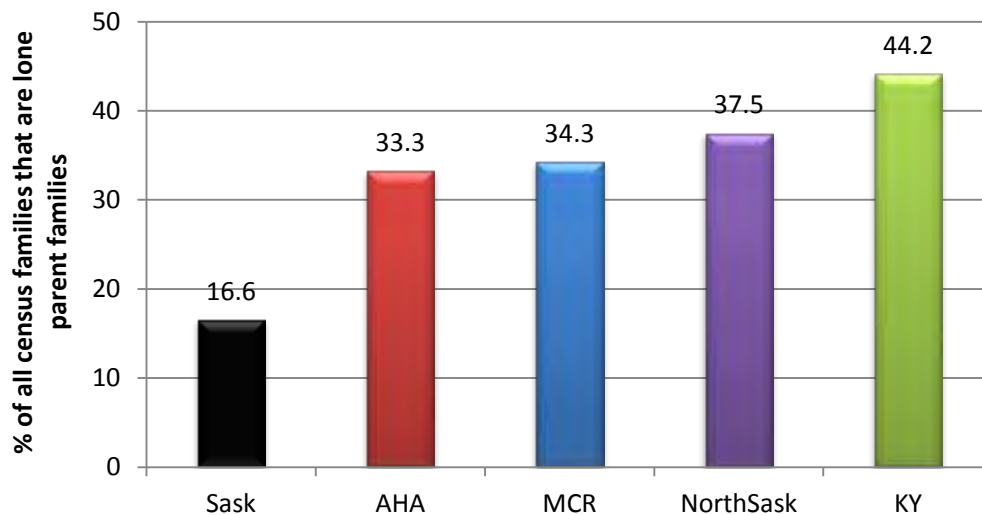


Lone parent families

Many parts of an individual's social network, such as co-workers, friends, professionals or the internet, can be accessed to deal with difficult life changes. However, at every stage of life, Canadians consistently identify family as the most helpful resource (Keown, 2009).

Lone parent families are at greater risk of having less familial support due to having only one adult in the immediate family and possibly only one extended family to draw upon. There is also a greater likelihood of income-related stress.

Figure 74 Lone parent families by Saskatchewan and northern Saskatchewan health authorities, 2006



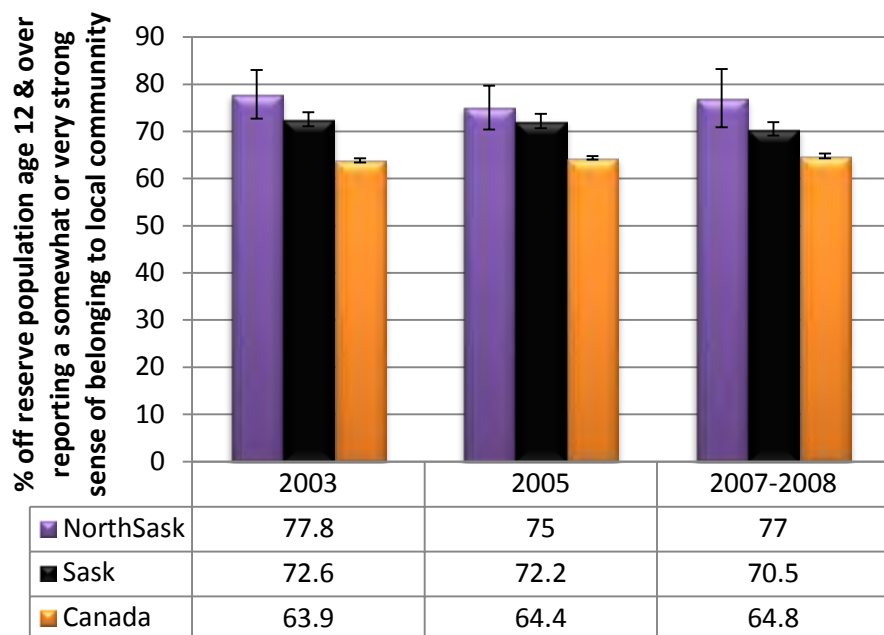
Source: Census 2006, Prepared by PHU June 2008

Northern Saskatchewan has a high number of lone parent families. At nearly 38%, northern Saskatchewan has more than double the rate of lone parent families than does Saskatchewan. There is an increased financial burden for lone parent families, as the income is less, while costs are similar when compared to two parent families. The smaller household requires the lone parent to reach to the broader community for social networks and support.



Community belonging

Figure 75 Sense of community belonging, off-reserve, northern Saskatchewan, Saskatchewan, and Canada, 2003 to 2007-2008

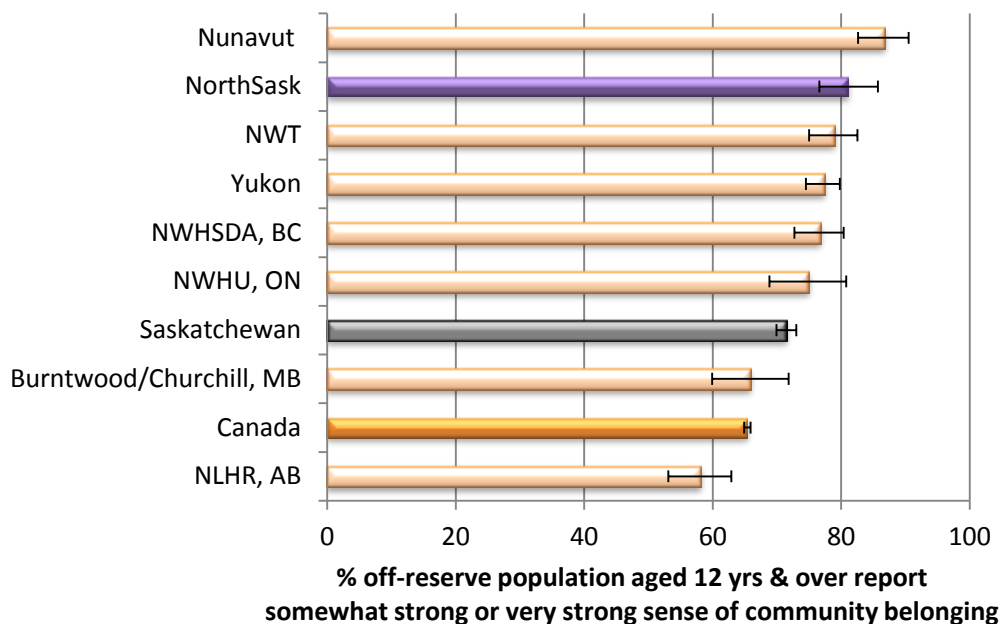


Source: StatsCan (CCHS-Health Indicators), Prepared by PHU July 2009

The level of self-reported community belonging of either a somewhat or very strong nature has remained fairly stable in northern Saskatchewan, Saskatchewan, and Canada between 2003 and 2007-2008. In all three time periods, northern Saskatchewan had the highest rate of self-reported community belonging, followed by Saskatchewan and then Canada. For the latest time period (2009-2010), the northern rate has increased further to over 80% making it significantly greater than the Saskatchewan rate.

Figure 76 Population aged 12 and over, off-reserve, who report a somewhat strong or very strong sense of community belonging to their local community, by selected northern Canadian region, 2009-2010

In 2009-2010, 81% of northern Saskatchewan residents reported their sense of belonging to their local community as being very strong or somewhat strong, which was higher than in both Saskatchewan (71%) and Canada (65%). The northern Saskatchewan rate was also higher than other northern comparators except Nunavut, which had a rate of 87%.



Source: Statistics Canada (CCHS) CANSIM table 105-0502, Prepared by PHU July 2011

Northern Saskatchewan individuals, living off-reserve, report higher levels of community belonging than either Saskatchewan or Canada as a whole.

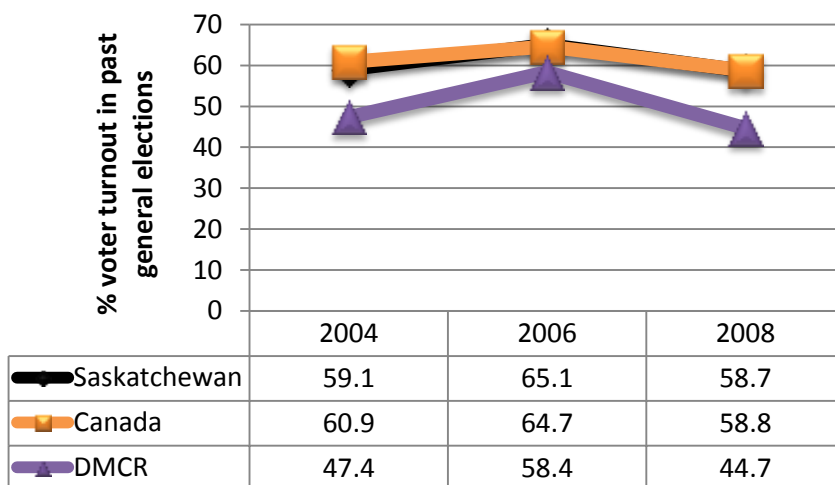
Civic participation

Social capital or cohesion is an important community health indicator and can be measured by civic participation, such as voter turnout (Lantz & Pritchard, 2010). Data from Elections Canada (Elections Canada, 2010) provides national, provincial and electoral district results for previous general elections in Canada. The electoral district of Desnethé-Missinippi-Churchill River (DMCR) includes all of the communities within the three northern health authorities, as well as some southern communities such as Meadow Lake, Spiritwood, Smeaton, and Shoal Lake.

Figure 77 Voter turnout in past three federal general elections, Desnethé-Missinippi-Churchill River (DMCR), Saskatchewan and Canada, 2004-2008

Voter turnout in Desnethé-Missinippi-Churchill River (DMCR), Saskatchewan and Canada was very similar to one another, and over time for the three elections between 2004 and 2008, ranging between 60 and 65%.

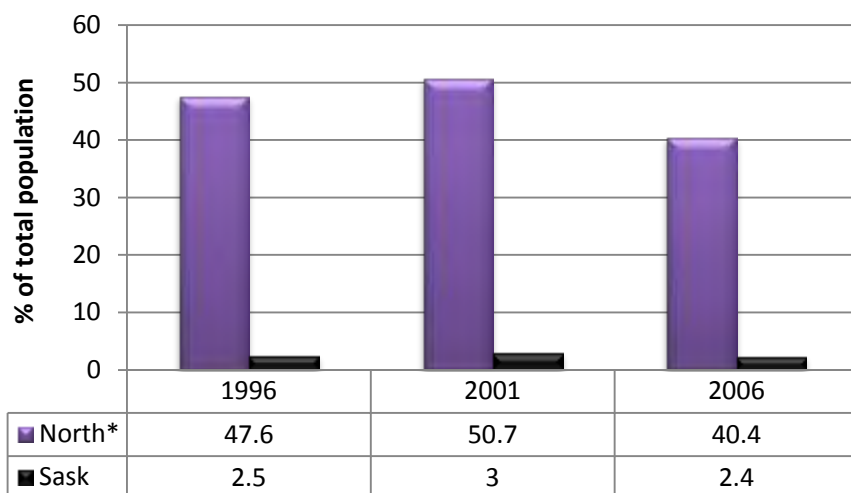
The difference between the voter turnout for all of Saskatchewan and for DCMR was 13% in 2004, 6% in 2006 and 14% in 2008. A federal by-election in March of 2008 may have contributed to the lower voter turnout in DMCR later that year.



Source: Elections Canada (www.elections.ca), Prepared by PHU Aug 2010

Language

Figure 78 Aboriginal language spoken at home, northern Saskatchewan and Saskatchewan, 1996-2006



Source: 2006 Census Ab profile, Prepared by PHU March 2008 * Div 18 used

For Aboriginal people, speaking an Aboriginal language at home is associated with increased cultural awareness and closeness to tradition. In the Canadian off-reserve Aboriginal population, speaking and/or understanding an Aboriginal language is associated with a 2 to 4 times likelihood of participating in cultural activities (Smith, 2010). About 40% of people in northern Saskatchewan spoke an Aboriginal language at home in 2006, a decrease from 48% in 1996.

Factors that enhance the likelihood off-reserve First Nations children are able to understand an Aboriginal language

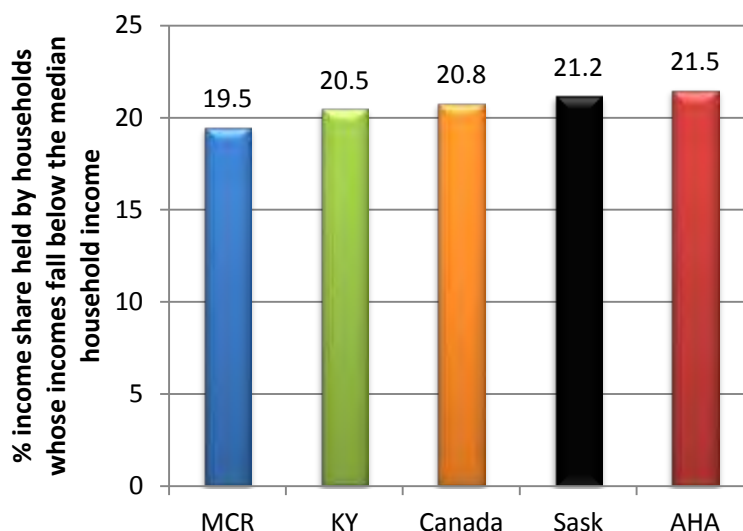
include having younger parents, having parents whose mother tongue is Aboriginal, and having parents who believe speaking and understanding Aboriginal language is somewhat or very important (Bougie, 2010). Children who are exposed to Aboriginal languages in the home daily (one of the most important factors) are over six times more likely to understand an Aboriginal language compared to children who are exposed less than daily (Bougie, 2010).

Income inequality

Much discussion has occurred regarding the impact of income on health; however, the distribution of the income throughout the population may also be of importance. Increased income inequality is associated with increased mortality and decreased self-rated health (Kondo et al., 2009; Zheng, 2009). It has been suggested that income inequality exerts its effect on health through the loss of social cohesion and the potentially harmful consequences of frustration brought about by relative deprivation (Zheng, 2009).

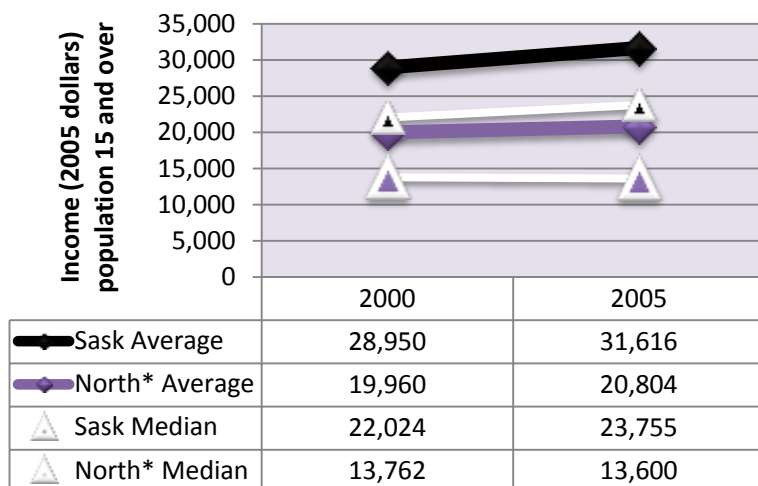
Figure 79 Median share of income, northern Saskatchewan health authority, Saskatchewan and Canada, 2005

One way to examine income inequality is to look at median share of income. The median income divides the population into two halves based on their household income levels. In other words, half of the households have incomes less than the median and half the households have incomes that are greater than the median. The median share of income refers to the proportion of income (from all sources, pre-tax, post-transfer) held by households whose incomes fall below the median household income. A value of 50% would indicate that there is no income inequality, while values lower than 50% would indicate some income inequality. The greatest income inequality in 2005 occurred in MCRHR where the bottom 50% of households held only 19.5% of the total income for the region, whereas the top 50% had 80.5% of the total income. Provincial and national results indicate a similar inequality with rates of 21.2 and 20.8, respectively.



Source: Statistics Canada (Health indicators), Prepared by PHU, Aug , 2010

Figure 80 Average and median income (in 2005 constant dollars), northern Saskatchewan and Saskatchewan, 2000-2005



Source: Census 1996-2006, Prepared by PHU June 2009 * Div. 18 used for North

Another way to examine income inequality is to compare a location's median and average incomes. In an area where there is an equal distribution of income, the average and median income should be the same. In an area where the wealthy hold a greater proportion of the wealth, the average income would be greater than the median income. By monitoring changes in these indicators over time we can see if the level of inequality is changing.

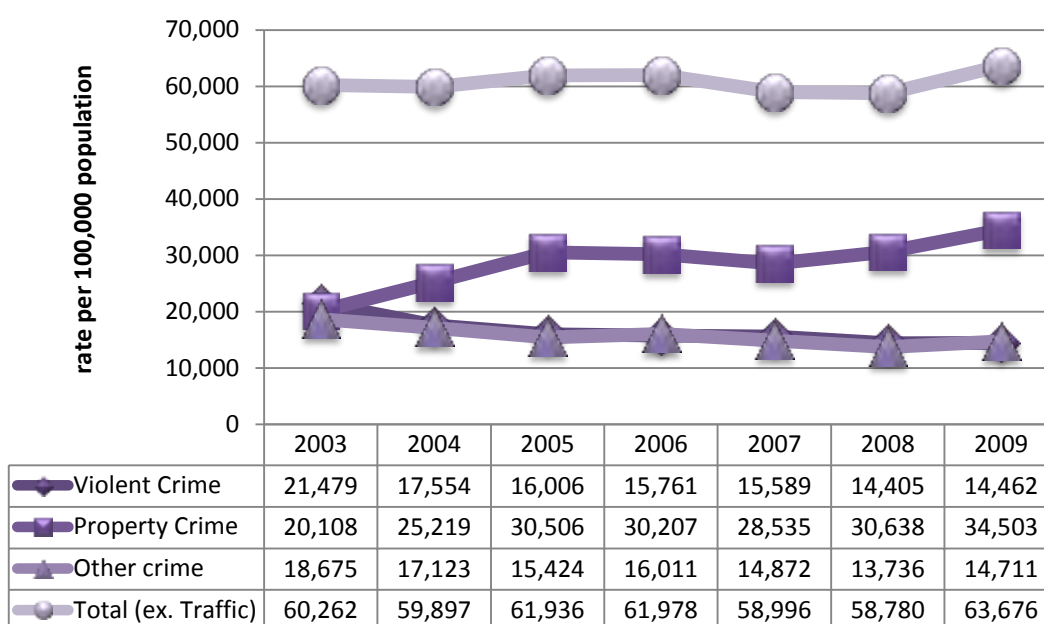
In both northern Saskatchewan and Saskatchewan, the average income was greater than the median income, indicating some income inequality in 2000 and 2005. In Saskatchewan, the average income increased

by 9.2% compared to the 7.9% increase in median income. In northern Saskatchewan, there was an increase of 4.2% in average income, while median income decreased by 1.2%. The increase in the gap between average and median income in the north compared to the narrowing of the gap across the province indicates that income inequality increased in northern Saskatchewan and decreased in the province from 2000 to 2005.

Crime

There are many links between crime and health. Crime is associated with a variety of social and socioeconomic issues. The same social and environmental factors that predict geographic variation in health status also help explain community variations in crime rates (Lemstra, Neudorf, & Opondo, 2006; Savoie, 2008). Crime also has direct impacts on the health status of individuals. After taking into account a mother's age, her child(ren)'s age(s), marital status, race, education, and household crowding, mothers exposed to neighbourhood violence are twice as likely to report poorer self-rated health, three times as likely to report smoking, two and half times as likely to report never exercising, twice as likely to report less sleep, and two and half times as likely to report sleep interruption (Johnson et al., 2009). Crime victimization also affects many aspects of quality of life, including parenting skills, occupational functioning, employment, and intimate relationships (Hanson, Sawyer, Begle, & Hubel, 2010). In addition, being abused as a child or witnessing intimate partner violence during childhood has been linked with poorer health status and higher prevalence of depression, as well as greater use of both medical and mental health services in adult women (Cannon, Bonomi, Anderson, Rivara, & Thompson, 2010).

Figure 81 Crime rates by major category and year, northern Saskatchewan, 2003-2009



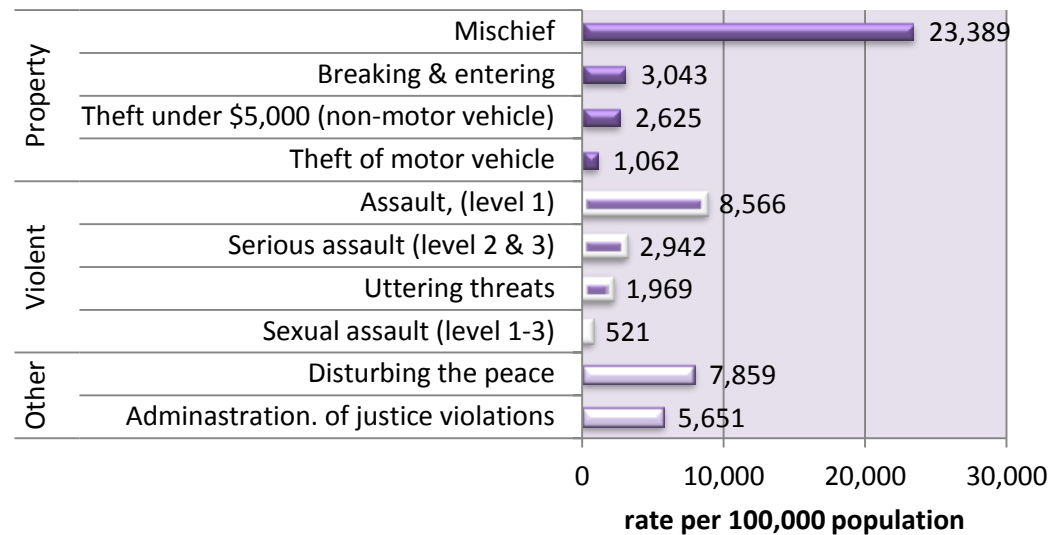
Source: Sask Ministry of Justice (UCRS), Prepared by PHU Aug 2010

Data on crime within Saskatchewan comes from the Saskatchewan Ministry of Justice through the Uniform Crime Reporting Survey. Rates are based on the number of incidents reported to or by police. In the north this includes all of the northern RCMP detachments that lie within the three northern health authorities, as well as the detachment in Prince Albert National Park in Waskesiu. The rates do not include data from the detachments in Cumberland House or Pierceland, which cover mainly the health regions south of the three northern health authorities. Violent crimes include offences such as assault, robbery, and uttering threats. Property crimes include offences such as break and enter, mischief and theft. Other criminal code offences include disturbing the peace and administration of justice violations, such as breach of probation and failure to comply with orders. The total crime category includes all criminal code offences, excluding traffic violations.

Between 2003 and 2009, the overall crime rate in the north remained fairly stable, ranging between 58,780 and 63,676 incidents per 100,000 population. During the same time period the major components of the total crime rate changed in opposite directions. In 2003, there was very little difference among the rates of property, violent and other crimes. From 2003 to 2009, the property crime rate increased while both violent crime and other crime decreased.

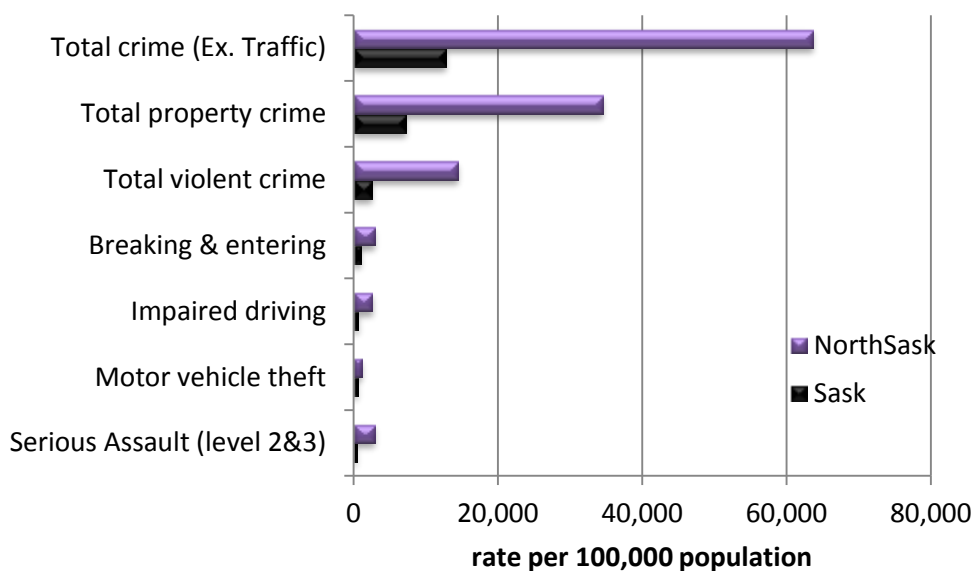
Figure 82 Crime rates for selected causes by major category, 5-year average rates, northern Saskatchewan 2005-2009

For each of the main categories of crime, including property, violent and other criminal code offences, several specific crimes made up most of these categories in the data for the north between 2005 and 2009. Within the property crime category, the four crimes of mischief, breaking and entering, theft under \$5,000 and theft of motor vehicle made up 97% of the violations. Within the violent crime category, assault, serious assault, uttering threats and sexual assault constituted 92% of the violations. In the 'other' category, disturbing the peace and administration of justice violations (e.g. breach of probation, failure to comply with an order) constituted 90% of violations. Serious assault includes aggravated assaults and assaults with a weapon or causing bodily harm.



Source: Sask Ministry of Justice (UCRS), Prepared by PHU Aug 2010

Figure 83 Selected crime rates, northern Saskatchewan and Saskatchewan, 2009



Source: Sask Ministry of Justice (UCRS), Prepared by PHU Aug 2010

When we compare various crime rates between northern Saskatchewan and Saskatchewan in 2009, we can see that northern rates are approximately five to six times greater for the broad categories for total crime, total property crime and total violent crime. The crime rates for specific violations are also greater in the north compared to the province, ranging from 2.2 times greater for motor vehicle theft to 7.1 times the rate for serious assaults.

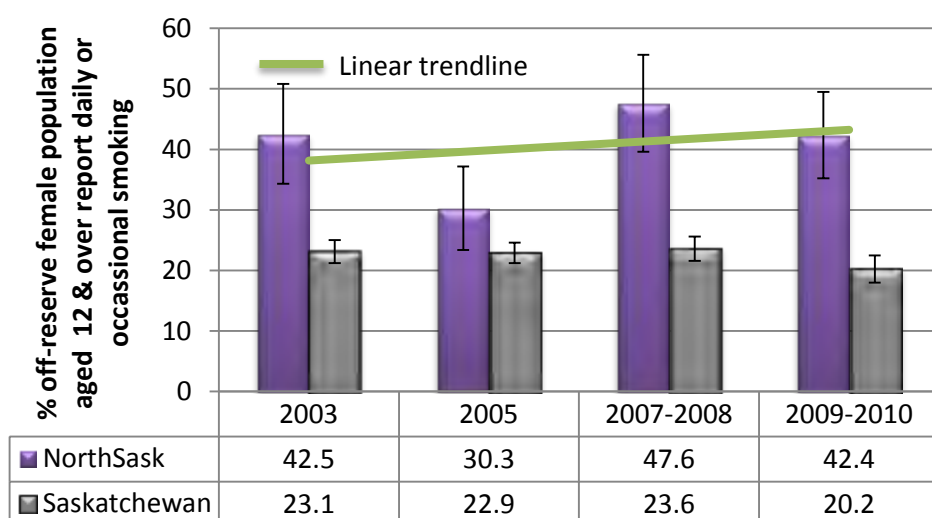
Personal health practices

Personal health practices refer to actions by which individuals can prevent disease or promote health. They include behaviours such as smoking, physical activity, diet, alcohol and illicit drug use, and the utilization of preventive health services. Although personal health practices arise from individual decisions, they are heavily influenced by social, economic, cultural and environmental factors (King, Sanguins, McGregor, & LeBlanc, 2007; Pan et al., 2009).

Smoking

Using 2002 Canadian data, smoking has been estimated to cause approximately 16.6% of all Canadian deaths, 21% of male deaths and 12.2% of female deaths (Baliunas et al., 2007). Smoking was also estimated to result in 515,608 years of life being lost prematurely in Canada in 2002, 316,417 years in men and 199,191 years in women (Baliunas et al., 2007). This was mainly due to smoking's causal link to cancers, cardiovascular diseases and respiratory diseases. Smoking also contributed to other causes of death, including injuries (smoking-related fires), intestinal diseases and conditions arising in infancy, such as low birth weight and sudden infant death syndrome (SIDS).

Figure 84 Daily or occasional smokers, off reserve females aged 12 and over, northern Saskatchewan and Saskatchewan, 2003 to 2009-2010

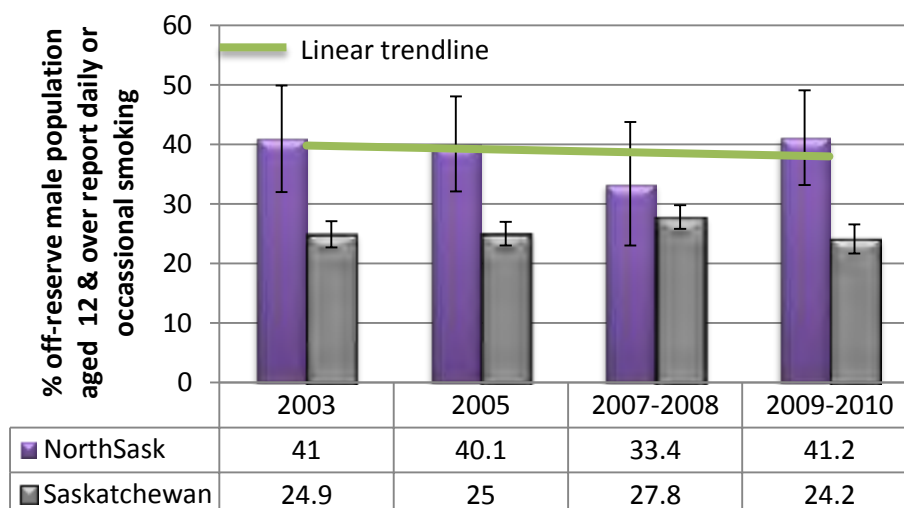


The Saskatchewan female smoking rate remained stable between 2003 and 2009-2010, decreasing from 23.1 to 20.2%. During the same time period the northern female smoking rate decreased in 2005 and then increased in 2007-2008 and 2009-2010. In 2009-2010 the northern Saskatchewan female smoking rate was over twice the provincial rate. The trend shows that the smoking rate among northern females is increasing.

Source: Statistics Canada (CCHS) CANSIM table 105-0501 & 105-0502, Prepared by PHU Aug 2011

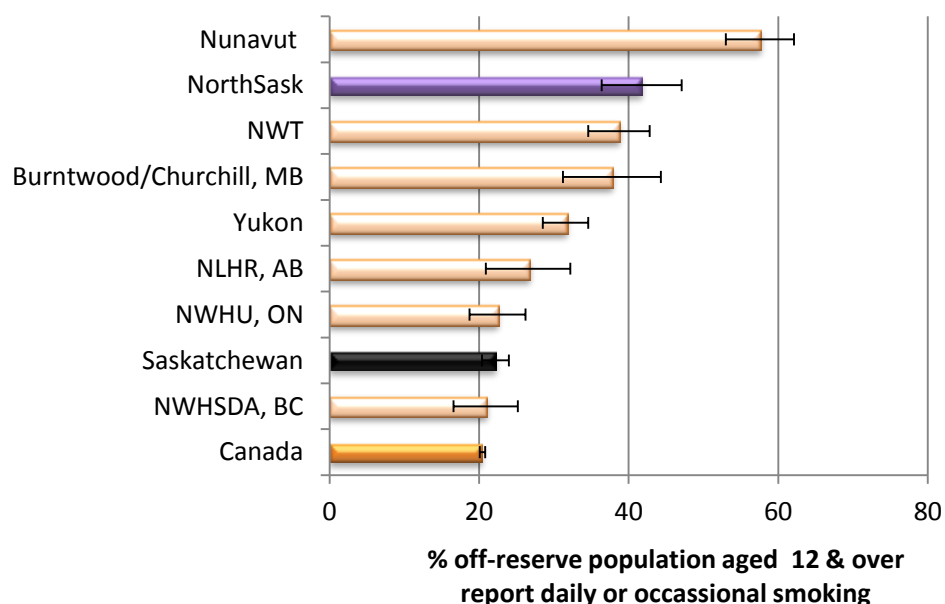
Figure 85 Daily or occasional smokers, off reserve males aged 12 and over, northern Saskatchewan and Saskatchewan, 2003 to 2009-2010

The Saskatchewan male smoking rate remained stable between 2003 and 2005, increased in 2007-2008 and then decreased in 2009-2010 to 2003 levels. During the same time period, the northern Saskatchewan male smoking rate remained stable between 2003 and 2005, decreased in 2007-2008 and then increased in 2009-2010 to 2003 levels. In 2009-2010 the northern Saskatchewan male rate was nearly twice the provincial rate; however, the overall trend for northern males shows a slight reduction in the rate.



Source: Statistics Canada (CCHS) CANSIM table 105-0501 & 105-0502, Prepared by PHU Aug 2011

Figure 86 Daily or occasional smokers, population aged 12 and over, off-reserve, by northern region, 2009-2010

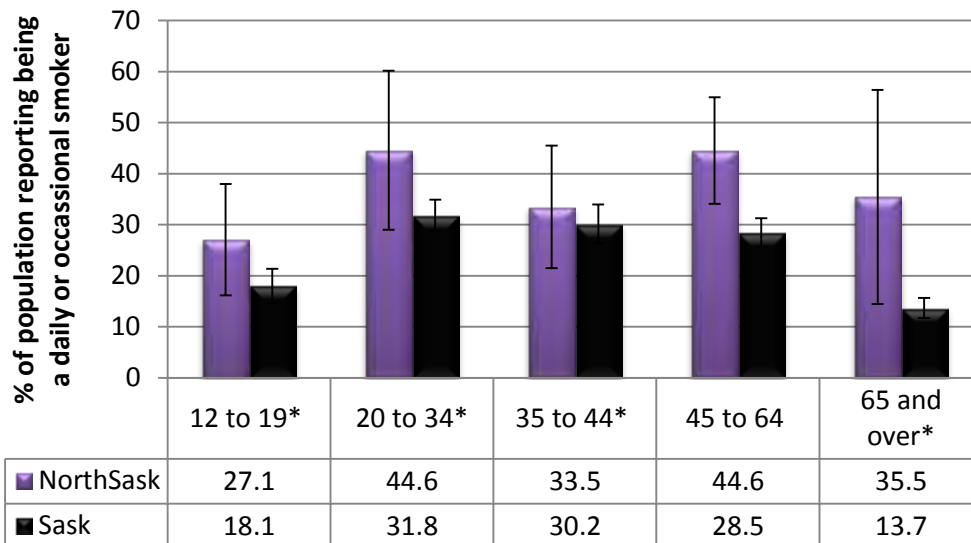


The 2009-2010 rate of daily or occasional smoking in the off-reserve population aged 12 and over in northern Saskatchewan was significantly higher than both the provincial and national rates. Northern Saskatchewan had lower smoking rates than Nunavut, but higher rates than the other northern regions in Canada.

Source: Statistics Canada (CCHS) CANSIM table 105-0502, Prepared by PHU July 2011

Figure 87 Daily or occasional smokers off reserve by age group, northern Saskatchewan and Saskatchewan, 2007-2008

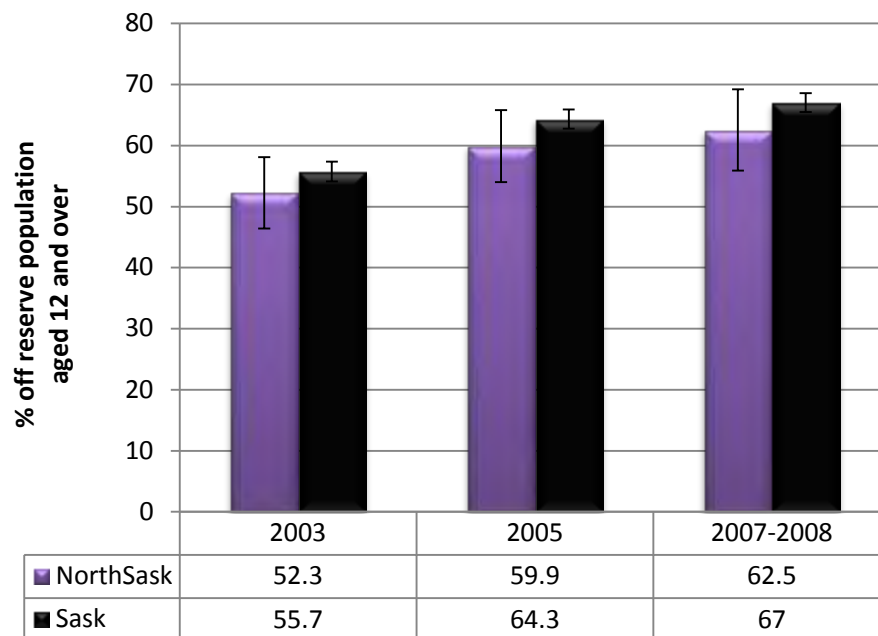
The proportion of northern Saskatchewan off-reserve population aged 12 and over reporting daily or occasional smoking is higher than the province as a whole in every age category. The two highest rates in the north are in the 20-34 and 45-64 age categories, both at 44.6%.



Source: Statistics Canada (CCHS-Health indicators) 2007/8, Prepared by PHU Feb 2010 * caution NorthSask CV > 16.5

Over 40% of northern Saskatchewan off-reserve population aged 12 and over smokes, nearly double the provincial rate.

Figure 88 Proportion of off reserve population aged 12 and up who were smokers that were asked to refrain from smoking in the house, northern Saskatchewan and Saskatchewan, 2003 to 2007-2008



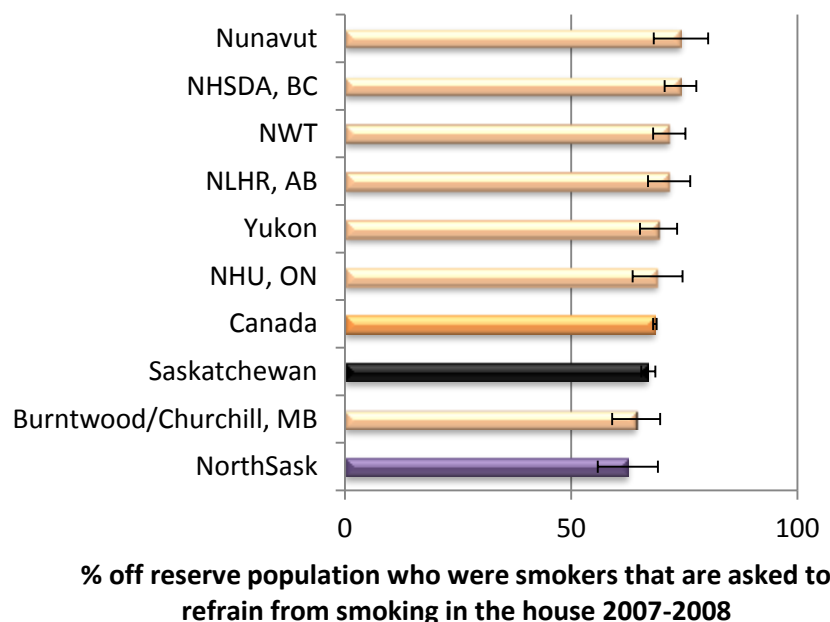
Source: StatsCan (CCHS-Health Indicators), Prepared by PHU July 2009

Social norms can have a major impact on personal health practices by exerting “peer pressure” on individuals to conform to behaviours that are seen as acceptable. Depending on the social norm, this pressure can result in choosing behaviours that can either improve or challenge healthy lifestyle adoption. Over the last number of decades, more and more evidence has come out on the negative health effects of smoking and second hand smoke. This could potentially create social norms where smoking in the presence of non-smokers, especially young children and infants, is not

acceptable. Data from the Canadian Community Health Survey illustrates that this could be happening in both northern Saskatchewan and Saskatchewan as a whole. Between 2003 and 2007-2008 the proportion of off-reserve smokers aged 12 and up that have been asked to refrain from smoking in the house has increased in the North and the province as a whole.

Figure 89 Smoking population aged 12 and over, off-reserve, asked to refrain from smoking in the house, by northern region, 2007-2008

The rate of smokers that were asked to refrain from smoking in the house in northern Saskatchewan in 2007-2008 was 63%, lower than both the provincial and national rates of 67% and 69% respectively, as well as in the other selected northern regions.



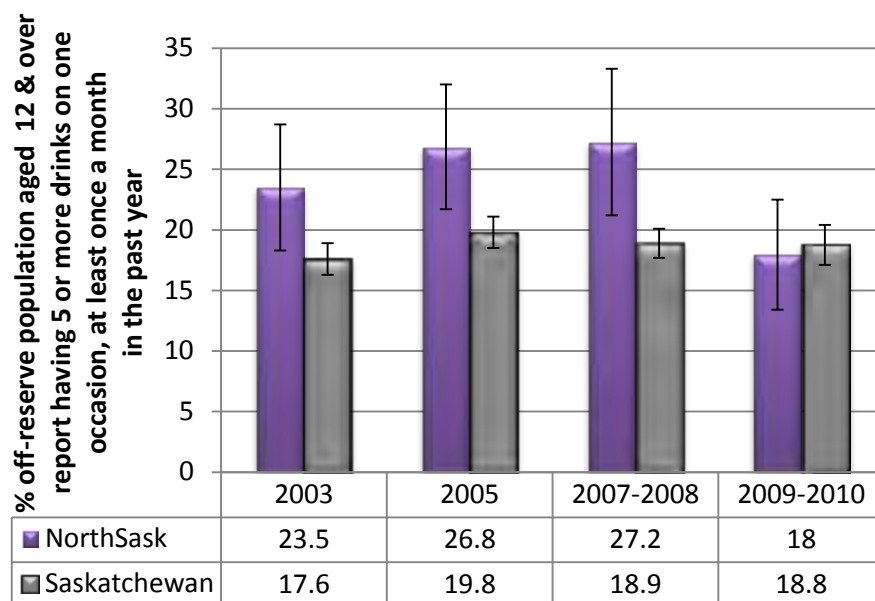
Source: StatsCan (CCHS-Health Indicators), Prepared by PHU July 2009

Drinking alcohol

The consumption of alcohol has been linked with increased mortality and hospitalization from a variety of health-related conditions, including cancers, digestive diseases (e.g. liver and stomach diseases), unintentional injuries (e.g. falls, motor vehicle accidents, drowning), intentional injuries (e.g. homicides, self-inflicted injuries), and infant conditions (e.g. low birth weight, fetal alcohol spectrum disorders) (Rehm, Giesbrecht, Patra, & Roerecke, 2006; Rehm, Patra, & Popova, 2006; World Health Organization, 2004). In Canada, a total of 4010 deaths, 3132 men and 877 women, were attributable to alcohol, representing 6% of all deaths in 2001 (Rehm, Patra et al., 2006). A review of 2002 Canadian data showed that alcohol was related to 381,617 hospitalizations and 4,319,747 hospital days within acute care facilities, psychiatric facilities, and specialized treatments centers, resulting in a health care cost of 2.29 billion dollars (Taylor, Rehm, Patra, Popova, & Baliunas, 2007).

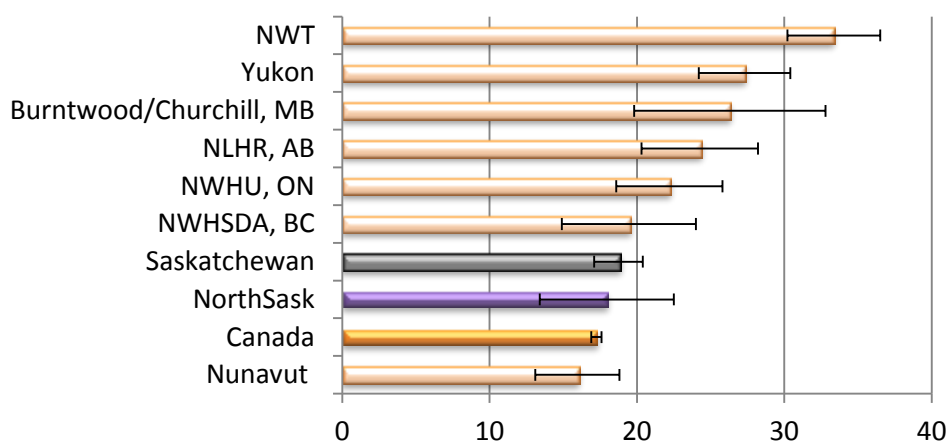
Figure 90 Heavy drinking population aged 12 and over, off-reserve, northern Saskatchewan and Saskatchewan, 2003 to 2009-2010

Heavy drinking is defined by Statistics Canada as having five or more drinks at one time, at least once a month in the past year. Rates of heavy drinking in the off-reserve northern Saskatchewan population aged 12 and up increased between 2003 and 2007-2008, and then decreased in 2009-2010. Over the same time period, rates remained fairly stable at the provincial level. In 2009-2010 rates in the north were similar to the provincial rates. Statistically speaking, we are unable to say whether this is a significant change or a change due to sampling differences for the different survey times.



Source: Statistics Canada (CCHS) CANSIM table 105-0501 & 105-0502, Prepared by PHU July 2011

Figure 91 Heavy drinking, population aged 12 and over, off-reserve, by northern region, 2009-2010



Among the selected northern regions, northern Saskatchewan had one of the lowest rates of heavy drinking in 2009-2010 at 18%, which was similar to both the provincial (18.8%) and national rate (17.3%).

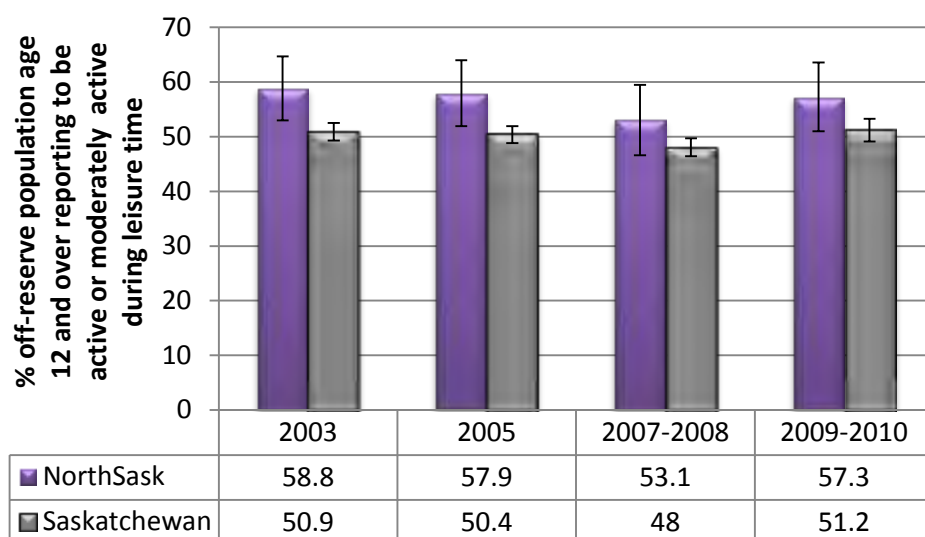
% off-reserve population aged 12 & over report having 5 or more drinks on one occasion, at least once a month in the past year

Source: Statistics Canada (CCHS) CANSIM table 105-0502, Prepared by PHU July 2011

Physical activity

Physical activity has major impacts on health. This includes decreasing obesity as well as preventing and treating many chronic diseases, such as cardiovascular disease, diabetes, cancer (specifically colon and breast), and osteoporosis (Warburton, Nicol, & Bredin, 2006). Physical activity is also related to improvements in quality of life and mental health, in areas such as lower levels of anxiety and depression, social and attention problems, and improvements in self-esteem and academic performance (Kantomaa, Tammelin, Ebeling, & Taanila, 2008; Martin, Church, Thompson, Earnest, & Blair, 2009; Ortega, Ruiz, Castillo, & Sjostrom, 2008).

Figure 92 Being physically active or moderately active during leisure time northern Saskatchewan and Saskatchewan, 2003 to 2009-2010



Source: Statistics Canada (CCHS) CANSIM table 105-0501 & 105-0502, Prepared by PHU July 2011

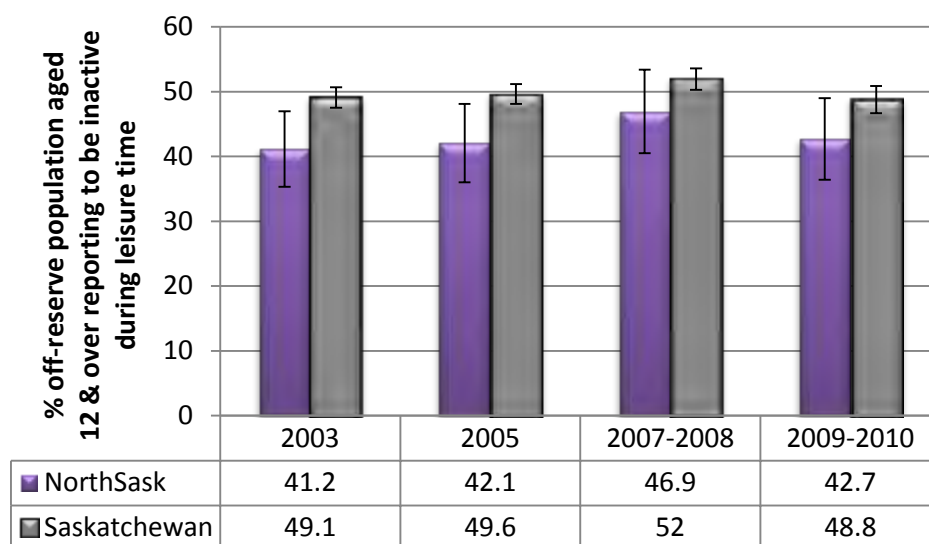
The Canadian Community Health Survey collects information on the physical activity levels for the off-reserve Canadian population. Individuals are classified as active, moderately active or inactive based on their responses to questions about the frequency, nature and duration of their participation in leisure time physical activities over the past three months.

The proportion of the off-reserve northern Saskatchewan population aged 12 and over

reporting active or moderately active levels of leisure time physical activity decreased from 58.8% in 2003 to 53.1% in 2007-2008, before increasing in 2009-2010 to 57.3%. The northern rate remains slightly higher than the provincial rate, but the gap has narrowed as the provincial rate has remained relatively stable over the same time period.

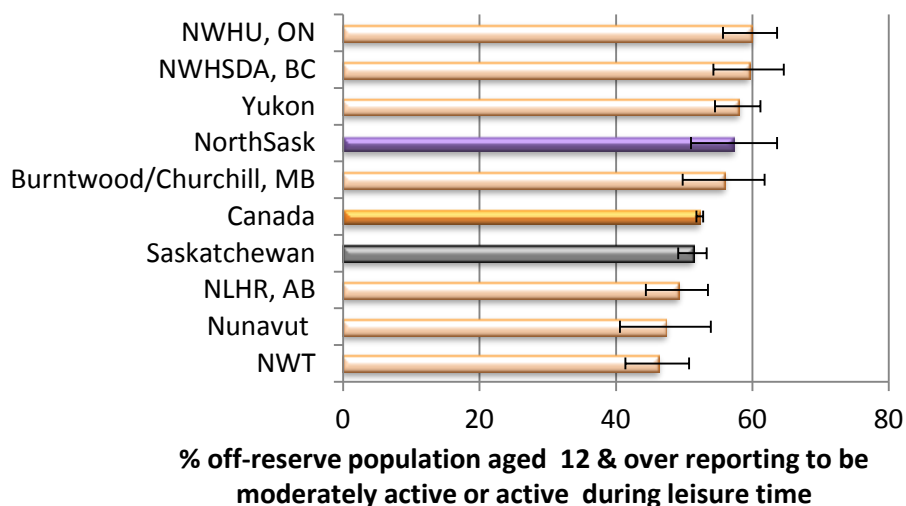
Figure 93 Levels of inactivity, northern Saskatchewan and Saskatchewan, 2003 to 2009-2010

Levels of inactivity are slightly lower in northern Saskatchewan than they are in Saskatchewan. The gap narrowed slightly between 2003 and 2009-2010 but the levels of activity remained relatively the same.



Source: Statistics Canada (CCHS) CANSIM table 105-0501 & 105-0502, Prepared by PHU July 2011

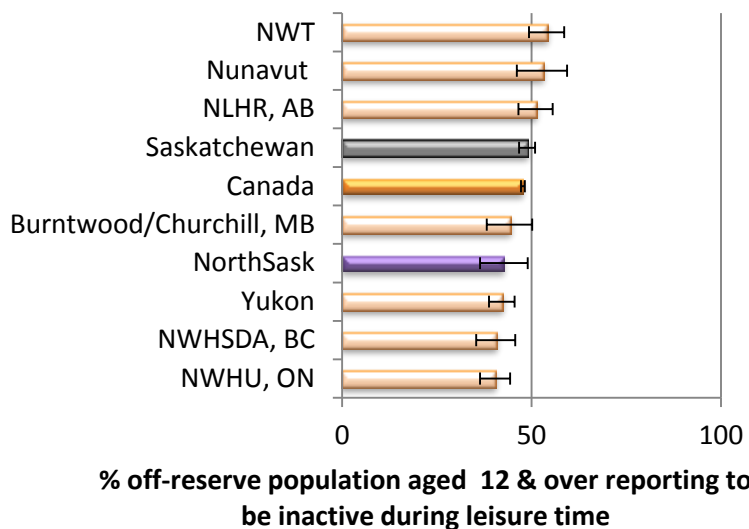
Figure 94 Population aged 12 and over, off-reserve, reporting to be moderately active or active during leisure time, by northern region, 2009-2010



Source: Statistics Canada (CCHS) CANSIM table 105-0502, Prepared by PHU July 2011

The rate of being moderately active or active during leisure time in northern Saskatchewan in 2009-10 was 57.3%, slightly higher than both the Canadian and Saskatchewan rates of 52.3% and 51.2%, respectively. Compared to the northern regions, the rate in northern Saskatchewan was higher than in NWT, Nunavut, and NLHR, while being lower than in Yukon, NHSDA, and NHU.

Figure 95 Population aged 12 and over, off-reserve, reporting to be inactive during leisure time, by northern region, 2009-2010



Source: Statistics Canada (CCHS) CANSIM table 105-0502, Prepared by PHU July 2011

The rate of being inactive during leisure time in northern Saskatchewan in 2009-2010 was 42.7%, slightly lower than both the Canadian and Saskatchewan rates of 47.7% and 48.8%, respectively. Compared to the northern regions, the rate in northern Saskatchewan was higher than in Yukon, NHSDA and NHU, and lower than in NWT, Nunavut, and NLHR.

Health related fitness

The terms physical activity and physical fitness are often used interchangeably, but in reality are very distinct. Physical activity simply refers to the amount a person moves their body on a regular basis (walking, running, playing sports, etc.), whereas physical fitness refers to a more objective assessment of how a person can meet the demands of daily living or perform in sports (Warburton et al., 2006). Health-related fitness focuses on the aspects of physical fitness that affect health status, including cardiovascular fitness (e.g. ability of lungs and heart), musculoskeletal fitness (strength and/or flexibility of muscles and bones) and body composition (e.g. weight, height, fat level) (Shields et al., 2010; Warburton et al., 2006). Unfortunately, the cost of collecting information on health related fitness is often excessive, so it has only been done a few times in Canada. By comparing data that was collected in 1981 with data collected between 2007 and 2009, we can see how some of the components of health-related fitness have changed over the past several decades in both adults and youth (Shields et al., 2010; Tremblay et al., 2010).

Figure 96 Portrait of typical 45-year-old male and female, Canada 1981 and 2007-2009

Compared to the average 45-year-old Canadian male in 1981, the average male in 2007-2009 was of similar height, but was heavier with an increased body mass index (BMI) and waist circumference, and a decreased grip strength rating. On the other hand the sit-and-reach (flexibility) score was slightly improved in 2007-2009.

Similar results were seen in Canadian females, where the average 45-year-old female in 2007-2009 was of similar height, but had increased weight, BMI and waist circumference compared to the average 45-year-old female of 1981. In 2007-2009, grip strength rating in females also decreased, while the sit-and-reach (flexibility) score was approximately the same.

Although cardiovascular fitness could not be compared over time, some disturbing results were found in the cardiovascular fitness health benefit ratings for 2007-2009. Health benefit ratings are based on age-specific cut-points that account for changes expected to occur with advancing age. The typical 45-year-old male and female had “good” ratings. However, only 27% and 23% of 20-39 year old males and females and 10% and 5% of 60-69-year-old males and females respectively received “excellent/very good” ratings.

MALE			
1981	BODY COMPOSITION	2007-2009	
173.0 cm (5'8")	Height	175.3 cm (5'9")	
77.4 kg (171 pounds)	Weight	86.6 kg (191 pounds)*	
25.7 kg/m ² - overweight	Body mass index	27.9 kg/m ² * - overweight	
90.6 cm (35.7") - low risk	Waist circumference	97.0 cm (38.2")* - increased risk	
99.0 cm (39.0")	Hip circumference	102.7 cm (40.4")*	
0.91	Waist-to-hip ratio	0.95*	
FITNESS TESTS			
104 kg - very good	Grip strength	94 kg* - good	
23.1 cm - fair	Sit-and-reach	26.7 cm* - good	
-	Predicted maximal aerobic power (VO ₂ max)	39.2 ml*(kg*min) ⁻¹ - good	

FEMALE			
1981	BODY COMPOSITION	2007-2009	
161.5 cm (5'4")	Height	162.3 cm (5'4")	
63.2 kg (139 pounds)	Weight	68.4 kg (151 pounds)*	
24.1 kg/m ² - normal weight	Body mass index	25.8 kg/m ² * - overweight	
76.3 cm (30.0") - low risk	Waist circumference	83.4 cm (32.8")* - increased risk	
98.5 cm (38.8")	Hip circumference	102.5 cm (40.4")*	
0.77	Waist-to-hip ratio	0.81*	
FITNESS TESTS			
62 kg - very good	Grip strength	56 kg* - good	
30.2 cm - good	Sit-and-reach	31.5 cm - good	
-	Predicted maximal aerobic power (VO ₂ max)	32.8 ml*(kg*min) ⁻¹ - good	

* significantly different from estimate for 1981 (p<0.05)

Note: To make estimates more comparable, Canadian Health Measures Survey estimates for flexibility and muscular strength exclude respondents screened out of aerobic fitness test (see Methods).

Sources: 1981 Canada Fitness Survey; 2007-2009 Canadian Health Measures Survey.

Figure 97 Portrait of a typical 12-year-old boy and girl, Canada 1981 and 2007-2009

Compared to the average 12-year-old Canadian boy in 1981, a 12-year-old boy in 2007-2009 was, on average, taller, weighed more, had a larger waist circumference, hip circumference and BMI. His grip strength and sit-and-reach test, both decreased.

Young girls had similar results. The average 12-year-old girl in 2007-2009 was taller, weighed more, had a larger waist circumference, hip circumference, and BMI. Her grip strength and sit-and-reach tests both decreased.

Similar to adults, some disturbing results were found in the cardiovascular fitness health benefit ratings for boys and girls in the 2007-2009 survey. In 15 to 19-year-olds, only 38% of boys and 26% of girls received an "excellent or very good" rating.

BOY			
1981	BODY COMPOSITION	2007-2009	
150.9 cm (4'11")	Height	155.8 cm (5'1")*	
41.6 kg (92 pounds)	Weight	48.0 kg (106 pounds)*	
18.1 kg/m ²	Body mass index	19.2 kg/m ² *	
64.9 cm (25.6")	Waist circumference	66.2 cm (26.1")	
78.0 cm (30.7")	Hip circumference	84.0 cm (33.1")*	
0.83	Waist-to-hip ratio	0.82*	
FITNESS TESTS			
49 kg	Grip strength	44 kg*	
26.5 cm	Sit-and-reach	21.4 cm*	

GIRL			
1981	BODY COMPOSITION	2007-2009	
153.1 cm (5'0")	Height	155.9 cm (5'1")*	
42.7 kg (94 pounds)	Weight	47.6 kg (105 pounds)*	
18.4 kg/m ²	Body mass index	19.5 kg/m ² *	
62.4 cm (24.6")	Waist circumference	68.0 cm (26.8")*	
81.2 cm (32.0")	Hip circumference	86.0 cm (33.9")*	
0.78	Waist-to-hip ratio	0.79*	
FITNESS TESTS			
43 kg	Grip strength	40 kg*	
32.0 cm	Sit-and-reach	28.2 cm*	

* significantly different from estimate for 1981 ($p < 0.05$)

Notes: Estimates are based on median values for boys and girls aged 11 to 13 years. To make estimates more comparable, Canadian Health Measures Survey estimates for flexibility and muscular strength exclude respondents screened out of aerobic fitness test (see Methods).

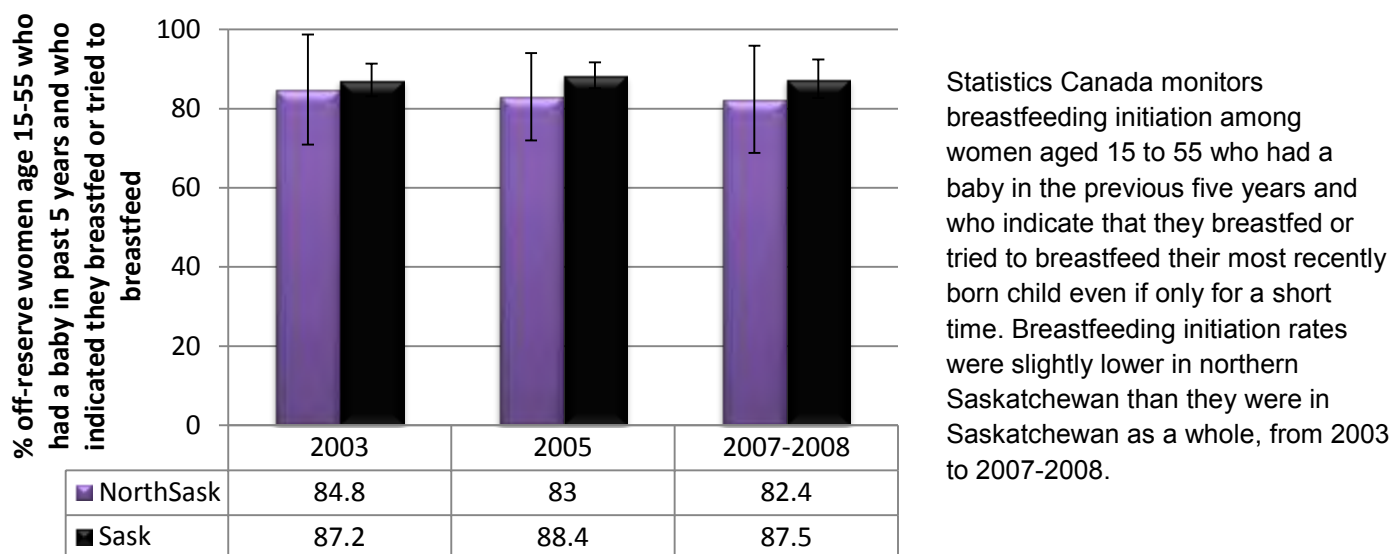
Sources: 1981 Canada Fitness Survey; 2007-2009 Canadian Health Measures Survey.



Breastfeeding practices

The World Health Organization (WHO) states that breastfeeding is an unequalled way of providing ideal food for the healthy growth and development of infants and is an integral part of the reproductive process with important implications for the health of mothers (World Health Organization, 2003). An extensive review of the evidence linking breastfeeding with health outcomes showed breastfeeding was associated with a reduction in the risk of a variety of infant conditions including infections of the ear, stomach, and respiratory tract, as well as skin problems, asthma (young children), obesity, type 1 and 2 diabetes, childhood leukemia, sudden infant death syndrome (SIDS), and a severe type of intestinal infection (Ip, 2007). The review also concluded that lactation was associated with a variety of health outcomes in the mother, including a reduced risk of type 2 diabetes, breast, and ovarian cancer, while early cessation of breastfeeding or not breastfeeding at all was associated with an increased risk of maternal postpartum depression (Ip, 2007).

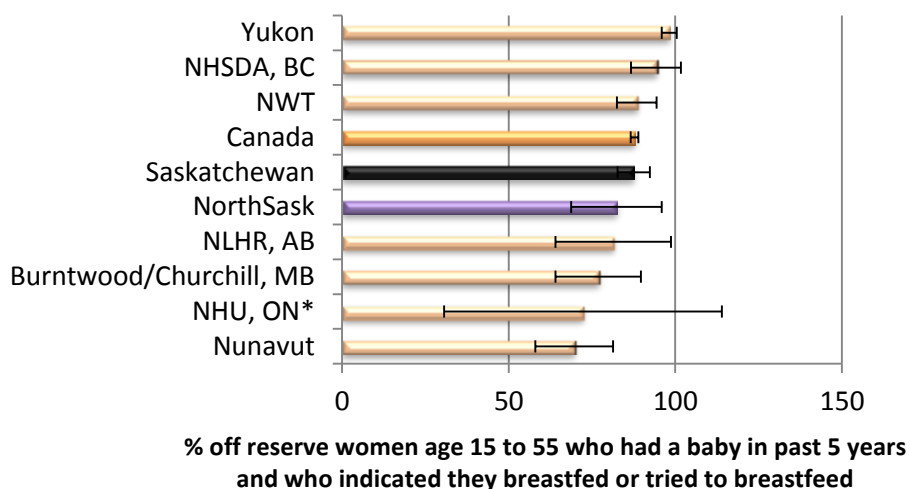
Figure 98 Breastfeeding initiation among women aged 15 to 55 years who had a baby in past 5 years, off-reserve, northern Saskatchewan and Saskatchewan, 2003 to 2007-2008



Source: StatsCan (CCHS-Health indicators), Prepared by PHU July 2009

Figure 99 Breastfeeding initiation among women aged 15 to 55 years who had a baby in past 5 years, off-reserve, by northern region, 2007-2008

Rates of breastfeeding initiation in northern Saskatchewan were slightly below the Canadian and Saskatchewan rates. In 2007-2008, 82% of women in northern Saskatchewan and 88% of women in Canada and Saskatchewan reported initiating breastfeeding. Among the other northern regions, Yukon, NHSDA and NWT had rates higher than northern Saskatchewan, while NLHR, Burntwood/Churchill, NHU and Nunavut had lower rates.



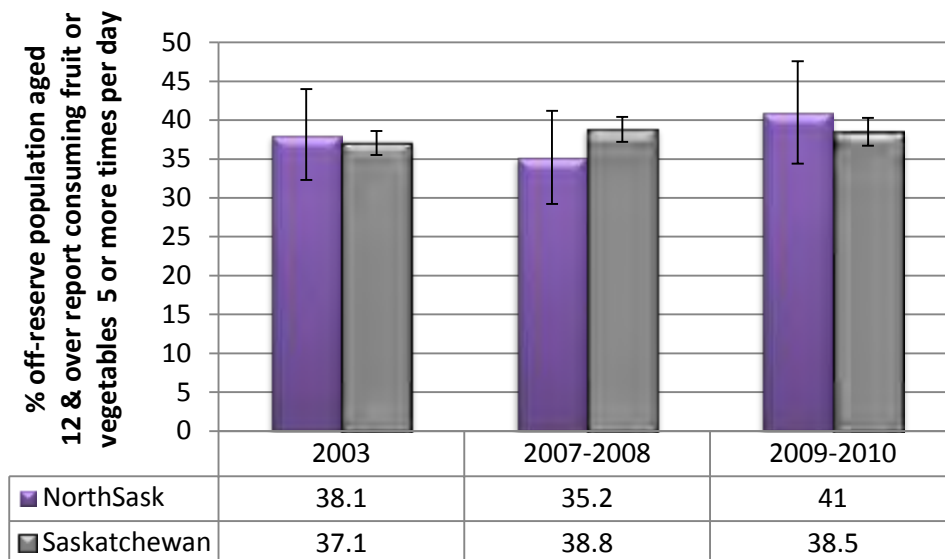
Source: StatsCan (CCHS - health indicators), Prepared by PHU July 2009 * CV > 16.5

Dietary practices

Dietary practices specifically related to adequate consumption of fruits and vegetables, fibre, essential fatty acids, Vitamin D and calcium, as well as limited consumption of red meat, salt, alcohol, fat (particularly saturated and trans fat), added sugars, and energy-dense-nutrient-low foods have been associated with a variety of health concerns including cancer, cardiovascular disease, diabetes, obesity, oral health and osteoporosis (Key et al., 2004; Moynihan & Petersen, 2004; Prentice, 2004; Srinath Reddy & Katan, 2004; Steyn et al., 2004; Swinburn, Caterson, Seidell, & James, 2004). Due to the numerous aspects of the diet that can affect health, it is often difficult and expensive to come up with an overall indicator for diet quality. However, the consumption of fruit and vegetables has been used as a good indicator for overall diet quality (Garriguet, 2009).

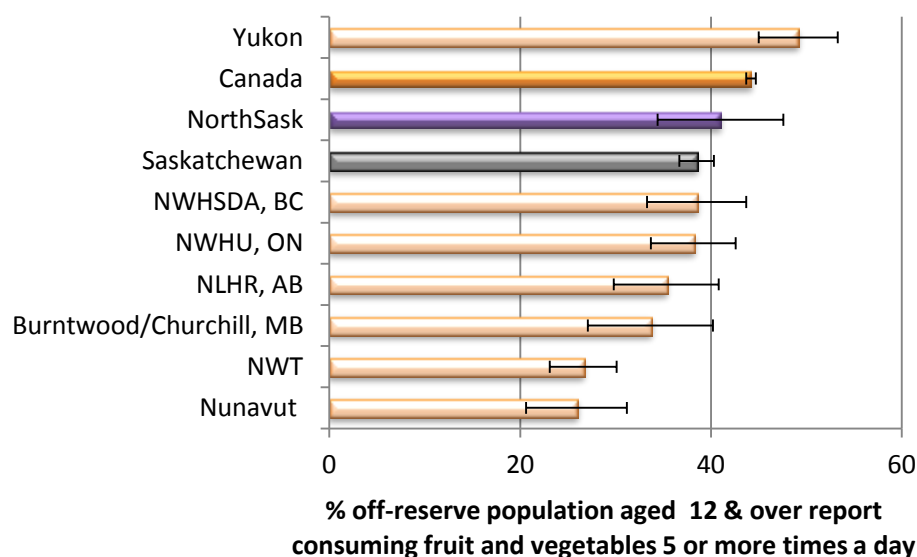
Figure 100 Population aged 12 and over, off-reserve, report consuming fruit or vegetables five or more times a day, northern Saskatchewan and Saskatchewan, 2003 to 2009-2010

Canada's Food Guide to Healthy Eating recommends individuals consume at least five servings of fruit and vegetables a day. The proportion of the northern off-reserve population aged 12 and up reporting consumption of fruit or vegetables at least five times a day increased slightly between 2003 and 2009-2010. The provincial rate increased slightly during the same time period and was slightly lower than the northern rate in 2009-2010.



Source: Statistics Canada (CCHS) CANSIM table 105-0501 & 105-0502, Prepared by PHU July 2011

Figure 101 Population aged 12 and over, off-reserve, report consuming fruit or vegetables five or more times a day, by northern region, 2009-2010



In northern Saskatchewan, 41% of people reported eating fruit or vegetables five or more times per day. This is higher than the Saskatchewan rate of 38.5% and lower than the Canadian rate of 44.2%. Compared to other northern regions, the rate in northern Saskatchewan is lower than Yukon, while higher than other northern regions.

Source: Statistics Canada (CCHS) CANSIM table 105-0502, Prepared by PHU July 2011

Figure 102 Weekly national nutritious food basket costs for reference family of four by geography, Saskatchewan, 2009

The cost of healthy foods also influences eating practices, particularly for low income families. The average weekly cost of a nutritious food basket in Saskatchewan increased consistently over two gradients, from large centre to small, and from south to north in 2009. The average weekly cost of the nutritious food basket in the Far North was almost twice as expensive as a large city in the south. This could be the difference of nearly 715 dollars per month.

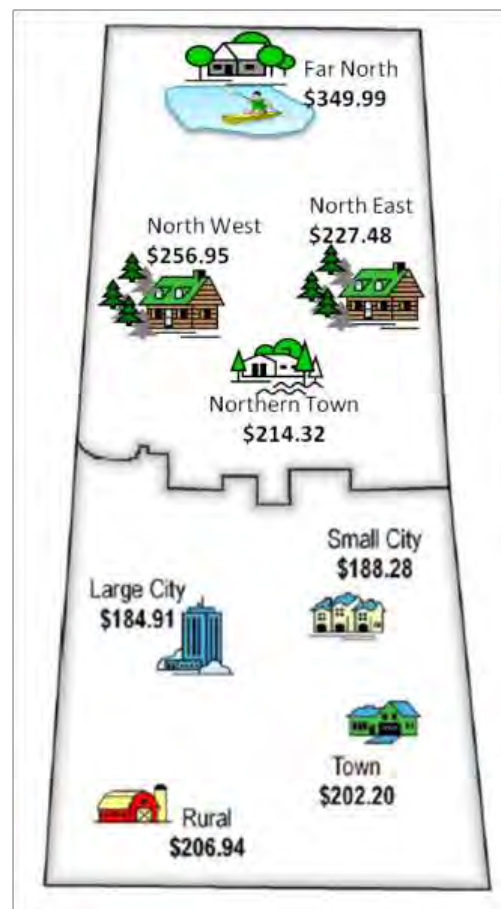
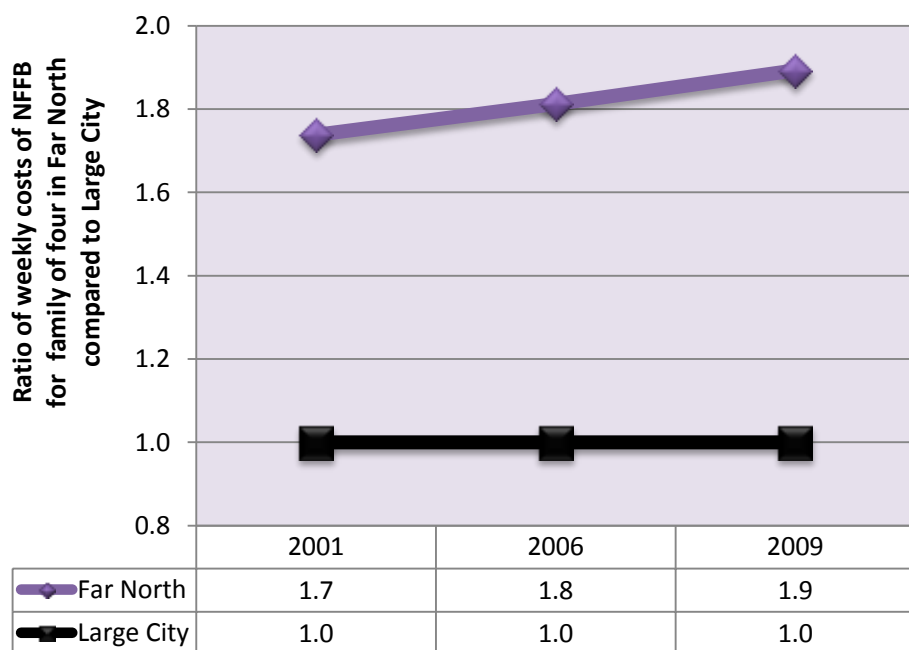


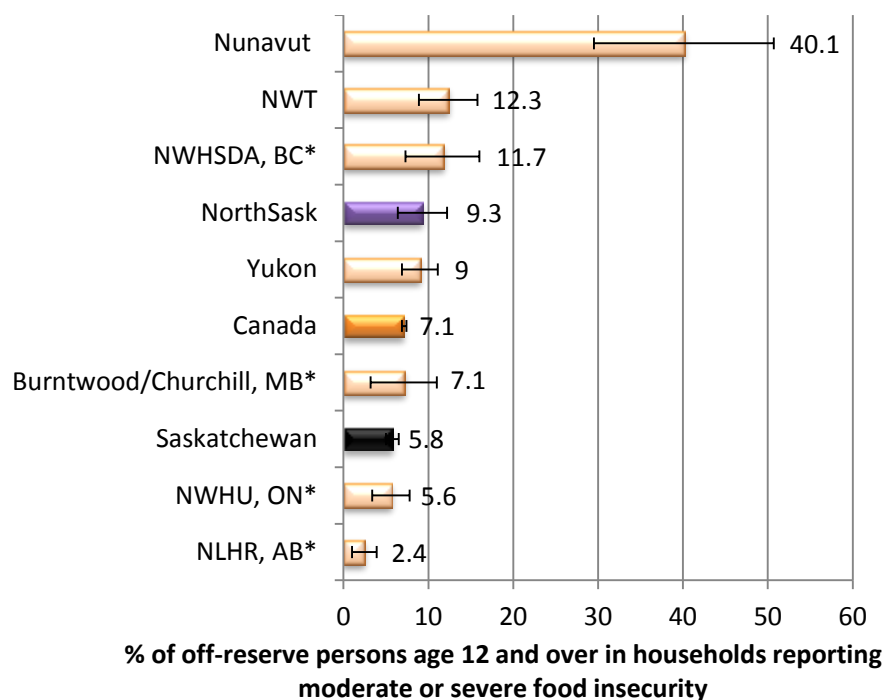
Figure 103 Ratio of the weekly costs for a reference family of four in the Far North compared to the Large City between 2001 and 2009



Source: PHU, Prepared by PHU June 2010

Public health nutritionists determined the national nutritious food basket costs in Saskatchewan in 2001, 2006 and 2009. Unfortunately, methods changed throughout the process which makes direct comparisons between the years invalid. However, in all three analyses, large discrepancies between the north and the south were shown. For example, the weekly cost to feed a family of four in the Far North was 1.7, 1.8 and 1.9 times the cost of the Large City in 2001, 2006, and 2009, respectively. The discrepancy in food costs between the north and south remained from 2001 to 2009.

Figure 104 Population aged 12 and over, off-reserve, reporting moderate or severe food insecurity, by northern territory, 2007-2008



According to Statistics Canada, food security exists in a household when all people at all times have access to sufficient safe and nutritious food for an active and healthy life, while food insecurity occurs when food quality and/or quantity are compromised, typically associated with limited income. In the CCHS, respondents were asked a set of 18 questions and were classified as food secure (defined as not any, or one indication of difficulty with income-related food access); moderately food insecure (defined as indication of compromise in quality and/or quantity of food consumed); or severely food insecure (defined as indication of reduced food intake and disrupted eating patterns).

Source: Statistics Canada (Health indicators), Prepared by PHU, Aug , 2010 * caution as CV's > 16.5

The levels of moderate or severe food insecurity varied greatly in the off-reserve northern regions across Canada in 2007-2008. The lowest rate was in NLHR; the highest rate was in Nunavut. Northern Saskatchewan's rate was lower than in Nunavut, NWT, and NWSDA, and higher than in Yukon, Canada, Burntwood/Churchill, Saskatchewan, NWHU and NLHR. The small numbers contribute to large variation in many of the results from the northern regions.



References

- Baliunas, D., Patra, J., Rehm, J., Popova, S., Kaiserman, M., & Taylor, B. (2007). Smoking-attributable mortality and expected years of life lost in Canada 2002: conclusions for prevention and policy. *Chronic Dis Can*, 27(4), 154-162.
- Bonnefoy, X., Annesi-Maesano, I., Aznar, L.M., Braubach, M., Croxford, B., Davidson, M., Ezratty, V., Fredouille, J., Gonzalez-Gross, M., van Kamp, I., Maschke, C., Mesbah, M., Moissonnier, B., Monolbaev, K., Moore, R., Nicol, S., Niemann, H., Nygren, C., Ormandy, D., R  bbe, N., Rudnai, P.,. (2004). *Fourth Ministerial Conference on Environment and Health - Review of evidence on housing and health*: World Health Organization (Europe).
- Bougie, E. (2010). Family, community, and Aboriginal language among young First Nations children living off reserve in Canada. *Canadian Social Trends*, 2010(November 9).
- Bryant, T., & Chisholm, S. (2002). *Housing as a Determinant of Health*. Retrieved February 26, 2010, from http://www.phac-aspc.gc.ca/ph-sp/oi-ar/09_housing-eng.php
- Canadian UNICEF Committee. (2009). *Canadian Supplement to The state of the world's children 2009 - Aboriginal children's health: Leaving no child behind*. Toronto, ON.
- Cannon, E. A., Bonomi, A. E., Anderson, M. L., Rivara, F. P., & Thompson, R. S. (2010). Adult health and relationship outcomes among women with abuse experiences during childhood. *Violence Vict*, 25(3), 291-305.
- Commission on Social Determinants of Health. (2008). *Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health*. Geneva: World Health Organization.
- Elections Canada. (2010). *Elections Canada: Past Elections*. Retrieved August 25, 2010, from <http://www.elections.ca/intro.asp?section=pas&document=index&lang=e>
- Garriguet, D. (2009). Diet quality in Canada. *Health Rep*, 20(3), 41-52.
- Government of Canada. (1999). *Towards a Healthy Future - The Second Report on the Health of Canadians*.
- Government of Canada. (2008). *The Chief Public Health Officer's Report on the State of Public Health in Canada 2008 - Addressing Health Inequalities*.
- Hanson, R. F., Sawyer, G. K., Begle, A. M., & Hubel, G. S. (2010). The impact of crime victimization on quality of life. *J Trauma Stress*, 23(2), 189-197.
- Health Canada. (2007). *Findings and Recommendations of the Fluoride Expert Panel (January 2007)*. Retrieved July 15, 2010, 2010, from http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/water-eau/2008-fluoride-fluorure/2008-fluoride-fluorure-eng.pdf
- Health Canada. (2009). *Fluoride in Drinking Water*. Retrieved July 15, 2010, from http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/consult/2009/fluoride-fluorure/consult_fluor_water-eau-eng.pdf
- Ip, S., Chung, M., Raman, G., Chew, P., Magula, N., DeVine, D., Trikalinos, T., Lau, J.,. (2007). *Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries*. Retrieved April 20, 2007, from <http://www.ahrq.gov/downloads/pub/evidence/pdf/brfout/brfout.pdf>
- Johnson, S. L., Solomon, B. S., Shields, W. C., McDonald, E. M., McKenzie, L. B., & Gielen, A. C. (2009). Neighborhood violence and its association with mothers' health: assessing the relative importance of perceived safety and exposure to violence. *J Urban Health*, 86(4), 538-550.
- Kantomaa, M. T., Tammelin, T. H., Ebeling, H. E., & Taanila, A. M. (2008). Emotional and behavioral problems in relation to physical activity in youth. *Med Sci Sports Exerc*, 40(10), 1749-1756.
- Keown, L. (2009). 2008 General Social Survey Report: Social networks help Canadians deal with change. *Canadian Social Trends*.
- Key, T. J., Schatzkin, A., Willett, W. C., Allen, N. E., Spencer, E. A., & Travis, R. C. (2004). Diet, nutrition and the prevention of cancer. *Public Health Nutr*, 7(1A), 187-200.
- King, K. M., Sanguins, J., McGregor, L., & LeBlanc, P. (2007). First Nations people's challenge in managing coronary artery disease risk. *Qual Health Res*, 17(8), 1074-1087.
- Kondo, N., Sembajwe, G., Kawachi, I., van Dam, R. M., Subramanian, S. V., & Yamagata, Z. (2009). Income inequality, mortality, and self rated health: meta-analysis of multilevel studies. *Bmj*, 339, b4471.
- Langford, L., V. Wittrock, M. Johnston, E. Wheaton, J. Irvine, and W. Osei. (2006). *Relationships of forest, climate, wildfires, and respiratory ailments in northern Saskatchewan*. (Publication No. 11667-1E05). Saskatoon, SK.
- Lantz, P. M., & Pritchard, A. (2010). Socioeconomic indicators that matter for population health. *Prev Chronic Dis*, 7(4), A74.
- Lemstra, M., Neudorf, C., & Opondo, J. (2006). Health disparity by neighbourhood income. *Can J Public Health*, 97(6), 435-439.
- Marmot, M., Allen, J., Goldblatt, P., Boyce, T., McNeish, D., Grady, M., Geddes, I. (2010). *Fair Society, Healthy Lives - The Marmot Review: strategic review of health inequalities in england post-2010*.
- Martin, C. K., Church, T. S., Thompson, A. M., Earnest, C. P., & Blair, S. N. (2009). Exercise dose and quality of life: a randomized controlled trial. *Arch Intern Med*, 169(3), 269-278.

- Moloughney, B. (2004). *Housing and Population Health. The State of Current Research Knowledge*: Canadian Institute of Health Information.
- Moynihan, P., & Petersen, P. E. (2004). Diet, nutrition and the prevention of dental diseases. *Public Health Nutr*, 7(1A), 201-226.
- National Collaborating Centre for Environmental Health. (2010). *Fact Sheets for Promoting Healthy Built Environments*.
- Orpana, H. M., Lemyre, L., & Gravel, R. (2009). Income and psychological distress: the role of the social environment. *Health Rep*, 20(1), 21-28.
- Ortega, F. B., Ruiz, J. R., Castillo, M. J., & Sjostrom, M. (2008). Physical fitness in childhood and adolescence: a powerful marker of health. *Int J Obes (Lond)*, 32(1), 1-11.
- Pampalon, R., Hamel, D., & Gamache, P. (2009). A comparison of individual and area-based socio-economic data for monitoring social inequalities in health. *Health Rep*, 20(4), 85-94.
- Pan, S. Y., Cameron, C., Desmeules, M., Morrison, H., Craig, C. L., & Jiang, X. (2009). Individual, social, environmental, and physical environmental correlates with physical activity among Canadians: a cross-sectional study. *BMC Public Health*, 9, 21.
- Prentice, A. (2004). Diet, nutrition and the prevention of osteoporosis. *Public Health Nutr*, 7(1A), 227-243.
- Public Health Agency of Canada. (2003). *What Make Canadians Healthy or Unhealthy*. Retrieved June 7, 2010, from <http://www.phac-aspc.gc.ca/ph-sp/determinants/determinants-eng.php#unhealthy>
- Public Health Agency of Canada. (2005). *Injuries Associated with Non-Fatal Dog Bites: Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) database, 1990-2003*, from http://www.phac-aspc.gc.ca/injury-bles/chirpp/pdf/CHIRPP_INJURY_BRIEF_DOG_BITE_update.pdf
- Raghavan, M. (2008). Fatal dog attacks in Canada, 1990-2007. *Can Vet J*, 49(6), 577-581.
- Reading, J., Kmetz, A., & Gideon, V. (2007). *First Nations wholistic policy and planning model: Discussion paper for the World Health Organization Commission on Social Determinants of Health*.: Assembly of First Nations.
- Reardon, J. Z. (2007). Environmental tobacco smoke: respiratory and other health effects. *Clin Chest Med*, 28(3), 559-573, vi.
- Rehm, J., Giesbrecht, N., Patra, J., & Roerecke, M. (2006). Estimating chronic disease deaths and hospitalizations due to alcohol use in Canada in 2002: implications for policy and prevention strategies. *Prev Chronic Dis*, 3(4), A121.
- Rehm, J., Patra, J., & Popova, S. (2006). Alcohol-attributable mortality and potential years of life lost in Canada 2001: implications for prevention and policy. *Addiction*, 101(3), 373-384.
- Saskatchewan Environment and Resource Management. (1999). *Saskatchewan's state of the environment report 1999: the Boreal Shield Ecozone: a land of lakes and forests*. Regina.
- Saskatchewan Ministry of Education. (2008). *Saskatchewan Education Core Indicators - Prekindergarten to Grade 12*.
- Saskatchewan Provincial Health Council. (1996). *Your health, my health, our health, our individual and collective responsibilities: a discussion paper on the determinants of health*. Regina.
- Savoie, J. (2008). *Analysis of the Spatial Distribution of Crime in Canada: Summary of Major Trends 1999, 2001, 2003 and 2006*.
- Search Institute Survey. (2010). *Developmental Assets: A profile of your youth*.
- Shields, M., Tremblay, M. S., Laviolette, M., Craig, C. L., Janssen, I., & Gorber, S. C. (2010). Fitness of Canadian adults: results from the 2007-2009 Canadian Health Measures Survey. *Health Rep*, 21(1), 21-35.
- Smith, K., Findlay, L., and Crompton, S. (2010). *Participation in sports and cultural activities among Aboriginal children and youth*. Retrieved Nov, 2010, from <http://www.statcan.gc.ca/pub/11-008-x/2010002/article/11286-eng.pdf>
- Srinath Reddy, K., & Katan, M. B. (2004). Diet, nutrition and the prevention of hypertension and cardiovascular diseases. *Public Health Nutr*, 7(1A), 167-186.
- Steyn, N. P., Mann, J., Bennett, P. H., Temple, N., Zimmet, P., Tuomilehto, J., et al. (2004). Diet, nutrition and the prevention of type 2 diabetes. *Public Health Nutr*, 7(1A), 147-165.
- Swinburn, B. A., Caterson, I., Seidell, J. C., & James, W. P. (2004). Diet, nutrition and the prevention of excess weight gain and obesity. *Public Health Nutr*, 7(1A), 123-146.
- Syme, S. L. (1998). Social and economic disparities in health: thoughts about intervention. *Milbank Q*, 76(3), 493-505, 306-497.
- Syme, S. L. (2004). Social determinants of health: the community as an empowered partner. *Prev Chronic Dis*, 1(1), A02.
- Taylor, B., Rehm, J., Patra, J., Popova, S., & Baliunas, D. (2007). Alcohol-attributable morbidity and resulting health care costs in Canada in 2002: recommendations for policy and prevention. *J Stud Alcohol Drugs*, 68(1), 36-47.
- The Canadian Dental Association. (2010). *CDA Position on Use of Fluorides in Caries Prevention*. Retrieved July 15, 2010, from http://www.cda-adc.ca/files/position_statements/Fluorides-English-2010-06-08.pdf
- Tremblay, M. S., Shields, M., Laviolette, M., Craig, C. L., Janssen, I., & Gorber, S. C. (2010). Fitness of Canadian children and youth: results from the 2007-2009 Canadian Health Measures Survey. *Health Rep*, 21(1), 7-20.

- van Rossum, C. T., Shipley, M. J., van de Mheen, H., Grobbee, D. E., & Marmot, M. G. (2000). Employment grade differences in cause specific mortality. A 25 year follow up of civil servants from the first Whitehall study. *J Epidemiol Community Health*, 54(3), 178-184.
- Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Cmaj*, 174(6), 801-809.
- World Health Organization. (2003). *Global strategy for infant and young child feeding*. Retrieved June 23, 2010, from <http://whqlibdoc.who.int/publications/2003/9241562218.pdf>
- World Health Organization. (2004). *WHO Global Status Report on Alcohol 2004 - Country Profiles: Canada*. Retrieved March 9, 2010, from http://www.who.int/substance_abuse/publications/en/canada.pdf
- World Health Organization. (2005). *WHO expert consultation on rabies, first report*. Retrieved June 28, 2010, from http://whqlibdoc.who.int/trs/WHO_TRS_931_eng.pdf
- Zheng, H. (2009). Rising U.S. income inequality, gender and individual self-rated health, 1972-2004. *Soc Sci Med*, 69(9), 1333-1342.

Health Status





HEALTH STATUS

An assessment of the health status of the residents of northern Saskatchewan, based on how healthy people perceive themselves to be, health risks, disease trends, major causes of death, and use of health services, is necessary for effectively planning and evaluating health services.

As discussed in the previous chapter, health status is a reflection of the many determinants of health including income and social status, employment, education, housing, environment, and social, family and community supports. Health status is not only the result of health services, but is also a reflection of many socio-cultural-economic factors. Many different organizations and groups are involved with activities which influence the health status of the northern Saskatchewan community.

The following section reviews a variety of health status indicators for northern Saskatchewan, including well-being, mortality, morbidity and chronic conditions, family health, communicable disease and emerging health issues. Unfortunately, desired community health indicators that focus on community strengths, as opposed to deficits are not readily available.

Some of the indicators used in this report are provided on a north-wide basis, while some indicators may be specific to each health region or authority. Some indicators are for all residents in northern Saskatchewan, while some are limited to only those living off-reserve (such as the indicators from the Canadian Community Health Survey or CCHS). Canada's First Nations Regional Health Surveys provide similar information, although not completely comparable, on indicators for First Nations people living on reserves. There are also some in-house data that include all of the off-reserve cases, as well as most (~80%) of the on-reserve cases. In this case, we presented the data as an estimated value. We realize that by providing an estimate we are losing a degree of accuracy; however, it is important to present the data in this manner for several reasons. Firstly, for many diseases, medical services (for example, physician, hospital, and laboratory services) for both on and off reserve clients are received within the three northern health authorities. If the on-reserve cases were excluded, we would not be providing an accurate picture for the health services needs or a true reflection of the health assessment of the service area. Secondly, many of our communities are intimately tied together so the level of risk of spreading some of these communicable diseases would not be accurately shown by excluding the on-reserve cases. Finally, the estimate will be conservative, as it will underestimate the burden of the disease within a geographical region, as opposed to overestimating the burden. The distinction will be provided for each table or graph for the population being described with the indicator.

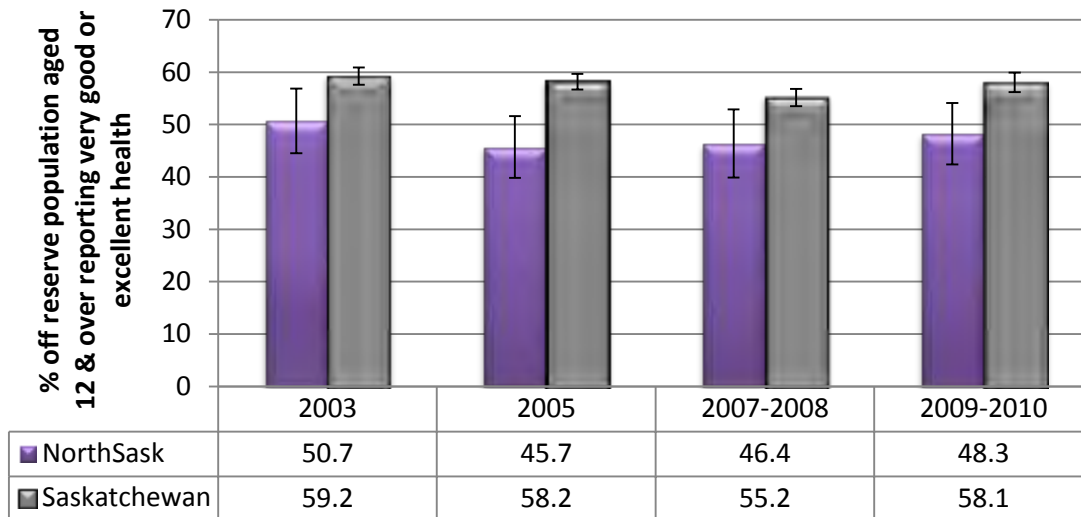
There are some challenges in making interpretations or predictions of trends because of the small numbers in northern Saskatchewan, so some caution is advised.

Well-being

Self-rated health

Self-rated health status is a good indicator of overall health as it corresponds to the individual's personal meaning of health. Thus, this indicator can capture components of health, such as early stages of disease, disease severity, aspects of positive health status, physiological and psychological reserves and social and mental function, which other measures cannot. Statistics Canada assesses self-rated health by asking off-reserve individuals how they would rate their own health (excellent, very good, good, or fair/poor) which is then averaged over the population to provide a rough indicator of the sense of wellness.

Figure 105 Self-rated health population aged 12 and over, off-reserve, northern Saskatchewan and Saskatchewan, 2003 to 2009-2010

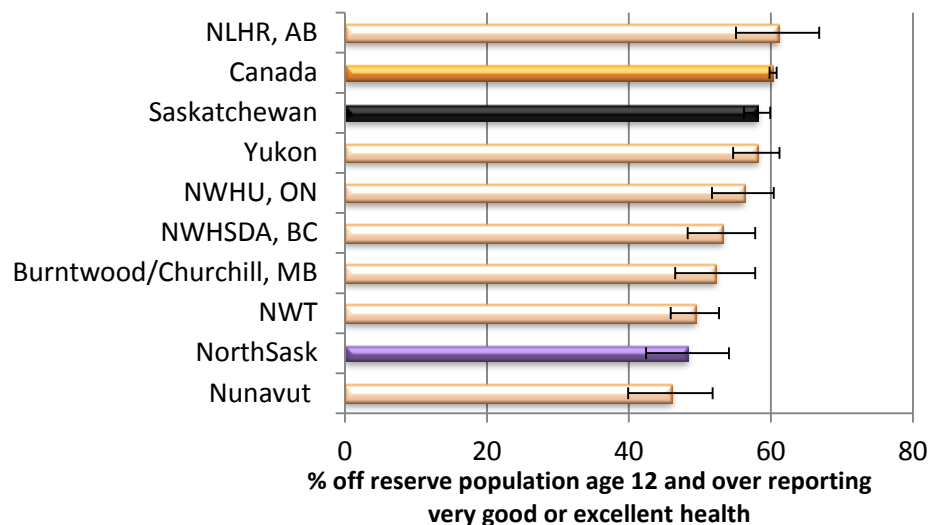


Source: Statistics Canada (CCHS) CANSIM table 105-0501 & 105-0502, Prepared by PHU July 2011

In northern Saskatchewan, the proportion of the population aged 12 and over, living off-reserve, that rated their health as very good or excellent remained stable between 2003 and 2009-2010, decreasing from 50.7% in 2003 to 48.3% in 2009-2010. Rates were also stable at the provincial level decreasing from 59.2% in 2003 to 58.1% in 2009-2010, a full 10 percentage points above the northern rate.

Figure 106 Population aged 12 and over, off-reserve, reporting perceived health status as very good or excellent, by northern region, 2009-2010

When comparing self-reported health status with other northern areas in Canada, fewer people in northern Saskatchewan reported their health as very good or excellent. At only 48%, this rate is significantly below the provincial rate of 58%, and the national rate of 60%. It is also below all of the other selected northern regions, except Nunavut, though not all comparisons reach statistical significance.



Source: Statistics Canada (CCHS) CANSIM table 105-0502, Prepared by PHU July 2011

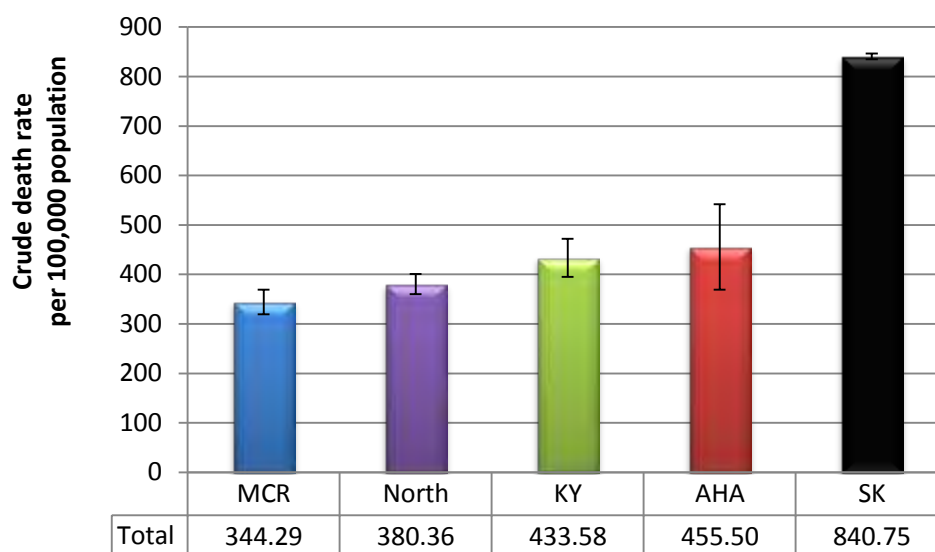
Mortality

Mortality or death is used for a variety of community health indicators and is useful to some extent for health planning. It is a limited indicator as it only measures illnesses or injuries which are severe enough to cause death.

Total mortality

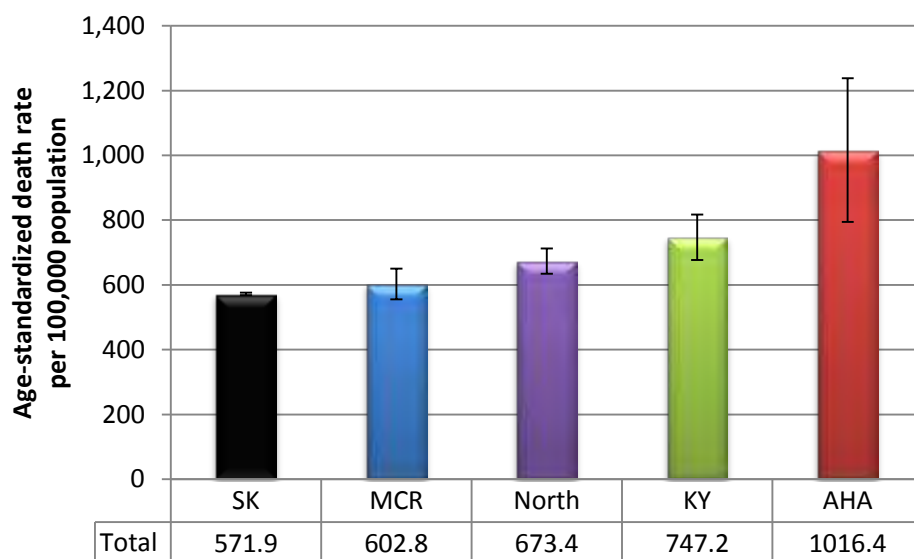
Figure 107 Crude mortality rate from the 10 leading causes of death, 10-year average, by health authority, 2000-2009

Total crude mortality rates are approximately twice as high in the province as a whole as in the northern health authorities. This means that there are on average about half the number of deaths over a time period in northern Saskatchewan communities in comparison to communities of the same size in southern Saskatchewan. This is not surprising as the Saskatchewan population has a much greater proportion of elders who would be expected to have a higher death rate, compared to northern Saskatchewan's younger population.



Source: SaskHealth 2011, Prepared by PHU Jan 2011

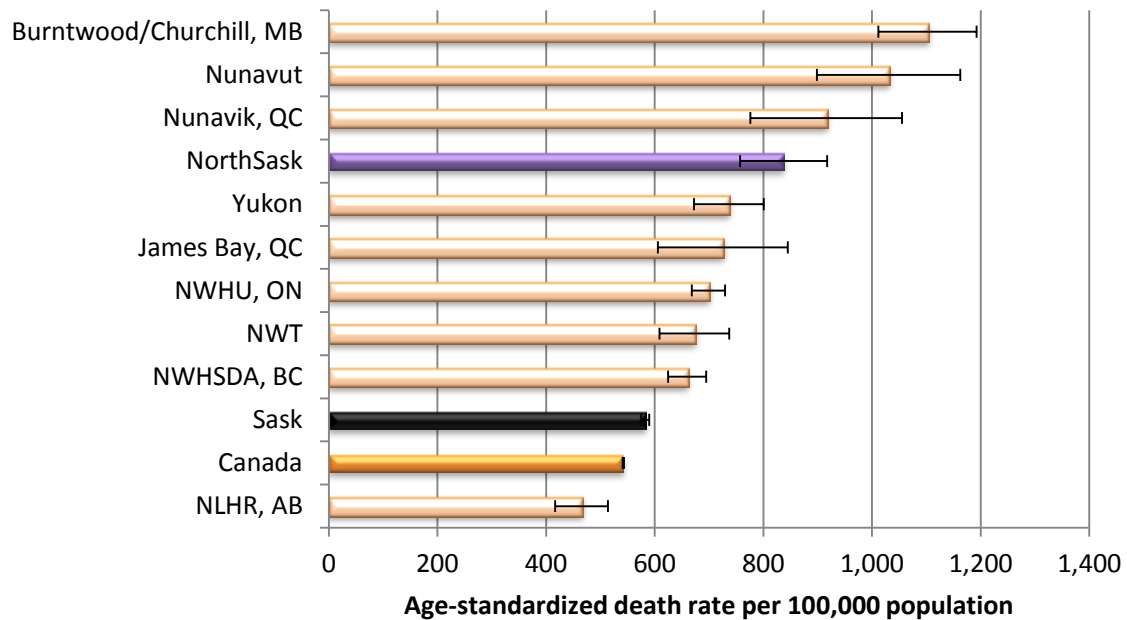
Figure 108 Age-standardized mortality rate from the 10 leading causes of death, 10-year average, by health authority, 2000-2009



Source: SaskHealth 2011, Prepared by PHU Jan 2011

As the middle-aged and elderly (who have higher rates of chronic diseases) make up a smaller proportion of the northern population, age-sex adjustments are made to allow for provincial comparisons. After these adjustments are made, mortality rates are between 5-80% higher in the north compared to the province. This indicates that the risk of dying from the 10 leading causes of death is similar or higher in the north, compared to the province as a whole.

Figure 109 Age-standardized mortality, 3-year average rates, by northern region, 2005-2007



Source: Statistics Canada (Health Indicators) Error bars = 95% CI

The age-standardized rate of total mortality in northern Saskatchewan in 2005-2007 was 837 deaths per 100,000 population. This was significantly higher than both the provincial (583 deaths per 100,000) and national (542 deaths per 100,000) rates. Compared to other northern regions, northern Saskatchewan had a higher rate than NLHR, NWHSDA, NWT, NWHU, James Bay and Yukon, while having a lower rate than Nunavik, Nunavut, and Burntwood/Churchill, MB.



Major causes of mortality

Figure 110 Number and % of deaths, by cause, northern Saskatchewan and Saskatchewan, 1998-2007

Cause (ICD classification)	Northern Saskatchewan				Saskatchewan			
	1998-2002		2003-2007		1998-2002		2003-2007	
	#	%	#	%	#	%	#	%
Injury	154	23.9	167	23.1	2,828	6.4	2,895	6.5
Circulatory	137	21.2	153	21.1	16,613	37.4	14,973	33.4
Cancers	153	23.7	148	20.4	11,466	25.8	11,474	25.6
Respiratory	49	7.6	57	7.9	4,076	9.2	4,007	8.9
Other	46	7.1	49	6.8	1,423	3.2	1,700	3.8
Endocrine, Nutrition, Metabolic	28	4.3	39	5.4	1,698	3.8	2,052	4.6
Digestive	23	3.6	29	4.0	1,657	3.7	1,712	3.8
Nervous system	12	1.9	18	2.5	2,025	4.6	2,135	4.8
Genitourinary	7	1.1	17	2.3	964	2.2	1,191	2.7
Mental/ behavioural	11	1.7	16	2.2	1,085	2.4	1,493	3.3
Abnormal findings NES	22	3.4	16	2.2	560	1.3	633	1.4
Unknown	*	*	15	2.1	67	0.2	615	1.4

Source: Saskatchewan Health 2009, Prepared by PHU Sept, 2009 (NES = not elsewhere specified)

There was very little change in the proportion of deaths from major causes in either the north or Saskatchewan, when comparing the 5-year period of 1998 to 2002 with the time period of 2003 to 2008.

Figure 111 Leading causes of death, Northern Saskatchewan, 1998-2007

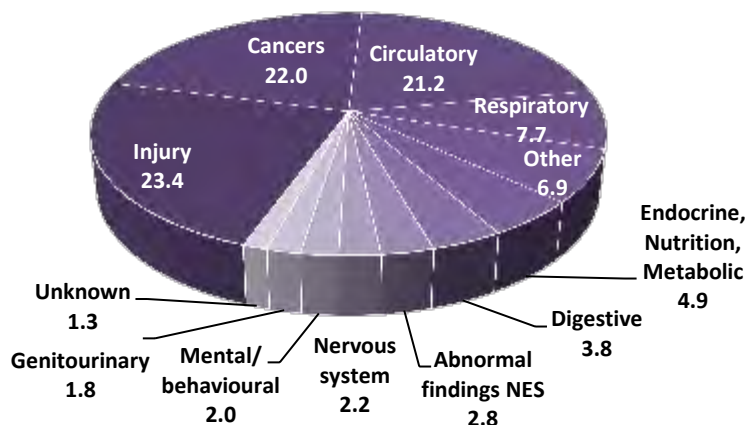
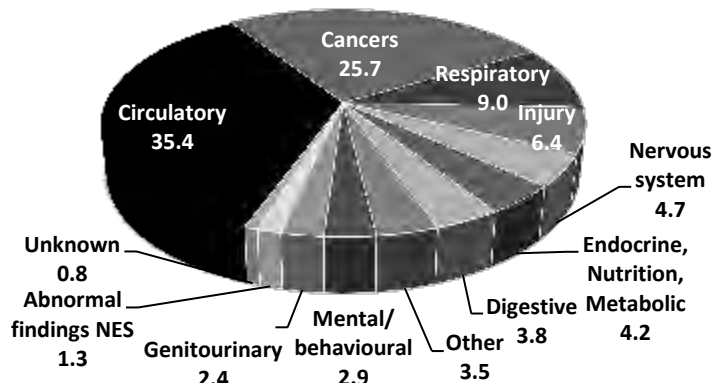


Figure 112 Leading causes of death, Saskatchewan, 1998-2007



Source: Saskatchewan Health 2009, Prepared by PHU Sept, 2009 (NES = not elsewhere specified)

In Saskatchewan, the most common cause of death between 1998 and 2007 was circulatory diseases such as heart attack and stroke (1 in 3 deaths), with 2 in 3 of deaths resulting from either circulatory diseases or cancers. In contrast, in northern Saskatchewan, injuries were the most common cause of death, followed closely by cancers and circulatory disease.

Injuries and violence account for 23.4% of deaths in northern Saskatchewan compared to 6.4% of deaths among the total Saskatchewan population.

Figure 113 Total number of deaths by cause and health authority, 1998-2007

Cause ICD Classification	AHA	KY	MCR
Injuries	28	111	182
Cancers	30	119	152
Circulatory	23	108	159
Respiratory	9	46	51
Other	10	27	58
Endocrine, Nutrition, Metabolic	< 5	21	42
Digestive	< 5	22	29
Abnormal findings not elsewhere specified	< 5	9	25
Nervous system	< 5	15	12
Mental/ behavioural	< 5	9	14
Genitourinary	0	14	10
Unknown	< 5	6	9
All	119	507	743

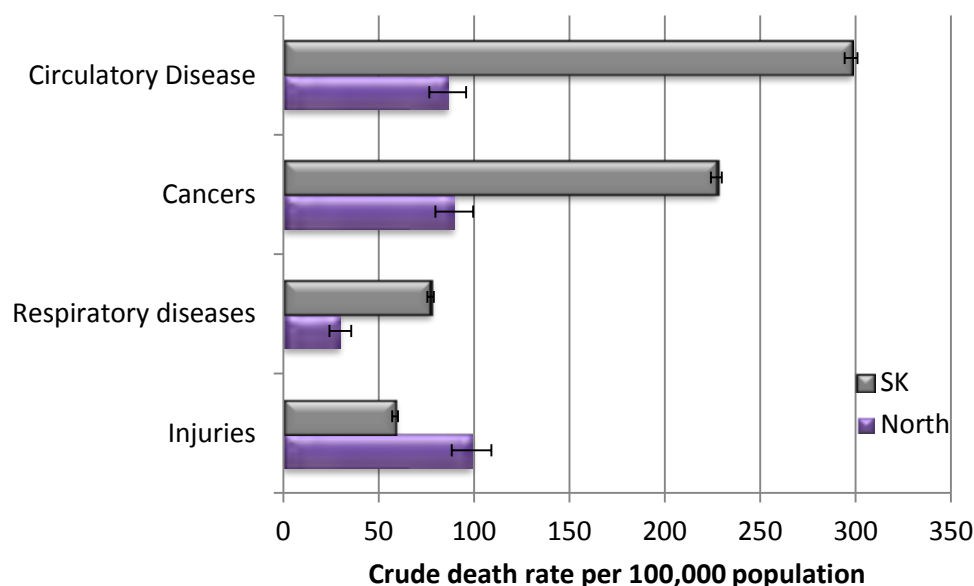
Source: Saskatchewan Health 2009, Prepared by PHU Dec 2010

On average, there were approximately 12, 51 and 74 deaths per year in AHA, KYHR and MCRHR respectively between 1998 and 2007. The average number of deaths per year for each of the specific categories can be calculated by dividing the total by 10, as there are 10 years of data.

In Saskatchewan, circulatory diseases and cancers are the most common causes of death with injuries being the fourth most common.

In northern Saskatchewan, injuries are the leading cause of death followed closely by circulatory disease and cancer.

Figure 114 Crude mortality rates, 10-year average, by cause, northern Saskatchewan and Saskatchewan, 2000-2009

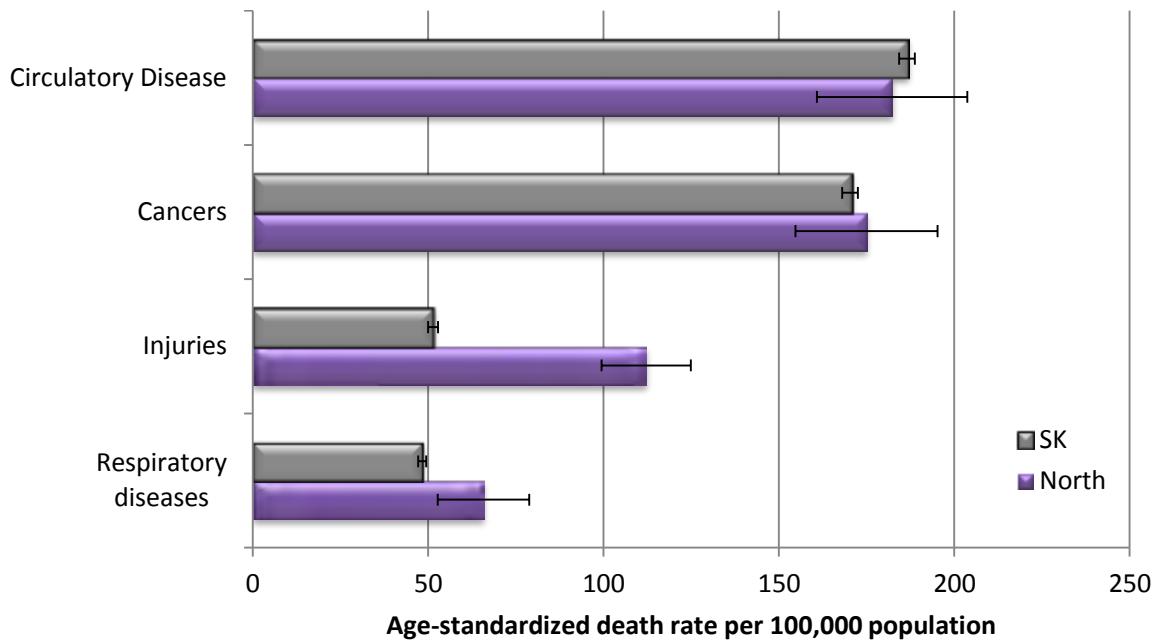


Source: SaskHealth 2011, Prepared by PHU Jan 2011

The leading causes of death in the northern health authorities, based on crude rates per 100,000 population between 2000 and 2009, were injuries, cancers, and circulatory diseases, all at similar rates (74-129). In contrast, the leading causes of death in Saskatchewan over the same time period, were circulatory diseases (298) and cancers (227), at similar rates to one another, and respiratory diseases at about one-third of the first two (77). This difference is not surprising as the north has a younger population in which injuries are more common, and a

lower population in the older age groups in which chronic conditions such as respiratory diseases are more common. On average, there would be about one-third the numbers of circulatory deaths, such as heart disease, one-half the number of deaths from cancer and respiratory disease, but close to double the number of deaths from injuries in a northern Saskatchewan community, compared to a southern Saskatchewan community of similar size.

Figure 115 Age-standardized mortality rates, 10-year average, by cause, northern Saskatchewan and Saskatchewan, 2000-2009

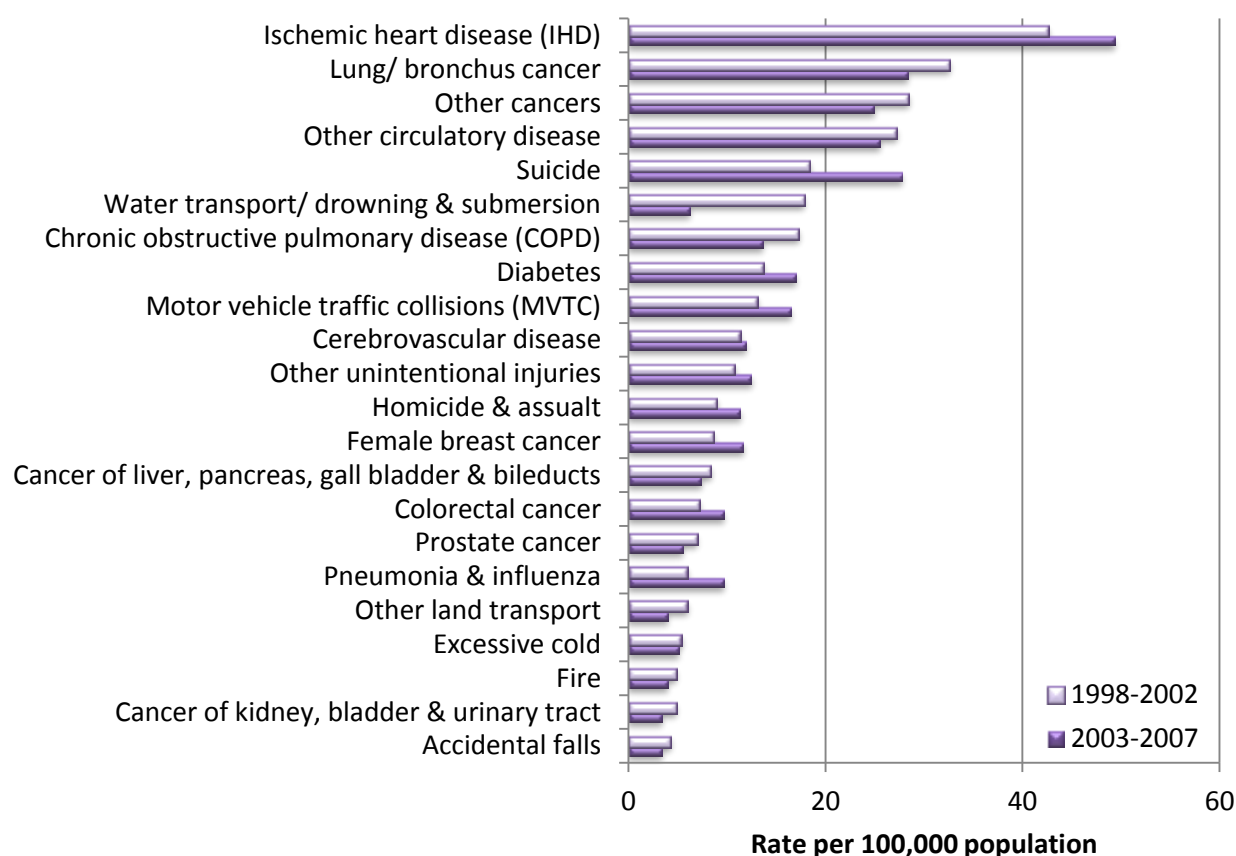


Source: SaskHealth 2011, Prepared by PHU Jan 2011

After age adjustments are made to allow for provincial comparisons, circulatory diseases, cancers, injuries and respiratory diseases remain the four leading causes of death in the north. However, injury death rates in all three northern health areas are significantly greater, at two to three times the provincial rate. The overall northern respiratory death rate is also significantly greater than the provincial rate. The similar age-standardized mortality rates for circulatory disease and cancer indicate that the levels of risk for dying from these diseases are the same across the whole province. The higher age-standardized mortality rates for injury and respiratory disease show that the levels of risk for dying from these conditions are greater in the northern regions compared to the province.



Figure 116 Crude mortality rates, 5-year averages, from common causes, northern Saskatchewan, 1998-2007



Source: SaskHealth 2009, Prepared by PHU Nov, 2009

The above graph shows the most common specific causes of chronic disease and injury deaths (e.g. ischemic heart disease [IHD]) in northern Saskatchewan between 1998 and 2007, as opposed to groups of diseases (e.g. circulatory diseases) shown in the previous charts. IHD and lung cancer are the most common causes of death from chronic diseases, while suicides and transport accidents are the most common types of injury deaths.

Figure 117 Changes in 5-year average crude mortality rates per 100,000 population from selected causes, northern Saskatchewan. 1998-2002 to 2003-2007

Decreasing Rates	Deaths/ 100,000	%	Increasing Rates	Deaths/ 100,000	%
Water transport/ drowning & submersion	-11.5	-64.8	Suicide	9.5	51.8
Lung/ bronchus cancer	-4.1	-12.7	Ischemic heart disease (IHD)	6.8	16.1
Chronic obstructive pulmonary disease (COPD)	-3.5	-20.5	Pneumonia & influenza	3.7	63.3
Other cancers	-3.4	-12.0	Motor vehicle traffic collisions (MVTC)	3.5	26.6
Other land transport	-1.9	-32.8	Diabetes	3.4	25.3

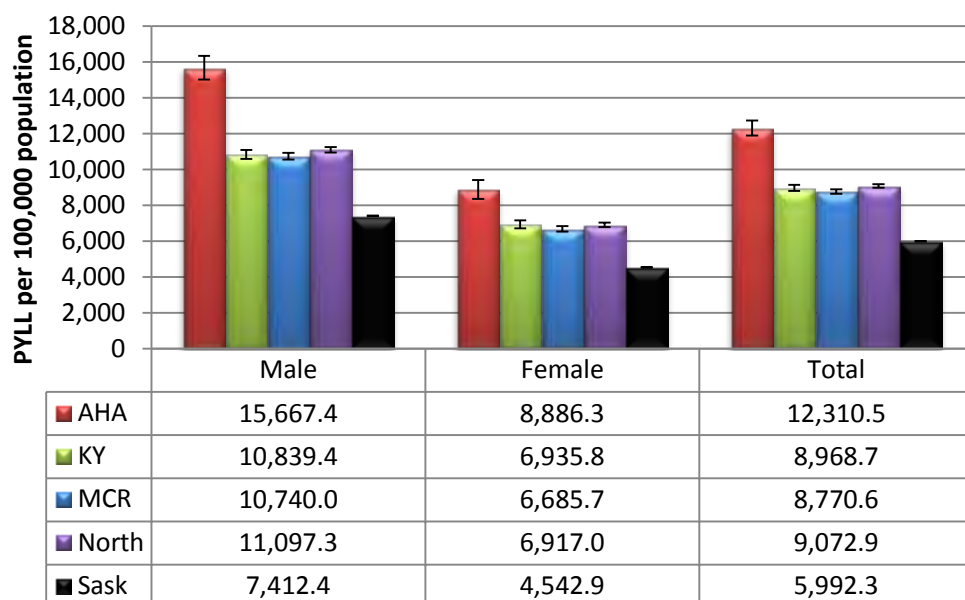
Source: Saskatchewan Health 2009, Prepared by PHU Nov, 2009

When we look at changes over time, we see that IHD and suicides increased between 1998-2002 and 2003-2007, while water transport/ drowning and submersion deaths decreased over the same time period. Caution should be taken when interpreting changes over time as changes in age structures have not been taken into account. As well, changes were made in how deaths were categorized throughout this time period. Prior to 2000, the International Classification of Disease 9th edition (ICD9) was used for classification; ICD9 classification was transitioning to the 10th edition (ICD10) between 2000 and approximately 2004, after which ICD10 was exclusively used.

Potential years of life lost (PYLL)

Potential years of life lost (PYLL) is an indicator of premature mortality or premature death. It gives more weight to causes of death occurring at younger ages than to those occurring at later ages. More specifically, the indicator PYLL estimates the total years of life lost before age 75 years by persons under 75 years of age. The death of a 12-year-old child contributes 63 years to the potential years of life lost, while the death of a 74-year-old contributes only one year.

Figure 118 Premature deaths (PYLL), all causes, 10-year average, by sex and health authority, 1998-2007

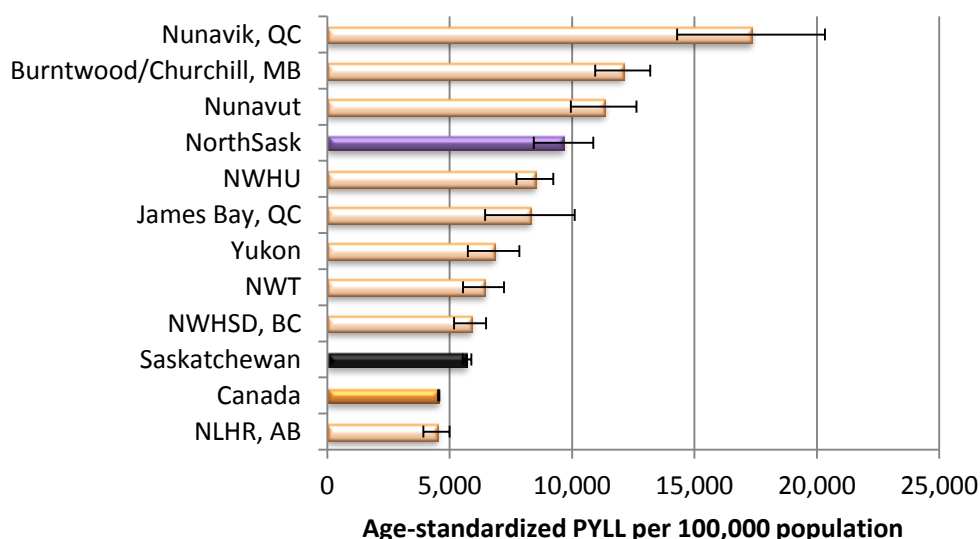


Source: SaskHealth (Vital Stats) 2009, Prepared by PHU Sept 2009

The rate of PYLL was much greater in the northern health authorities than it was at the provincial level between 1998 and 2007, with AHA having the highest rates. In all regions, the PYLL rate was higher in males than in females. Overall, in the north the male rate was 1.6 times greater than the female rate, with similar differences occurring in the individual northern regions, as well as the province as a whole.

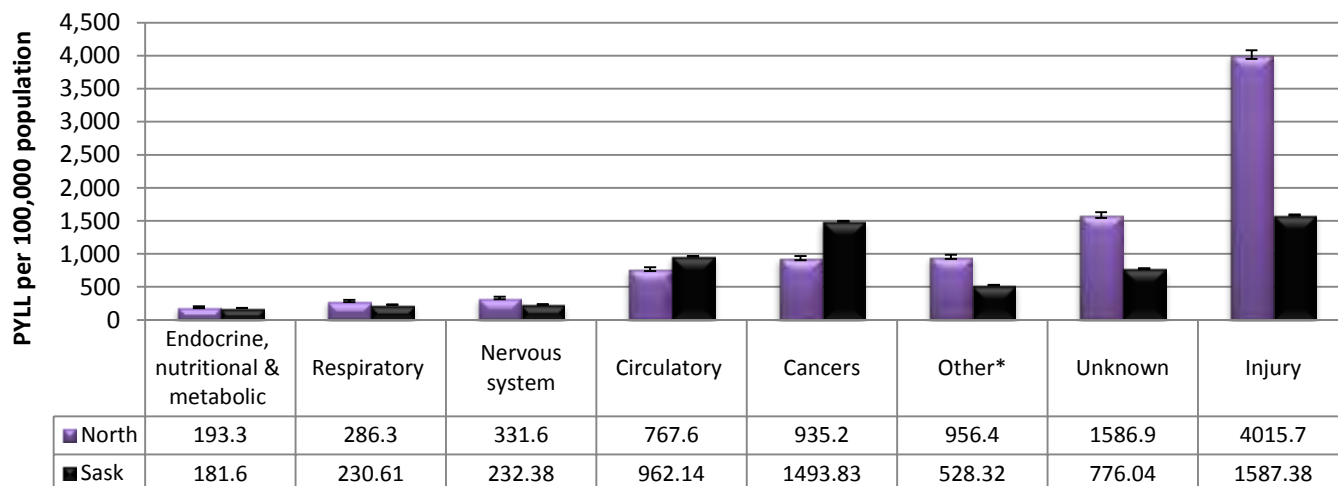
Figure 119 Premature deaths (PYLL), all causes, 3-year average, by northern region, 2005-2007

The northern Saskatchewan rate of PYLL in 2005-2007 was 9,654.7 years per 100,000 population. This was significantly higher than both the provincial (5,709 years per 100,000) and national (4,553.9 years per 100,000) rates. Compared to other northern regions, northern Saskatchewan had a higher rate than NLHR, NWHSDA, NWT, NWHU, James Bay and Yukon, and a lower rate than Nunavik, Nunavut, and Burntwood/Churchill, MB.



Source: Statistics Canada (Health Indicators) Error bars = 95% CI

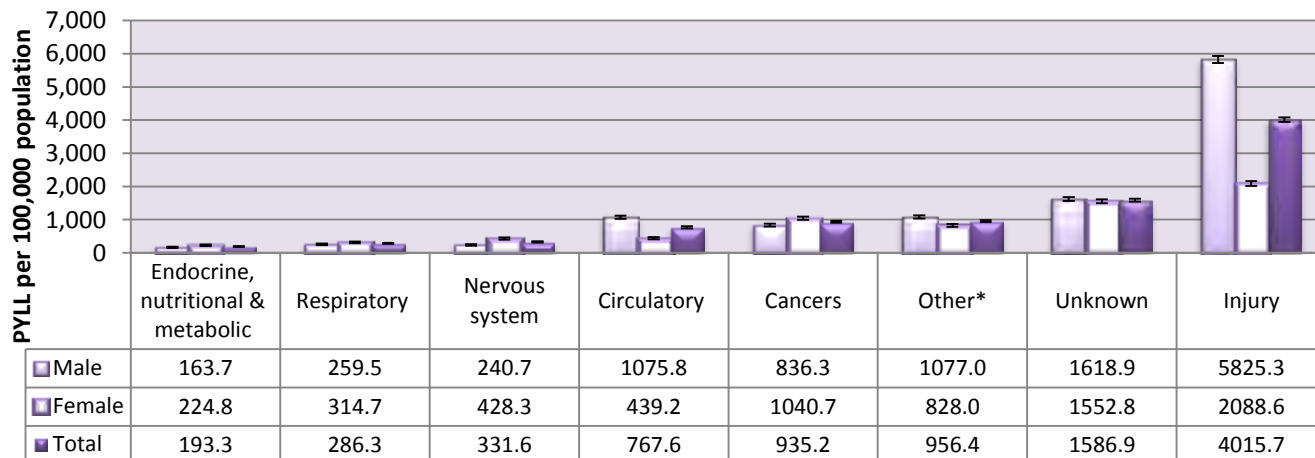
Figure 120 Premature deaths (PYLL) by causes, 10-year average, Saskatchewan and northern Saskatchewan, 1998-2007



Source: SaskHealth (Vital Stats) 2009, Prepared by PHU Sept 2009 (* Other includes Digestive, Genitourinary, Mental and behavioural disorders, and Signs, symptoms and abnormal clinical and laboratory findings not elsewhere classified).

The PYLL rate for injuries and violence, unknown causes and other causes are much higher in the north compared to the province, whereas PYLL rates for cancers and circulatory diseases are much higher in the province than in the north. Not shown in this graph, the rate of premature deaths from injury in northern Saskatchewan decreased from 5,500 PYLL per 100,000 population in 1995, to just over 4,000 PYLL per 100,000 in 1998-2007.

Figure 121 PYLL by sex and cause, 10-year average, northern Saskatchewan, 1998-2007



Source: SaskHealth (Vital Stats) 2009, Prepared by PHU Sept 2009 (* Other includes Digestive, Genitourinary, Mental and behavioural disorders, and Signs, symptoms and abnormal clinical and laboratory findings not elsewhere classified).

In northern Saskatchewan, the PYLL rate from injury in 1998-2007 was almost three times greater in males than in females. For males, the PYLL rates from circulatory causes were over twice the rates for females, and for nervous system causes were under half the rates for females. The rates of premature deaths for other causes showed less discrepancy among males and females.

The rate of premature deaths from injuries has decreased by over 25% over the past decade and a half. However, the northern premature deaths from injuries:

- make up 44% of the overall premature death rate
- are 2.5 times the provincial rate
- are 2.8 times higher for males than for females

Life expectancy

Figure 122 Life expectancy at birth, 3-year average rates, by sex and northern region, 2005-2007

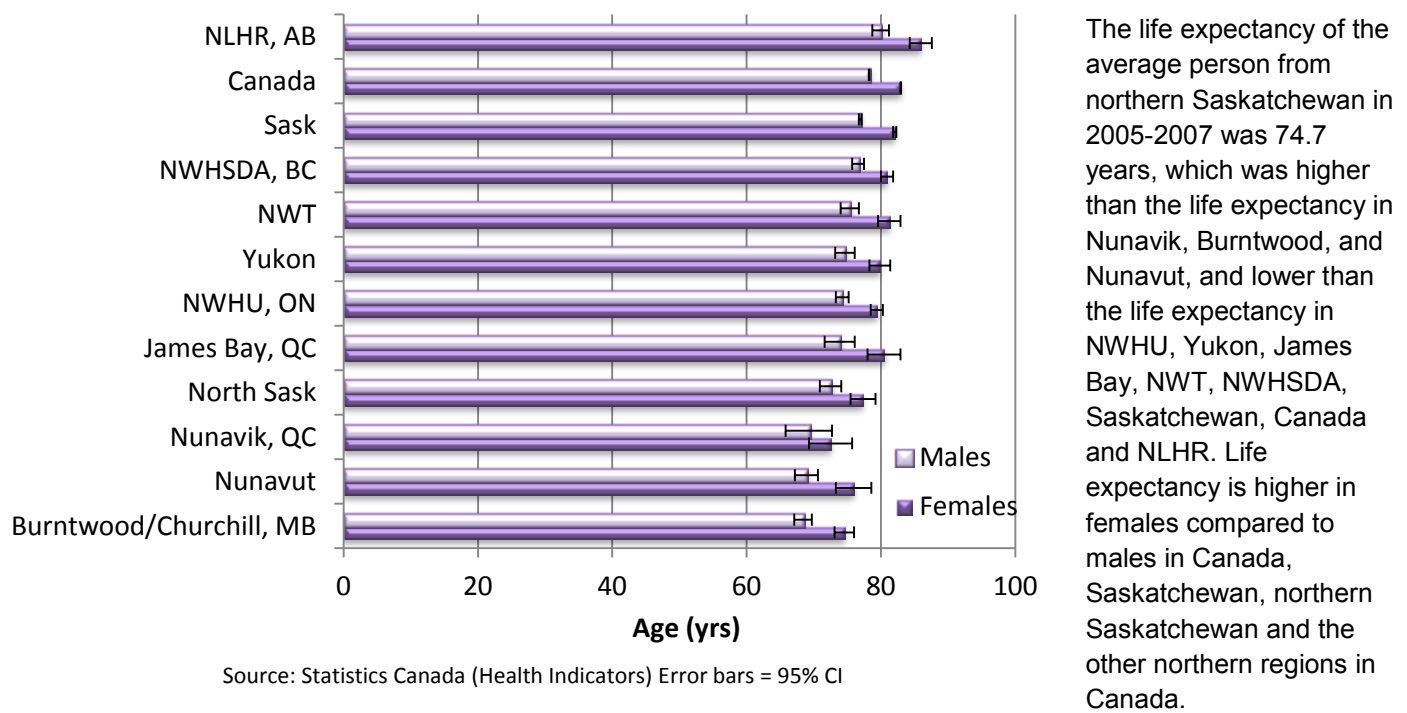
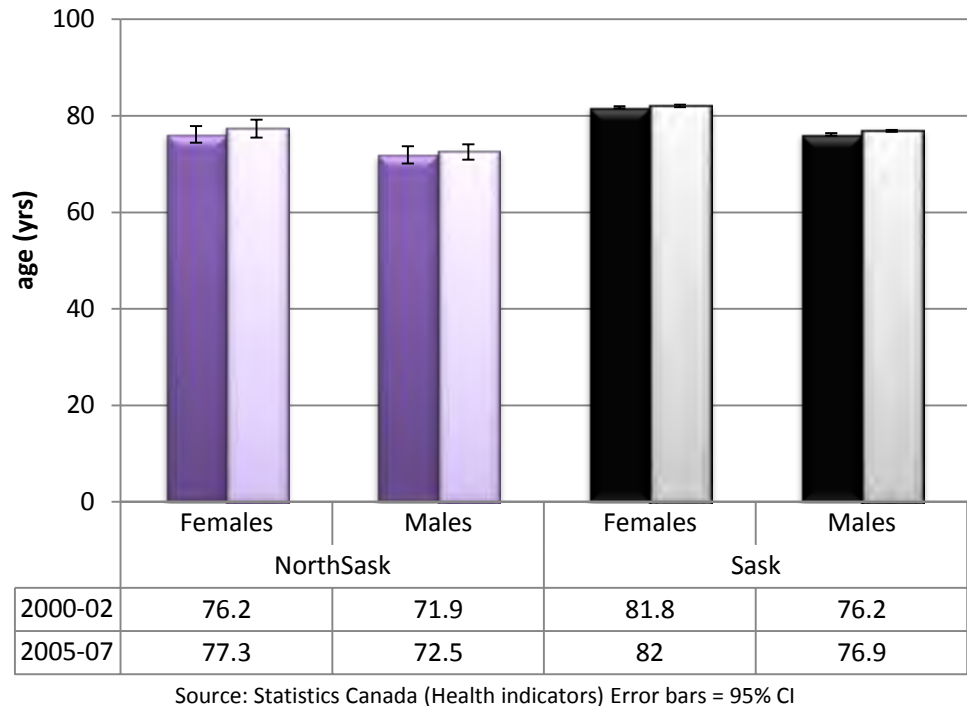


Figure 123 Life expectancy at birth, 3-year average rates by sex, northern Saskatchewan and Saskatchewan, 2000-2002 to 2005-2007

The life expectancy in Saskatchewan and northern Saskatchewan increased in males and females between 2000-2002 and 2005-2007. The increases in northern Saskatchewan were greater than in the province as a whole; however life expectancy of northern males and females is still significantly lower than their provincial counterparts.



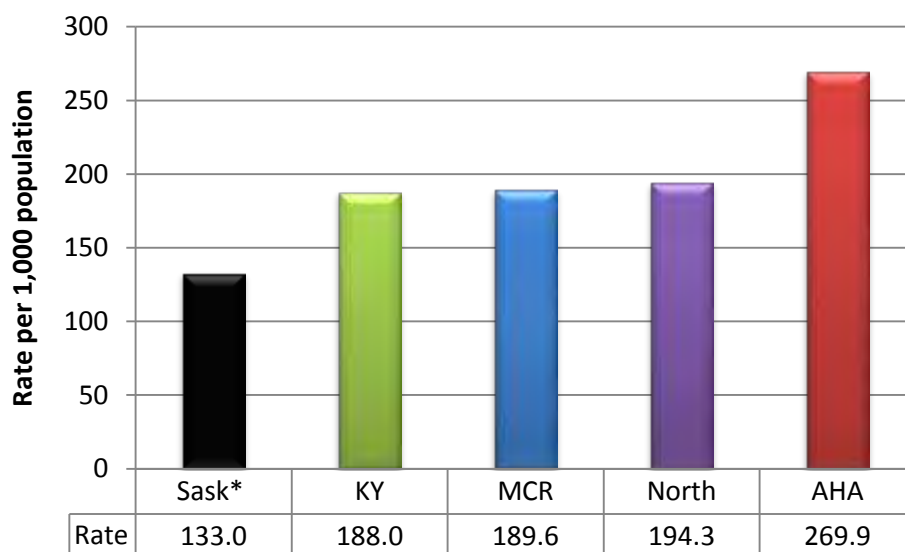
Morbidity and chronic conditions

Hospitalizations

Hospitalization rates are commonly used as a proxy measure for the rate of serious health conditions. Caution is advised in the interpretation of hospital utilization rates because whether or not someone is hospitalized is also influenced by the availability of and access to hospital beds, physician practice patterns, the availability of and access to alternative facilities, services and supports, and distance from the hospital (Irvine, 1999). Hospitalization data for residents of northern Saskatchewan include hospitalizations in all locations, in northern Saskatchewan, and other Saskatchewan and Canadian hospitals. The hospitalization data includes hospitalizations for all ages, including newborns, except where clearly stated that newborns are excluded.

Total hospitalizations

Figure 124 Crude hospitalization rates for all causes, multi-year average rates, Saskatchewan 2004/5 to 2007/8 and northern Saskatchewan health authorities 2004/5 to 2008/9

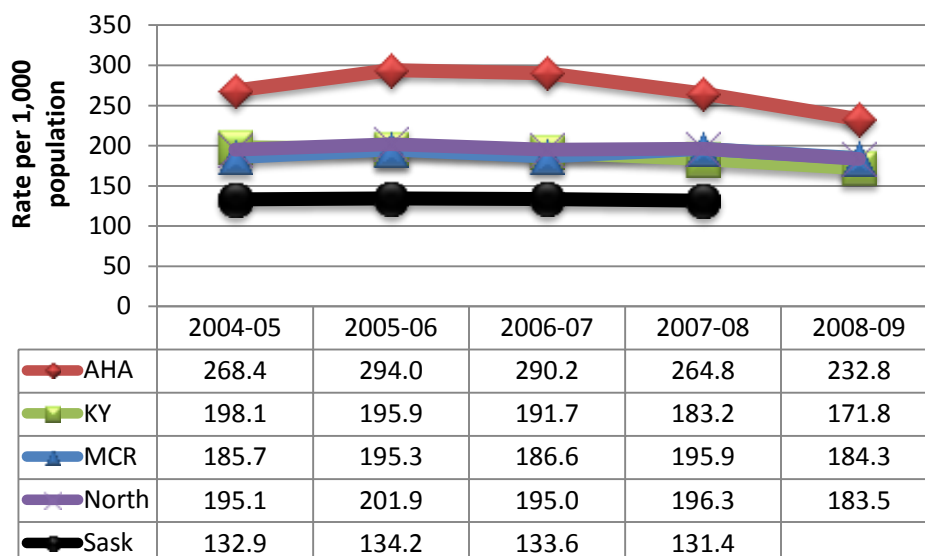


The crude rate of hospitalizations in Saskatchewan in the 2004/5 to 2007/8 period was slightly lower than the rates for KYHR and MCRHR in the 2004/5 to 2008/9 period, and only half of the rate for AHA.

Source: SaskHealth, Prepared by PHU July 2010 * SK is 4 yr average rate

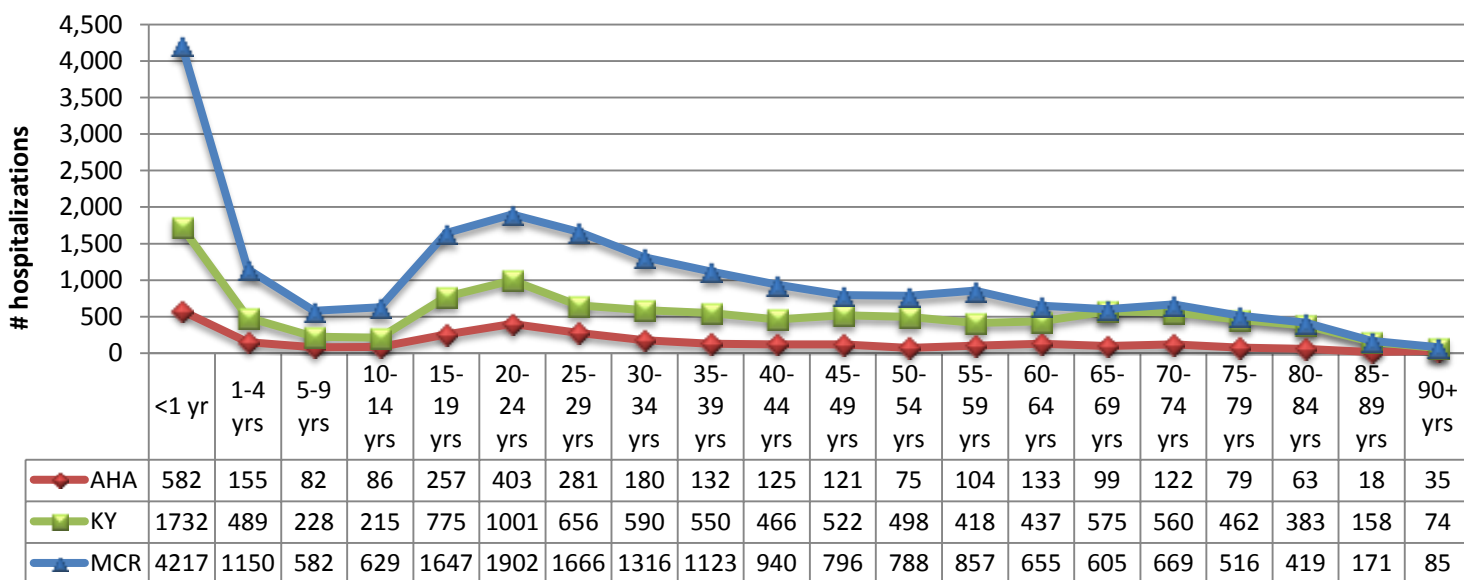
Figure 125 Crude hospitalization rate for all causes, by year and location, northern health authority and Saskatchewan, 2004/5 to 2008/9

The crude rate of hospitalizations in Saskatchewan remained relatively stable between 2004/5 and 2007/8. Similarly between 2004/5 and 2008/9 crude hospitalization rates in MCRHR remained relatively stable, whereas there were slight decreases in KYHR and AHA. On average, between 2004/5 and 2008/9, there were about 7,000 hospitalizations per year for northern residents, with 626 for AHA, 2,158 for KYHR and 4,146 for MCRHR.



Source: SaskHealth, Prepared by PHU July 2010

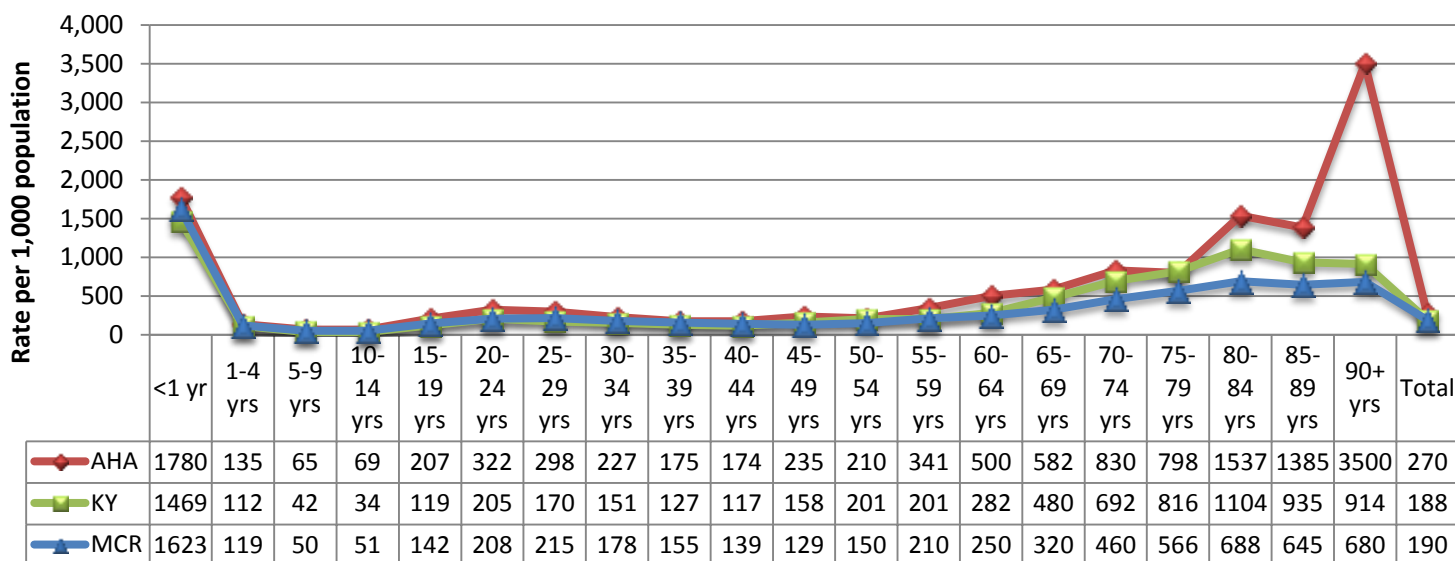
Figure 126 Hospitalizations for all causes, number by age group, northern health authority, 2004/5 to 2008/9



Source: SaskHealth, Prepared by PHU July 2010

The number of hospitalizations, as opposed to the rate, provides information for planning hospital services. In the three northern health authorities, the age groups of less than one year followed by the 15-30 year categories have the most hospitalizations.

Figure 127 Hospitalizations for all causes, 5-year average age-specific rates, by age group, northern health authority, 2004/5 to 2008/9

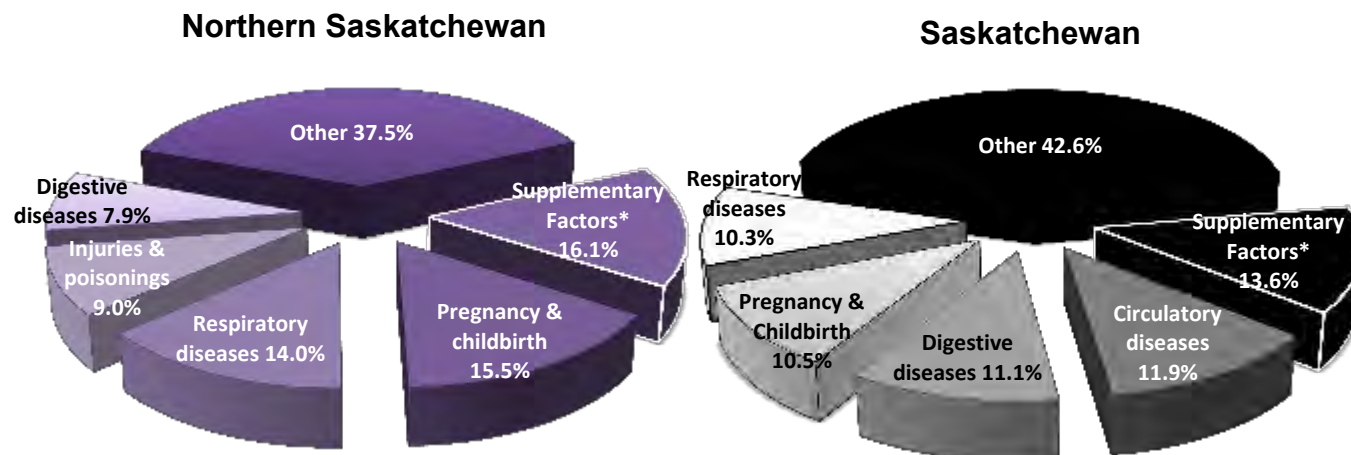


Source: SaskHealth, Prepared by PHU July 2010

The highest rates of hospitalization occurred in the age groups 75 years and older and under one year.

Major causes of hospitalizations

Figure 128 Hospitalizations for top 5 causes, percent of all hospitalizations, Saskatchewan 2004/5 to 2007/8 and northern Saskatchewan 2004/5 to 2008/9

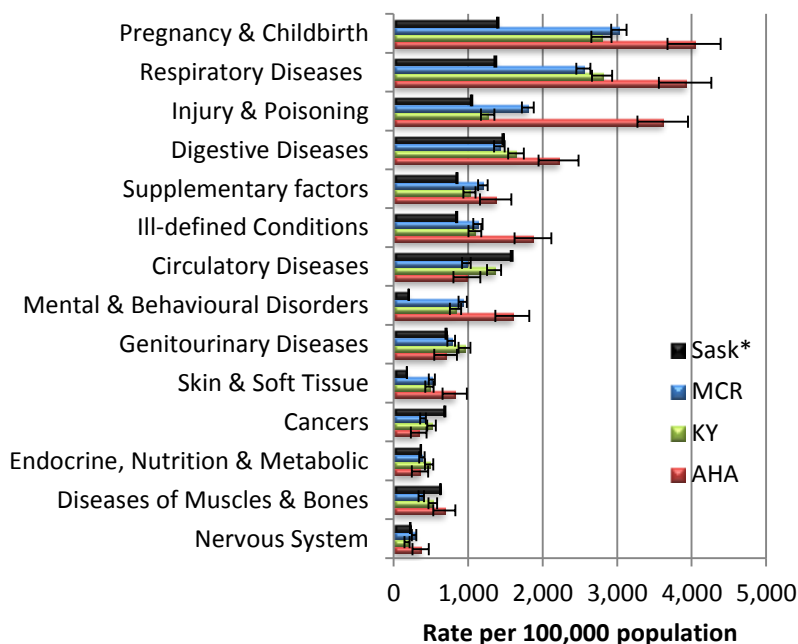


Source: Saskatchewan Health, Prepared by PHU July 2010, * includes live born infants

The most common reasons, based on primary diagnostic group, for admission to hospital varied between the north and the whole province for the periods shown above. In northern Saskatchewan, the five most common diagnostic groups in order of frequency were Supplementary Factors (includes Live Born Infants), Pregnancy and Childbirth, Respiratory Diseases, Injuries and Poisonings, and Digestive Diseases. These five groups accounted for 62.5% of admissions. The remaining 15 diagnostic groups were combined into the "other" category (e.g. cancers, mental and behavioural disorders, diseases of the nervous system). For Saskatchewan, the most common categories were Supplementary Factors, Circulatory and Digestive Diseases, Pregnancy and Childbirth and Respiratory Diseases, accounting for 57.4% of admissions. Supplementary

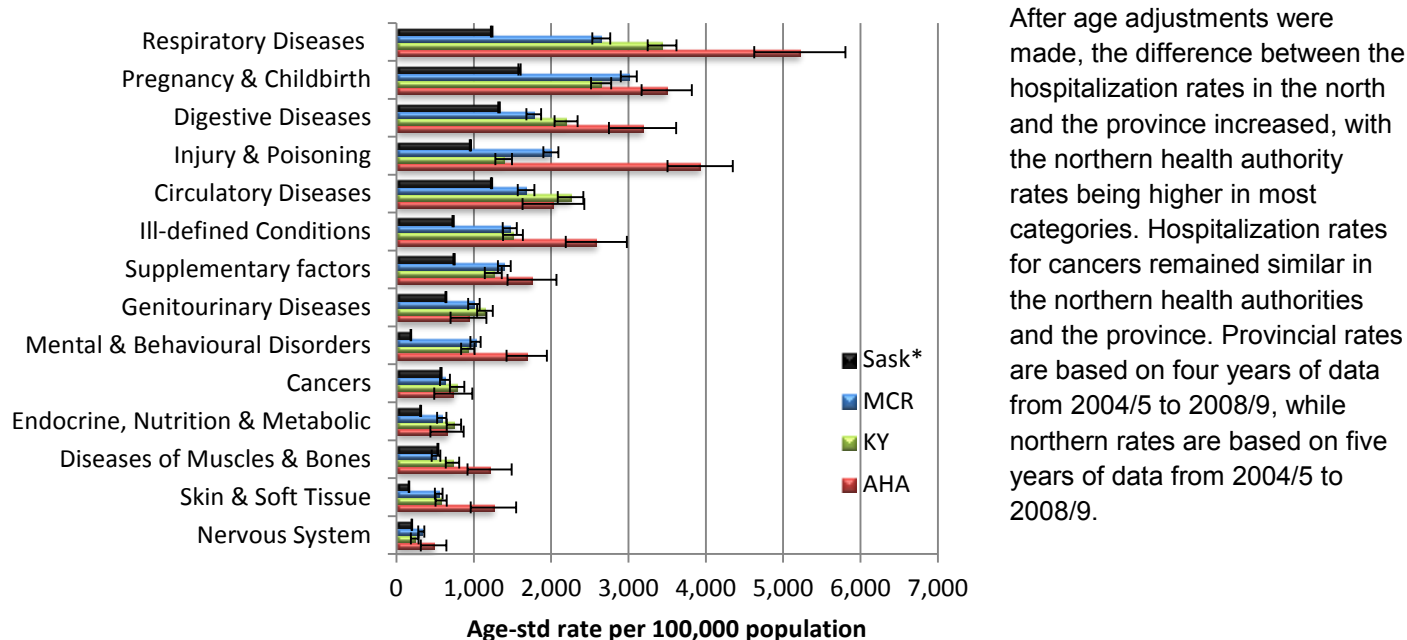
Figure 129 Hospitalizations, multi-year average crude rate (newborns excluded) by diagnostic group, Saskatchewan 2004/5 to 2007/8 and northern Saskatchewan health authorities, 2004/5 to 2008/9

Crude hospitalization rates give an idea of the hospital workload for health conditions. These indicators also reflect factors, other than health status, that can influence hospitalization. For some remote northern communities, residents may be hospitalized more readily because of the challenges of travel, home supports, and accommodation. Northern Saskatchewan hospitalization rates are greater than provincial rates for most diagnoses, though hospitalization rates for circulatory diseases and cancer are higher in the province than northern Saskatchewan. Injuries were the fifth most common reason for admission in the province and the third most common in northern Saskatchewan. Provincial rates are based on four years of data from 2004/5 to 2007/8 while northern rates are based on five years of data from 2004/5 to 2008/9.



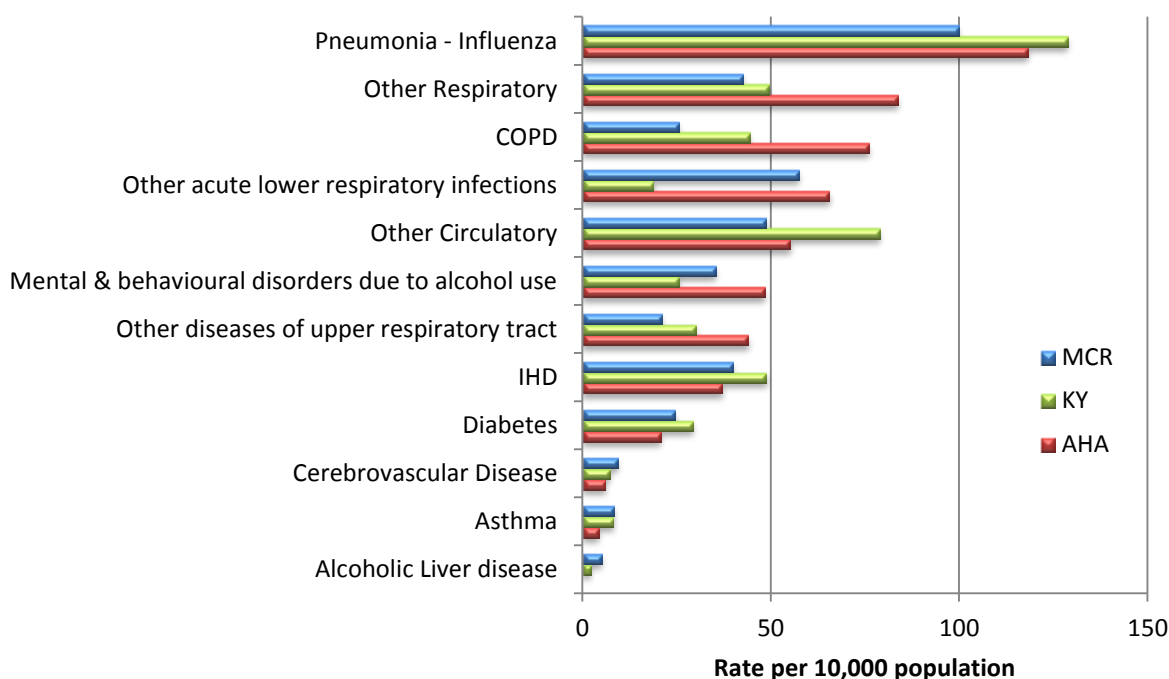
Source: SaskHealth, Prepared by PHU Aug 2010 * SK is 4 yr av rate 2004-5 to 2007-

Figure 130 Hospitalizations, multi-year average age-standardized rate (newborns excluded) by diagnostic group, Saskatchewan 2004/5 to 2007/8 and northern Saskatchewan health authorities 2004/5 to 2008/9



Source: SaskHealth, Prepared by PHU Aug 2010 * SK is 4 yr av rate 2004-5 to 2007-8

Figure 131 Hospitalizations for selected conditions, 5-year average crude rate, northern Saskatchewan health authorities, 2004/5 to 2008/9



Source: SaskHealth, Prepared by PHU July 2010

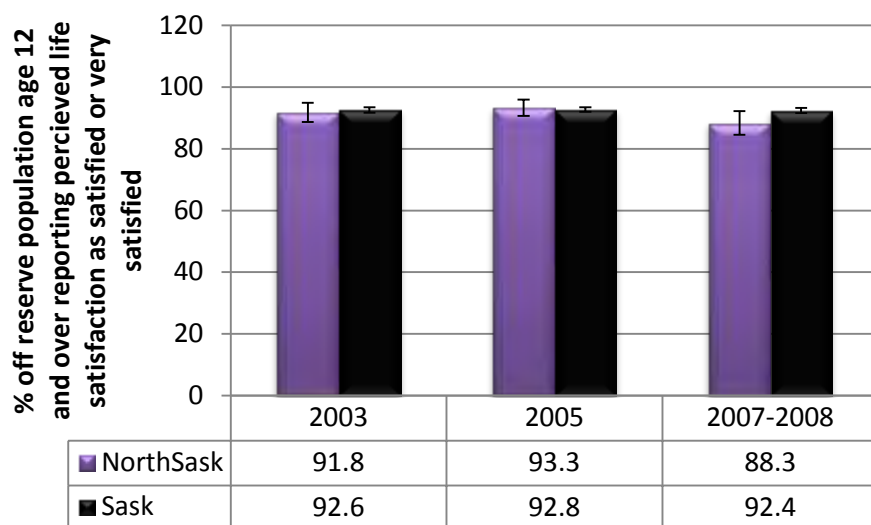
Hospitalizations rates in the north for respiratory diseases were higher than for circulatory diseases, diabetes and selected alcohol-related diseases. Hospitalization rates for chronic obstructive pulmonary disease (COPD) and most other specific respiratory conditions were higher in AHA than MCRHR and KYHR. Compared to MCRHR and AHA, KYHR had slightly higher hospitalization rates for pneumonia-influenza and other circulatory diseases. Rates were similar among the northern health authorities for ischemic heart disease (IHD), diabetes, cerebrovascular diseases and asthma.

Mental health

Indicators for mental health include individuals' perception of their own mental health, life stress and life satisfaction. These important indicators are closely linked to many social determinants of health, health conditions, and risk factors for those conditions. For example, there are links between poverty and stress; early childhood development and coping skills; life satisfaction and violence and injuries; and mental health and smoking. The relationships between mental health indicators and other health conditions, risk factors for other health conditions, and the social determinants of health are complex and interrelated.

Satisfaction with life

Figure 132 Population feeling satisfied or very satisfied with life, ages 12 and over, off-reserve, northern Saskatchewan and Saskatchewan, 2003 to 2007-2008

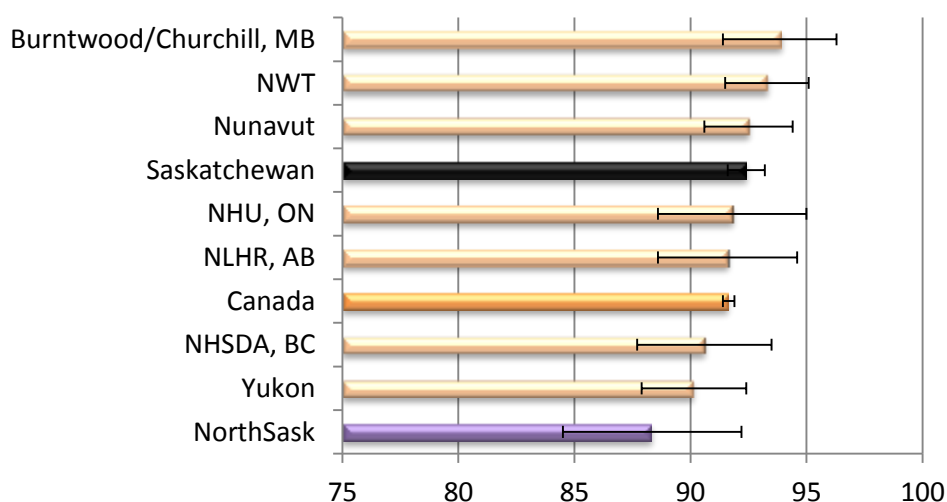


Source: StatsCan (CCHS- Health indicators), Prepared by PHU July 2009

According to Statistics Canada, life satisfaction refers to the proportion of the population aged 12 and over, living off-reserve, who, when asked about how they feel about their life reported being satisfied or very satisfied. In both northern Saskatchewan and Saskatchewan as a whole, a large majority of the population reports a high level of life satisfaction. This remained stable at approximately 90% in both the north and the province between 2003 and 2007-2008, although there was a slight decline between 2005 and 2007-2008 in the north.

Figure 133 Population feeling satisfied or very satisfied with life, ages 12 and over, off-reserve, by northern region, 2007-2008

While 88 percent of northern Saskatchewan residents living off reserve reported that they are satisfied or very satisfied with life, this was below both the Canadian and Saskatchewan reported rates, as well as all other selected northern regions (though not significantly different).



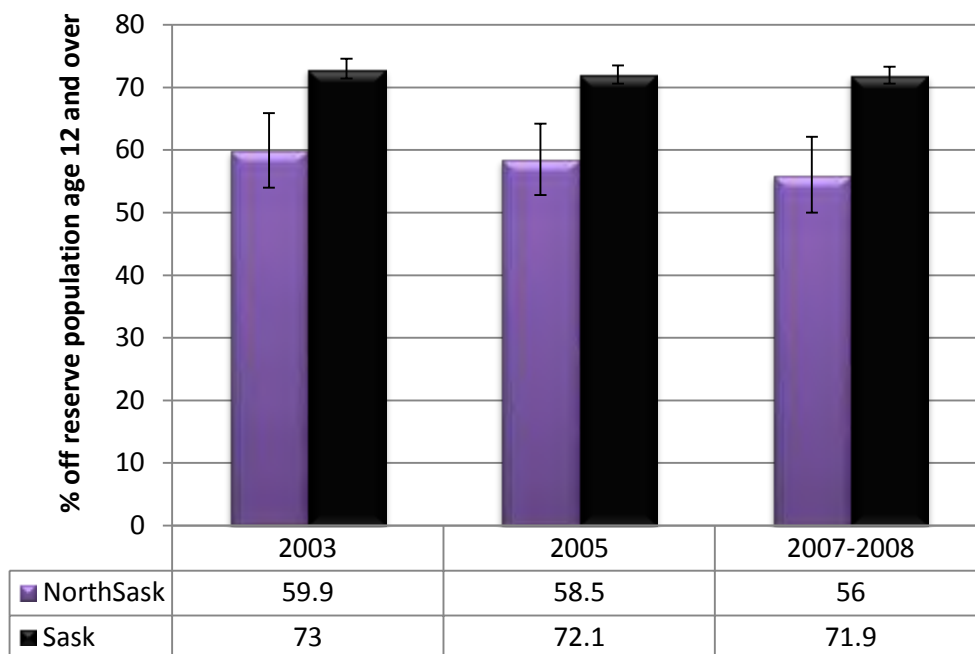
% off-reserve population age 12 and over reporting life satisfaction status as satisfied or very satisfied 2007-2008

Source: StatsCan (CCHS-Health indicators), Prepared by PHU July 2009

Self-rated mental health

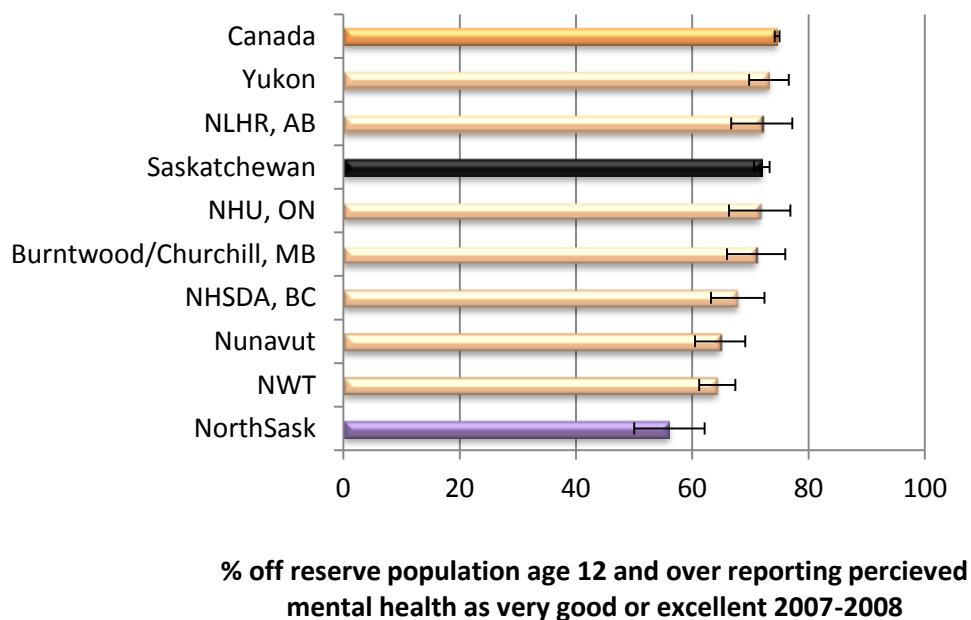
Figure 134 Population reporting mental health as very good or excellent, ages 12 and over, off-reserve, northern Saskatchewan and Saskatchewan, 2003 to 2007-2008

The majority of northern residents living off-reserve reported that their mental health is very good or excellent. However, the rates were significantly below the Saskatchewan rates, and declined from 2003 to 2007-2008.



Source: StatsCan (CCHS - Health Indicators), Prepared by PHU July 2009

Figure 135 Population reporting mental health as very good or excellent, ages 12 and over, off-reserve by northern region, 2007-2008



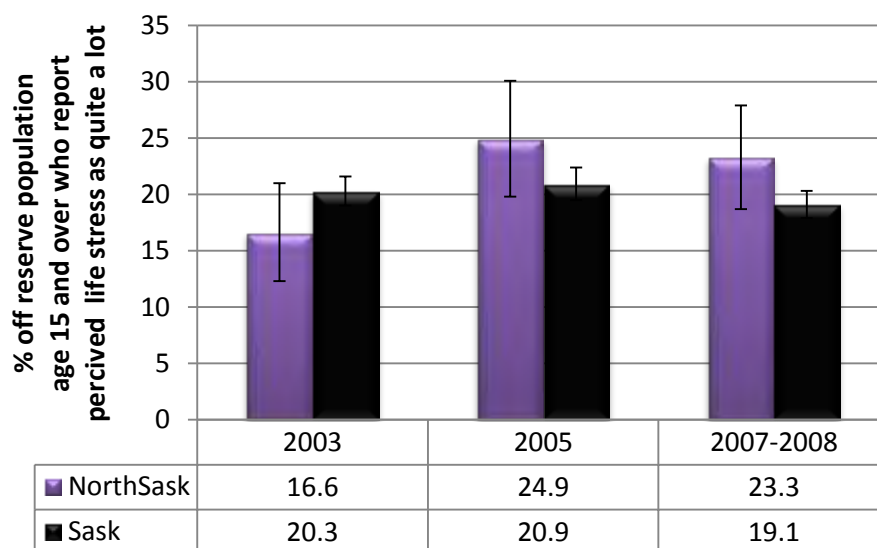
Northern Saskatchewan had low rates of people reporting their perceived mental health as very good or excellent when compared to other northern regions in Canada. The northern Saskatchewan rate was 56%, significantly lower than the provincial rate of 72% and the national rate of 75%. It was also lower than all other selected northern regions.

Source: StatsCan (CCHS-Health Indicators), Prepared by PHU July 2009

Perceived life stress

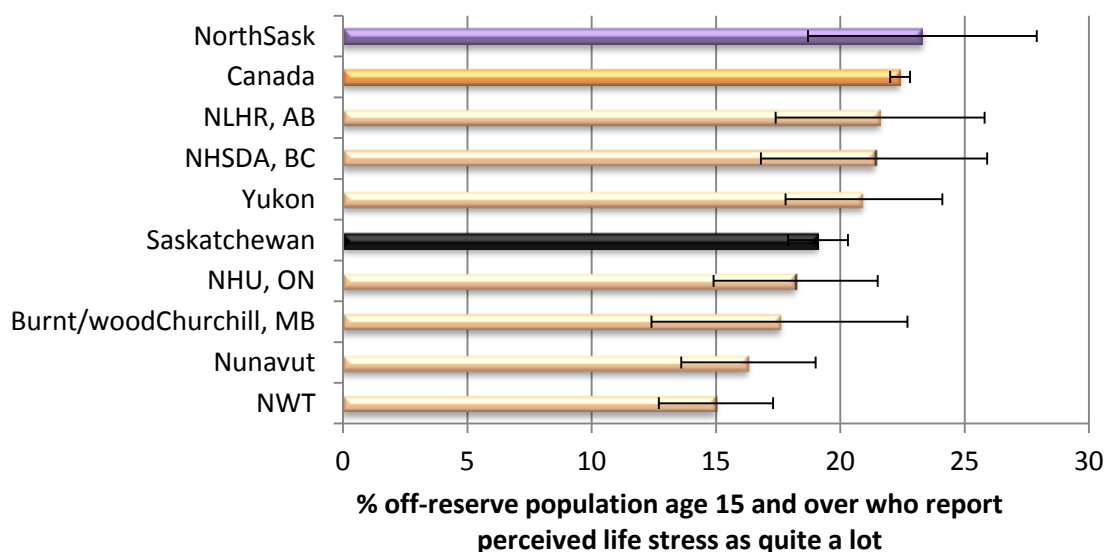
Figure 136 Population reporting “quite a lot” of perceived life stress, ages 15 and over, off-reserve northern Saskatchewan and Saskatchewan, 2003 to 2007-2008

This graph refers to the proportion of the population aged 15 and over, living off-reserve, who reported that most days in their life were “quite a bit stressful”. In northern Saskatchewan, there was a slight increase in self-perceived life stress between 2003 and 2007-2008 though this change is not statistically significant. In the most recent time period, there was a greater proportion reporting “quite a lot of stress” in northern Saskatchewan than in southern Saskatchewan; however, this difference is not statistically significant and may be a result of a true difference or due to the small numbers of people asked to report on this.



Source: StatsCan (CCHS Health Indicators), Prepared by PHU July 2009

Figure 137 Population reporting life stress as “quite a lot”, ages 15 and over, off-reserve, by northern region, 2007-2008



Source: StatsCan (CCHS-Health Indicators), Prepared by PHU July 2009

Northern Saskatchewan has high rates of people who report feeling “quite a lot of life stress”. The rate of 23% for northern Saskatchewan was slightly above the Canadian rate of 22% and the Saskatchewan rate of 19%, as well as all other northern Canadian regions. Challenges with mental well-being are linked to other health conditions, health determinants, and health behaviours. For example, mental health challenges have been associated with difficulties in maintaining employment; higher smoking rates; misuse of alcohol and drugs; injuries, violence and suicides; cardiovascular disease; and diabetes.

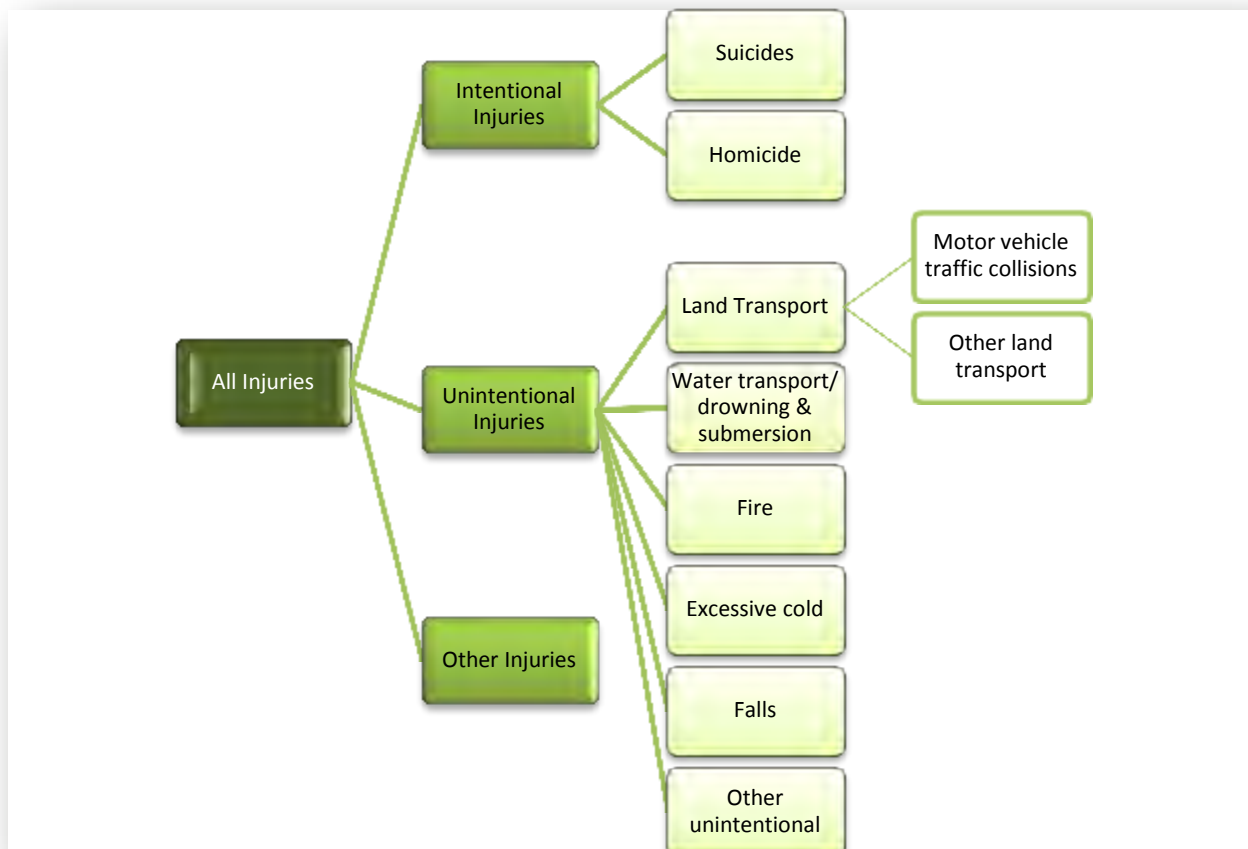
Injuries

Introduction

The broad category of Injuries includes intentional, unintentional, and other types of injury, as shown below in Figure 138. Intentional injuries include suicides and self-inflicted harm, as well as homicides and assaults. Unintentional injuries are classified as land transport, water transport/drowning and submersion, fire, excessive cold (e.g. exposure), falls, and other unintentional injuries. Land transport includes injuries from motor vehicle traffic collisions and other land transport collisions, including snowmobiles and all-terrain vehicles. The Other injuries category is an uncommon category that refers mostly to injuries, such as poisoning, that have an undetermined intent.



Figure 138 Specific causes of injuries

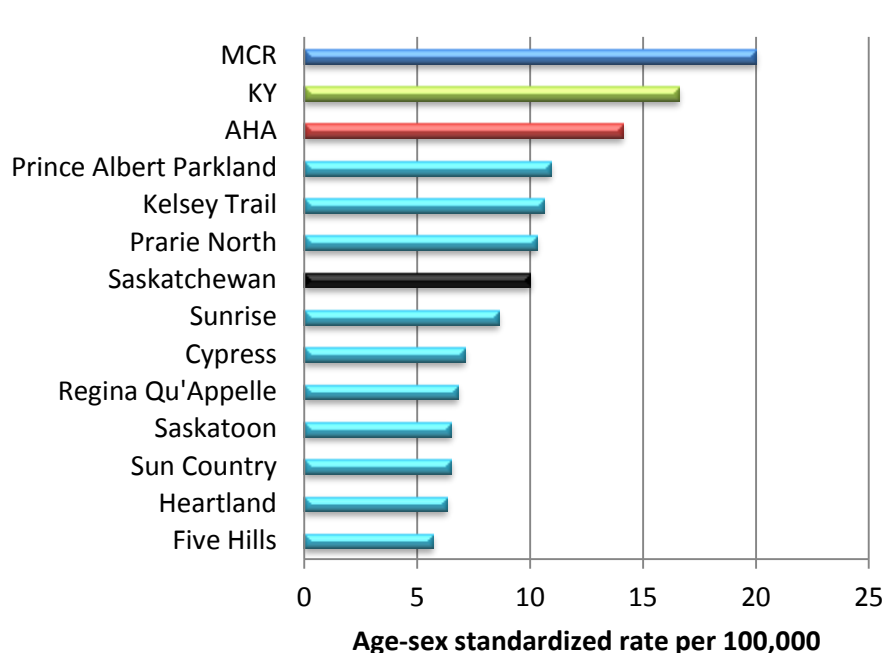


Injuries and violence (all causes)

Mortality from injuries

Injuries are the leading cause of death in northern Saskatchewan with injuries causing about 23% of the deaths in the north compared to 6% for the province (See Figure 110).

Figure 139 10-year average injury related death rates for Saskatchewan children and youth, aged 0-19, by health authority, 1995-2005



Children and youth are particularly affected by injuries. The risk of death from injuries in children and youth in the northern regions is much greater than in the southern regions. The Saskatchewan Comprehensive Injury Surveillance Report (Ministry of Health, 2008) showed that after age and sex adjustments were made, MCRHR had the highest death rate from injuries in children and youth less than 20 years of age. MCRHR's rate of 20 deaths per 100,000 population was close to double the rate of the highest southern RHA.

Source: Sask Comp Injury Surv Report 1995-2005, Prepared by PHU Mar 2010

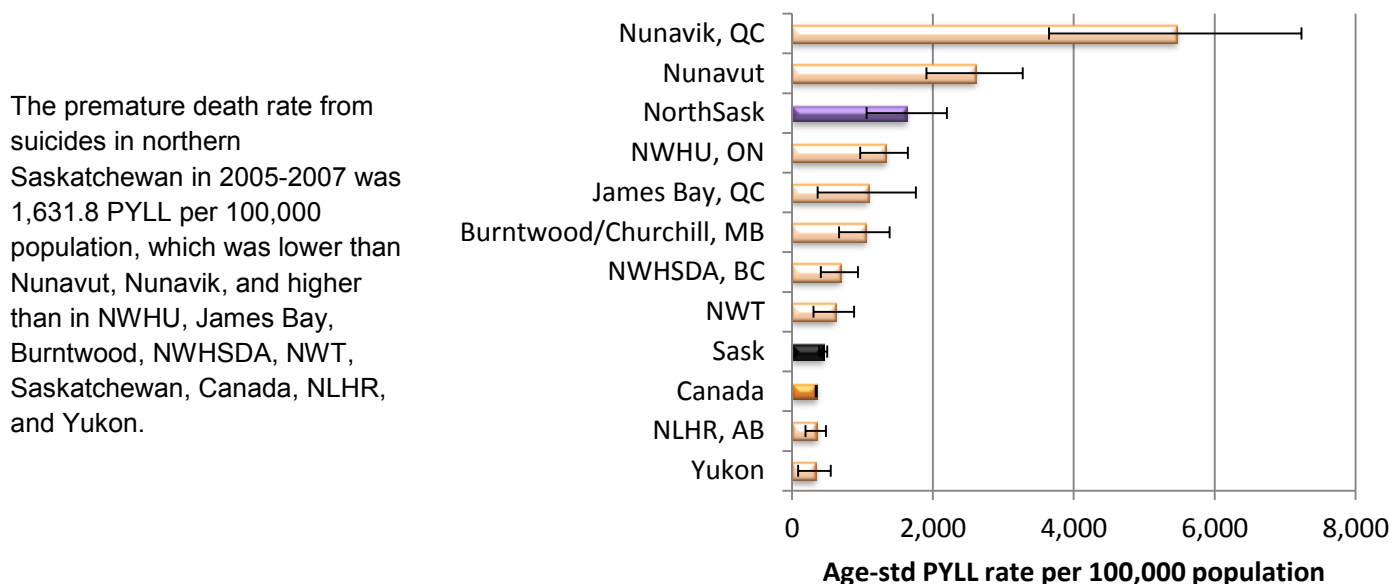
A child under 20 years of age in Mamawetan Churchill River Health Region is twice as likely to die from injury as is the average Saskatchewan child.



Premature deaths from injuries

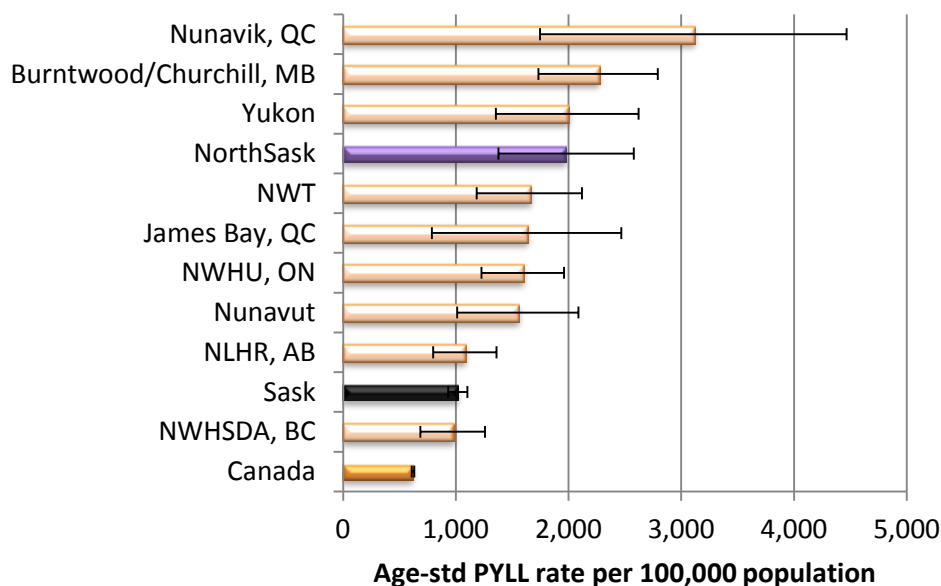
Injuries and violence are the most common causes of premature death or potential years of life lost in northern Saskatchewan (see Figure 120). Premature deaths from injury in northern Saskatchewan were almost three times higher in males than in females in 2005-2007 (see Figure 121).

Figure 140 Age-standardized PYLL rate from suicide, 3-year average, by northern region, 2005-2007



Source: Statistics Canada (Health Indicators) Error bars = 95% CI

Figure 141 Age-standardized PYLL rate from unintentional injuries, 3-year average, by northern region, 2005-2007

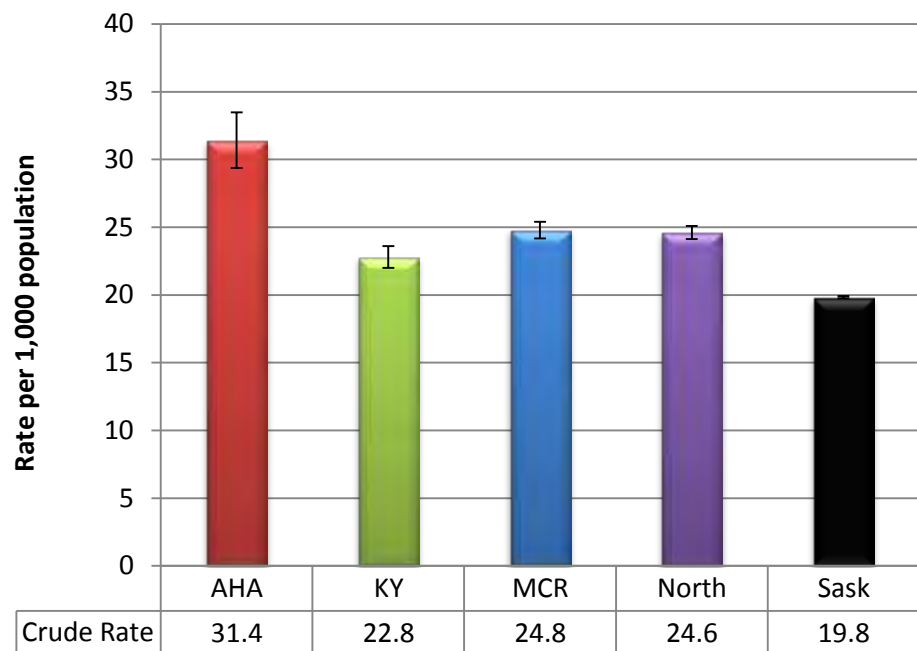


The premature death rate from unintentional injuries in northern Saskatchewan in 2005-2007 was 1,979 PYLL per 100,000 population, which was lower than in Yukon, Burntwood, Nunavik, and higher than in NWT, James Bay, NWHU, Nunavut, NLHR, Saskatchewan, NWHSDA, and Canada.

Source: Statistics Canada (Health Indicators) Error bars = 95% CI

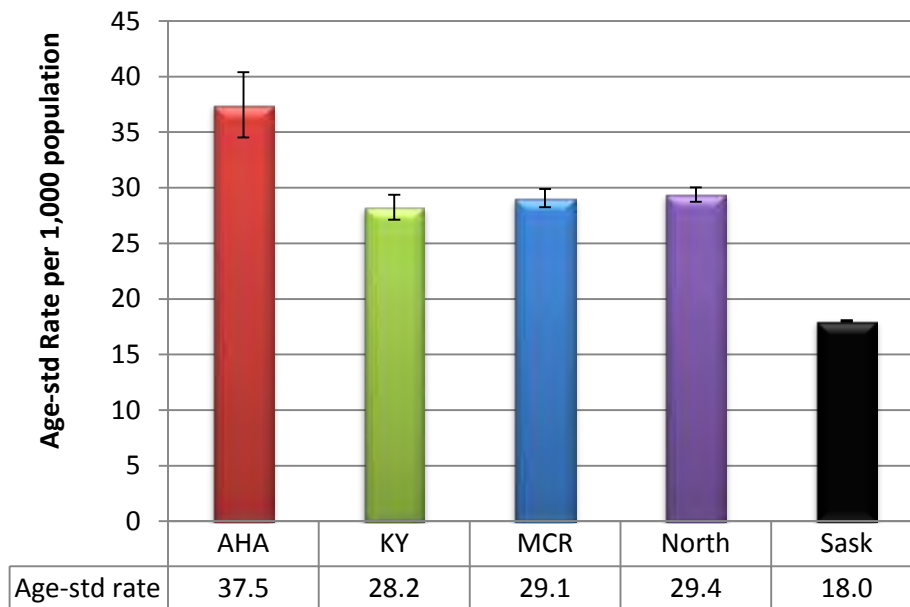
Figure 142 Crude rate of hospitalizations due to injuries, 12-year average, Saskatchewan and northern Saskatchewan, 1995/6 to 2006/7

Between 1995/6 and 2006/7, the rate of injury hospitalization was higher in northern Saskatchewan than in the whole province, with KYHR at 1.2 times and AHA at 1.6 times the provincial rate.



Source: SaskHealth 2009, Prepared by PHU Dec, 2009

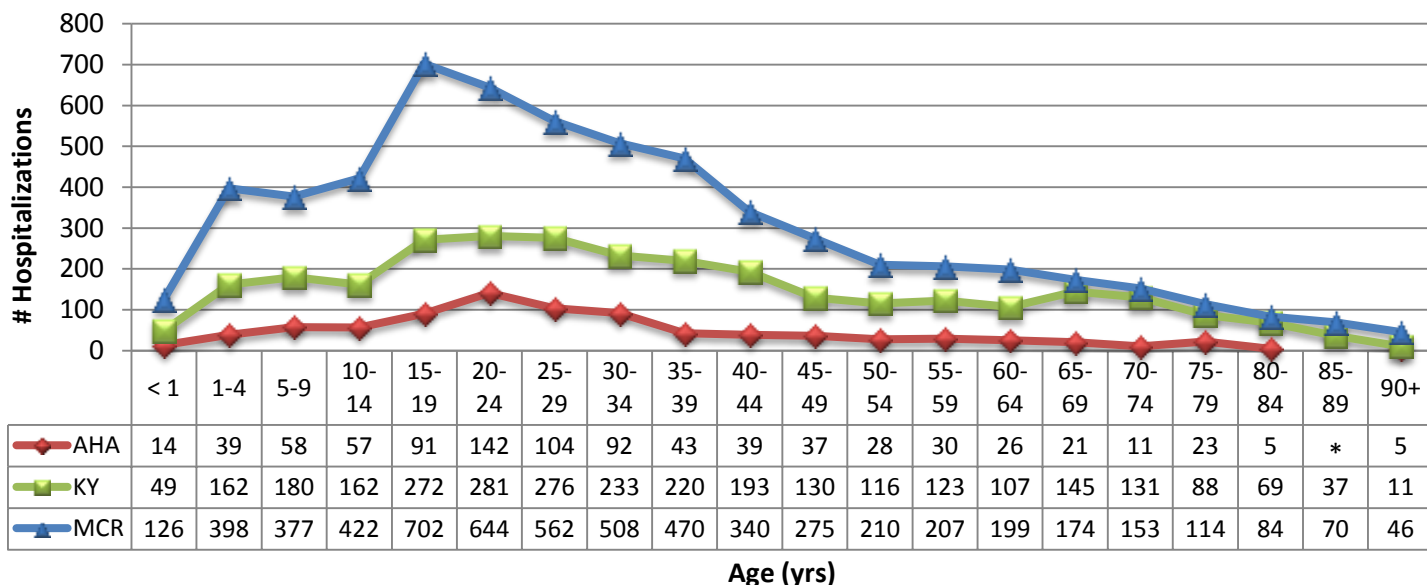
Figure 143 Age-standardized Injury hospitalization rate, 12-year average, Saskatchewan and northern Saskatchewan, 1995/6 to 2006/7



Source: SaskHealth 2009, Prepared by PHU Dec, 2009

After age adjustments were made, the discrepancy between the north and the province widened. The age-adjusted rates in the north were between 1.6 and 2.1 times the rate of the province, with the highest rate occurring in AHA. This shows that the risk of hospitalization from injuries is greater in the north than in the province as a whole.

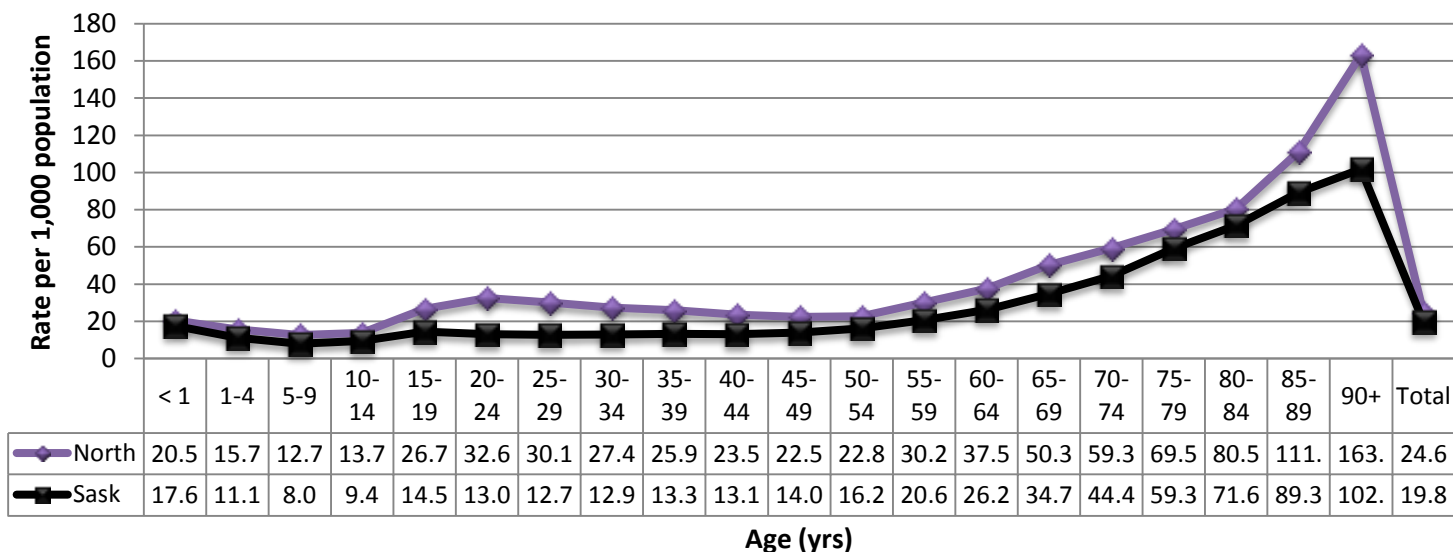
Figure 144 Injury hospitalizations, all causes, by 5-year age group and northern health authority, 1995/6 to 2006/7



Source: SaskHealth 2009, Prepared by PHU Dec, 2009 * Data suppressed as < 5

The number of hospitalizations provides an indication of the workload within the health care system. In northern Saskatchewan there is a larger proportion of the population in the younger age groups and so, even with lower rates of hospitalizations in some age groups, the absolute numbers may be greater. In the three northern health areas, most hospitalizations occur in the 15-44 year age categories, with the 1-14 year age categories contributing the second most. With the largest population in the north, it is not surprising that MCRHR contributes the greatest number of injury hospitalizations.

Figure 145 Injury hospitalization rate, all causes, 12-year average, northern Saskatchewan and Saskatchewan, 1995/6 to 2006/7

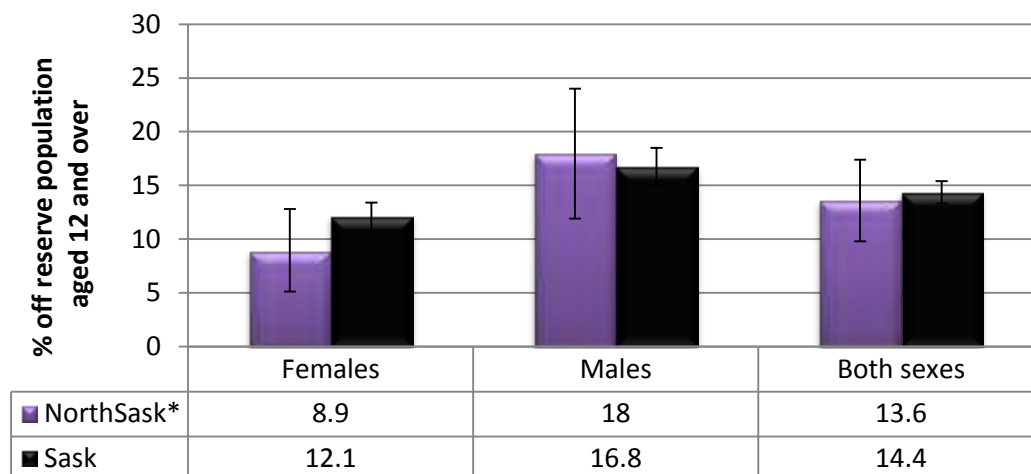


Source: SaskHealth 2009, Prepared by PHU Dec, 2009

The hospitalization rate is influenced by age, with the highest rates of hospitalization occurring in the older age groups (65 and over). The hospitalization rates in northern Saskatchewan exceeded the provincial rates in all age groups.

Self-reported injuries

Figure 146 Population aged 12 and over, off-reserve, reporting an injury in the past year, northern Saskatchewan and Saskatchewan, by sex, 2005



Source: CCHS (Health indicators) 2005, Prepared by PHU Mar 2010 *male/female CV's > 16.5

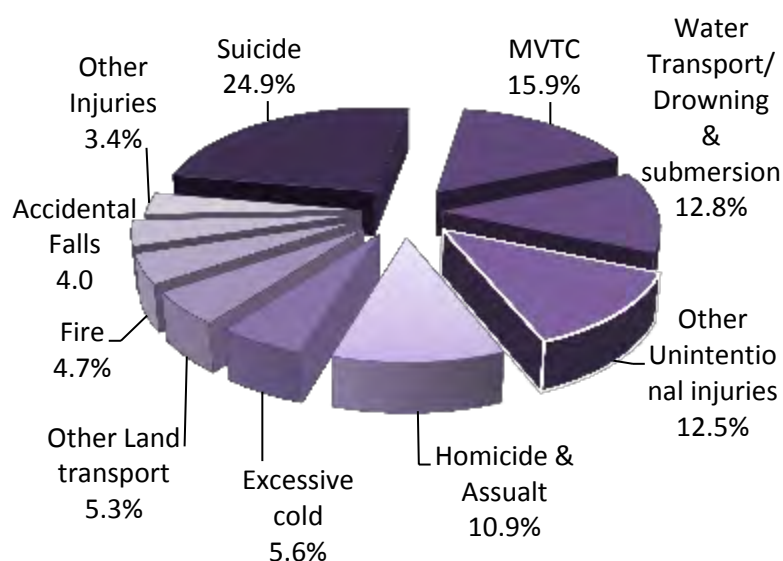
In 2005, 8.9% and 18% of northern off-reserve females and males respectively, aged 12 and over, reported that they had sustained an injury that was serious enough to limit their normal activities in the past year, in comparison to 12.1% and 16.8% respectively of Saskatchewan females and males. It should be noted that due to small numbers, there is a high degree of variability in the sex-specific rates for the northern population.

Specific causes of injury

It is important to explore the specific causes of injury mortality so that we can develop specific strategies to address them. As previously mentioned, the broad injury category includes both intentional and unintentional injuries. Mortality from intentional injuries include suicides and homicides, while unintentional injuries include mortality from land transport, water transport/drowning and submersion, fire, excessive cold (e.g. exposure), and falls. Land transport includes motor vehicle traffic collisions, as well as other land transport including snowmobiles, and all-terrain vehicles.

Mortality

Figure 147 Proportion of total injury mortality by specific cause, northern Saskatchewan 1998-2007



Source: SaskHealth 2009, Prepared by PHU Sept 2010

Suicide was the leading cause of injury deaths in northern Saskatchewan between 1998 and 2007, accounting for 1 in 4 injury deaths. Motor vehicle traffic collisions and water transport/drowning and submersion, were the second and third leading causes of injury deaths respectively, followed by homicides and assaults. These four categories accounted for about 65% of all injury deaths in northern Saskatchewan. Information is not readily available on the influence of alcohol on injury mortality but it is considered significant. Two-thirds of deaths from motor vehicle traffic collisions were related to drivers under the influence of alcohol (See Figure 161 Injuries and deaths in traffic collisions involving drinking drivers, northern Saskatchewan and Saskatchewan, 2004-2008).

Hospitalizations

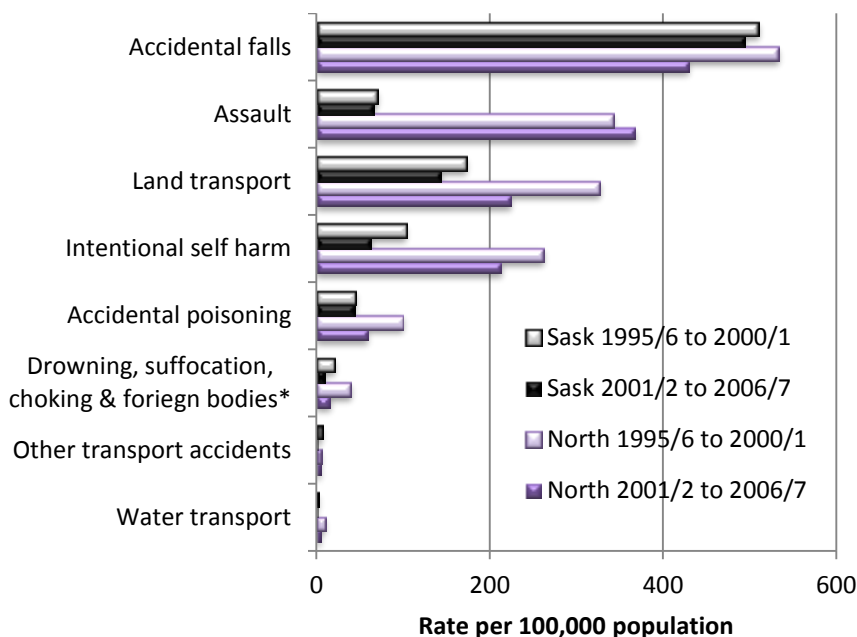
Figure 148 Crude Injury hospitalization by selected causes, 6-year average rate, northern Saskatchewan and Saskatchewan 1995/6 to 2006/7

Between 1995/6 and 2006/7, the major causes of injury-related hospitalization in northern Saskatchewan were:

- 1) accidental falls,
- 2) assault,
- 3) land transport,
- 4) intentional self-harm and
- 5) accidental poisoning.

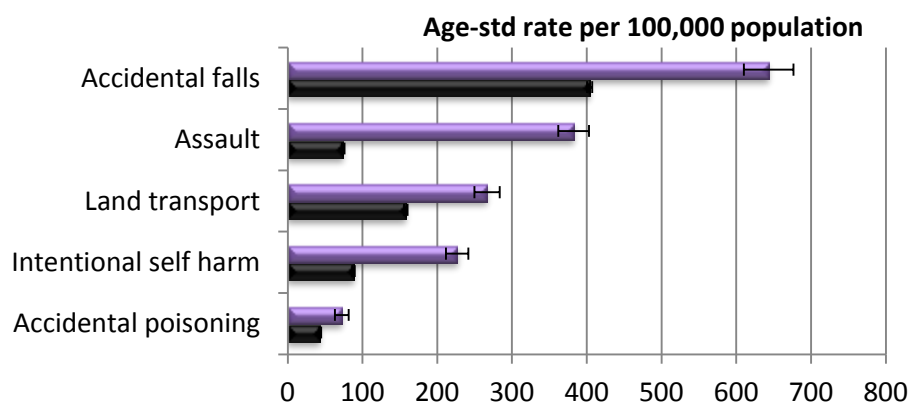
During the same time period, the major causes in the province were similar, although hospitalizations from assault ranked lower. In the north, between the 1995/6 to 2000/1 period and the 2001/2 to 2006/7 period, large decreases occurred in hospitalization rates from accidental falls, land transport, and intentional self-harm, while a slight increase occurred in hospitalizations from assaults. In Saskatchewan, most

hospitalization rates remained relatively stable over the same time period, although decreases occurred in hospitalizations from land transport accidents and intentional self-harm. The six-year average hospitalization rates in the 2001/2 to 2006/7 period in the north were similar to the province for accidental poisoning, lower for accidental falls, and higher than the province for assaults, land transport accidents and intentional self-harm.



Source: SaskHealth 2009, Prepared by PHU Dec, 2009 * Excludes drowning from Water transport

Figure 149 Age-standardized injury hospitalization rate by selected causes, 12-year average rate, northern Saskatchewan and Saskatchewan 1995/6 to 2006/7

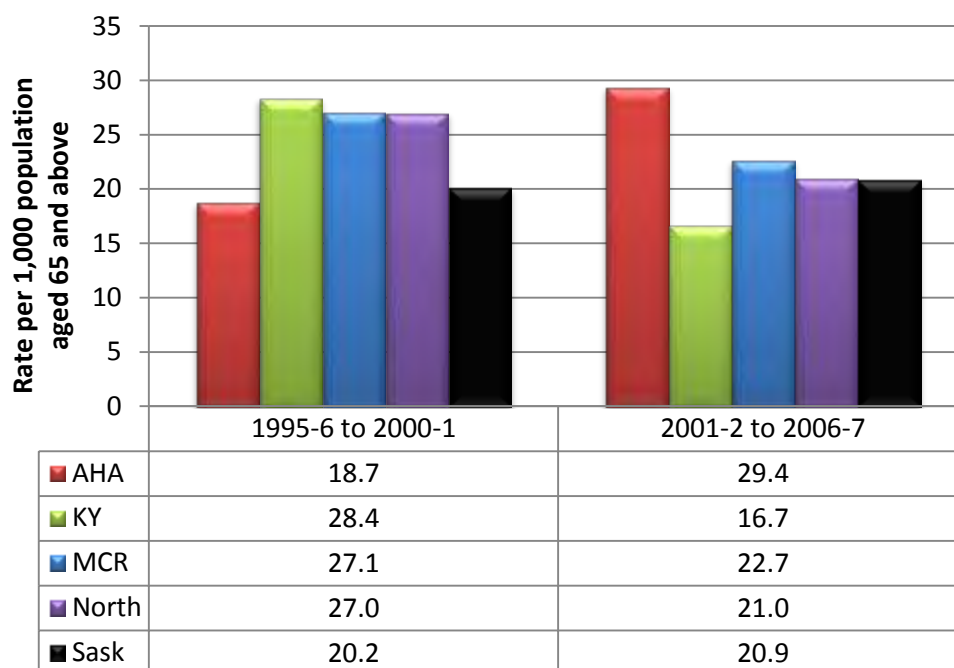


After age adjustments were made, hospitalization rates for the 1995/6 to 2006/7 period for accidental falls, assault, land transport, intentional self-harm and accidental poisoning were all higher in northern Saskatchewan than in the province as a whole. The largest discrepancies occurred in hospitalizations from intentional self-harm and assaults where northern rates were 2.6 and 5.2 times the provincial rates. This indicates that the risk of being hospitalized from intentional self-harm or assaults was much greater in the north than across the province in this time period.

	Accidental poisoning	Intentional self harm	Land transport	Assault	Accidental falls
North	72.29	226.76	266.74	382.37	643.24
Sask	43.41	87.97	157.95	74.19	403.90

Source: SaskHealth 2009, Prepared by PHU March 2010

Figure 150 Hospitalization from accidental falls, aged 65 and over, Saskatchewan and northern Saskatchewan, 6-year average rates, 1995/6 to 2006/7

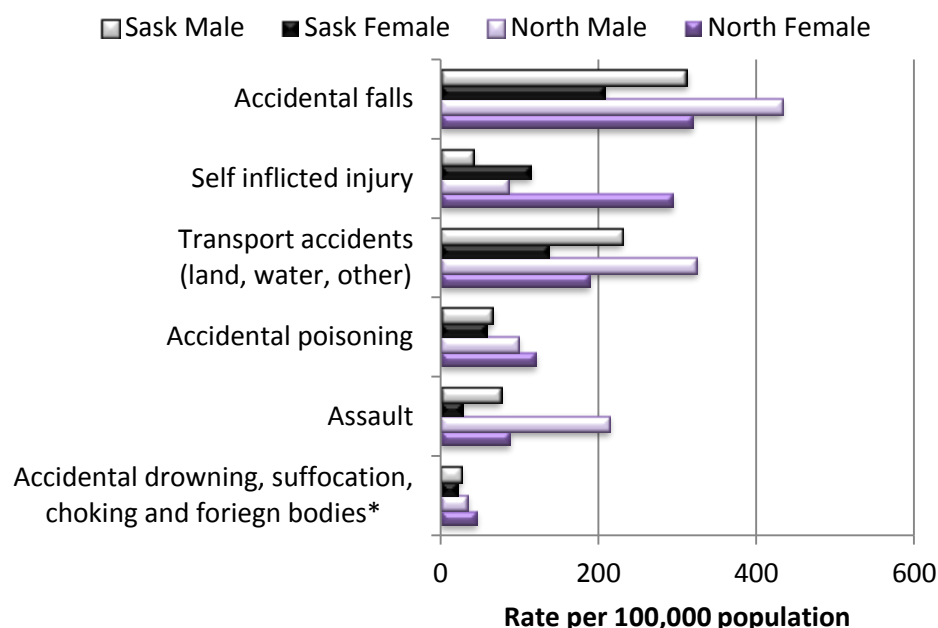


Source: SaskHealth 2009, Prepared by PHU Dec, 2009

Older adults aged 65 and over can be particularly susceptible to injuries, specifically from accidental falls. Hospitalization rates from falls in individuals aged 65 and over decreased in KYHR and MCRHR between 1995/6 to 2000/1 and 2001/2 to 2006/7. In AHA, the rate increased substantially; in absolute numbers, the change was from 10 to 16 hospitalizations per six-year period. During the same time, the provincial hospitalization rate remained relatively stable.



Figure 151 Crude injury hospitalization, population aged 0-19 years, by selected causes and sex, 12-year average rate, northern Saskatchewan and Saskatchewan, 1995/6 to 2006/7

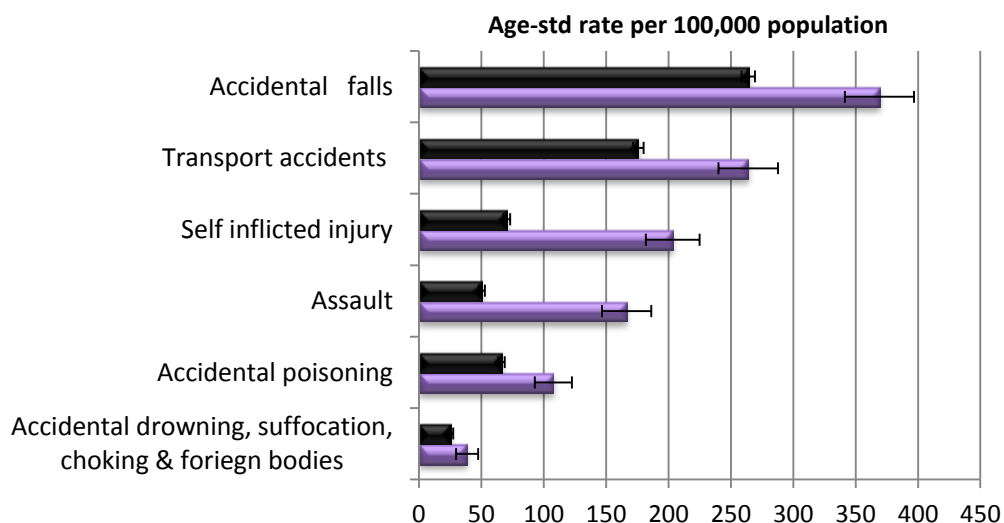


Injuries leading to hospitalization in children aged 0 to 19 can vary by sex. In northern female children, accidental falls, self-inflicted injury and transport accidents were major contributors. In northern male children, self-inflicted injury was not as common, but injuries from assault were more common. Similar trends were evident across Saskatchewan; however provincial rates were lower than their northern counterparts in all selected causes.

Source: SaskHealth 2009, Prepared by PHU Dec, 2009 * Excludes drowning from Water transport

Figure 152 Age-standardized injury hospitalization, population aged 0-19 years, by selected causes and sex, 12-year average rate, northern Saskatchewan and Saskatchewan, 1995/6 to 2006/7

After age adjustments were made, hospitalization rates for children aged 0-19 years in the 1995/6 to 2006/7 time period for accidental falls, transport accidents, self-inflicted injuries, assaults, accidental poisonings, and accidental drowning, suffocation, choking and foreign bodies were all higher in the north than in the whole province. The largest discrepancies occurred in hospitalizations from assaults and self-inflicted injuries, which were 3.3 and 2.9 times higher respectively in the north than in the province.



	Accidental drowning, suffocation, choking & foreign bodies	Accidental poisoning	Assault	Self inflicted injury	Transport accidents	Accidental falls
■ Sask	25.6	66.0	50.4	70.4	175.8	264.0
■ North	38.6	107.7	166.4	203.4	263.9	369.0

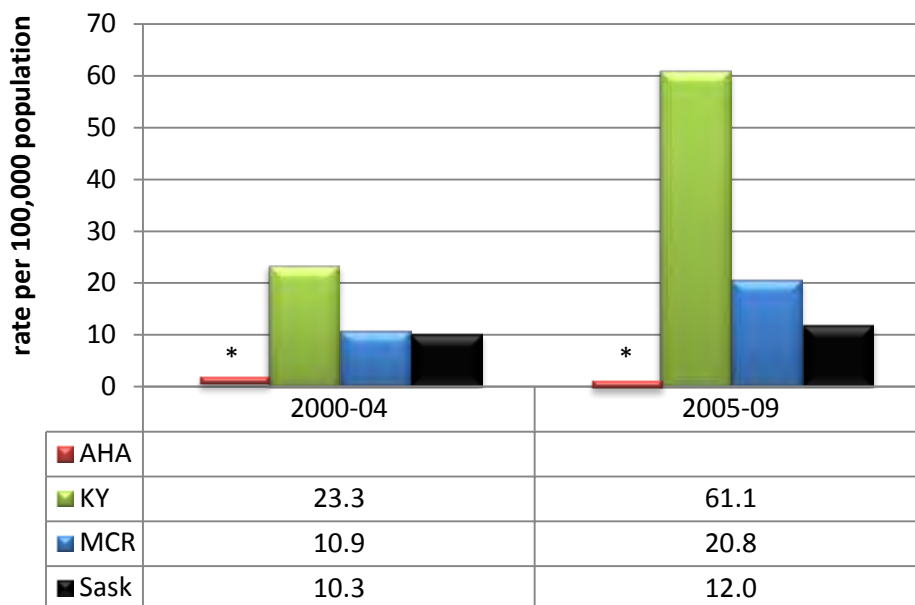
Source: SaskHealth 2009, Prepared by PHU March 2010

Suicide

Suicide is influenced by underlying mental health disorders including depression as well as by alcohol and drug abuse, early childhood traumatic events, impulsivity, peers, and troubles with interpersonal relationships. It is often committed under despair and can be seen as a symptom of various social and mental health conditions.

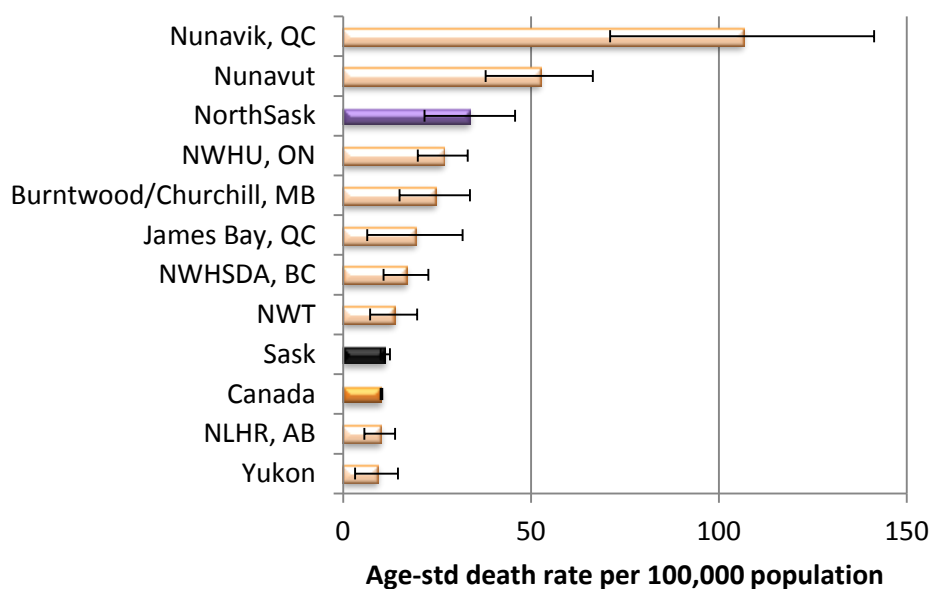
Figure 153 Crude suicide rate, 5-year average, by health authority, 2000-2004 to 2005-2009

The 5-year average suicide rate for MCRHR and KYHR increased between 2000-2004 and 2005-2009. During the same time period, rates increased slightly at the provincial level. In absolute numbers this meant an average of five suicides a year between 2000 and 2004 and 12 suicides a year between 2005 and 2009 in the north. At the provincial level there were an average of 105 suicides a year between 2000 and 2004 and 123 a year between 2005 and 2009. For the latest period of 2005-2009, the suicide rate in KYHR was over five times higher than the provincial rate. More recent data suggests the KYHR rate has decreased.



Source: SaskHealth (HSUR 2008-9), Prepared by PHU Mar 2011 * suppressed < 5

Figure 154 Age-standardized suicide rate, 3-year average, by northern region, 2005-2007

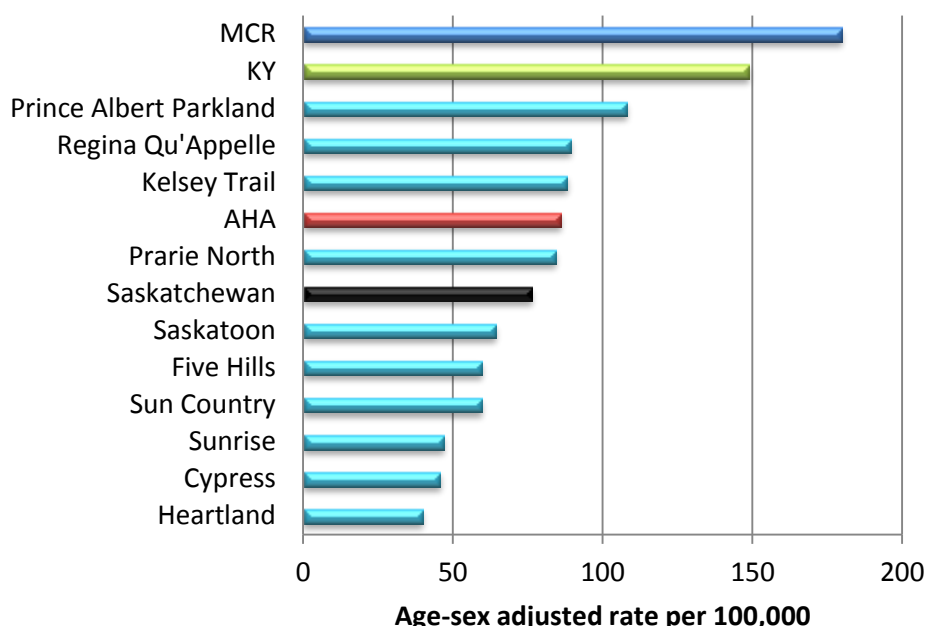


Source: Statistics Canada (Health Indicators) Error bars = 95% CI

The three year average suicide rate in northern Saskatchewan in 2005-2007 was 33.7 suicides per 100,000 population, which was lower than the rate in Nunavut and Nunavik, but higher than the rates in NWHU, Burntwood, James Bay, NWHSDA, NWT, Saskatchewan, Canada, NLHR, and Yukon.

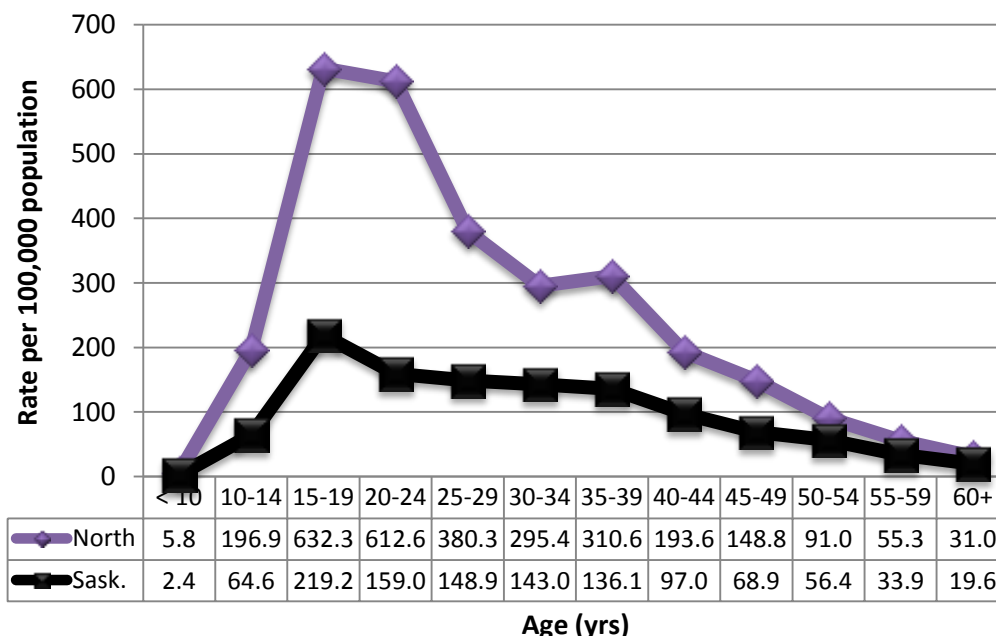
Figure 155 Age–sex adjusted hospitalization rate for suicide/self-inflicted injury, Saskatchewan health authorities, 1995/6 to 2004/5

Data from the Saskatchewan Comprehensive Injury report showed that after age and sex adjustments were made, MCRHR had the highest rate of persons hospitalized with injuries due to suicide attempts and self-inflicted harm among all Saskatchewan regions, with 179.7 per 100,000. KYHR had the second highest rate (148.6) and AHA had the sixth highest (85.9). The northern Saskatchewan rate was substantially higher than the provincial rate of 76.2 per 100,000.



Source: Sask Comp Injury Surv Report 1995-2005, Prepared by PHU Mar 2010

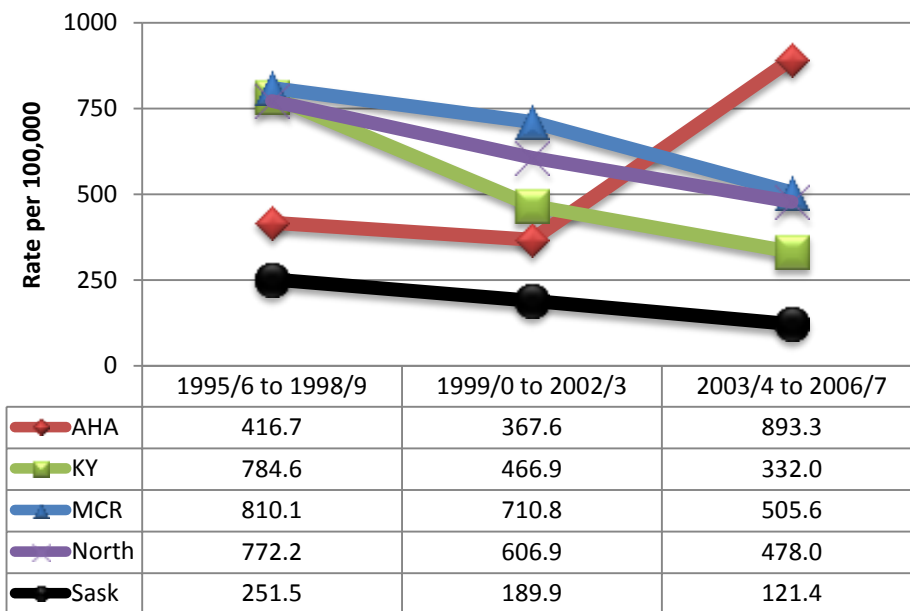
Figure 156 Age specific hospitalization rates for suicide self-inflicted injury by 5-year age category, 12-year average rates, Saskatchewan and northern Saskatchewan, 1995/6 to 2006/7



Hospitalizations from self-inflicted injuries affect different segments of the population. The greatest rates in the 1995/6 and 2006/7 period in both northern Saskatchewan and the whole province occurred in the 15-19 and 20-24 year old age categories. The rates in the north ranged from 1.6 to 3.9 times greater in each five-year age category than the rates in all of Saskatchewan.

Source: SaskHealth 2009, Prepared by PHU Dec, 2009

Figure 157 Hospitalization rate for suicide/self-inflicted injury aged 15-24 by year, 4-year average rates, Saskatchewan and northern health authorities, 1995/6 to 2006/7

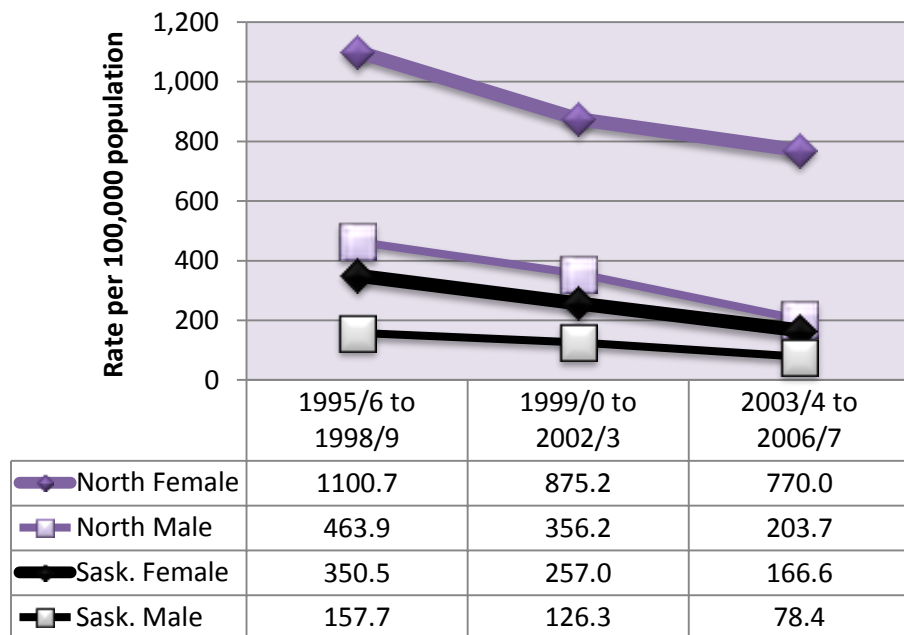


The rates of hospitalization from self-inflicted injuries decreased across the whole north and Saskatchewan between 1995/6 and 2006/7. As the exception, AHA had a large increase between the 1999/0 to 2002/3 period and the 2003/4 to 2006/7 period. This was an absolute increase from seven self-inflicted related hospitalizations to 18 in AHA. Overall, the rates within the north were substantially higher than the provincial rate.

Source: SaskHealth 2009, Prepared by PHU Nov, 2009

Figure 158 Hospitalization rate for suicide/self-inflicted injury aged 15-24, by sex, 4-year average rates, Saskatchewan and northern Saskatchewan, 1995/6 to 2006/7

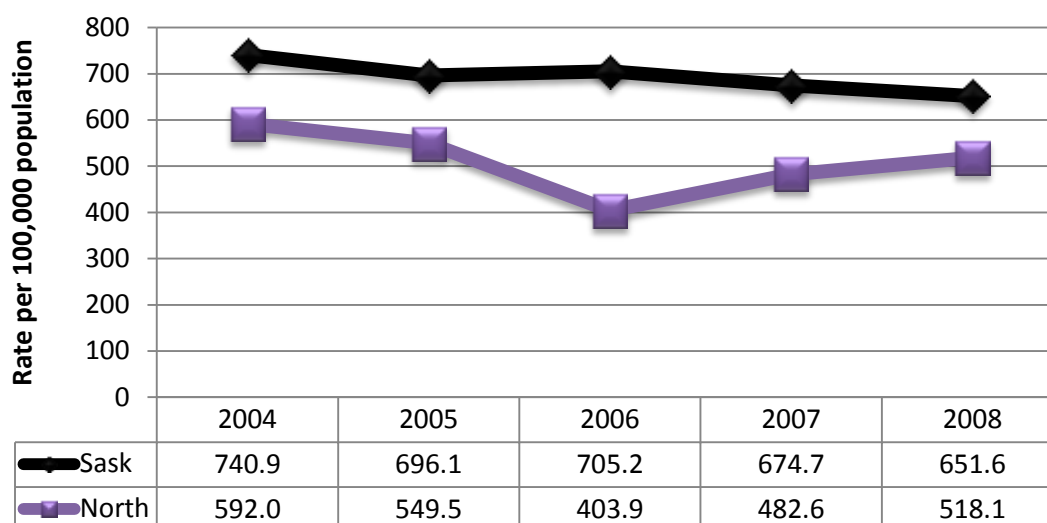
The rates of hospitalization from self-inflicted injuries across the north decreased in both sexes between 1995/6 to 1998/9 and 2003/4 to 2006/7 in the north and the province. However, northern rates remained approximately two-and-one-half and five times higher in the north for males and females respectively, compared to the province in 2003/4 to 2006/7. Provincially the female rate remained approximately double the male rate, while in the north the female rate was almost four times the male rate.



Source: SaskHealth 2009, Prepared by PHU Dec, 2009

Injuries from motor vehicle traffic collisions (MVTC)

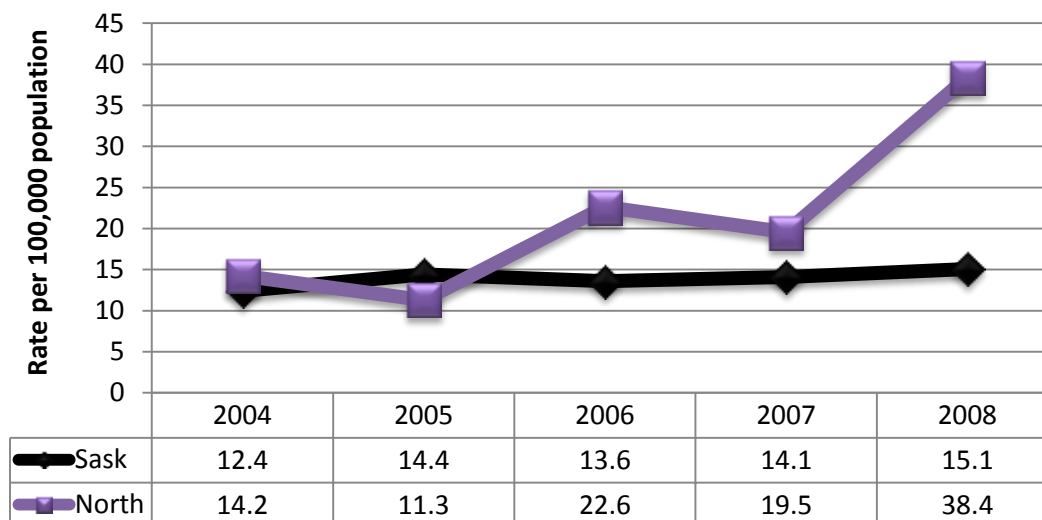
Figure 159 Injuries in traffic collisions, northern Saskatchewan and Saskatchewan by year, 2004-2008



SGI Traffic Accident Information System, 2010, Prepared by PHU Apr 2010

Saskatchewan Government Insurance collects information on traffic collisions allowing us to assess the extent of injuries from these events. Between 2004 and 2008 the crude rate of injuries from traffic collisions decreased in Saskatchewan. During the same time period the rate in northern Saskatchewan decreased between 2004 and 2006 and then increased in 2007 and 2008; however the 2008 rate was lower than in 2004. Throughout the time period the northern rate was slightly lower than the provincial rate. This may, in part, be explained by a supposed smaller amount of traffic in the north.

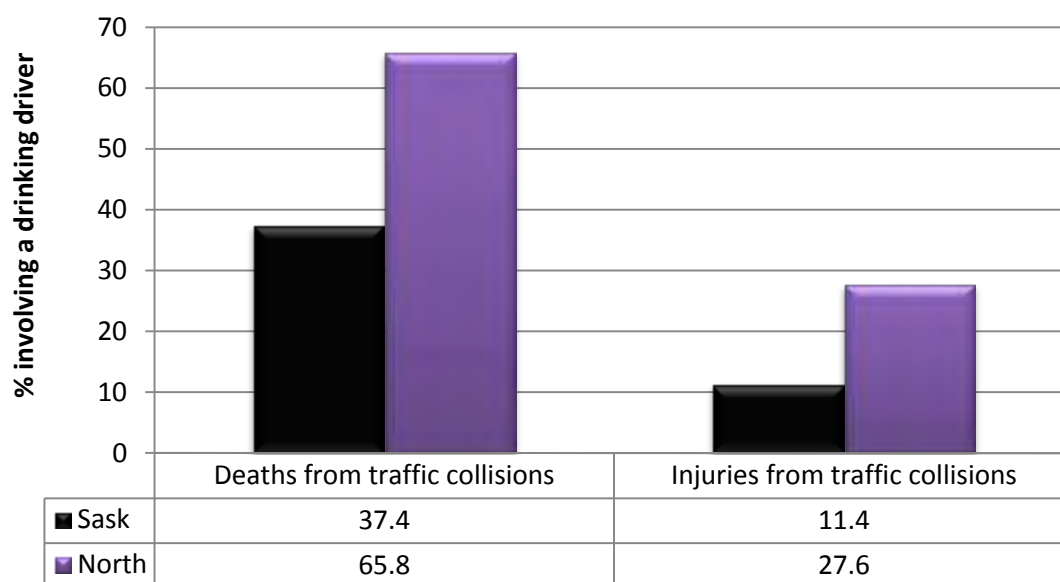
Figure 160 Deaths from traffic collisions, northern Saskatchewan and Saskatchewan by year, 2004-2008



SGI Traffic Accident Information System, 2010, Prepared by PHU Apr 2010

The crude rate of deaths from traffic collisions remained relatively stable across the province between 2004 and 2008. In contrast, rates in northern Saskatchewan have been rising since 2005, and in 2008 were over 2.5 times the provincial rate. Ongoing surveillance will determine whether this increase in 2008 is a sign of an increasing trend or a one-year anomaly.

Figure 161 Injuries and deaths in traffic collisions involving drinking drivers, northern Saskatchewan and Saskatchewan, 2004-2008



SGL Traffic Accident Information System, 2010, Prepared by PHU Apr 2010

Greater proportions of both injuries and deaths from traffic collisions involve a drinking driver in the north compared to the province as a whole. In 2010, one in three injuries and two in three deaths from traffic collisions in the north involved a drinking driver.

Two-thirds of all motor vehicle collision deaths in northern Saskatchewan have involved drinking drivers. This is almost twice as frequent as in the Saskatchewan general population.

Public attitudes about drinking and driving have changed dramatically in recent decades. What was once considered a normal activity has become unacceptable to the majority of Canadians. Let's make it that way in northern Saskatchewan.

Don't let alcohol ruin your fun!

Alcohol impairs the body's movement and balance and slows reactions. This puts you more at risk for injury. With alcohol, you may also take risks you normally wouldn't. Risky actions lead to injuries. Alcohol can also affect emotions leading you to harm yourself or to hurt others (suicide and violence). You can make sure your "good times" are safe times by controlling when you drink and how much you drink.

(Alberta Centre for Injury Control & Research, 2010)

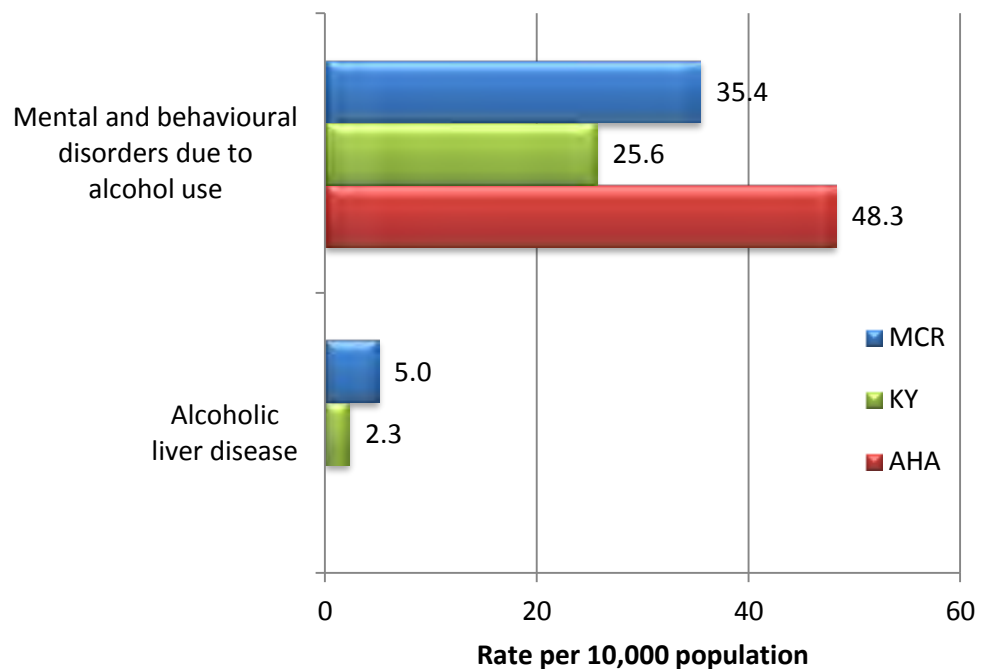
Alcohol related health conditions

Alcohol can have an impact on health status in a variety of ways including increasing rates of disease, injury, hospitalizations and mortality, and can affect many of the social determinants of health.

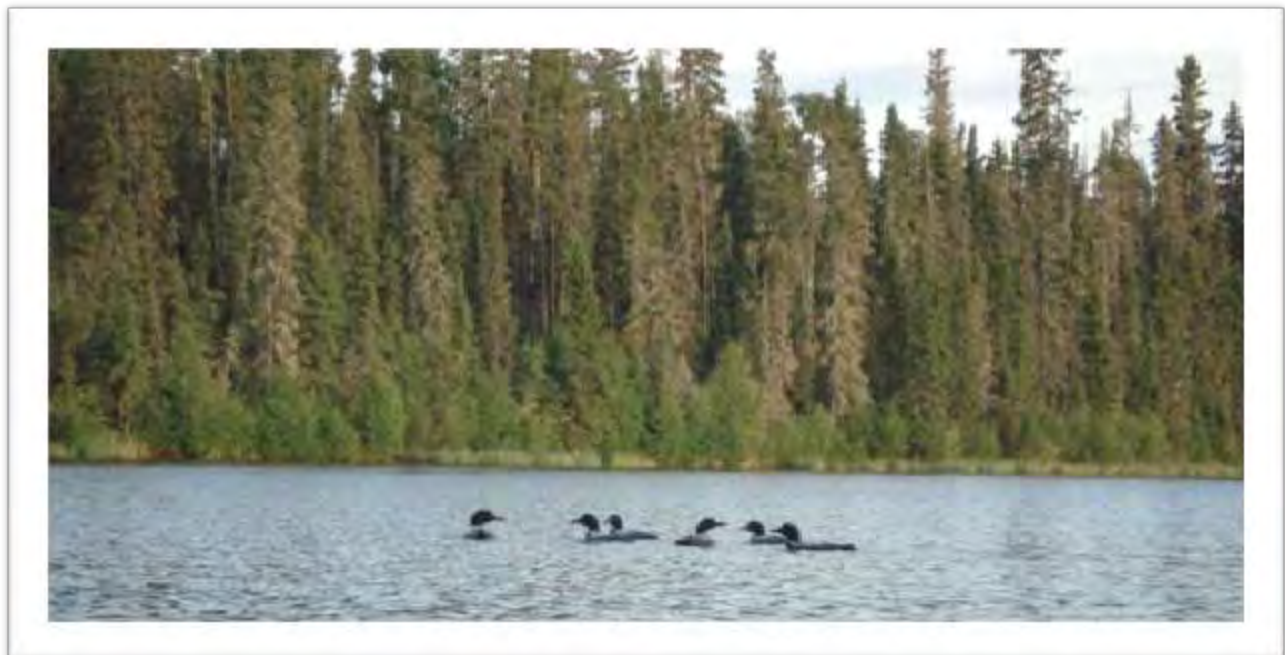
Figure 162 Hospitalizations for alcohol related conditions, northern Saskatchewan health authorities, 5-year average crude rates, 2004/5 to 2008/9

Alcohol has a major impact on the health status of individuals, including hospitalizations for alcohol related disorders. Between 2004/5 and 2008/9, there were between 25 and 50 hospitalizations per 10,000 population for mental and behavioural disorders due to alcohol use in the three northern health authorities. There were also between two and five hospitalizations per 10,000 population for alcoholic liver disease.

Alcohol is also a contributor to other hospitalizations and deaths, especially injuries and suicides.



Source: SaskHealth, Prepared by PHU July 2010



Obesity

Obesity can be seen as a health risk or health condition. Overweight and obesity are weight classifications that are highly correlated with excess levels of body fat and increased health risks at the population level. In 2004, it was estimated that in Canada, 45% of hypertension, 39% of type II diabetes, 35% of gallbladder disease, 23% of coronary artery diseases (CAD), 19% of osteoarthritis, 11% of stroke, 22% of endometrial cancer, 12% of postmenopausal breast cancer, and 10% of colon cancer could be attributed to obesity (Luo et al., 2007).

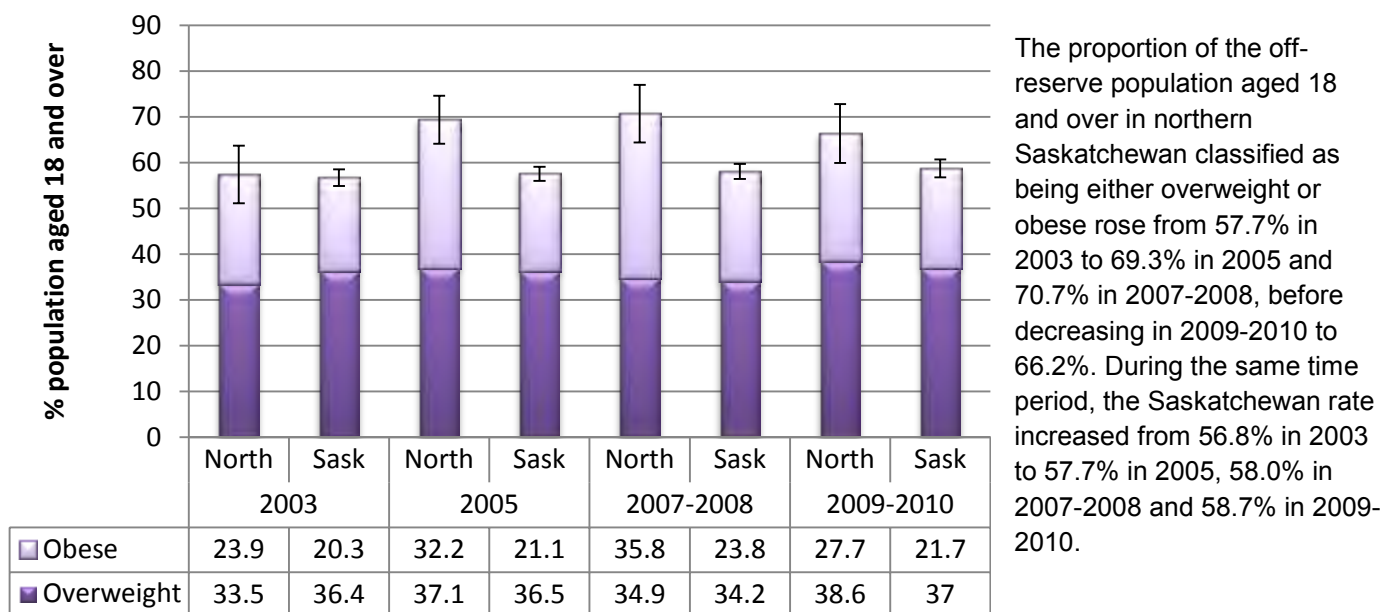
BMI	Description
< 18.5	Underweight
18.5 to 24.9	Normal Weight
25.0 to 29.9	Overweight
30 and over	Obese

The overweight and obesity classifications include both height and weight measurements, are calculated using the Body Mass Index (BMI), and are defined as having a BMI of 25.0 to 29.9 or 30 and over, respectively.

To determine your BMI, take your weight in kilograms, divide by your height in metres squared or $BMI = \text{weight (kg)} / \text{height (m)}^2$

At its simplest, overweight and obesity results from an energy imbalance when a person consumes more energy from food (calories) than that person burns off from physical activity, over an extended period of time. The causes of this energy imbalance are complex and multi-factorial with interactions between environmental, cultural and genetic factors at the forefront. However, it is recognized that the dramatic rise in obesity levels over the past several decades is the result of environmental and cultural factors, rather than genetic factors (Lau et al., 2007).

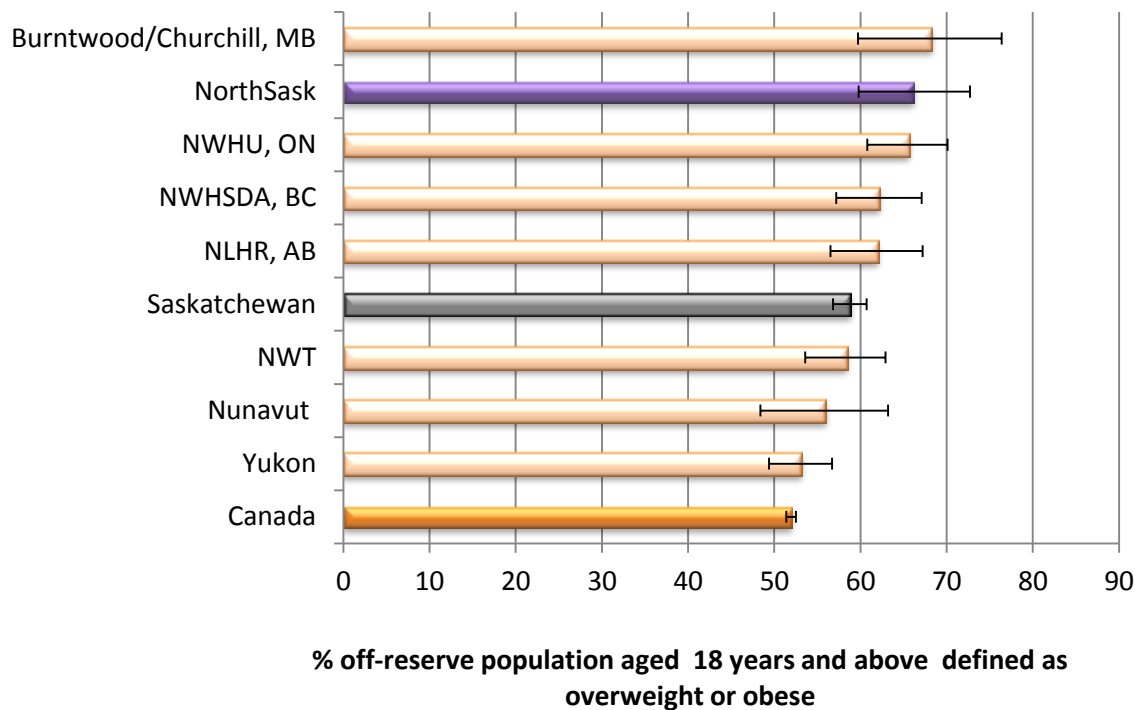
Figure 163 Overweight or obese populations aged 18 and over, off reserve, northern Saskatchewan and Saskatchewan, 2003 to 2009-2010



Source: Statistics Canada (CCHS) CANSIM table 105-0501 & 105-0502, Error bars for overweight or obese category Prepared by PHU Sept 2011

As the data from the CCHS is self-reported, the results most likely underestimate the true proportion of the population that is considered overweight or obese. In 2005, Statistics Canada collected both self-reported data and direct measurements of individuals' heights and weights from the same individuals to assess the level of misreporting in their data (Shields, Gorber, & Tremblay, 2008). They found that, on average, males over reported their height by 1 cm and females by 0.5 cm, while males under reported their weight by 1.8 kg and females by 2.5 kg. As this misreporting was highly related to measured BMI category, the self-reported data underestimated the prevalence of overweight/obesity by approximately 9 percentage points in both males and females. This indicates that values for northern Saskatchewan and Saskatchewan as a whole are most likely underestimated.

Figure 164 Population aged 18 years and over, off-reserve, who are overweight or obese, by northern region, 2009-2010



Source: Statistics Canada (CCHS) CANSIM table 105-0502, Prepared by PHU July 2011

Northern Saskatchewan has a high proportion of its population, aged 18 and over, who are overweight or obese based on self-reported height and weight. At 66.2%, the northern Saskatchewan rate is significantly higher than the Saskatchewan rate of 58.7% or the Canadian rate of 52%. Compared to the other northern regions, northern Saskatchewan had a rate that was lower than in Burntwood/Churchill but higher than in all of the others.

About 66% of northern Saskatchewan residents living off-reserve are overweight or obese and are at increased risk of hypertension, diabetes, heart disease and stroke, osteoarthritis and some types of cancer.

Diabetes

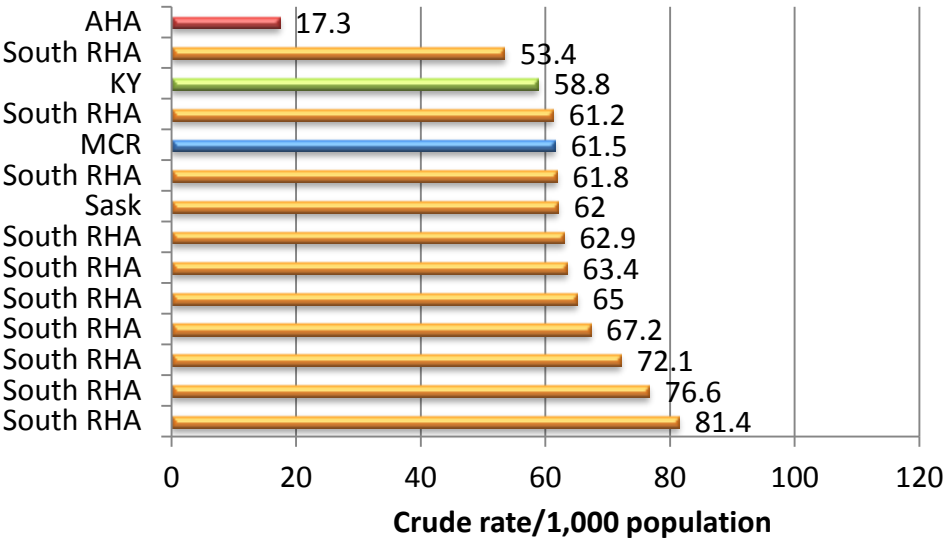
Diabetes is a chronic condition that results from the body’s inability to produce enough and/or properly use insulin. Without insulin or without the ability to use insulin properly, the cells of the body, primarily in muscle, fat and liver tissue, cannot absorb enough glucose (sugar) from the bloodstream. Chronic high levels of blood glucose can result in long-term damage, leading to the damage to and failure of various organs, such as the kidneys, eyes, nerves, heart and blood vessels. Diabetes occurs in several forms: type 1, type 2 and gestational diabetes (Public Health Agency of Canada, 2009d). Type 2 diabetes is by far the most common type of diabetes in northern Saskatchewan.

Some caution needs to be used in the interpretation of the statistical results for diabetes in northern Saskatchewan. The Saskatchewan Ministry of Health used three sources of information: hospitalizations for diabetes, physician billing records for diabetes, and prescription records for diabetes medications. For the time frame used in our analysis, 2002/3 to 2005/6, there were two physician groups which did not submit claims for physician billings – one in the Athabasca area and one in the Keewatin Yatthé region. As well, prescription medications covered through First Nations and Inuit Health (FNIH) would be missed in the provincial database. Therefore, the number of people with diabetes in the northern areas may be underestimated.

Figure 165 Crude diabetes prevalence rates in Saskatchewan by health authority, 2005/6

In 2005/6, the proportion of individuals living with diabetes (crude rate) in KYHR and MCRHR was lower than in most southern health regions, while being similar to the province as a whole. AHA had the lowest rate in the province, with the next closest rate being 3 times greater than in AHA.

As it is thought that the underestimation would affect AHA the greatest, it is important to compare it with other sources of information. There is a manual tracking system of individuals with diabetes in AHA where

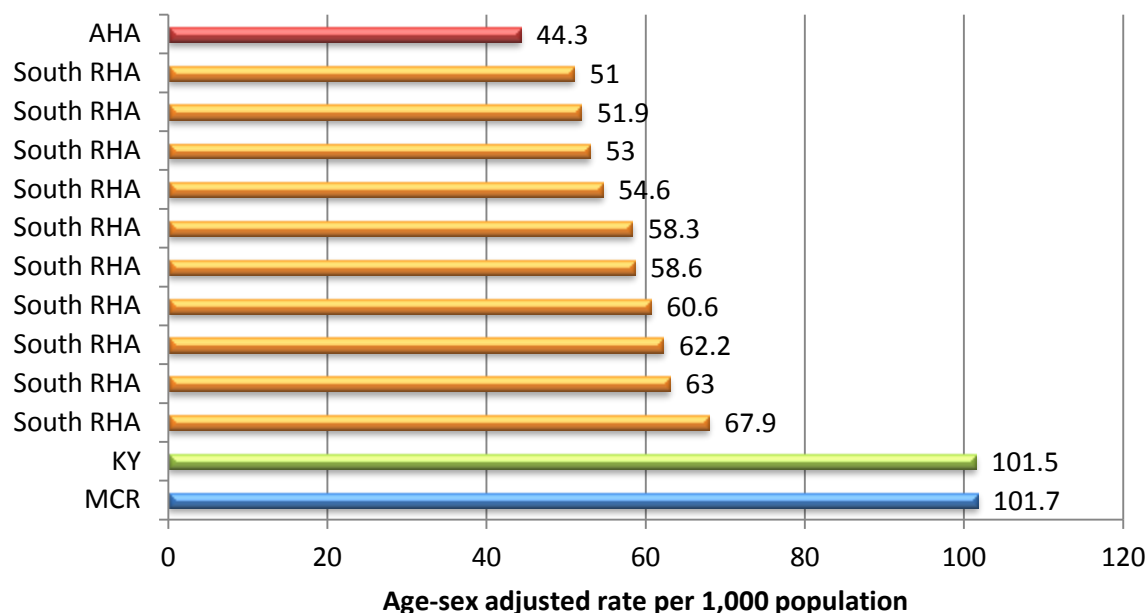


Source: Sask Health, Performance Indicators, Prepared by PHU May, 2008

persons are identified by primary care nurses and referred to physicians for further diagnosis/confirmation of diabetes. This running-total list of individuals is routinely reviewed to remove ineligible individuals from the list (e.g. deceased). Using these figures and the 2009 covered population estimates we can estimate a crude prevalence rate of 35 individuals per 1000 population as of September 2010 compared to the rate of 17.3 per 1000 population for 2005 as calculated through the Saskatchewan Ministry of Health.

The number of individuals identified as having diabetes in the northern health authorities would be underestimated by the Saskatchewan Ministry of Health due to differences in data collection. This underestimation would be most notable in the Athabasca Health Authority.

Figure 166 Age-sex adjusted diabetes prevalence rates in Saskatchewan by health authority, 2005/6

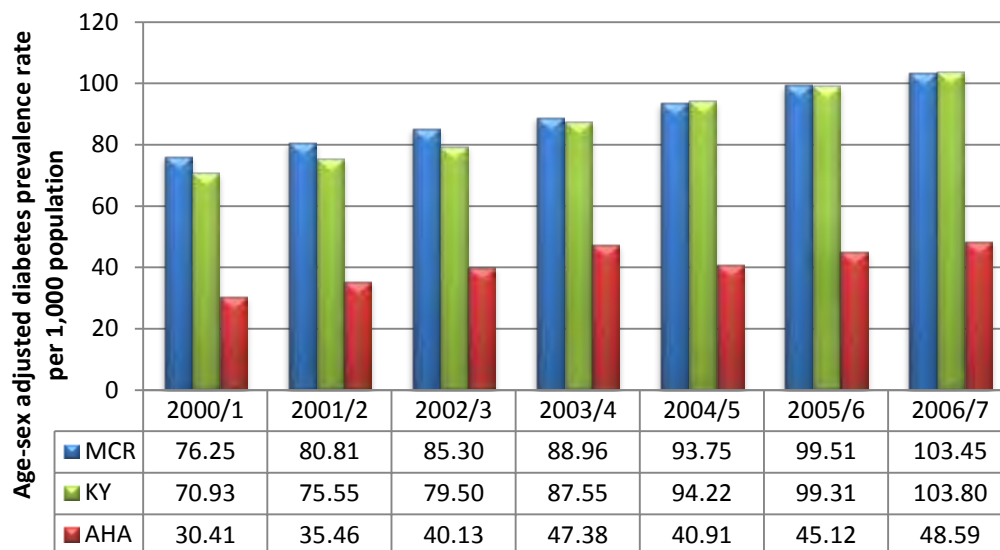


Source: Sask Health, Performance management indicators, Prepared by PHU May, 2008

After age and sex adjustments were made, KYHR and MCRHR had the highest rates of diabetes in the province, with rates approximately 1.5 times the closest southern region. AHA still had the lowest rate in the province, although the gap between their rate and the second lowest rate narrowed. This would indicate that the risk of having diabetes is much greater in KYHR and MCRHR and lower in AHA than in the other Saskatchewan RHAs. The AHA rate should be considered an underestimate of the true rate because of the approach used to determine the number of individuals with diabetes in the province.

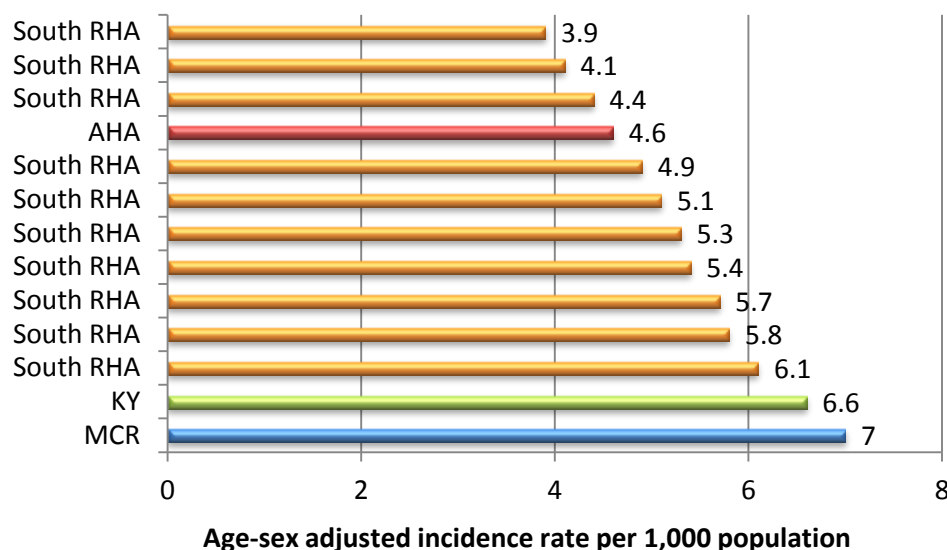
Figure 167 Age-sex adjusted diabetes prevalence rates by northern Saskatchewan health authority, 2000/1 to 2006/7

The age-sex adjusted rates of diabetes steadily increased between 2000/1 and 2006/7 in both MCRHR and KYHR. During the same time period, rates also increased in AHA, but with more year to year fluctuations.



Source: Sask Health, (NDCSS v 209) Prepared by PHU May, 2008

Figure 168 Age-sex adjusted diabetes incidence rate by Saskatchewan health authority, 2005/6



Source: Sask Health, Performance management indicators, Prepared by PHU May, 2008

The prevalence rate tells us the proportion of the population that has diabetes. In other words it tells us the total number of new cases of diabetes in a year combined with the total number of pre-existing cases of diabetes in that year.

The incidence rate tells us how many new cases of diabetes occurred in the year. After age and sex adjustments were made, the rates in KYHR and MCRHR were the highest in the province, while AHA's rate was one of the lowest in the province. This would indicate that the risk of developing diabetes is greater in KYHR and MCRHR than in the rest of the province. As mentioned previously, the incidence rate in the AHA may be underestimated due to the methods used by the province.

Reducing the risk of type 2 diabetes:

Like other serious health conditions, the likelihood of developing type-2 diabetes can be reduced by healthy lifestyle choices, such as controlling the diet, not smoking, losing excess weight and exercising (Public Health Agency of Canada, 2010a).

Reducing the complications of diabetes:

The management of diabetes depends on the type of diabetes and can include lifestyle changes and/or medications, including insulin. Regular physical activity, healthy weight and not smoking are important factors for effective management of diabetes. Controlling blood glucose, blood pressure and blood lipids are necessary to reduce other diabetes related health problems. Self-management of diabetes is an essential part of overall care.

Effective disease management may help prevent or delay many health problems related to diabetes such as cardiovascular disease, kidney failure, blindness, nerve damage, heart attack, and stroke (Public Health Agency of Canada, 2010b).

Circulatory or cardiovascular disease (heart and stroke)

Circulatory or cardiovascular diseases are defined as diseases and injuries of the cardiovascular system: the heart, the blood vessels of the heart and the system of blood vessels (veins and arteries) throughout the body and within the brain (Heart & Stroke Foundation of Saskatchewan, 2010). The four most common classifications of cardiovascular disease are ischemic heart disease, myocardial infarction (or heart attack), congestive heart failure and cerebrovascular disease (also called stroke). Stroke is the result of a blood flow problem in the brain and is considered a form of cardiovascular disease (Heart & Stroke Foundation of Saskatchewan, 2010) with hypertension being the most important cause.



Cardiovascular diseases are the leading causes of death in Canada (32.1% of all deaths in 2004) (Public Health Agency of Canada, 2009a) and Saskatchewan (35.4% of the all deaths between 1998 and 2007). These diseases also have a major impact on health care utilization, causing the most hospitalizations in Canada, 16.9% of all hospitalizations in 2005-6 (Public Health Agency of Canada, 2009a). Cardiovascular diseases also have a substantial economic impact on Canadian individuals, families, the community, and the health care system, estimated in 2000 to be the second highest cost of all diagnosis categories at 22.2 billion dollars. Between 2003 and 2007, circulatory diseases were the second most common cause of death, making up 21% of deaths in northern Saskatchewan. In Saskatchewan overall, circulatory disease was the most common cause of death making up 33% of deaths (see Figure 110).

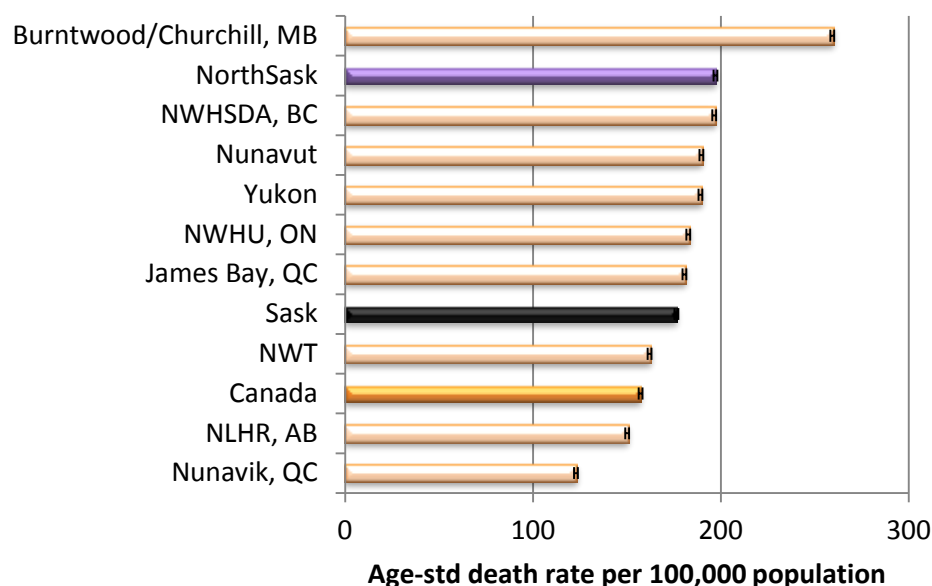
Northern Saskatchewan had increased numbers of deaths from circulatory disease over the decade, from 1998 to 2007, (from an average of almost 14 deaths per year to just over 15 deaths per year), whereas the number of deaths from circulatory disease decreased in Saskatchewan overall. During the same time period, ischemic heart disease deaths (heart attacks) increased in northern Saskatchewan (see Figure 116). The number of deaths from ischemic heart disease increased by 15 deaths per five-year period, from 72 during 1998-2002 to 87 during 2003-2007. Many factors may have contributed to this increase, including increases in the older age groups in the north, rising numbers of diabetes and obesity, and the long-term impact of smoking.

The cardiovascular disease death rate has been declining steadily in Canada since the mid-1960s. The 1995 death rate for CVD was almost half that of 1969 and between 1994 and 2004 the death rate fell by 30% (Canadian Public Health Association, 2010). According to the Heart and Stroke Foundation (Heart & Stroke Foundation of Saskatchewan, 2010), the rate of heart disease and stroke have steadily declined over the last 40 years. The rate has declined:

- 25% over the past 10 years
- 50% over the past 20 years
- 70% between 1956 and 2002

Unfortunately, new data from the Canadian Institute for Health Information (CIHI) show a large discrepancy in the rate of heart attacks between the lowest income and highest income groups within Canada. The rate of heart attacks in Canada's lowest-income neighbourhoods was 255 per 100,000 population, compared to 186 per 100,000 in the most affluent ones, which is a significant 37% difference (Canadian Institutes of Health Information, 2010). The link between the occurrence of heart attacks and socioeconomic status is well known and thought to be partially explained by the higher prevalence of risk factors amongst the lower socioeconomic groups. However, the entire difference cannot be explained by these differences alone (Canadian Institutes of Health Information, 2010). As well, socioeconomic conditions are major influences on the development of some of these risk factors such as lifestyle behaviours (Canadian Institutes of Health Information, 2010).

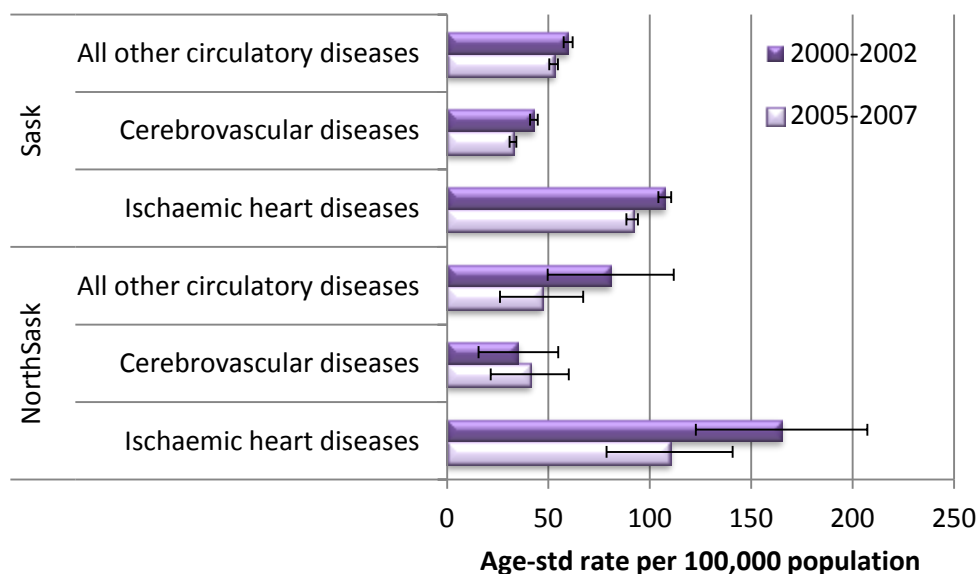
Figure 169 Age-standardized mortality rate from circulatory diseases, 3-year averages, by northern region 2005-2007



The three-year average rate of mortality from circulatory diseases in northern Saskatchewan in 2005-2007 was 197.2 deaths per 100,000. This was lower than the rate in Burntwood, but higher than rates in Saskatchewan, Canada and all other northern regions.

Source: Statistics Canada (Health Indicators) Error bars = 95% CI

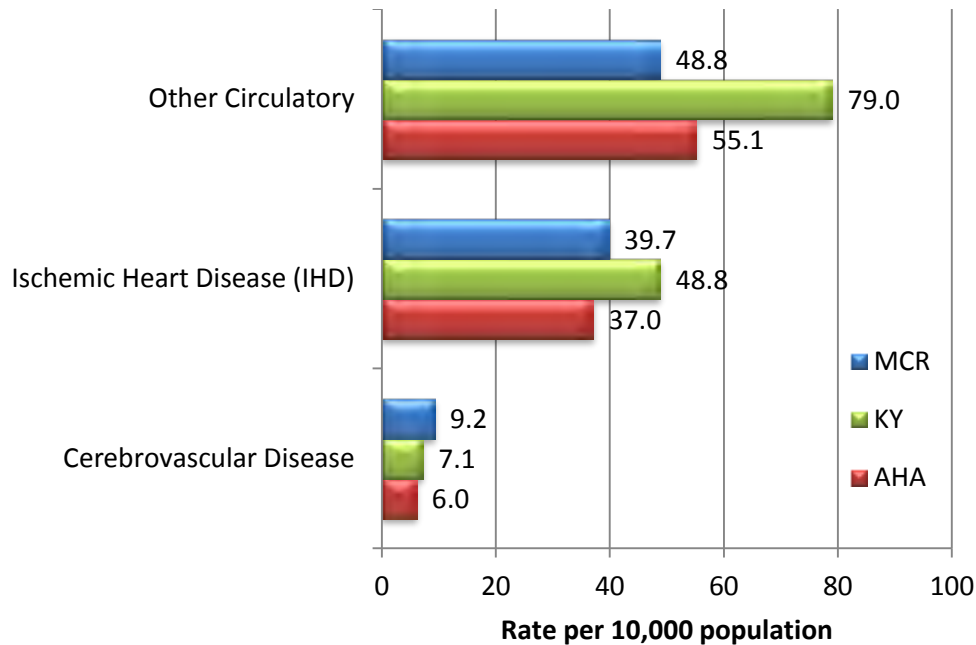
Figure 170 Age-standardized mortality rate from circulatory diseases, 3-year averages, northern Saskatchewan and Saskatchewan, 2000-2002 to 2005-2007



Source: Statistics Canada (Health Indicators) Error bars = 95% CI

Ischemic heart disease accounted for the greatest number of circulatory deaths in northern Saskatchewan and Saskatchewan in both 2000-2002 and 2005-2007. Overall, there were decreases in the circulatory mortality rates between 2000-2002 and 2005-2007 in both northern Saskatchewan and Saskatchewan. In 2005-2007, the circulatory mortality rates in northern Saskatchewan and Saskatchewan were similar.

Figure 171 Hospitalizations for circulatory diseases 5-year average crude rate, northern Saskatchewan health authorities, 2004/5 to 2008/9



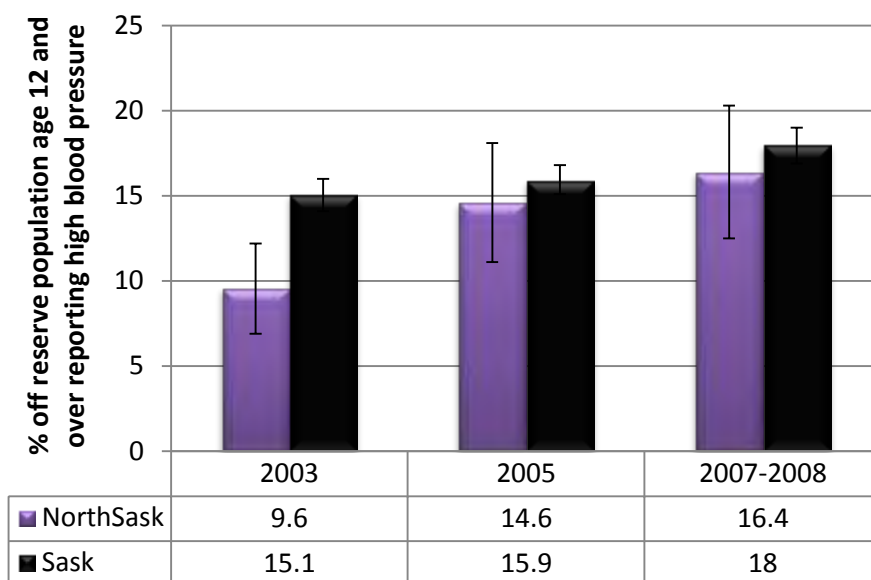
Source: SaskHealth, Prepared by PHU July 2010

The 5-year average annual crude hospitalization rates for most circulatory diseases were higher in KYHR than in MCRHR or AHA between 2004/5 and 2008/9. There were 40-50 hospitalizations per 10,000 population per year across the north for ischemic heart disease, 6-9 hospitalizations per 10,000 population per year for cerebrovascular diseases and 50-80 hospitalizations per 10,000 population per year for other circulatory diseases.



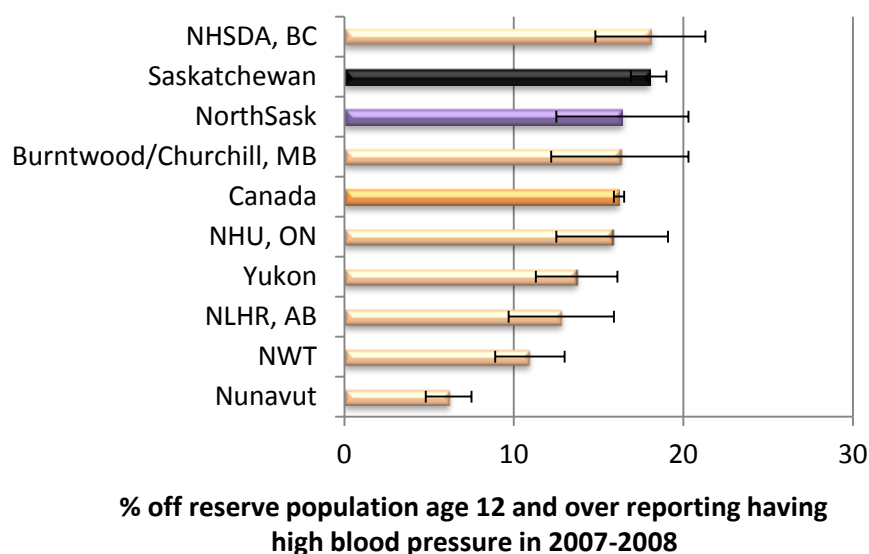
Figure 172 Self-reported high blood pressure, population aged 12 and up, off reserve, northern Saskatchewan and Saskatchewan 2003 to 2007-2008

Asking people in surveys whether they have high blood pressure is one way of getting an idea of the prevalence of the condition. The percentage of people self-reporting high blood pressure is dependent on how common the condition is and also how often it is recognized or diagnosed. In some situations the differing self-reported rate can depend on differing use of preventative health care services (i.e. people had to have their blood pressure checked in order to know if they have high blood pressure). The rates of self-reported high blood pressure for those living off-reserve in northern Saskatchewan increased from 2003 to 2007-2008, with smaller increases at the provincial level during the same time period.



Source: StatsCan (CCHS - Health indicators), Prepared by PHU July 2009

Figure 173 Population aged 12 and over, off-reserve, reporting been diagnosed by a health professional as having high blood pressure, by northern region, 2007-2008



In 2007-2008, 16% of the off-reserve population aged 12 and over in northern Saskatchewan reported having a diagnosis of high blood pressure. This is the same as the Canadian rate and slightly lower than the Saskatchewan rate of 18%. Compared to other northern regions, northern Saskatchewan had a higher rate compared to Burntwood/Churchill, Yukon, NLHR, NWT, Nunavut and NHU, and a lower rate than NHSDA.

Due to extensive costs, there is very little data available on measured blood pressure, as opposed to self-reported blood pressure. However, a large study called the Canadian Health Measures

Source: StatsCan (CCHS-Health Indicators), Prepared by PHU July 2009

Survey collected measured blood pressure data on adults aged 20 to 79 years through the use of automated blood pressure cuffs (Wilkins et al., 2010). Their results showed that 19% of Canadian adults have high blood pressure and 20% of adults have pre-high blood pressure; that is they have blood pressure values that are not high enough to meet the definition of high blood pressure, but are at increased risk of developing high blood pressure in the future as well as increased risk of cardiovascular events (Vasan et al., 2001).

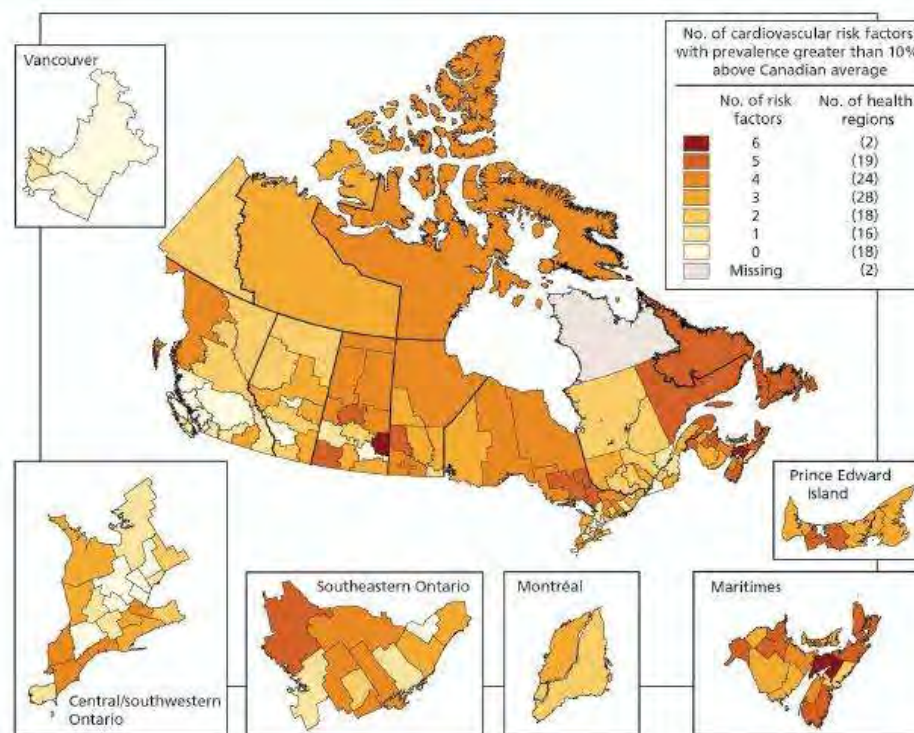
Cardiovascular risk factors

Cardiovascular diseases are chronic conditions that are caused by complex interactions between individual genetics, health behaviours, and environmental influences. Fortunately, cardiovascular diseases can be prevented by addressing the major risk factors, specifically by not smoking, engaging in regular physical activity, effective stress management, healthy nutrition and healthy weight, and by the early recognition and treatment of related conditions such as high blood pressure, diabetes, and high cholesterol (Public Health Agency of Canada, 2009a).

As for diabetes and some cancers, cardiovascular diseases can be prevented by not smoking, engaging in regular physical activity, effective stress management, healthy nutrition and healthy weight and by early recognition and treatment of related conditions (like high blood pressure, diabetes, and high cholesterol).

A landmark global study investigated the association of nine risk factors (smoking, lipids, hypertension, diabetes, obesity, diet, physical activity, alcohol consumption, and psychosocial factors) with the occurrence of a first heart attack in close to 30,000 individuals in over 50 countries (Yusuf et al., 2004). The study found that these nine risk factors cause 90% of first time heart attacks, and by addressing five common risk factors (smoking, lipids, hypertension, diabetes, and obesity), 80% of these heart attacks could be prevented. The study found that these risk factors were the same in almost every geographic region and every racial/ethnic group and were consistent in men and women.

Figure 174 Map of risk factors for cardiovascular disease in Canada.
Health regions for which data were available are shown according the number of risk factors with a prevalence exceeding the national average by at least 10%.



The above map came from a recent Canadian study that looked at the occurrence of some of the main risk factors for cardiovascular disease, including diabetes, hypertension, obesity, smoking, and low levels of physical activity and income adequacy in off reserve populations in Canada (Lee et al., 2009). The map illustrates various Canadian health regions by the number of risk factors (1 to 6) that are 10% above the Canadian average. Northern Saskatchewan belongs to the category that has 4 risk factors that are 10% above the Canadian average.

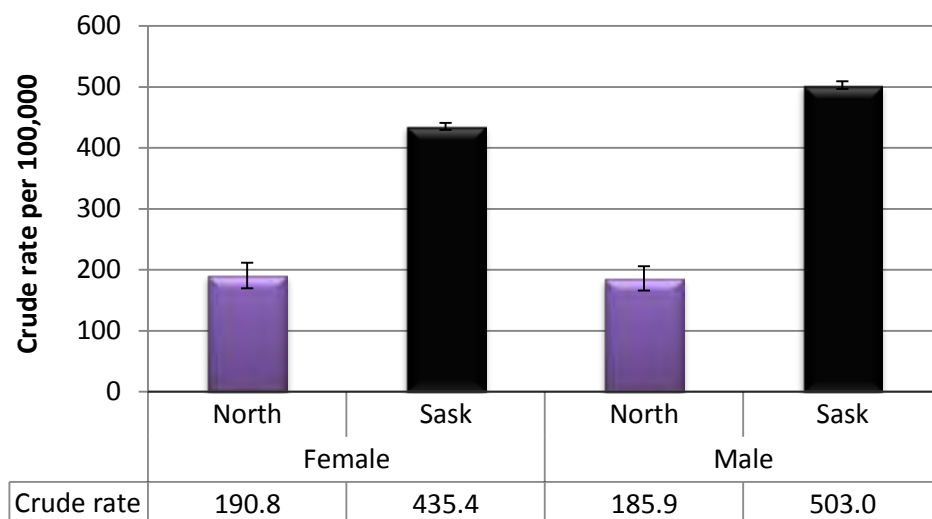
It has been estimated that smoking has contributed to about 36% of circulatory disease deaths in Saskatchewan (Rhymes, 2009).

Cancer

In Canada, about 40% of people will develop some form of cancer, other than skin cancer, in their lifetime. That's one person developing cancer out of every two to three people, with the chance being somewhat higher in men (Canadian Cancer Society, 2010b). Between 1998 and 2007, cancer was the underlying cause of death for one in every four deaths in Canada and Saskatchewan, and one in every five deaths in northern Saskatchewan. Data from the Saskatchewan Cancer Agency provides us with an understanding of the impact of cancer on the health status of individuals in northern Saskatchewan and Saskatchewan as a whole, between 1998 and 2007.

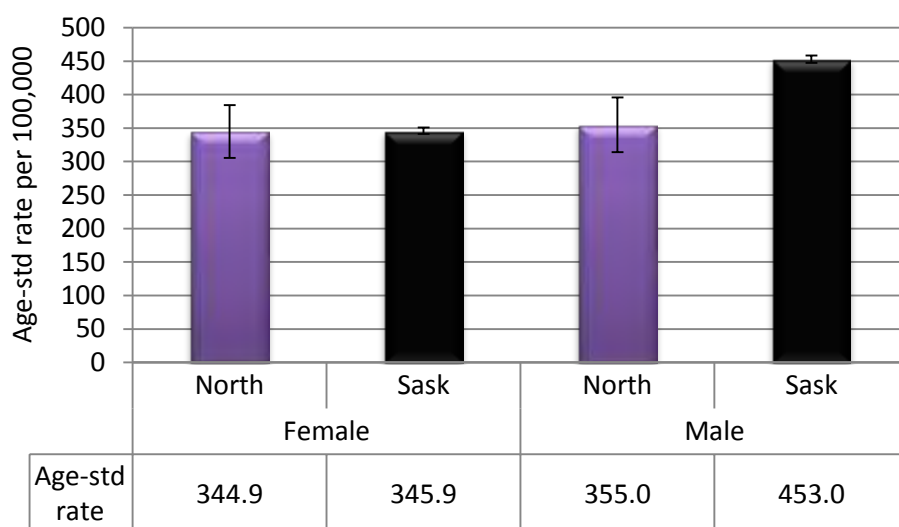
Figure 175 Crude Incidence rate, 10-year average, total invasive cancers, by sex and northern health authority, 1998-2007

The crude rate of total invasive cancers was consistently lower in the northern Saskatchewan health authorities compared to the province as a whole between 1998 and 2007, in both males and females. This is not surprising as cancers tend to occur more often in the older age groups, of which the province has a greater proportion. Generally, in a northern community the same size as a southern Saskatchewan community, there were less than half the numbers of cancers, largely due to the different age makeup of the communities.



Source: SCA 2010, Prepared by PHU Aug, 2010

Figure 176 Age-adjusted cancer incidence rate, 10-year average, total invasive cancers, by sex and northern health authority, 1998-2007



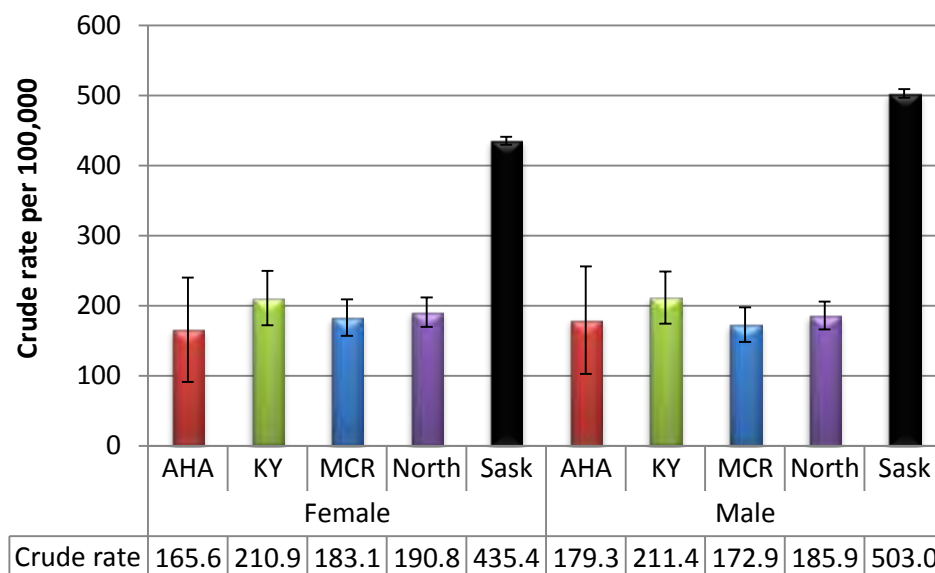
Source: SCA 2010, Prepared by PHU Aug, 2010

After adjustments were made to account for different age structures between the north and the province, rates in the north were more comparable to rates in the south in both males and females.

Figure 177 Crude incidence rate for invasive cancer by health authority and province, 1998-2007

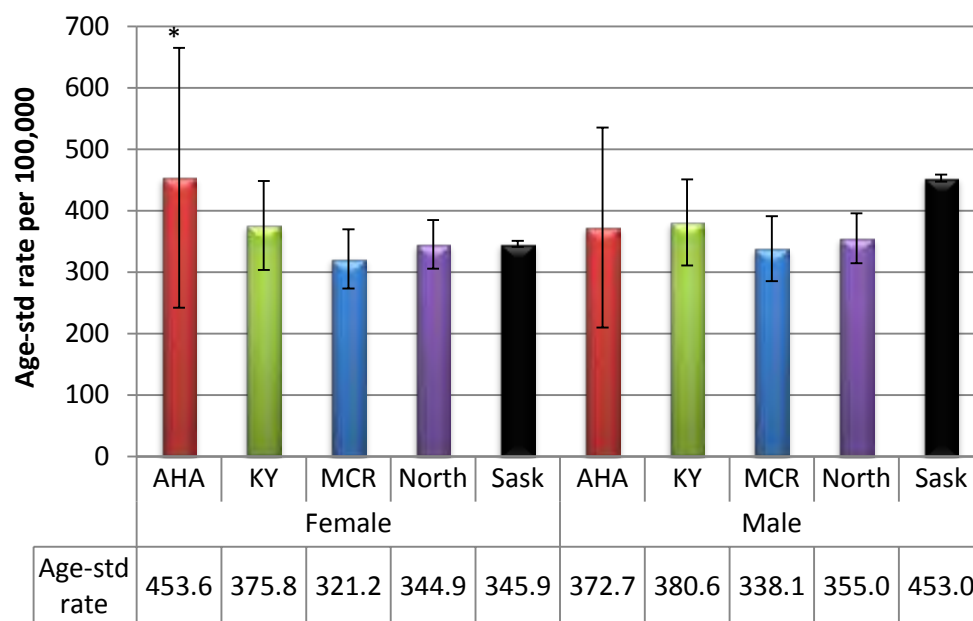
The crude incidence rate of total invasive cancers was consistently lower in the northern Saskatchewan health authorities compared to the province as a whole between 1998 and 2007, in both males and females. Again, cancers tend to occur more often in the older age groups, of which the whole province has a greater proportion.

Generally, there were fewer than half the numbers of cancers in a northern community the same size as a southern Saskatchewan community, largely due to the different characteristics of the communities.



Source: SCA 2010, Prepared by PHU Aug, 2010

Figure 178 Age-standardized incidence rate of cancer by health authority and province, 1998-2007



After adjustments were made to account for different age structures between the north and the province, rates in the north were more similar to the south in both males and females. Of particular note, for all other invasive cancers, other than for lung cancers, the incidence rate in AHA are nearly the same as the provincial rate.

Source: SCA 2010, Prepared by PHU Aug, 2010 * caution n =19 total cases for Age-std

Figure 179 Cancer incidence for top 14 sites, by sex, northern Saskatchewan, 1998-2007

Female	# cases	Male	# cases
Breast	96	Lung	75
Lung	53	Prostate	66
Colorectal	28	Colorectal	47
Cervical	16	Kidney	15
Kidney	12	Lymphoma	14
Primary Unknown	12	Testis	12
Lymphoma	10	Primary Unknown	11
Gall Bladder & Biliary Tract	10	Bladder	11
Ovary	10	Leukemia	9
Pancreas	8	Other Primaries	7
Uterus	8	Malignant Melanoma of Skin	7
Other Primaries	6	Bone & Connective Tissue	7
Oral Cavity	6	Pancreas	6
Thyroid	6	Stomach	6

Source: SCA 2010, Prepared by PHU Aug 2011

In northern Saskatchewan, the most common cancers diagnosed in females between 1998 and 2007 were breast cancer, followed by lung, colorectal, and cervical cancers, while in men the most common were lung cancer, followed by prostate, colorectal, and kidney cancers.

The largest change in cancer incidence in females occurred in colorectal cancer which increased from 10 cases in 1998-2002 to 18 cases in 2003-2007. In males, the largest changes occurred in prostate cancer which increased from 25

to 41 cases, and colorectal cancer which increased from 17 to 30 cases. In 2010, the Canadian Cancer Society estimated that lung cancer accounted for 13 and 14% of total cancer cases in females and males, respectively (Canadian Cancer Society, 2010a). In comparison, between 1998 and 2007, lung cancer accounted for 17 and 23% of total cancer cases in northern Saskatchewan females and males, respectively.

The graph below illustrates cancer incidence data to aid in interpreting the graphs on the upcoming pages. The Saskatchewan rate is on the bottom of the chart (x-axis) while the northern rate is on the left hand side of the chart (y-axis). The black line that runs through the middle of the chart shows the point where the north and Saskatchewan rates would be the same. Therefore, when a purple dot is below the line, the rate is higher in Saskatchewan, while a purple dot above the line means the rate is higher in the north. For example, the purple dot identified as "Rate is Higher in North" is above the black line. By following the dashed red line to the left we can see the north rate would be ~ 80 cases per 100,000 population compared to the Saskatchewan rate of ~ 55 cases per 100,000 population (by following the dashed red line to the bottom). This chart also lets us see what are the most common rates compared to the least common rates. The most common rates in both locations will be located at the far right hand corner of the chart, while the least common rates will be located in the bottom left hand corner.

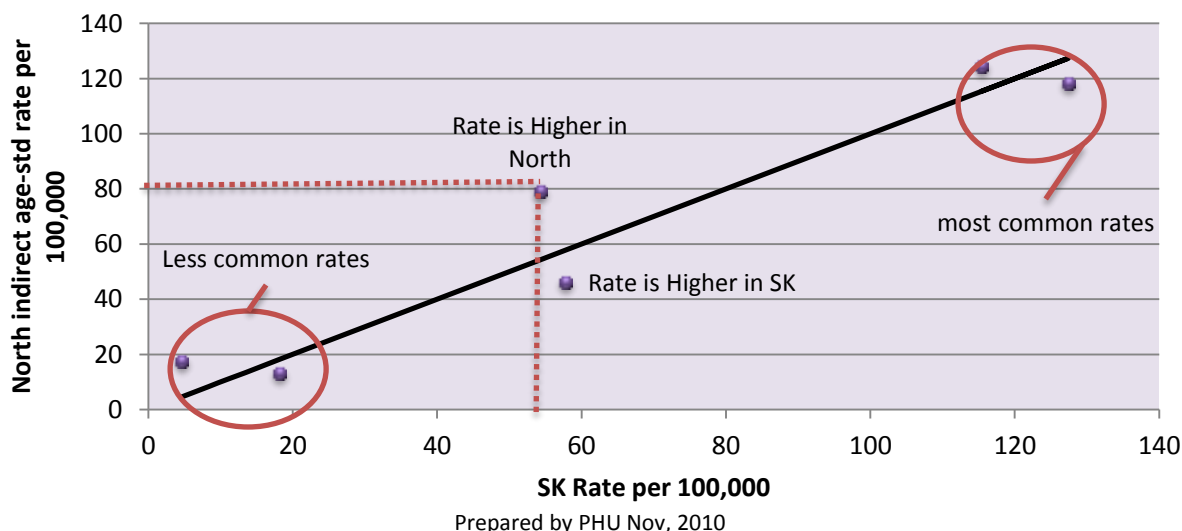
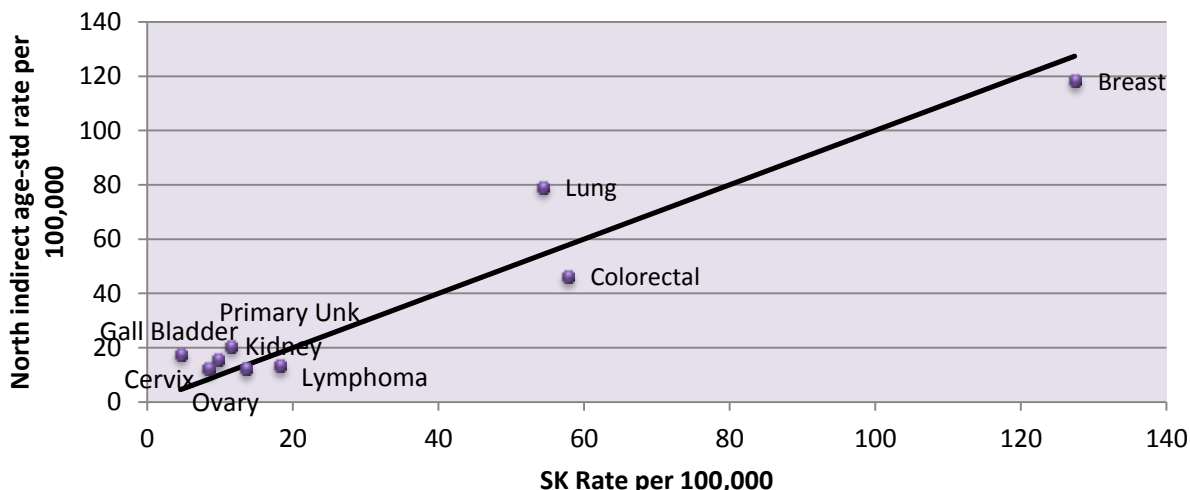


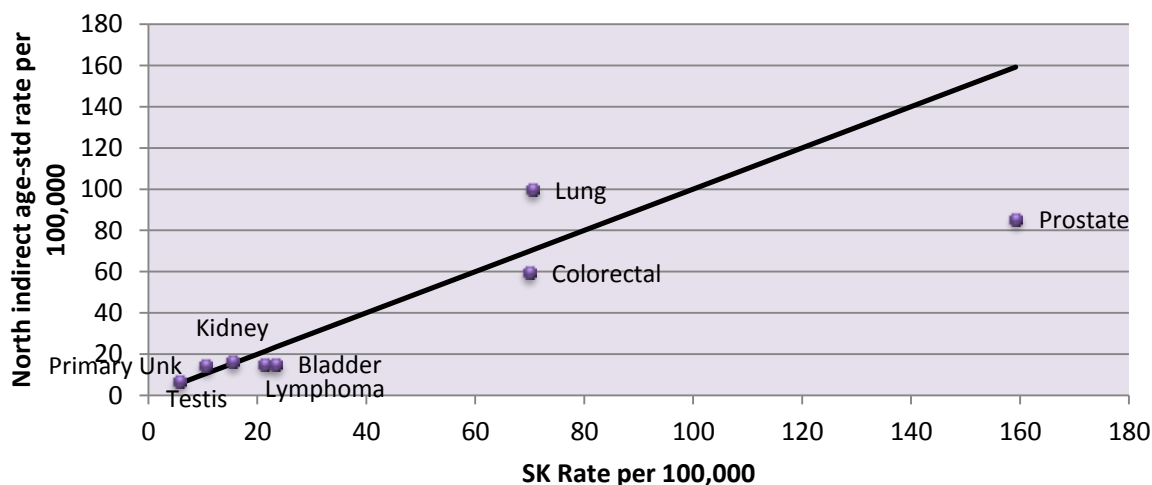
Figure 180 Female age-standardized cancer incidence by cause, 10-year average, northern Saskatchewan and Saskatchewan, 1998-2007



Source: SCA 2010, Prepared by PHU Nov, 2010

After adjustments for age, the top causes of cancer in Saskatchewan and northern Saskatchewan females between 1998 and 2007 were breast, colorectal and lung. The 10-year average breast and colorectal cancer incidence rates for females are higher in Saskatchewan than in the north, although this is not a significant difference statistically. On the other hand, the northern lung cancer rate is 46% higher than the provincial rate, which is statistically significant.

Figure 181 Male age-standardized cancer incidence by cause, 10-year average, northern Saskatchewan and Saskatchewan, 1998-2007

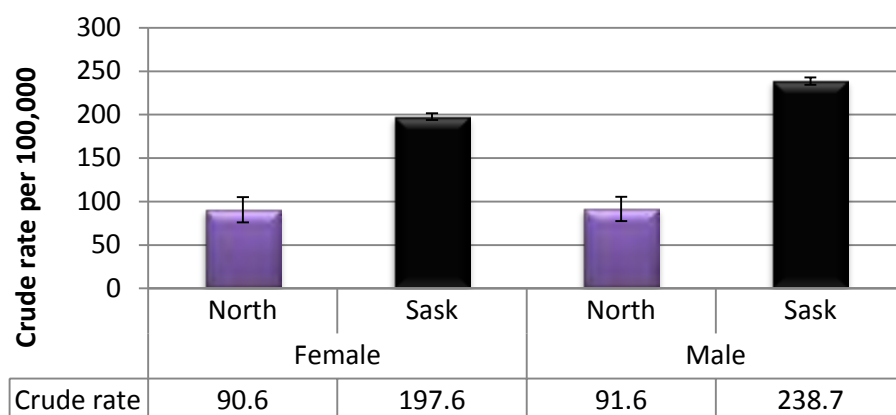


Source: SCA 2010, Prepared by PHU Nov, 2010

After adjustments for age, the top causes of cancer in Saskatchewan and northern Saskatchewan males between 1998 and 2007 were lung, prostate and colorectal. The 10-year average colorectal and prostate cancer incidence rates for males were higher in Saskatchewan than in the north, with prostate cancer being significantly lower statistically in the north. On the other hand, the rate of lung cancer in northern Saskatchewan males is 42% higher than their provincial counterparts, which is a statistically significant higher rate.

Female and male lung cancer rates in northern Saskatchewan between 1998 and 2007 were 46% and 42% greater than provincial rates, respectively.

Figure 182 Crude mortality rates, 10-year average, total invasive cancer, northern Saskatchewan and Saskatchewan, by sex, 1998-2007

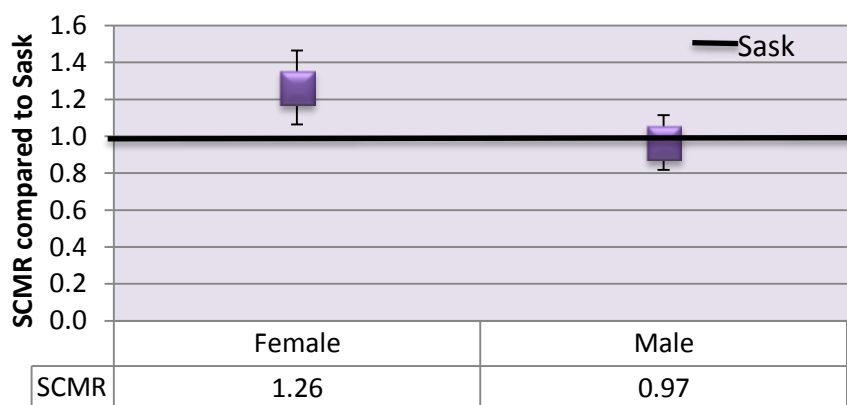


Source: SCA 2010, Prepared by PHU Aug, 2010

The 10-year annual average crude mortality rate for total invasive cancers was higher in Saskatchewan than in northern Saskatchewan for both males and females. This is not surprising as Saskatchewan has an older population than northern Saskatchewan has, and cancer tends to occur more often in the older age groups.

Figure 183 Standardized cancer mortality ratio (SCMR), total invasive cancers, northern Saskatchewan compared to Saskatchewan, by sex, 1998-2007

As the middle-aged and elderly (who have higher rates of cancer) make up a smaller proportion of the northern population, age adjustments have to be made to allow for provincial comparisons. One method to complete these age adjustments is the standardized cancer mortality ratio (SCMR). The SCMR compares the actual number of deaths from invasive cancers in northern Saskatchewan to the number of deaths from invasive cancers that would be expected if northern Saskatchewan had the same age specific rates as Saskatchewan. A ratio of 1 would indicate that the number of deaths that occurred in



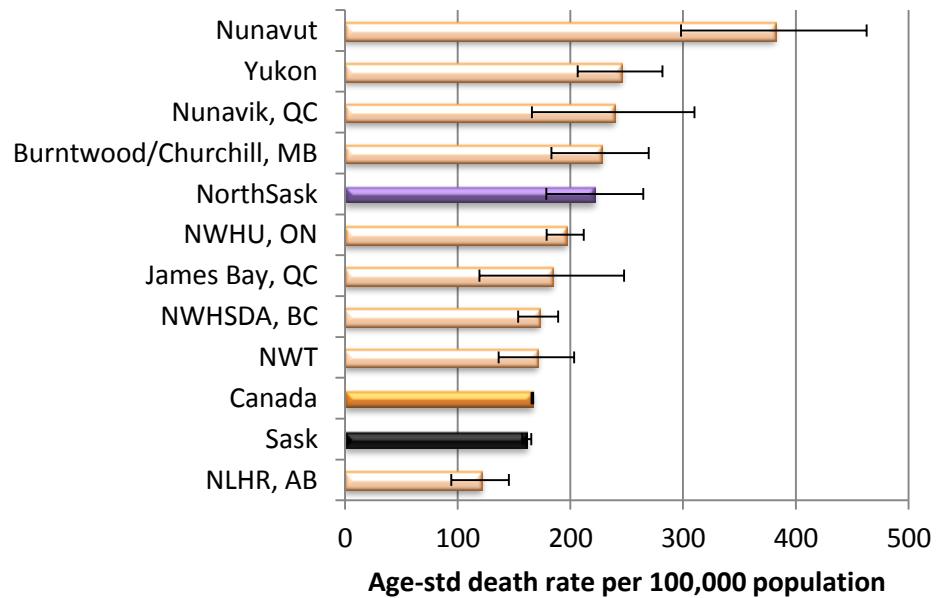
Source: SCA 2010, Prepared by PHU Aug, 2010 * North compared to respective Sask gender

the north was the same as what would be expected, while a ratio of less than 1 would indicate that there were fewer deaths than expected and a ratio of greater than 1 would indicate that there were more deaths than expected. In males, the number of deaths from invasive cancers in the north was similar to what would be expected. In females, the number of deaths was significantly higher than expected in the north compared to the province.

For women in northern Saskatchewan, the incidence rate of cancer was the same as the provincial rate; however, the death rate from cancer is greater than the provincial rate. For men in northern Saskatchewan, the incidence rate of cancer is lower than the provincial rate; however, the death rate from cancer is the same as the provincial rate. This can be explained by a significantly higher northern lung cancer rate (a cancer with a high death rate) and a significantly lower rate of prostate and a slightly lower rate of breast and colorectal (cancers which have a lower death rate than lung cancer). In Canada, the 5-year survival (the percentage of individuals diagnosed who are still living after 5 years) from lung cancer is about 15%, much lower than the survival rates from prostate (about 95%), breast (about 87%) and colorectal (about 62%) (Canadian Cancer Society, 2010d). This is why in Canada for 2010, lung cancer made up about 14% of cancers diagnosed but about 27% of cancer deaths. With between 85-90% of lung cancers being attributed to smoking and the smoking rate being high in northern Saskatchewan, smoking prevention and cessation programs are very important in the north.

Figure 184 Age-standardized mortality rates for total malignant cancers, 3-year average, by northern region, 2005-2007

The 3-year average age standardized mortality rate from total malignant cancers in northern Saskatchewan of 221.8 deaths per 100,000 population in 2005-2007 was lower than in Burntwood, Nunavut, Yukon and Nunavut, and higher than in NWHU, James Bay, NWHSDA, NWT, Canada, Saskatchewan and NLHR.



Source: Statistics Canada (Health Indicators) Error bars = 95% CI

Figure 185 Cancer mortality, for top 7 sites, by sex, northern Saskatchewan, 1998-2007

Female	# deaths	Male	# deaths
Lung	50	Lung	72
Breast	19	Primary Unknown	14
Primary Unknown	16	Colorectal	14
Colorectal	11	Prostate	10
Gall Bladder & Biliary Tract	7	Kidney	8
Digestive Tract	7	Lymphoma	7
Pancreas	6	Liver	6

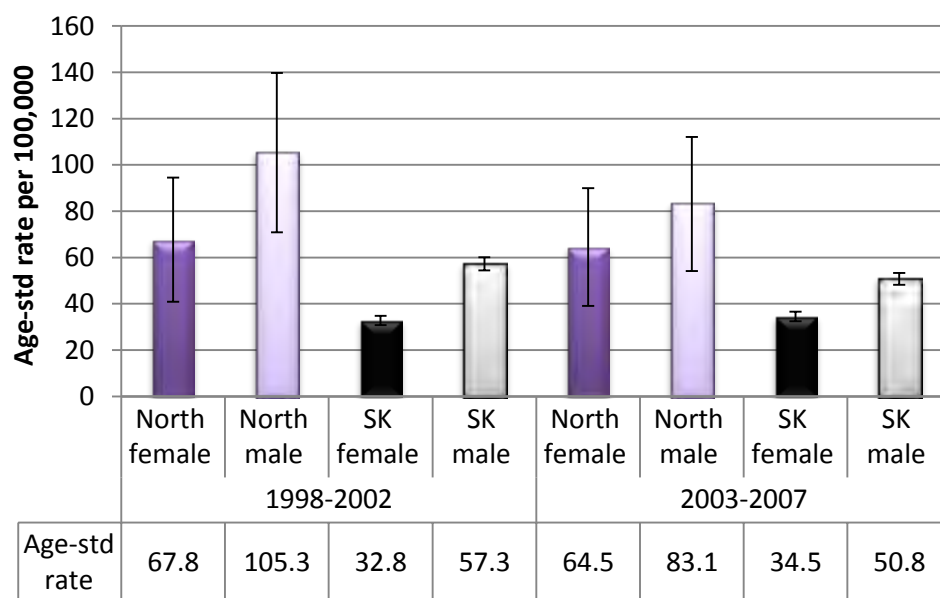
Source: SCA 2010, Prepared by PHU Aug 2011

In both males and females in northern Saskatchewan, lung cancer was the most common cause of cancer death between 1998 and 2007. The second and third most common causes of cancer death in the north were breast and primary unknown in women and colorectal and primary unknown in men, all markedly lower than lung cancer deaths. The incidence of lung cancer deaths in northern Saskatchewan stayed the same in females between 1998-2002 and 2003-2007, while slightly decreasing in males.

During the same time period, lung cancer was the most common cause of cancer deaths in Saskatchewan females and males, followed by breast cancer and colorectal cancer in females and prostate and colorectal cancer in males. The difference in the number of deaths for the top three causes was much less in all of Saskatchewan than for the north. In 2010, the Canadian Cancer Society estimated that lung cancer accounted for 26 and 28% of total cancer deaths in females and males, respectively. In comparison, between 1998 and 2007, lung cancer accounted for 33 and 44% of total cancer deaths in northern Saskatchewan females and males, respectively (Canadian Cancer Society, 2010a).

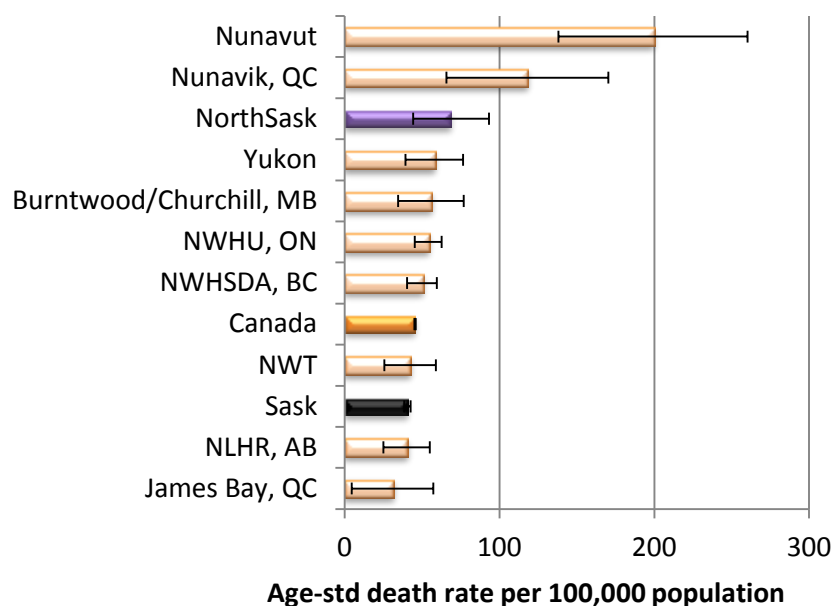
Figure 186 Trends in mortality rates for lung cancer by sex, northern Saskatchewan and Saskatchewan, 5-year average age-standardized rates, 1998-2007

Across Canada, the mortality rate from lung cancer declined over the 1998-2007 period in males, while increasing in females (Canadian Cancer Society's Steering Committee, 2009). The trend was similar in Saskatchewan with male rates declining and female rates increasing slightly. During the same time period in northern Saskatchewan, the female rate remained relatively unchanged while the male rate decreased. However, due to the variability in the northern data, it is hard to say if these changes are significant and will persist.



Source: SCA 2010, Prepared by PHU Aug, 2010

Figure 187 Age-standardized lung cancer mortality rates, 3-year average, by northern region, 2005-2007



Source: Statistics Canada (Health Indicators) Error bars = 95% CI



The lung cancer mortality rate in 2005-2007 was lower in northern Saskatchewan than in Nunavik and Nunavut, while being higher than in Saskatchewan, Canada, and all other northern regions.

Cervical Cancer

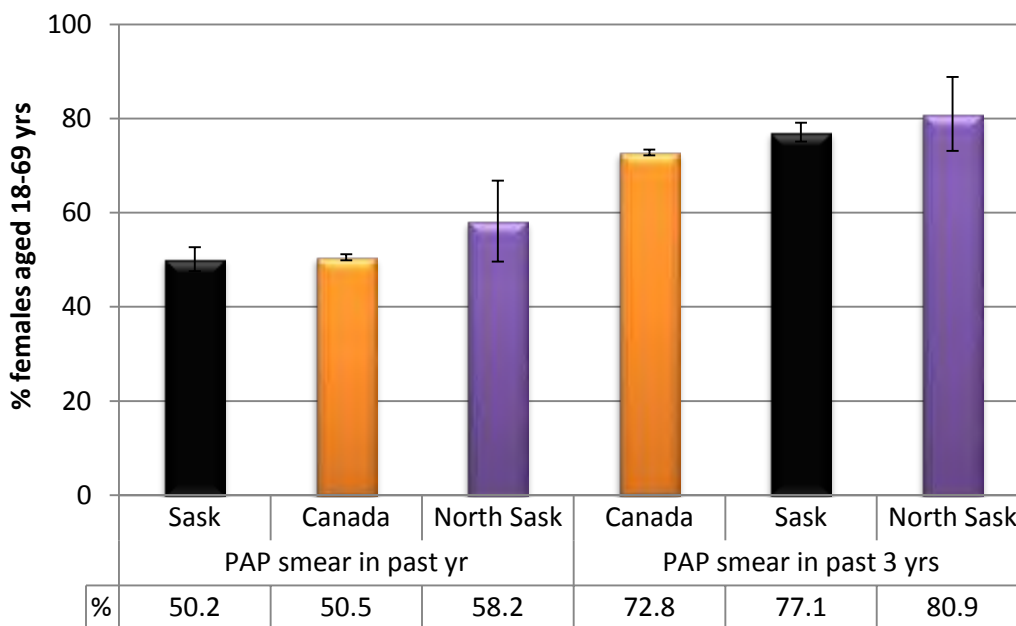
Cervical cancer continues to be a concern in northern Saskatchewan. However, there have been substantial decreases in the rates of cervical cancer in northern Saskatchewan. The first health status reports for the three northern health authorities (1998) reported that the northern cervical cancer rate was four times the provincial rate in 1970-1974 and then decreased to about twice the provincial rate in 1990-1995. For the most recent time period, the rate has decreased again – now about one and a half times the provincial rate. Between 1998 and 2007 there were 16 new cases of cervical cancer in northern Saskatchewan.

There are various approaches to the prevention of cervical cancer including strategies to reduce sexually transmitted viral infections (limiting partners and using barrier methods of contraception, such as condoms), early detection of precancerous conditions through Pap smear testing, and through immunization. The vaccine programs for human papilloma virus (HPV) infection will help reduce cervical cancer even further.

Cervical cancer rates have shown substantial improvements with northern rates decreasing from 4 times to now 1.5 times the provincial rate. The HPV vaccination program should help reduce the rate even further.

Pap smear testing

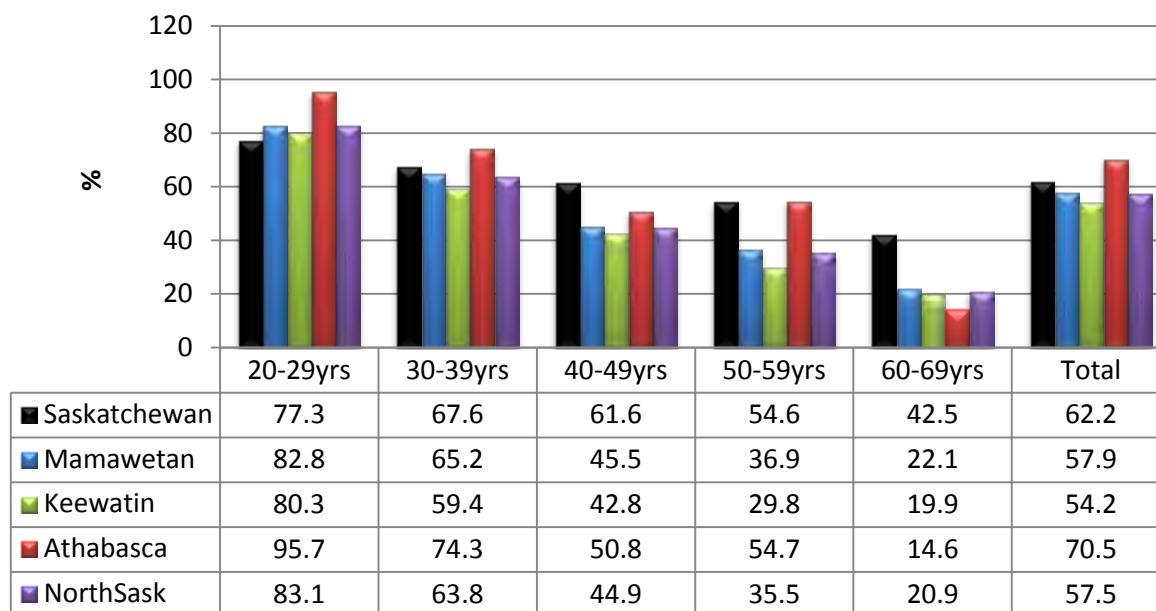
Figure 188 Self-reported pap-smear testing, off-reserve, age 18-69, by time when tested, northern Saskatchewan and Saskatchewan, 2005



Source: StatsCan (CCHS, Health Indicators), Prepared by PHU 2007 (* error bars = 95% CI's)

The Canadian Community Health Survey collects information on the proportion of the off-reserve population that self-report having a Pap smear done in either the past year or past three years. In 2005, the proportion of off-reserve females aged 18-69 years in northern Saskatchewan who self-reported having a Pap smear in the past year and the past three years was slightly higher than the provincial and national rates, but was still comparable.

Figure 189 Pap smear participation rates (%): Percentage of eligible women with at least one Pap test in a 3-year period, by age group, northern Saskatchewan health authorities and Saskatchewan, 2007-2009



Source: SCA 2011, prepared by PHU May 2011

The Saskatchewan Cancer Agency (SCA) collects information on Pap testing within Saskatchewan, as well as Pap testing done for Saskatchewan residents within Manitoba, through a registry on lab requisitions. Data from the SCA will vary from the CCHS data due to differences in the methods used; however the data from the SCA should be more accurate as it includes both on and off-reserve populations and does not rely on self-reported information. Throughout the province, participation rates are highest in the youngest age groups and steadily decrease with age. The northern rates are higher than the provincial rate in the 20-29 years age category but are lower than the provincial rate in the older age groups. The exception to this is in AHA, which has a higher rate than in the province in the 30-39 years and 50-59 years age categories. Overall the participation rates of women in MCRHR and KYHR are lower than in the province, while the AHA participation rate is higher.



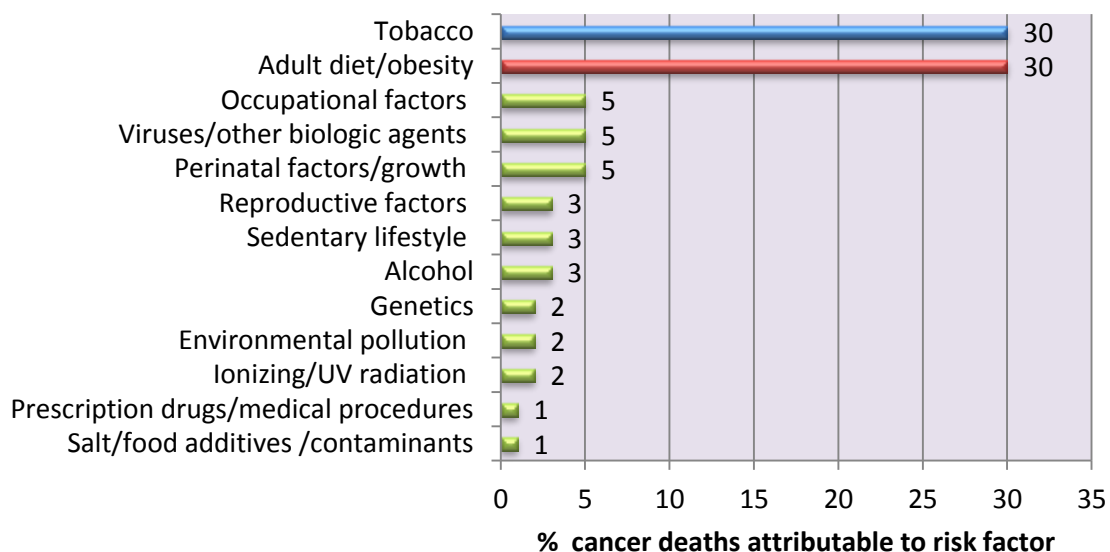
Cancer Prevention

Many risk factors for cancer are both common and preventable: tobacco use, unhealthy eating, excess body weight, and physical inactivity (Canadian Cancer Society, 2010c).

In addition to assessing which types of cancers have the greatest impact on the health of the population (by looking at cancer incidence or death statistics by cancer type), reviewing the various causes of cancer can help in determining priorities for prevention interventions. Estimating the causes for all types of cancer combined can give a clear understanding of the interventions required.

For instance, smoking has been linked to about 90% of lung cancers, with other factors being exposure to radon gas, asbestos, chemicals such as arsenic, or air pollution. Diet, family history, and the presence of chronic lung disease also contribute to cancer. For all types of cancer mortality combined, tobacco contributes about 30%, which is about the same contribution as other factors which are interlinked, such as diet, body weight and physical activity (Adami, Day, Trichopoulos, & Willett, 2001).

Figure 190 Causes of cancer mortality in Canada (percent attributed to various risk factors/conditions)

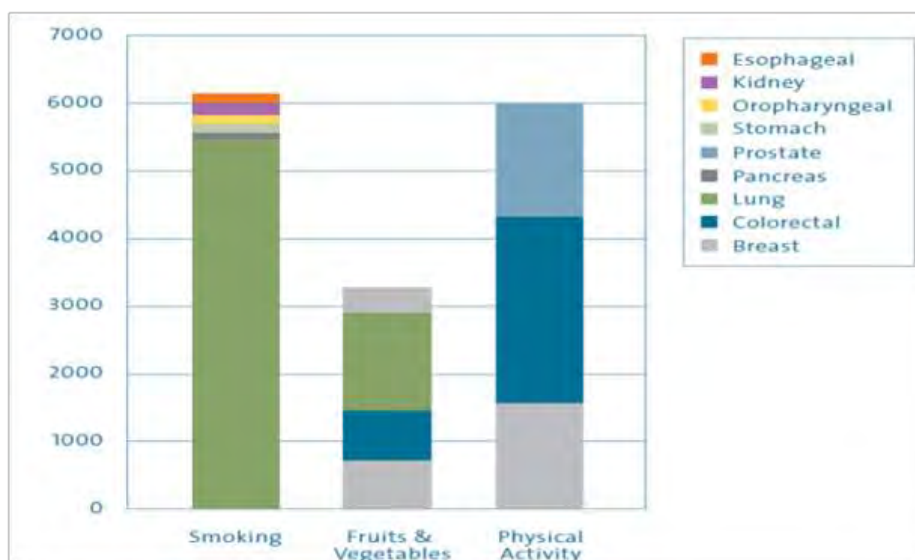


Source: Adapted from Primary and secondary prevention in the reduction of cancer morbidity and mortality. European Journal of Cancer. 37: Adami HO, Day NE, Trichopoulos NE & Willett WC (2001). Prepared by PHU, Jan 2008

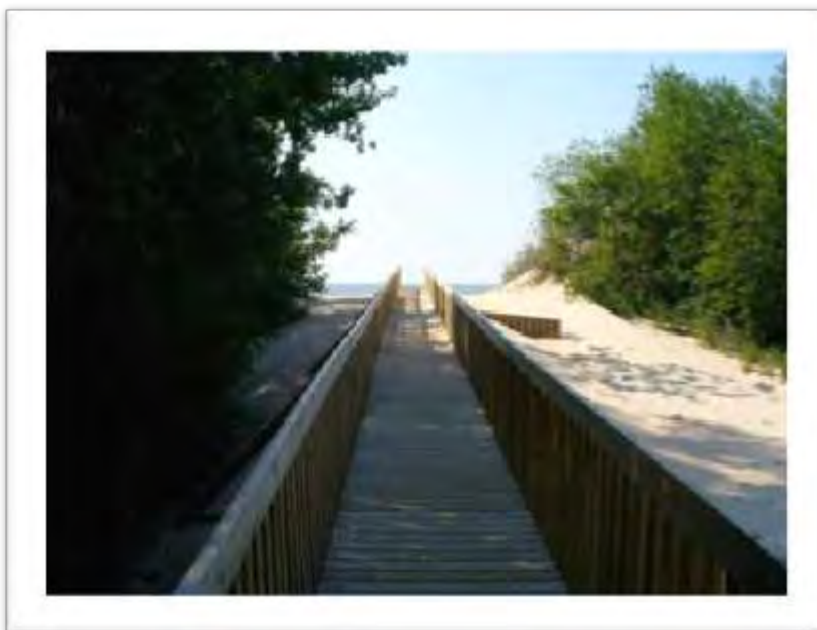


A recent study estimated the impact on the number of people in Ontario diagnosed with lung cancer by the year 2020 if various targets were reached for smoking rates (from about 20% to 5% smoking rates), consumption of fruits and vegetables (from 32% to 90% of adults consuming 5 or more fruits and vegetables daily), and physical activity (from 34% to 90% of adults having moderate to vigorous physical activity for most days of the week) (Canadian Cancer Society & Cancer Care Ontario, 2003). The authors predicted that there would be over 15,000 fewer people diagnosed with cancer in Ontario by 2020! There would also be a reduction in diabetes, heart disease, stroke and other chronic health conditions.

Figure 191 Number of cases of cancers prevented by implementing tobacco, diet and physical activity interventions by 2020



Source: Targeting Cancer: An action plan for cancer prevention and detection: Cancer 2020 Summary Report (Canadian Cancer Society & Cancer Care Ontario, 2003)

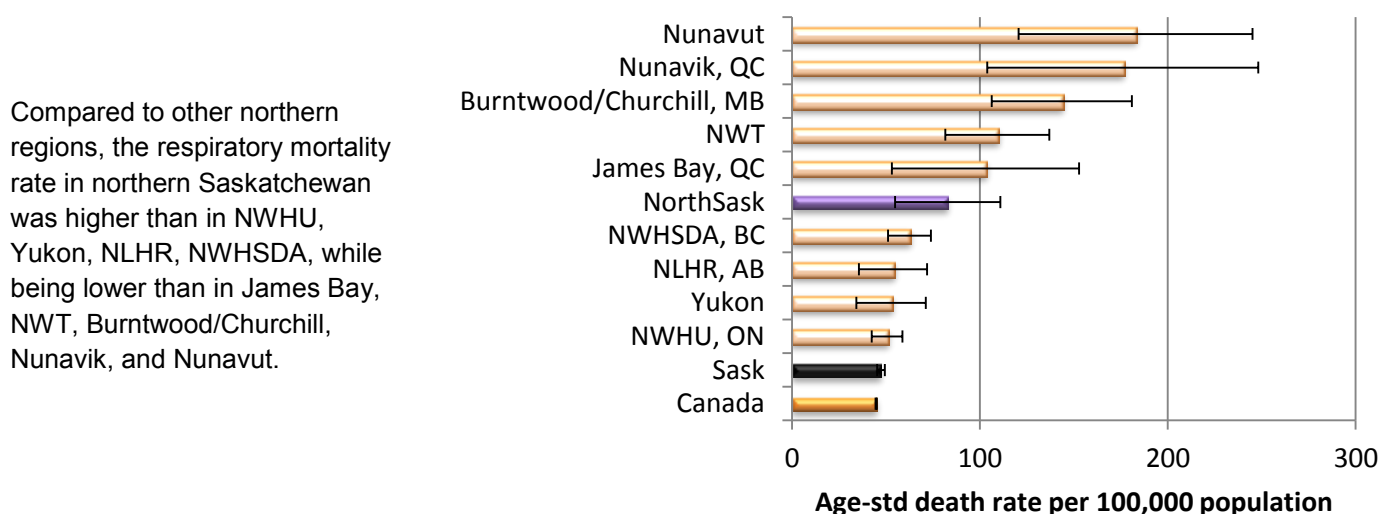


Respiratory disease

Respiratory diseases cover a variety of illnesses, including chronic obstructive pulmonary diseases (COPD), asthma, influenza and pneumonia, and adult respiratory distress syndrome.

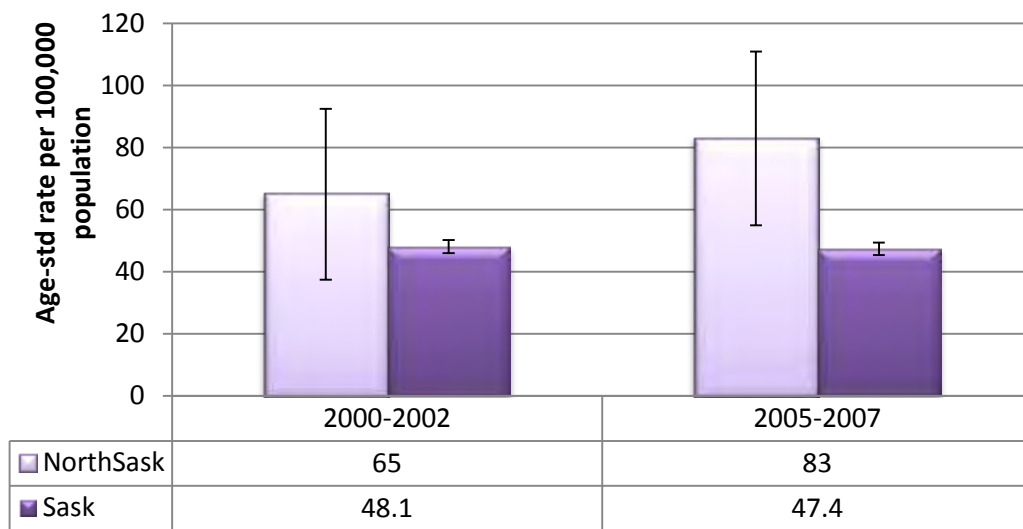
Respiratory diseases contributed 7.7% of deaths in northern Saskatchewan and 9.0% of deaths in Saskatchewan as a whole, between 1998 and 2007. Respiratory mortality rates remained fairly constant in northern Saskatchewan between 1998 and 2007, ranging from 7.6% of all deaths in 1998-2002 to 7.9% in 2003-2007 (see Figure 110). Changes in specific causes of respiratory deaths in northern Saskatchewan included a decrease in COPD mortality rates from 17.1 to 13.6 deaths per 100,000 population and an increase in rates of pneumonia and influenza, from 5.9 to 9.6 deaths per 100,000 population.

Figure 192 Age-standardized respiratory mortality rate, 3-year averages, by northern region, 2005-2007



Source: Statistics Canada (Health Indicators) Error bars = 95% CI *excludes infectious & parasitic diseases

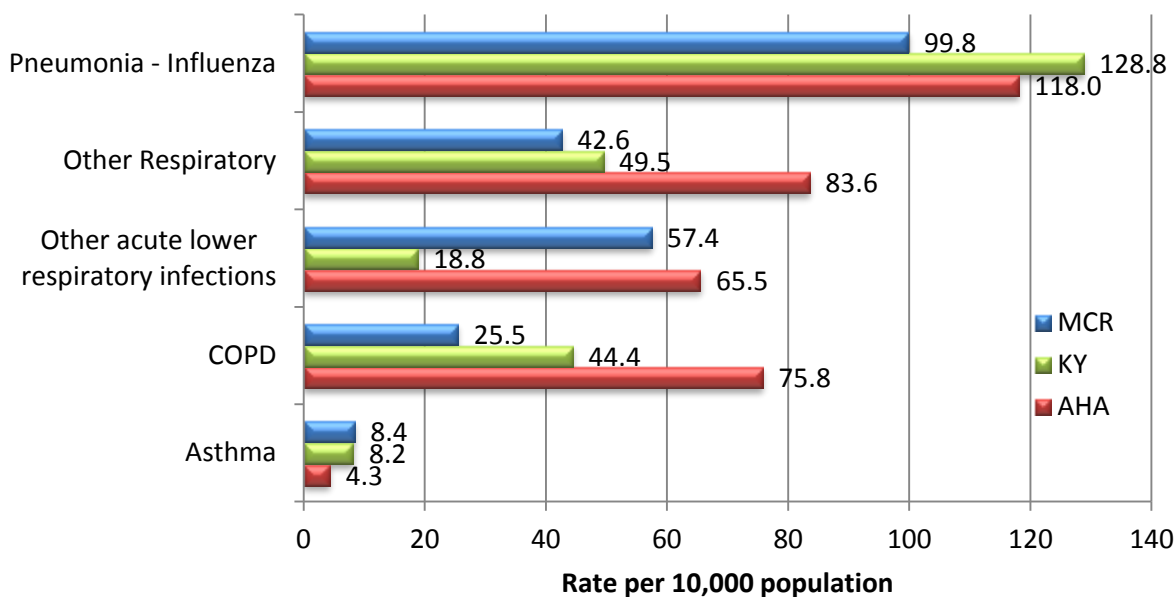
Figure 193 Age-standardized respiratory mortality rate, 3-year averages, by northern region, 2000-2002 to 2005-2007



Source: Statistics Canada (Health Indicators) Error bars = 95% CI

The respiratory mortality remained stable between 2000-2002 and 2005-2007 in Saskatchewan. During the same time period, the rate in northern Saskatchewan increased by almost 30% and was significantly greater than the provincial rate.

Figure 194 Hospitalizations for respiratory conditions, 5-year average crude rate, northern Saskatchewan health authorities, 2004/5 to 2008/9



Source: SaskHealth, Prepared by PHU July 2010

Respiratory diseases accounted for 14.0% of all hospitalizations in northern Saskatchewan between 2004/5 and 2008/9, whereas, at the provincial level, these diseases only accounted for 10.3% of all hospitalizations. Across the north, hospitalization rates for most respiratory conditions were higher in AHA than MCRHR or KYHR, between 2004/5 and 2008/9. The leading cause of respiratory hospitalizations in the north was pneumonia and influenza.

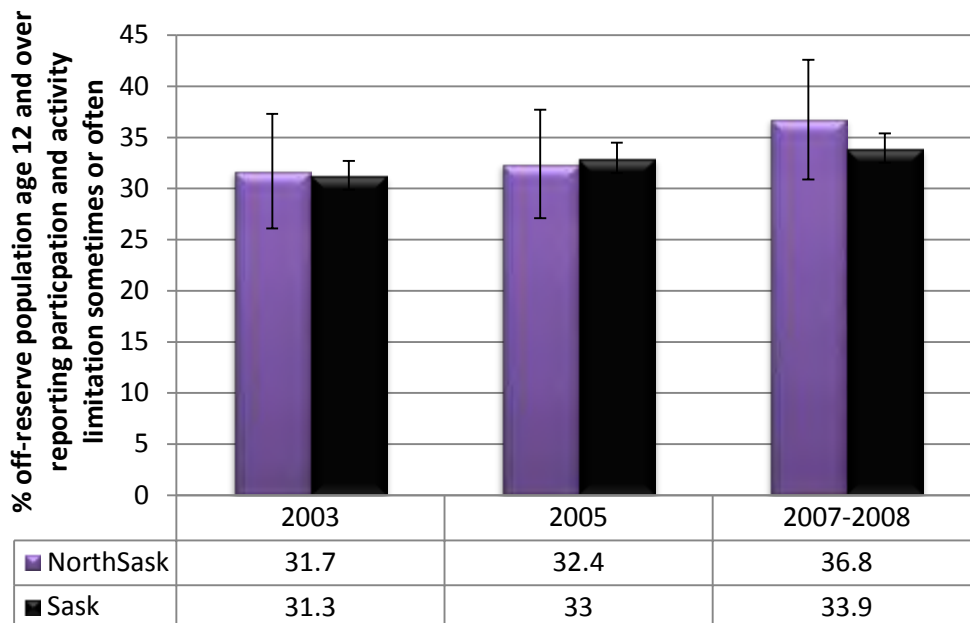
Respiratory diseases can be influenced by smoking, environmental tobacco smoke, housing conditions, other air quality conditions, and other factors. In Canada, the two important preventable risk factors for respiratory disease are smoking (both personal smoking and exposure to environmental tobacco smoke) and air quality (indoor and outdoor). Exposure to environmental tobacco smoke has been shown to have negative health effects on a variety of respiratory conditions including lung cancer, COPD, asthma, allergies and pneumonia (Reardon, 2007). Immunization for influenza as well as pneumococcal disease and pertussis (whooping cough) can decrease death rates and hospitalization rates for respiratory conditions.



Activity limitation

Activity limitation among the population aged 12 and over was assessed through the Canadian Community Health Status Survey. Activity limitation refers to being limited in selected activities (home, school, work and other) because of a physical condition, mental condition, or health problem which has lasted or is expected to last six months or longer.

Figure 195 Population aged 12 and over, off-reserve, reporting activity limitations sometimes or often, northern Saskatchewan and Saskatchewan, 2003 to 2007-2008

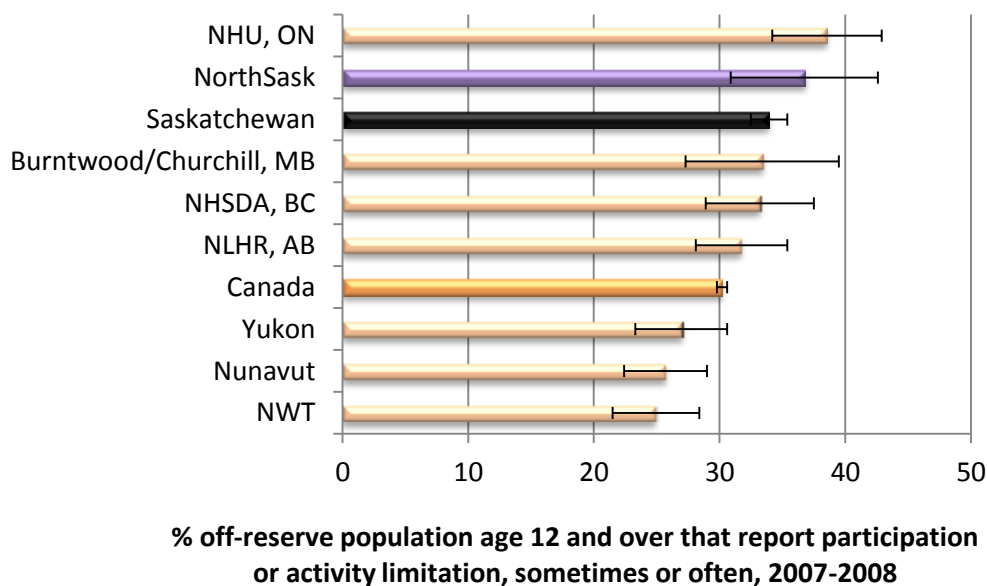


Between 2003 and 2007-2008 the percent of the off-reserve population aged 12 and over in northern Saskatchewan reporting an activity limitation steadily increased. During the same time period, the provincial rate increased slightly less, and was slightly below northern Saskatchewan levels.

Source: StatsCan (CCHS- Health Indicators), Prepared by PHU July 2009

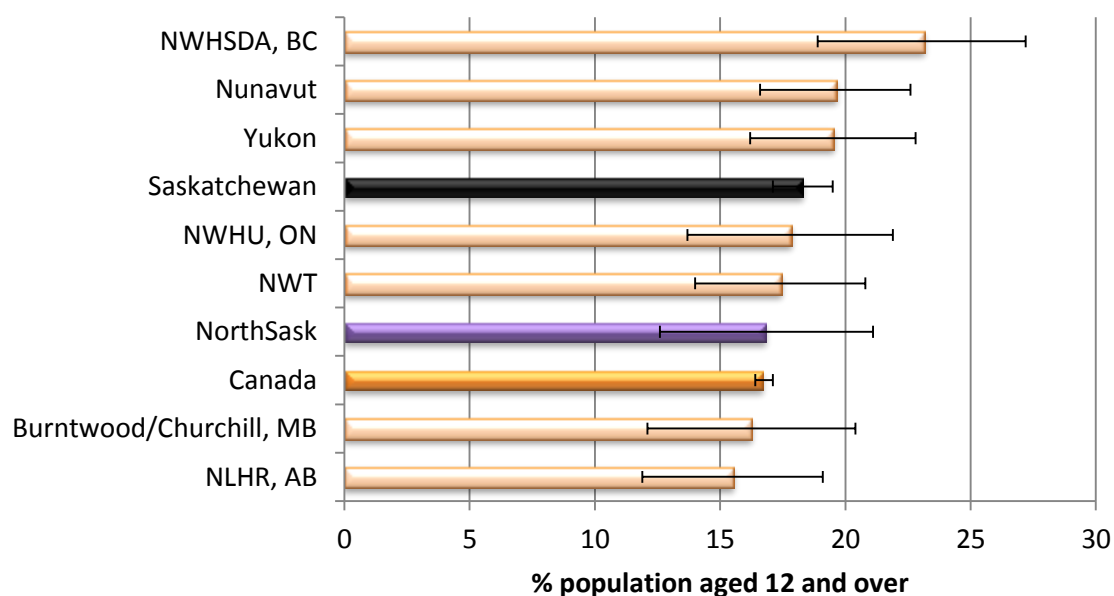
Figure 196 Population aged 12 and over, off-reserve, reporting participation or activity limitation, sometimes or often, by northern region, 2007-2008

Northern Saskatchewan has relatively high rates of people who report participation or activity limitation "sometimes or often". The rate in northern Saskatchewan was 37%, higher than both the Saskatchewan rate at 34% and the Canadian rate of 30%. Compared to other northern regions, northern Saskatchewan's rate was lower than NHU's, but higher than all of the other rates.



Source: StatsCan (CCHS-Health Indicators), Prepared by PHU July 2009

Figure 197 Population reporting two-week disability days, off-reserve, aged 12 and over, by northern region, 2005



Source: Statistics Canada (Health indicators), Prepared by PHU, Apr , 2010 * Error bars are 95% CI

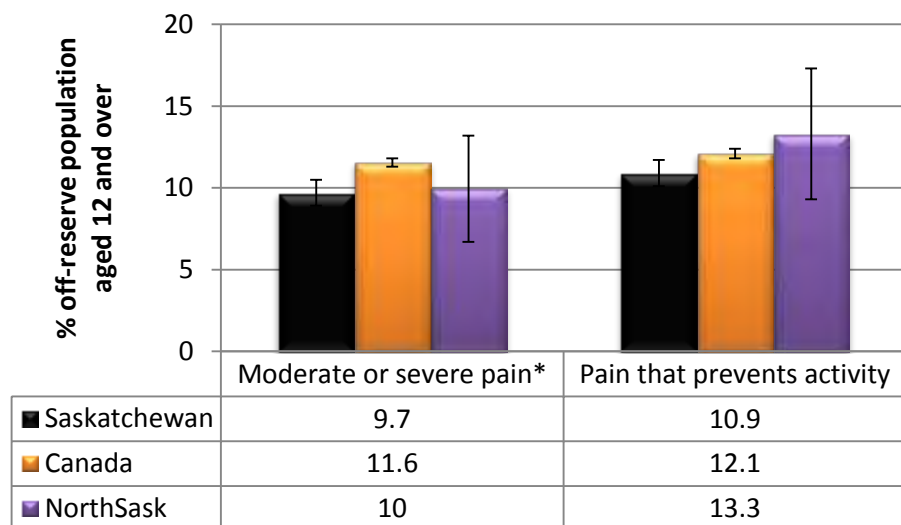
The proportion of the population reporting two-week disability days refers to those surveyed who stayed in bed or cut down on normal activities because of illness or injury, on one or more days in the two weeks preceding the survey. In 2005, 16.8% of the northern Saskatchewan off-reserve population reported at least one day of disability in the previous two weeks. This was higher than the rates in Canada, Burntwood/Churchill, and NLHR, but lower than the rates in NWT, NWHU, Saskatchewan, Yukon, Nunavut, and NWHSDA. However, due to small numbers, there is a lot of variability in the results and thus it is hard to tell if these differences are true differences.



Self-reported pain

Pain is an understudied health condition that can have major impacts on many aspects of our lives. Pain is something that is experienced by all of us, one time or another, and can vary in its nature. It can be considered “acute” in nature, such as days after a sports injury, or “chronic” in nature, when it persists for months or even years after the initial injury or condition, such as lower back pain. Chronic pain has been shown to increase with age and the number of chronic conditions an individual has and in turn can interfere with daily activities, increase the likelihood of reporting lower self-perceived health and contribute to feelings of unhappiness (Ramage-Morin, 2008). As well, greater pain severity has been shown to be related to greater activity interference, while an increase in pain severity has been related to increased likelihood of being unhappy and reporting negative self-perceived health (Ramage-Morin, 2008).

Figure 198 Population aged 12 and over, off-reserve, which self-report moderate or severe pain and pain that prevents activity, by region, 2007-2008



Source: StatsCan (CCHS - Health Indicators), Prepared by PHU July 2009, * NorthSask CV > 16.5

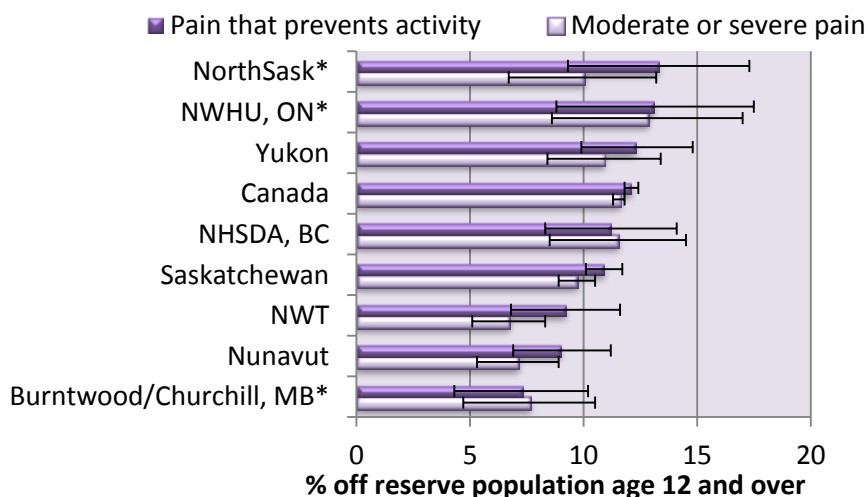
The Canadian Community Health Survey collects information from the off-reserve population aged 12 and over on pain severity and pain that prevents activity. Individuals who report “usually having pain or discomfort” are asked to describe the intensity of the pain or discomfort (mild, moderate, severe) and how many activities their pain or discomfort prevents (none, a few, some, or most).

The proportion of the off reserve population reporting moderate or severe pain was slightly higher in

northern Saskatchewan than in Saskatchewan, and slightly lower than in Canada. Northern Saskatchewan had a slightly higher rate of individuals’ reporting pain that prevented activities than in the province and the country.

Figure 199 Population aged 12 and over, off-reserve that self-report moderate or severe pain and pain that prevents activity by northern region, 2007-2008

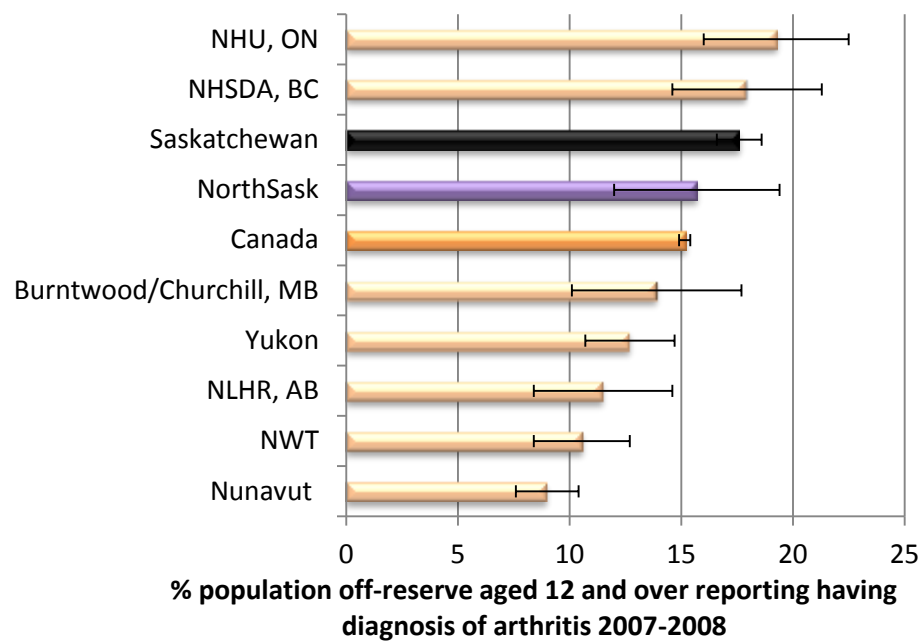
The proportion of the off-reserve population reporting pain that prevents activities in northern Saskatchewan was higher than in all other northern regions, while the proportion reporting moderate/severe pain was higher than in Saskatchewan, Burntwood/Churchill, and Nunavut, and lower than in Yukon, NHSDA, Canada and NWHU. However, due to small numbers, there is a lot of variability in the results and thus it is hard to tell if these differences are true differences.



Source: StatsCan (CCHS - Health Indicators), Prepared by PHU July 2009, *CV > 16.5 for at least 1 indicator

Arthritis

Figure 200 Population aged 12 and over, off-reserve, reporting being diagnosed by a health professional as having arthritis, by northern region, 2007-2008



In 2007-2008, 16% of the off-reserve population aged 12 and over in northern Saskatchewan reported having a diagnosis of arthritis. This is slightly higher than the Canadian rate of 15%, but slightly lower than the Saskatchewan rate of 18%.

Compared to other northern regions, this rate was higher in northern Saskatchewan than in Burntwood/Churchill, Yukon, NLHR, NWT, Nunavut, and lower than in NHSDA and NHU.

Source: StatsCan (CCHS-Health Indicator), Prepared by PHU July 2009



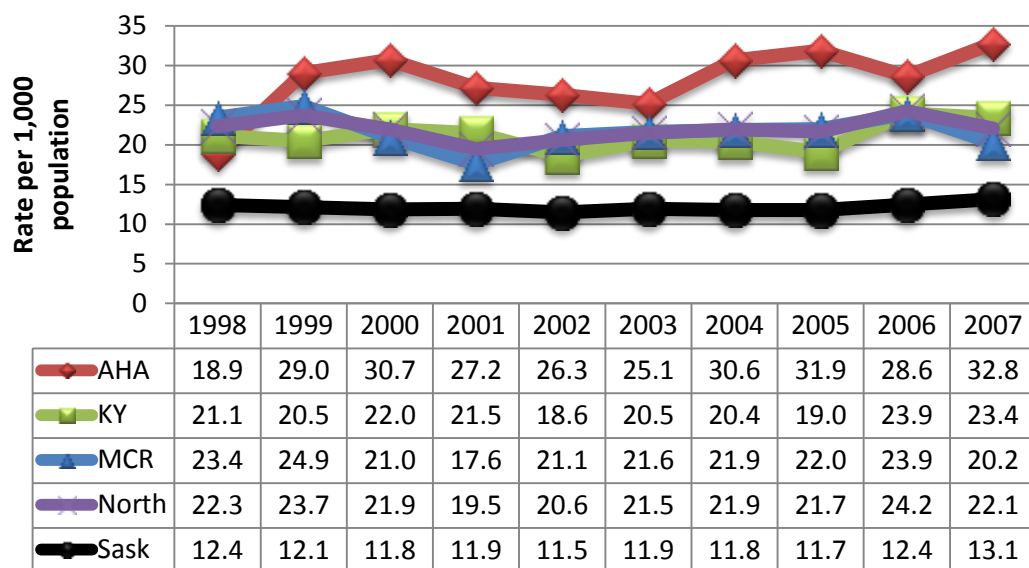
Family health (maternal and child health)

"There can be no keener revelation of a society's soul, than the way it treats its children."

Nelson Mandela

Birth rates

Figure 201 Crude birth rate by year and health authority, 1998-2007



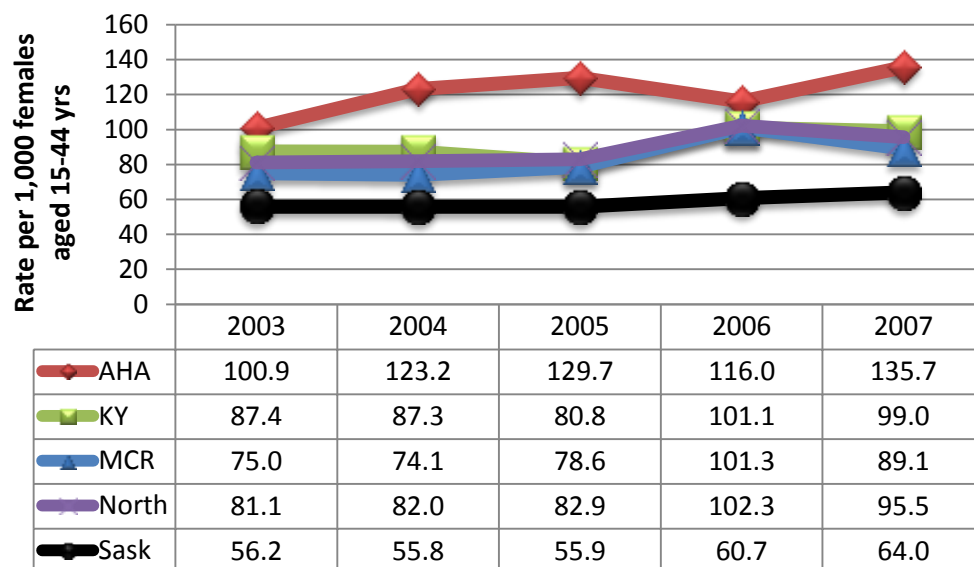
Source: SaskHealth, Prepared by PHU Sept 2009

The crude birth rate is the total number of births per 1,000 total population per year. The Saskatchewan birth rate remained relatively stable between 1998 and 2007. As there are fewer births per year in the northern health authorities, there is more year to year variation in the annual rates. Birth rates in the northern health authorities ranged from 1.9 to 2.3 times higher than in all of Saskatchewan over this time period.

The general fertility rate refers to the birth rate for women aged 15-44 years, the age groups most likely to have births. The northern 5-year average general fertility rates, between 2003 and 2007, ranged from 83.8 to 121.0 births per 1,000 women aged 15-44 years, which was between 1.5 to 2 times the provincial rate of 58.5 births per 1,000 women.

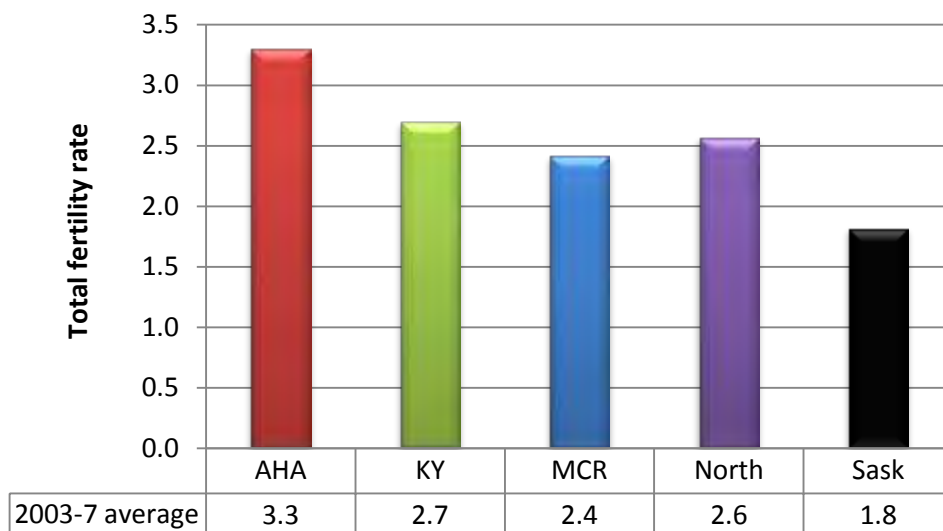
Figure 202 Fertility rate (birth rate for females aged 15-44 years), by health authority and year, 2003-2007

Between 2003 and 2007, the general fertility rate increased by 34.5% in AHA, 13.2% in KYHR, 18.8% in MCRHR, 17.8% in northern Saskatchewan, and 13.9% in Saskatchewan. In 2007, the northern general fertility rates remained substantially higher than the provincial rate.



Source: SaskHealth, Prepared by PHU Sept 2009

Figure 203 Total fertility rate, 5-year average, by northern health authority and Saskatchewan, 2003-2007



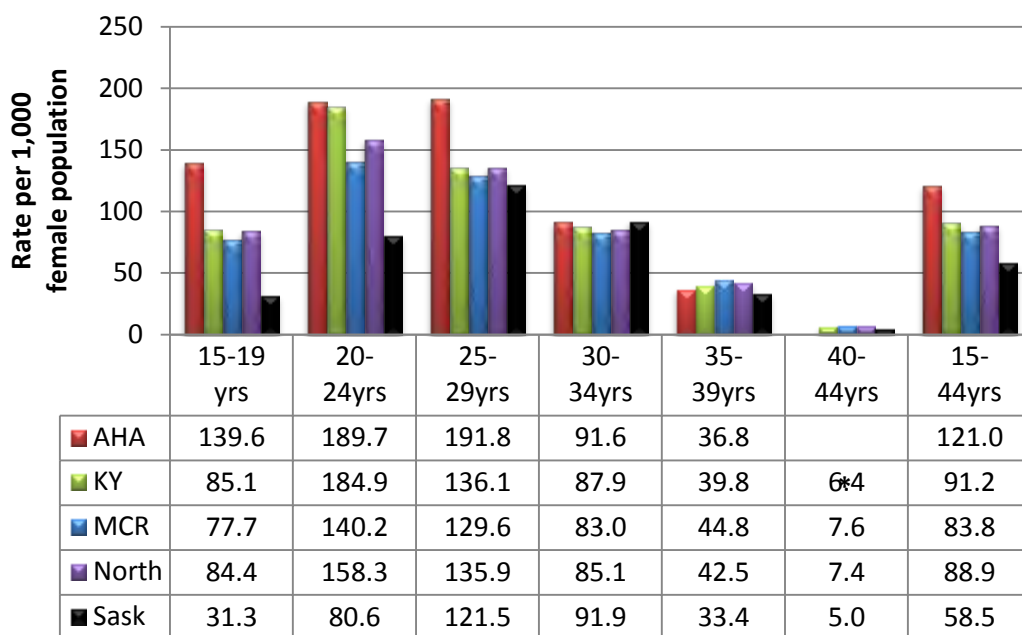
Source: SaskHealth, Prepared by PHU Jan 2010

The total fertility rate tells us the average number of children that would be born per woman if a woman lived to the end of her child bearing years. In other words, it answers "On average, how many children does a woman have?" The 5-year average fertility rates were higher in northern Saskatchewan than in the whole province, with the overall northern rate of 2.6 being almost 1 child per woman higher than the provincial rate of 1.8.

Between 2003 and 2007, the northern rate increased from 2.4 children per woman in 2003 to 2.8 children per woman in 2007. The increase in the provincial rate was smaller, from 1.8 in 2003 to 2.0 children per woman in 2007.

Figure 204 Age-specific birth rates, 5-year average, by health authority, 2003-2007

The highest birth rates, averaged over five years, in the northern health authorities tended to be in the 20-24 year age groups followed by the 25-29 year age group. The highest provincial rates were in the 25-29 year old age group followed by the 30-34 year age group. In the 30-34 year age group, the province had the highest crude birth rate, whereas the northern health authorities had higher rates in all other age groups.



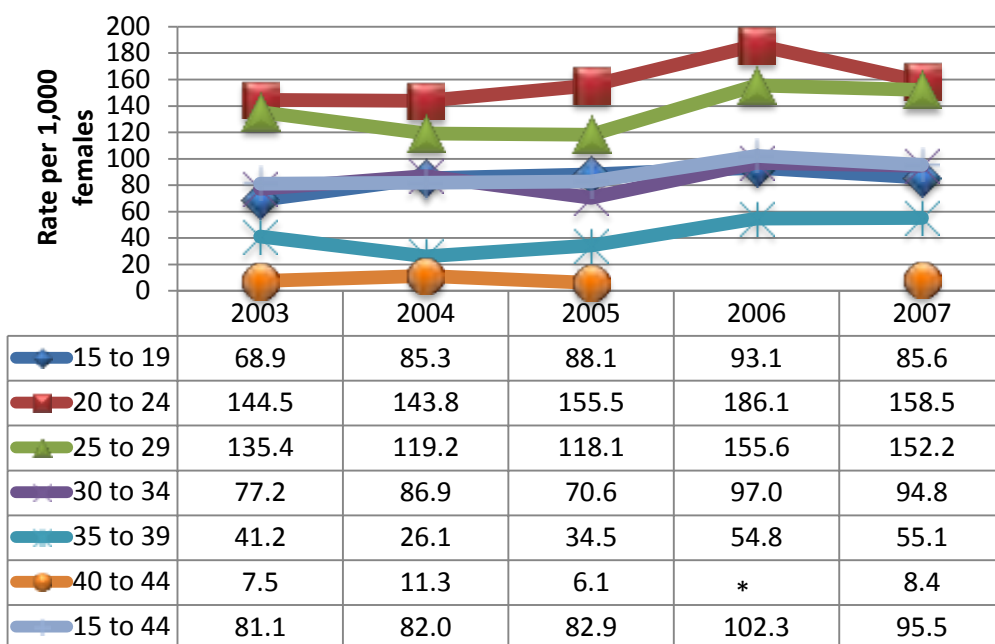
Source: SaskHealth, Prepared by PHU Sept 2009 (* suppressed as cell count < 5)

The biggest differences between the northern health authorities and the whole province were in the younger age categories. The northern birth rates for 15-19 year olds and 20-24 year olds ranged from 1.7 to 4.5 times higher than the provincial rates.

Figure 205 Age-specific birth rates by year, northern Saskatchewan, 2003-2007

Between 2003 and 2007, the largest increases in northern birth rates were in the 15-19 year (24.4%), 30-34 year (22.8%), and 35-39 year (33.7%) age groups.

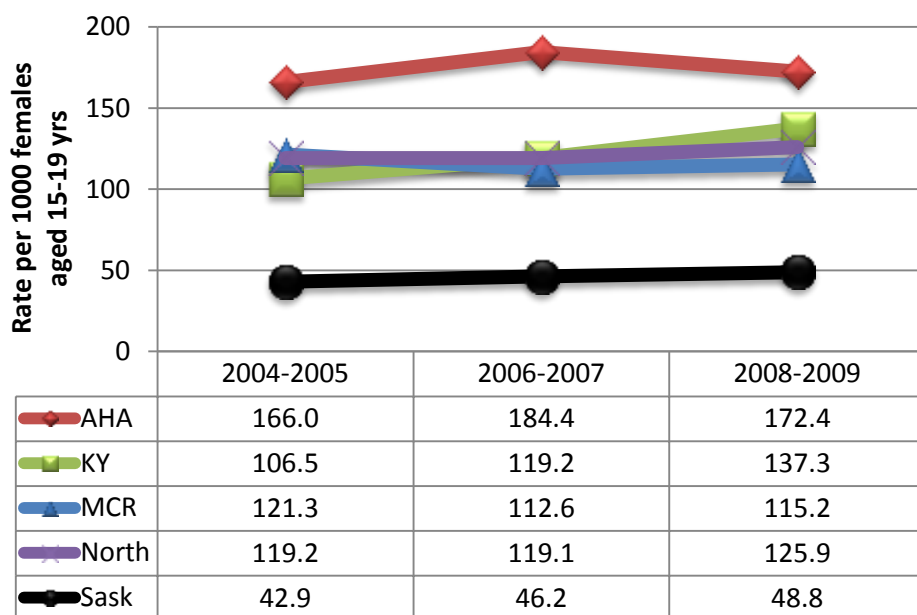
However, northern birth rates remained the highest over the five-year period in the 20-24 years and 25-29 years age groups.



Source: SaskHealth, Prepared by PHU Sept 2009 * Data suppressed as < 5

Teen pregnancy

Figure 206 Teen pregnancy rates, females aged 15-19 years, 2-year averages, by northern health authority and Saskatchewan 2004-2005 to 2008-2009



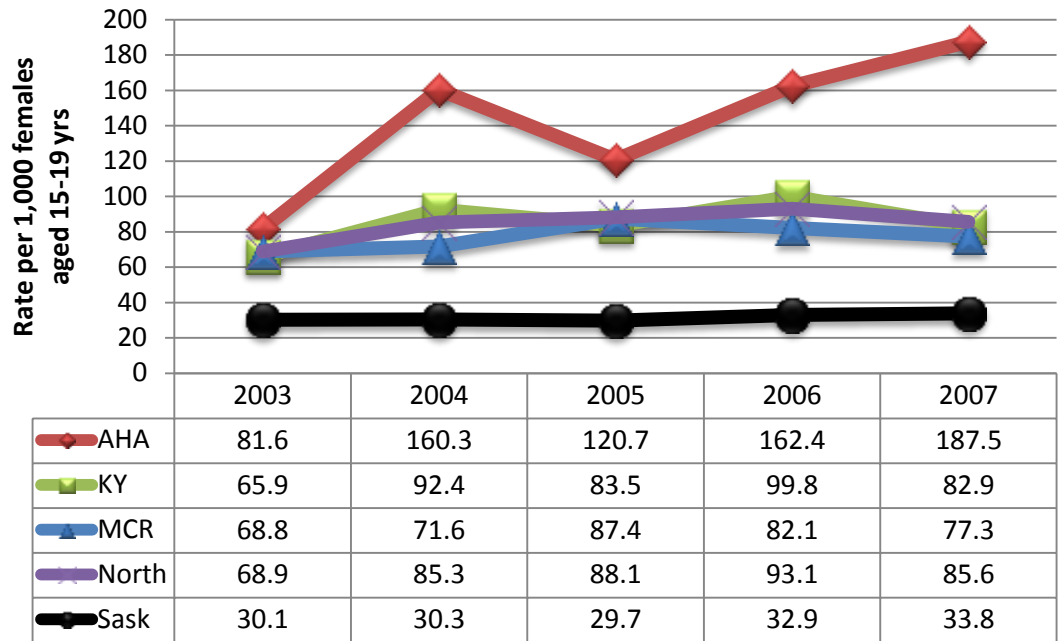
Source: SaskHealth HSUR 2008-9 Reports, Prepared by PHU Mar 2011

The teen pregnancy rate tells us the average number of pregnancies per woman aged 15-19 years in a given period of time. Small numbers in some communities can result in big increases and decreases in those rates from year to year. In order to minimize this we average the rate over a 2-year time period. The teen pregnancy rate is broader than the teen birth rate as it captures not only the number of live births, but also the number of still births, spontaneous abortions (miscarriages) and planned abortions. Between 2004-2005 and 2008-2009 the teen pregnancy rates decreased

slightly in MCRHR, and increased in AHA and KYHR, the north as a whole and the province. In 2008-2009, the teen pregnancies rates were all substantially higher in AHA, KYHR and MCRHR than in the province, ranging from 2.4 to 3.5 times higher.

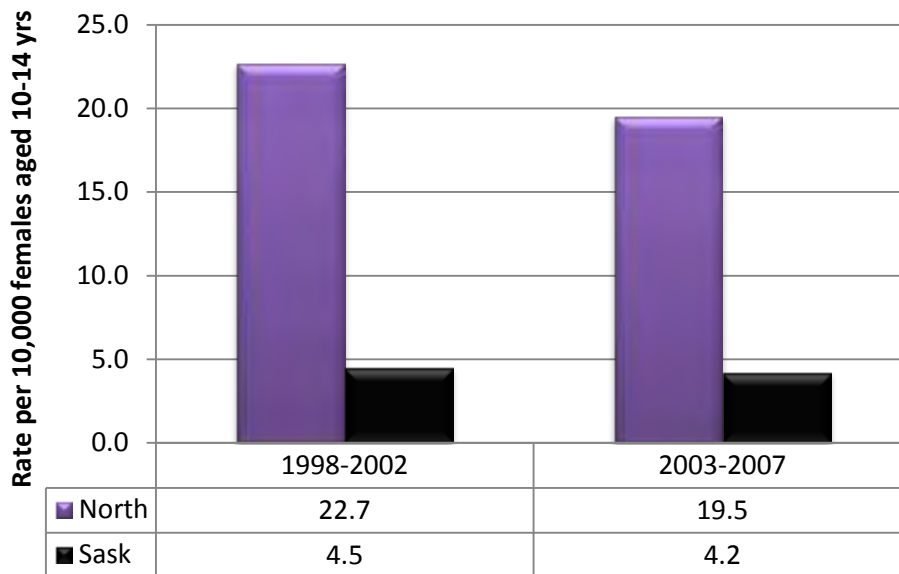
Figure 207 Teen birth rate by health authority and year, 2003-2007

The teen birth rate tells us the number of live births per 1000 females, aged 15-19, per year. Between 2003 and 2007, the teen birth rate increased by 12.3% in Saskatchewan, in comparison to 12.4% in MCRHR, 25.9% in KYHR, and 129.7% in AHA. In 2007, the teen birth rate in AHA, KYHR, and MCRHR remained between 2.3 and 5.5 times greater than Saskatchewan's rate.



Source: SaskHealth, Prepared by PHU Sept 2009

Figure 208 Early adolescent birth rate, females aged 10-14 years, northern Saskatchewan and Saskatchewan, 5-year averages, 1998-2007



Source: SaskHealth, Prepared by PHU Jan 2011

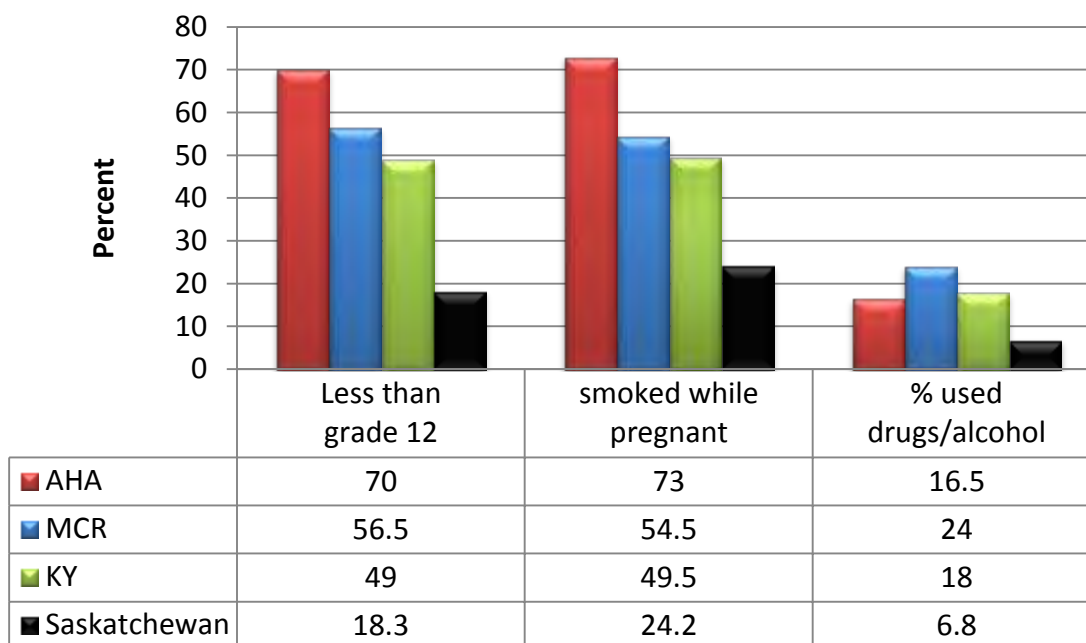
The early adolescent birth rate tells us the number of live births per 10,000 females aged 10-14 years, per year. As the numbers can often be very small, there can be big increases and decreases in those rates from year to year. In order to minimize this, we average the rate over a 5-year time period. Between 1998-2002 and 2003-2007, the adolescent birth rates decreased in both northern Saskatchewan and Saskatchewan. However, the northern rate remains 4.6 times the provincial rate.

The 20 births to northern girls aged 10-14 years accounted for 26% of the total 75 Saskatchewan births to girls in this age group between 2003 and 2007. The northern birth rate among girls aged 10-14 year old is almost five times higher than the provincial rate.

Perinatal health determinants

The Ministry of Education's Early Childhood Development and Integrated Services coordinates a questionnaire for women who deliver infants in Saskatchewan hospitals, with the support of the Kids First programs and the health authorities/regions. This provides information about potential risk factors or vulnerabilities of the infants. For the period between November 2007 and March 2010, 23,796 interviews were conducted in the province, with 1,684 being conducted with women from northern Saskatchewan. Results from northern Saskatchewan indicate increased vulnerabilities for the unborn child and potentially ongoing risk to infants. On average, more than 54% of northern women reported that they smoked while pregnant (up to 74% in AHA – three times the provincial average) and more than 21% used drugs or alcohol during pregnancy (up to 24% in MCRHR – at a rate of almost four times that of the provincial average).

**Figure 209 Perinatal health determinants from in-hospital questionnaires at time of birth
November 2007 – March 2010**



Source: In-hospital Birth Questionnaire Data (Nov 07-Mar 10) Saskatchewan Ministry of Education Early Childhood Development and Integrated Services, 2011)

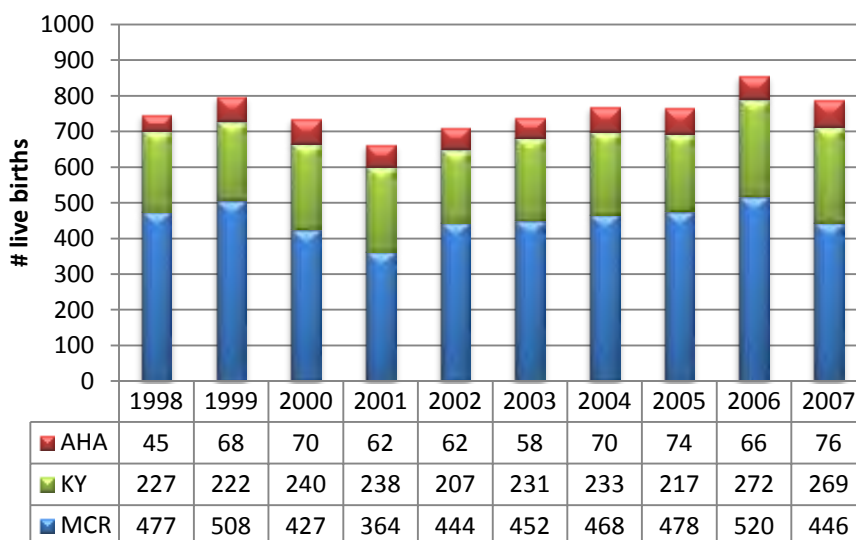


Newborns and their health

Births

Figure 210 Number of births by northern health authority and year, 1998-2007

Between 1998 and 2007, there was an average of 759 births in northern Saskatchewan per year, although there were some year to year fluctuations. The years with the fewest births were 2001 in MCRHR, 2002 in KYHR and 1998 in AHA. The years with the highest numbers of births were 2006 in MCRHR and KYHR and 2007 in AHA. Overall in the north, the number of births decreased around 2001, and then increased slowly until 2006 and 2007.



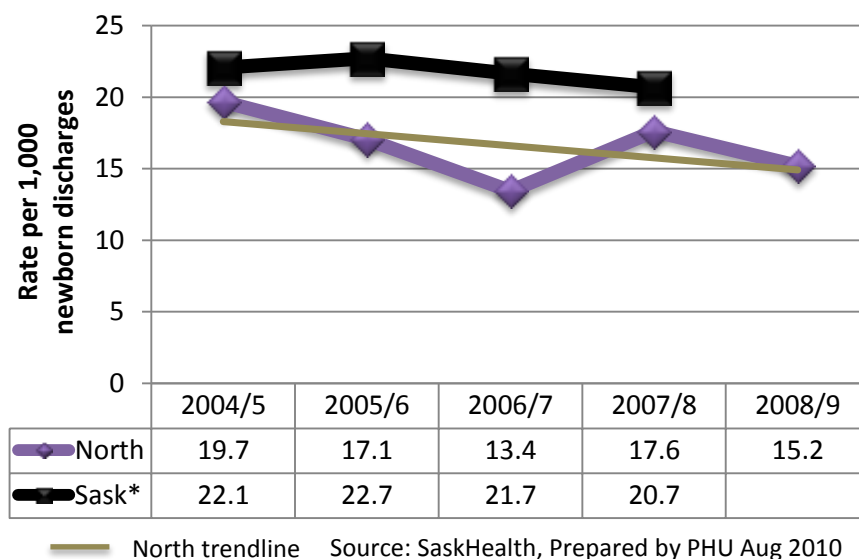
Source: SaskHealth, Prepared by PHU Sept 2009

Congenital anomalies

A congenital anomaly, also referred to as a birth defect or a congenital malformation, is an abnormality of structure, function or body metabolism, which is present at the time of birth (even if not diagnosed until later in life) and results in physical or mental disability, or is fatal. (March of Dimes Resource Center In Health Canada, 2002). The assessment of the impact of congenital anomalies on a population can include looking at the infant death rates due to congenital anomalies, or looking at the rates of congenital anomalies diagnosed at birth in hospital, to compare between populations and the changes over time. Infant deaths from congenital anomalies decreased from about 4.5 per 1,000 live births in the mid-1980s (Tan, 1992) to 2.5 per 1,000 in 2007 – a decrease by almost half in 25 years (see Figure 215).

Figure 211 Congenital anomalies diagnosed at birth in hospital, northern Saskatchewan and Saskatchewan 2004/5 to 2008/9

When we examine congenital anomalies diagnosed in hospital for newborn infants, we see that the north has rates that are comparable to the province as a whole, if not slightly below. Between 2004/5 and 2008/9, the average number of northern newborns diagnosed with a congenital anomaly in the hospital was 17 per 1,000 newborn discharges. This was slightly lower than the provincial rate of 22 congenital anomalies diagnosed per 1,000 newborn discharges. The trend line shows that the rate of congenital anomalies diagnosed at birth decreased between 2004/5 and 2008/9.



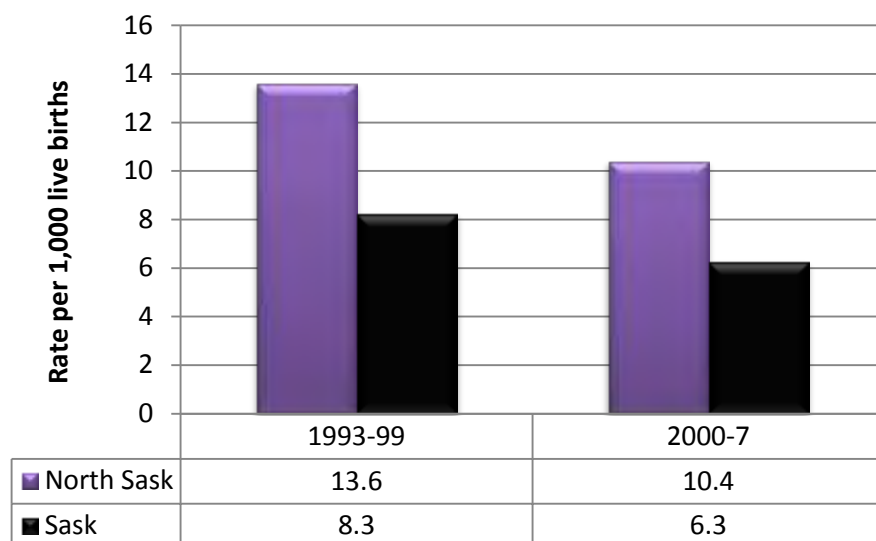
In the 25 years from the mid-1980s to 2007, the rate of infant deaths from congenital anomalies in northern Saskatchewan decreased by almost half.

Infant mortality

Infant mortality is death in children in their first year of life. The infant mortality rate (IMR) is the number of deaths in infants under one year of age per 1,000 live births, and is commonly used internationally as a health indicator to compare countries or regions.

Infant mortality has been considered the single most comprehensive measure of health in a society (Public Health Agency of Canada, 2008a). It is thought to reflect not only the level of mortality, but also the health status and healthcare of a population, specifically the effectiveness of preventive care and the attention paid to maternal and child health, as well as broader social factors such as maternal education, smoking and deprivation (Health Canada, 2008).

Figure 212 Infant mortality rate, multi-year averages, northern Saskatchewan and Saskatchewan, 1993-2007



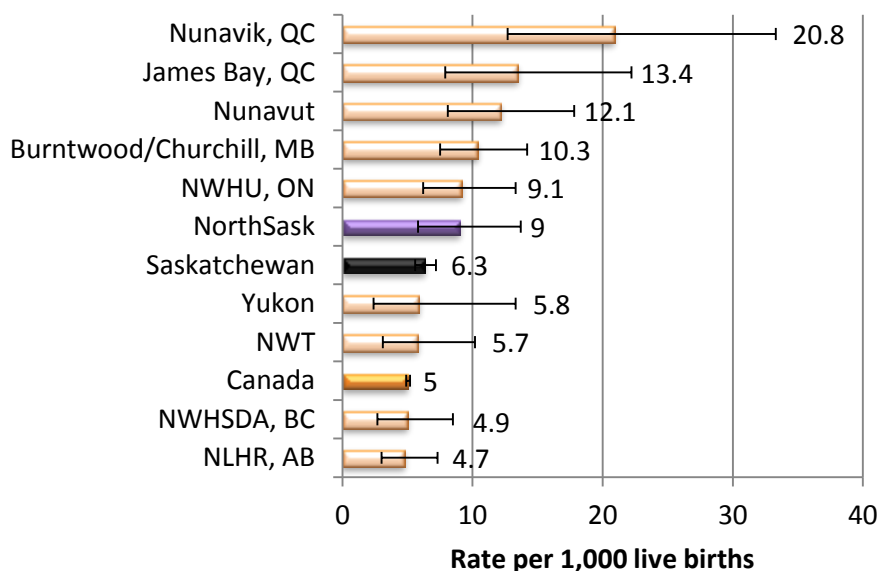
Source: SaskHealth, Prepared by PHU Nov 2009

Since the 1950s, there has been about a ten-fold reduction in the infant mortality rate in northern Saskatchewan. However, northern rates remain higher than for the whole province. The infant mortality rate in Saskatchewan decreased slightly between 1993-1999 and 2000-2007. During the same time period, the northern Saskatchewan rate also decreased by about 25% but remained 1.6 times the provincial rate.

Figure 213 Infant mortality rate by northern regions, 3-year average, 2005-2007

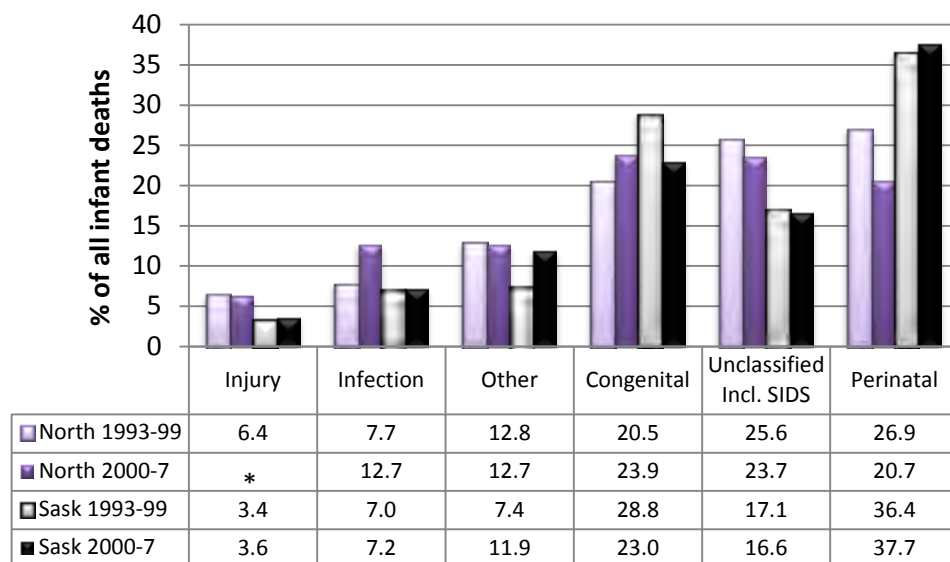
Comparing the infant mortality rate in northern Saskatchewan with other northern regions, we see that the 3-year average northern Saskatchewan rate of 9 infant deaths per 1,000 live births is lower than rates in Nunavik, James Bay, Nunavut, Burntwood/Churchill, and NWHU but higher than rates in Saskatchewan, Yukon, NWT, Canada, NWSDA, and NLHR.

Between 2000-2002 and 2005-2007, the 3-year average rate in northern Saskatchewan decreased from 11.5 to 9 infant deaths per 1,000 births. However, caution should be taken when comparing these rates between regions or over time, as there are large fluctuations in the 3-year averages due to the small populations in the northern regions.



Source: Statistics Canada (Health indicators), Prepared by PHU, Aug , 2010
* Error bars are 95% CI

Figure 214 Causes of infant death in northern Saskatchewan and Saskatchewan by time period (%), 1993-2007



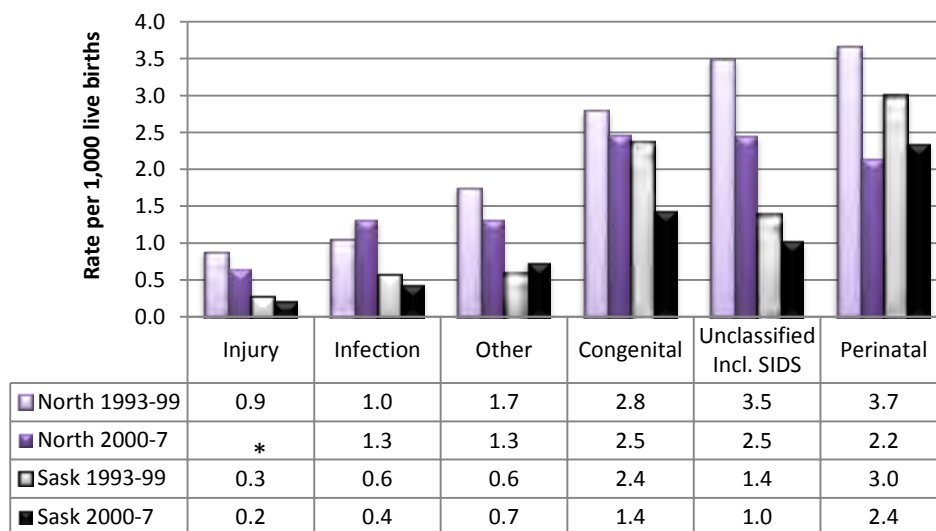
Source: SaskHealth, Prepared by PHU Nov 2009 * suppressed as cell < 5

The causes of infant death were assessed over time and compared between northern areas and the province. Caution should be taken when interpreting the changes over time as data from 1993-1999 were categorized using the ICD9 codes and Canadian List Diagnosis, while data from 2000-2007 was categorized using ICD10 codes. Between 1993 and 1999, conditions arising from the perinatal period (in the first week of life) were the leading causes of infant deaths in northern Saskatchewan,

followed by unclassified conditions (including sudden infant death syndrome - SIDS) and congenital conditions. Between 2000 and 2007, congenital and unclassified conditions including SIDS were the two leading causes of infant death and perinatal conditions were third in northern Saskatchewan. During both the 1993 to 1999 and 2000 to 2007 time periods, the leading causes of death in the province were perinatal conditions, followed by congenital conditions, and unclassified, including SIDS. Between 2000 and 2007, in comparison to the province, northern Saskatchewan had greater proportions of infant deaths caused by injuries, infections, and Unclassified including SIDS; similar proportions for deaths from other causes, and congenital conditions; and lower proportions from perinatal conditions.

Figure 215 Cause of infant death in northern Saskatchewan and Saskatchewan by year groups (per 1,000 live births), 1993-2007

Infant mortality rates from all causes, except infections, decreased between 1993-1999 and 2000-2007 in northern Saskatchewan. Similarly at the provincial level, infant mortality rates for all causes decreased, except from the category of other causes. In 2000-2007, infant mortality rates from injuries, infections, other causes, congenital conditions and unclassified causes, including SIDS were between 1.7 and 2.9 times higher in northern



Source: SaskHealth, Prepared by PHU Nov 2009 * suppressed as cell < 5

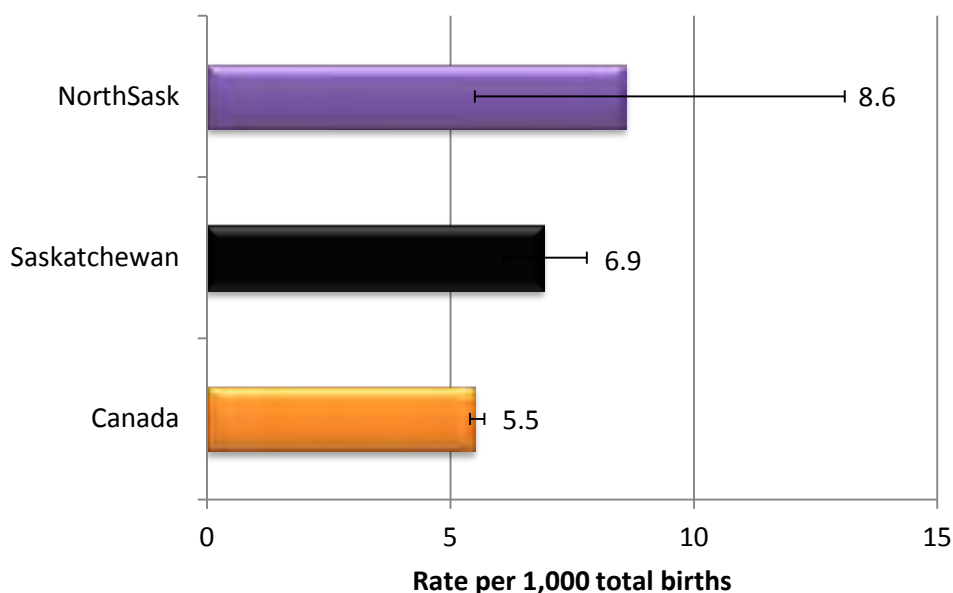
Saskatchewan than in the province as a whole. On the other hand, infant mortality rates from conditions arising in the perinatal period were 9% less in the north compared to the province, during the same time period.

Infant deaths from congenital anomalies, decreased from about 4.5 per 1,000 live births in the mid-1980s (Tan, 1992) to 2.5 per 1,000 between 2000 and 2007 – a decrease by almost half in 25 years.

Perinatal mortality

The perinatal mortality rate is the total number of stillbirths (infants with gestational age of 28 or more weeks) and early neonatal deaths (deaths within the first week of life) per 1,000 total births (live births and still births). It is a community health indicator which reflects both obstetric and pediatric care as well as socio-environmental conditions and public health actions (Peron, 1985).

Figure 216 Perinatal mortality rate, 3-year average, northern Saskatchewan, Saskatchewan, and Canada, 2005-2007



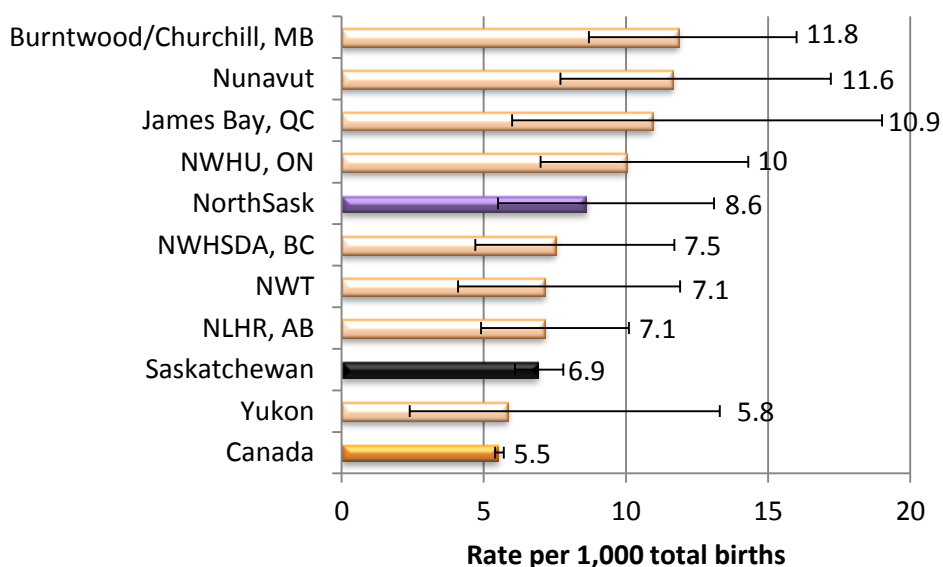
The perinatal mortality rate of northern Saskatchewan decreased slightly from 9.3 deaths per 1,000 total births in 2000-2002 to 8.6 deaths in 2005-2007. In 2005-2007, the perinatal mortality rate in northern Saskatchewan was higher than both the provincial and national estimates, but not statistically significant. Caution should be taken when comparing northern Saskatchewan rates (between regions or over time) as there are large fluctuations in the 3-year averages due to the small numbers in the northern region. When comparing the northern rate over a longer period of time, there was a reduction in the

Source: Statistics Canada (Health indicators), Prepared by PHU, Aug , 2010 * Error bars are 95% CI
perinatal mortality rate from about 17 per 1,000 total births (Tan, 1992) to 8.6 per 1,000 total births for 2005-2007.

Figure 217 Perinatal mortality rate, 3-year average, by northern region 2005-2007

The perinatal mortality rate of northern Saskatchewan in 2005-2007 (8.6 deaths per 1,000 total births) was higher than in NWHSDA, NWT, NLHR, Saskatchewan, Yukon, and Canada, while being lower than in NWHU, James Bay, Nunavut, and Burntwood/ Churchill.

Between 2000-2002 and 2005-2007, the 3-year average rate in northern Saskatchewan decreased slightly from 9.3 to 8.6 deaths per 1,000 total births.



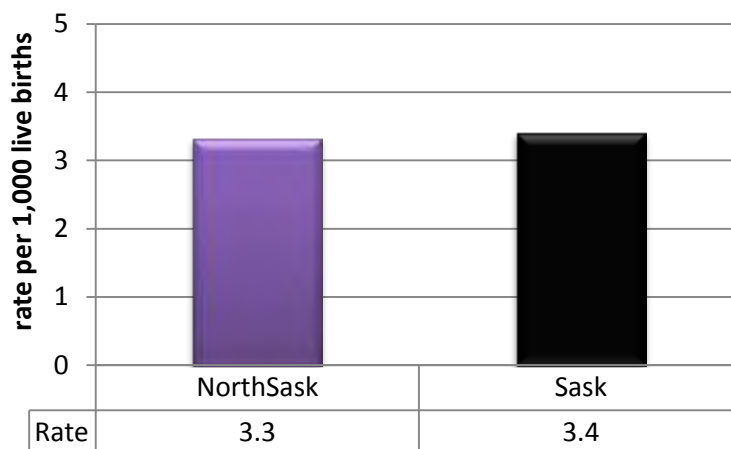
Source: Statistics Canada (Health indicators), Prepared by PHU, Aug , 2010 * Error bars are 95% CI

Early neonatal mortality

Figure 218 Early neonatal mortality rate, 5-year average rate, northern Saskatchewan and Saskatchewan, 2004-2008

The early neonatal mortality rate refers to the number of infant deaths that occur within the first week of life compared to the total number of live born infants. The Ministry of Health provides neonatal mortality data at the health region level annually. However, due to the small numbers involved, a 5-year average rate for the north has been calculated. This rate is thought to be an indicator of perinatal care, particularly during the first week of life (Peron, 1985), although other factors can also affect the results. The 5-year average early neonatal mortality rate in northern Saskatchewan was very similar to the provincial rate in 2004-2008. In Canada in 1995, the most common causes of death during the early neonatal period were perinatal complications including

respiratory distress, short gestation (prematurity), low birth weight, maternal complications and congenital anomalies (Nault, 1997). More recent Canadian data does not separate deaths that occur in the first week of life from those that occur within the first month of life; however, causes appear to remain similar (Public Health Agency of Canada, 2008a).



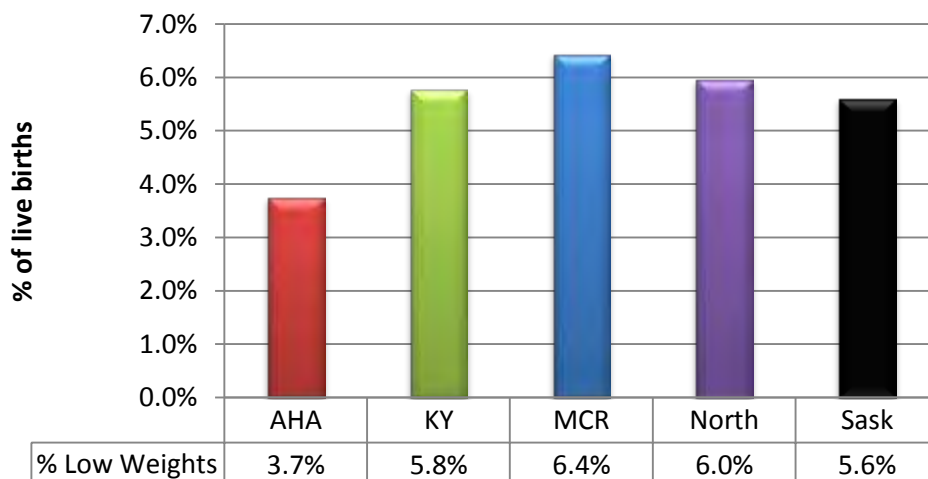
Source: SaskHealth HSUR 2004-8 reports, Prepared by PHU Jan 2010

Birth weight

Low birth weight is linked with infant survival, health and development. It can result from being born too early (preterm birth) and/or inadequate fetal growth (small-for-gestational-age) and is associated with poor maternal health and nutrition, maternal smoking, low pre-pregnancy body mass index (BMI), multiple gestation (e.g., twins, triplets), delayed childbearing, and economic circumstances (Health Canada, 2008). Low birth weight infants are at greater risk of infant death; short term health outcomes such as respiratory distress syndrome and necrotizing enterocolitis; and long term health outcomes such as blindness, deafness, hydrocephaly, mental retardation, cerebral palsy and Type 2 diabetes (Goldenberg & Culhane, 2007; Harder, Rodekamp, Schellong, Dudenhausen, & Plagemann, 2007).

Figure 219 Low birth weight by northern health authority and Saskatchewan, 2005-2009

The Ministry of Health provides birth weight data at the health region level annually. However, due to the small numbers involved, a 5-year average rate has been calculated for each region. Data from 2005 to 2009 indicate that MCRHR and KYHR have slightly higher proportions of low birth weight infants compared to the province, whereas AHA has a lower proportion. Overall, the rate of 6.0% in northern Saskatchewan is slightly higher than in the province.



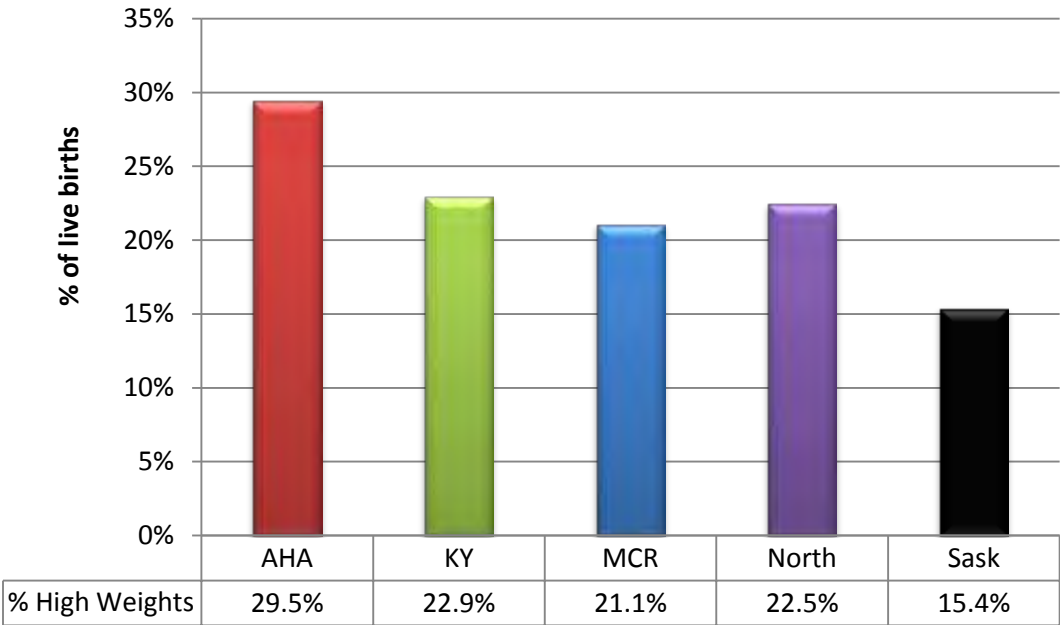
Source: SaskHealth HSUR Reports 2005-9, Prepared by PHU March 2011

High birth weight is another indicator used to monitor the overall perinatal and infant health. There is not a lot of information available on the risk factors for high birth weight or large-for-gestational-age (Public Health Agency of Canada, 2008a). The limited data that is available indicates that maternal diabetes is an important risk factor, while other factors including increased pre-pregnancy weight, increased number of previous pregnancies, previous large-for-gestational-age births, First Nations status, age 35 years and older, genetic predisposition and maternal diet may also play a role (Aljohani et al., 2008; Armstrong, Robinson, & Gray-Donald, 1998; Jaipaul, Newburn-Cook, O'Brien, & Demianczuk, 2009; Public Health Agency of Canada, 2008a). High birth weight, or macrosomia, is associated with birth complications for the infant and the mother, an increased risk of developing type 1 and type 2 diabetes, and increased number of emergency room visits for asthma later in the child's life (Harder et al., 2009; Public Health Agency of Canada, 2008a; Sin et al., 2004).



Data from 2005 to 2009 show that the proportion of high birth weights was higher in the northern health authorities, with the overall northern rate of 22.5% being over 7% higher than the provincial rate. The highest rate was in AHA, which had a rate of 29.5%, almost double the provincial rate.

Figure 220 High birth weight by northern health authority and Saskatchewan, 2005-2009



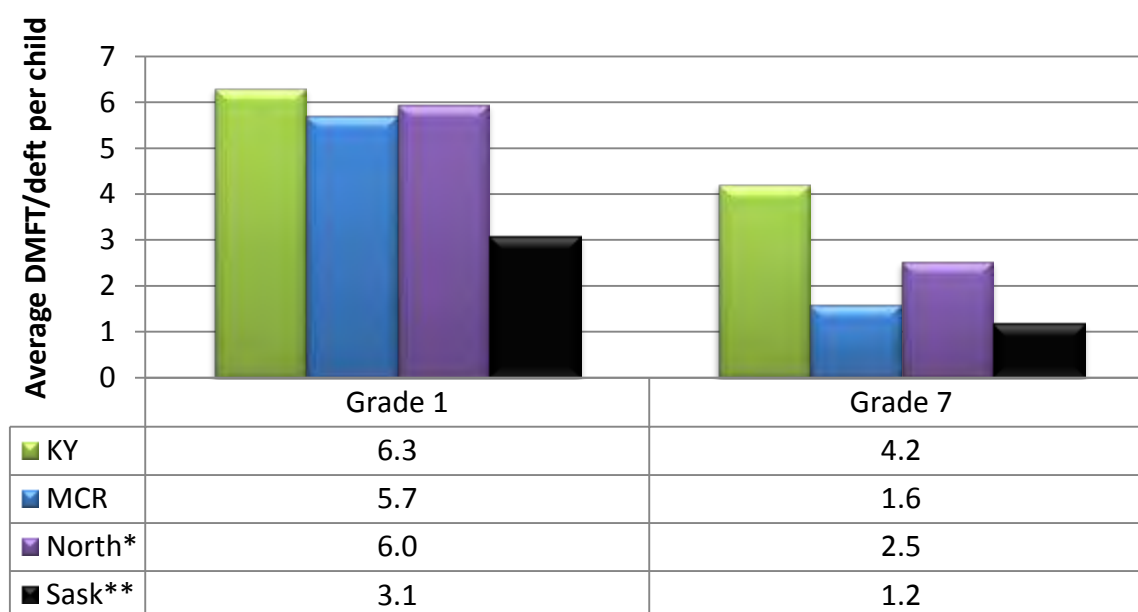
Source: SaskHealth HSUR Reports 2005-9, Prepared by PHU March 2011

Oral health in children

An indicator for oral health in children is a measure of the average number of decayed, extracted and filled primary teeth (deft) or decayed, missing and filled permanent teeth (DMFT) per client. The decay of teeth, also referred to as the development of cavities or caries, is a result of an infectious disease. Dental caries can be looked at a result of three factors: the presence of the caries causing bacteria, the presence of fermentable carbohydrate on the tooth (dietary and oral hygiene factors), and host susceptibility factors (the integrity of the tooth enamel which can be influenced by prenatal factors).

Early childhood caries (ECC) is defined as the presence of tooth decay involving any primary tooth in a child less than six years of age. ECC has been termed the most prevalent paediatric infectious disease and the most common chronic disease of children (US Surgeon General's Report). The presence of early childhood caries is an indicator of risk for subsequent tooth decay in older children and adults.

Figure 221 Decayed, missing or extracted, and filled teeth (DMFT/deft), by northern health authority and grade, 2008/9



Source: Source: Northern Saskatchewan Children's Dental Program 2008-9, Prepared by PHU Jan 2010 *
North does not include AHA **SK does not include AHA or PAPHR

In 2008/9, the average grade one student in KYHR had 6.3 decayed, extracted, or filled teeth, while a grade seven student had 4.2 decayed, missing or filled teeth. In comparison, in MCRHR the average grade one student had 5.7 decayed, extracted, or filled teeth, while a grade seven student had 1.6 decayed, missing or filled teeth. The Canadian goal for grade seven students (age 12) is to have DMFT scores of 1.0 or less (FPTDD Working Group, 2005). Thus MCRHR scores are slightly above and KYHR scores over four times the desired rate. Compared to the province, northern rates are about twice as high for both grade one and seven.

The importance of childhood caries is that when left to progress, ECC can become painful, resulting in altered chewing, eating, and sleeping patterns in addition to potential growth restriction. Early tooth loss as a result of caries may result in speech difficulties and associated self-esteem issues due to altered appearance. Children with ECC are known to be at increased risk of decay in both primary and permanent dentition and may also experience mal-alignment and crowding of permanent teeth resulting in poor bite. A consequence of more severe ECC is that it often requires extensive treatment under general anesthesia. Almost half of the children under six years of age having dental surgery in Saskatoon's hospitals in 2008/9 were from northern Saskatchewan (Saskatoon Health Region Public Health Services, 2011).

Communicable or infectious diseases

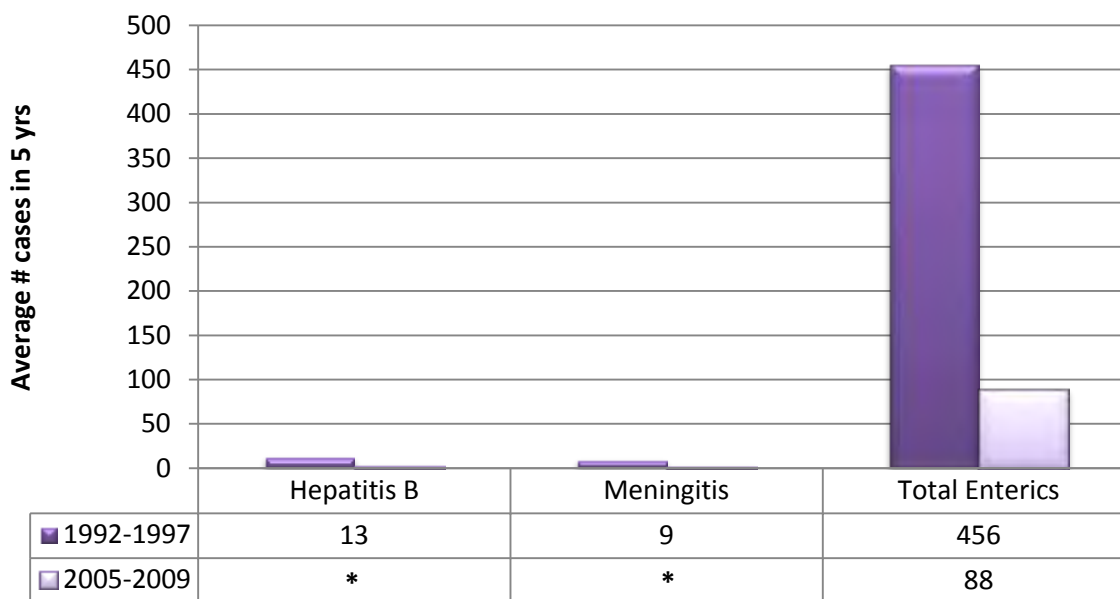
Many communicable diseases are reportable to the Medical Health Officer in each region, including some diarrheal type diseases, vaccine preventable illnesses, sexually transmitted infections, hepatitis A, B and C, HIV, tuberculosis, meningitis and a variety of others.

There have been substantial changes in communicable disease rates over the past 20 years. We are seeing marked decreases in some types of communicable disease, with some other types increasing or emerging.

Enteric disease is a broad classification of bacteria, virus and parasites that can cause diarrhea and other illnesses. There have been marked reductions in laboratory diagnosed enteric diseases over the period of 1992-1997 to 2005-2009. Improved availability of water and sewage systems in northern communities is likely a significant contributor to this, along with improved food preparation and storage.

There have been reductions in the numbers of individuals diagnosed with hepatitis B and meningitis. The main change for hepatitis B has been the introduction of a hepatitis B immunization program for all Saskatchewan residents given at grade six, for others at high risk (included for individuals who inject drugs as part of a harm reduction strategy) and the availability of travel clinics where individuals can purchase this vaccination prior to travel to moderate or high risk countries. Meningitis is a general term signifying a variety of bacterial infections of the lining around the brain. Across the province, the addition of several vaccinations has substantially reduced the number of cases of meningitis – including meningitis from *Haemophilus influenza* type B, meningococcus, and pneumococcus. More recent changes to provide broader coverage for pneumococcus and meningococcus should further reduce the risk of meningitis.

Figure 222 Selected communicable diseases reported, 5-year average estimated number of cases, northern Saskatchewan 1992-1997 to 2005-2009



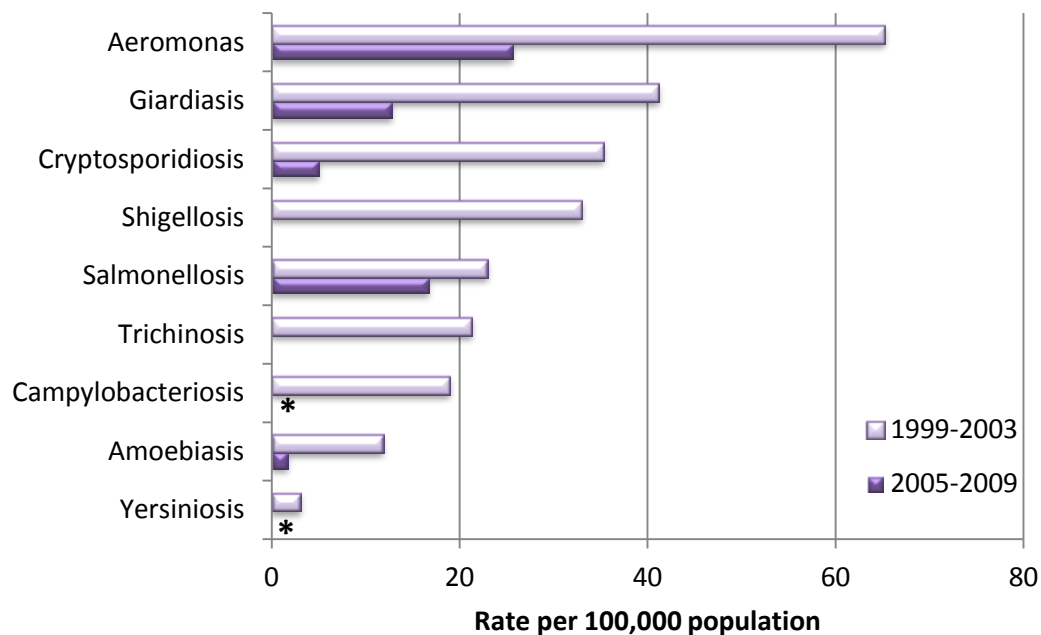
Source: PHU, Prepared by PHU Apr 2010, * data suppressed as cell < 5 **the 5 yr average was calculated for 1992-1997 by multiplying by 5/6

Reportable enteric (diarrheal) diseases have decreased more than five-fold over the past 15 years.

Diarrheal diseases

With the reduction of all enteric infections, reportable diarrheal diseases have declined over the past 10 years.

Figure 223 Selected diarrheal diseases reported, 5-year average estimated crude rates, northern Saskatchewan, 1999-2003 to 2005-2009



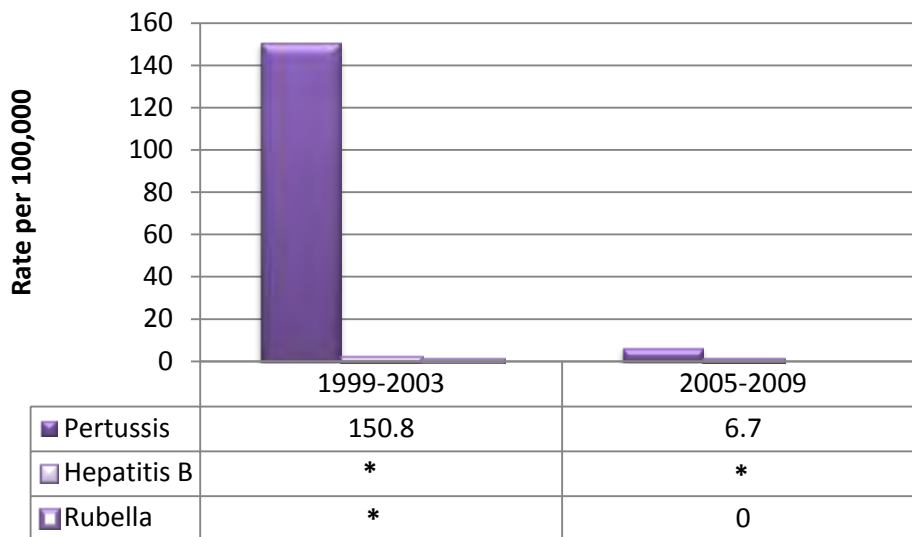
Source: PHU, Prepared by PHU Apr 2010, * data suppressed for 2005-9 as cell < 5

Reportable diarrheal type illnesses can be influenced by the availability of water for hand washing, clean drinking water, healthy food storage and preparation, as well as factors such as overcrowding and poverty. The most recent five year period, between 2005 and 2009, has shown a dramatic decline in the overall number of diarrheal type illnesses. Between 1999 and 2003, the overall crude rate for diarrheal diseases was 256.5 cases per 100,000 population. However, by 2005 to 2009, this rate had decreased to 77.9 cases per 100,000 population. This was the result of declines in most of the reportable diarrheal diseases including aeromonas, giardiasis, cryptosporidiosis, shigellosis, trichinosis, campylobacteriosis, amoebiasis and yersiniosis. The smallest decline occurred in salmonellosis, which still decreased by 27% between the two time periods.



Vaccine preventable diseases (VPD)

Figure 224 Most common VPD, 5-year average estimated crude rates, northern Saskatchewan, 1999-2003 to 2005-2009



Source: PHU, Prepared by PHU Apr 2010, * data suppressed as cell < 5

Rates of rubella and hepatitis B have been decreasing for quite some time as a result of improvements made to the immunization programs. In 2005-2009, there were no cases of rubella and fewer than five cases of hepatitis B, whereas 5-year average rates for these diseases 15 years ago were substantially higher. In Canada, some individuals continue to be diagnosed with rubella, most commonly individuals who have not been adequately vaccinated. In 1990-1994, the 5-year average rates for hepatitis B and rubella were 11.0 and 80.0 cases per 100,000 population in northern Saskatchewan, more than 10 times the rates in 2005-2009.

There was an outbreak of pertussis (whooping cough) in parts of the north in 2000, which led to an increase in the 5-year average rate to 150.8 cases per 100,000 population. This was related more to decreasing immunity with age than to low immunization coverage. Since that time a pertussis booster immunization has been added to the adolescent immunization program and the 5-year average crude rate has decreased to 6.7 cases per 100,000 population.

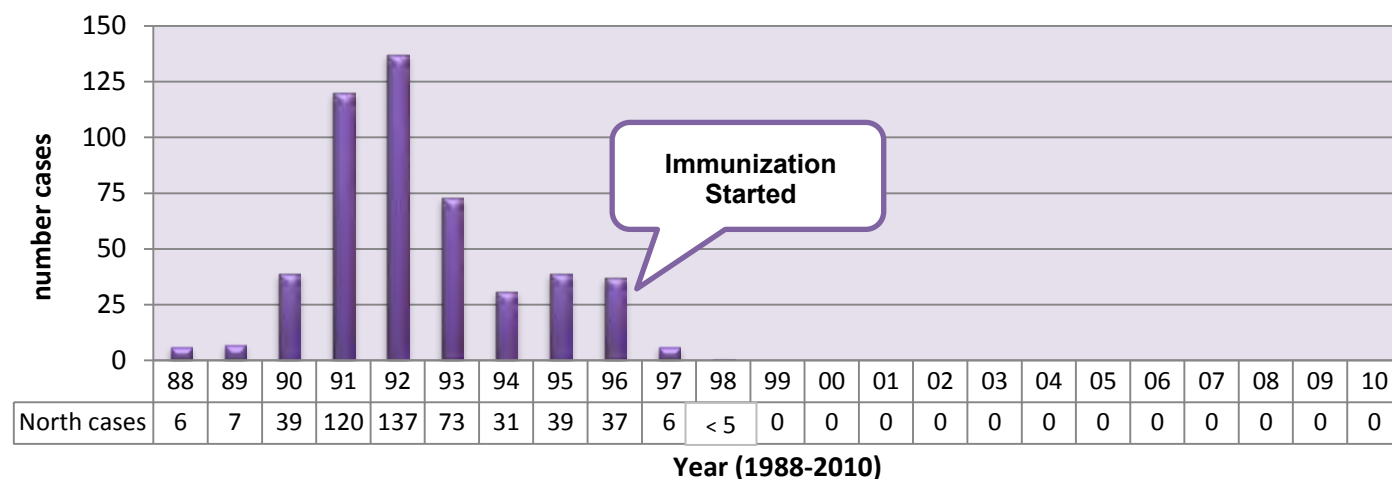
In 2009, there were some reports of pertussis in KYHR predominately in the very young. In 2010, there was a province wide outbreak of pertussis with preliminary results indicating 234 cases occurred in the province and an estimated 69 cases in MCRHR (including on and off reserve). During this recent outbreak, those at greatest risk of severe disease were the infants who were either too young to have received their first pertussis immunization (under age 2 months), were only partially immunized or who had a delay in their immunization. During the outbreak, there was an expansion of the adult immunization program to include care-givers of newborn infants in order to reduce the exposure of pertussis to the infants. An expansion of the adult pertussis immunization program occurred in Saskatchewan in the spring of 2011.



Hepatitis A

Hepatitis A is an infectious liver disease that can be associated with food and waterborne outbreaks which are common in situations where there is poverty, overcrowding and poor water availability. It was a very common illness in northern Saskatchewan and would often occur in outbreaks. Since the hepatitis A immunization program was initiated, there has been a major reduction in the number of cases of hepatitis A in northern Saskatchewan with subsequent major reductions in childhood illness, hospitalizations, and doctor visits. Two deaths had been attributed to hepatitis A in children in northern Saskatchewan in the few years prior to the immunization program. This has been a truly effective program.

Figure 225 Estimated number of hepatitis A cases, northern Saskatchewan, 1988-2010



Source: PHU, Prepared by PHU Feb 2011

There continue to be sporadic hepatitis A outbreaks in Canada including a recent outbreak (2010-2011) in southern Vancouver Island, where First Nations were disproportionately affected. This is an indication of the continual need to maintain this program in northern Saskatchewan.



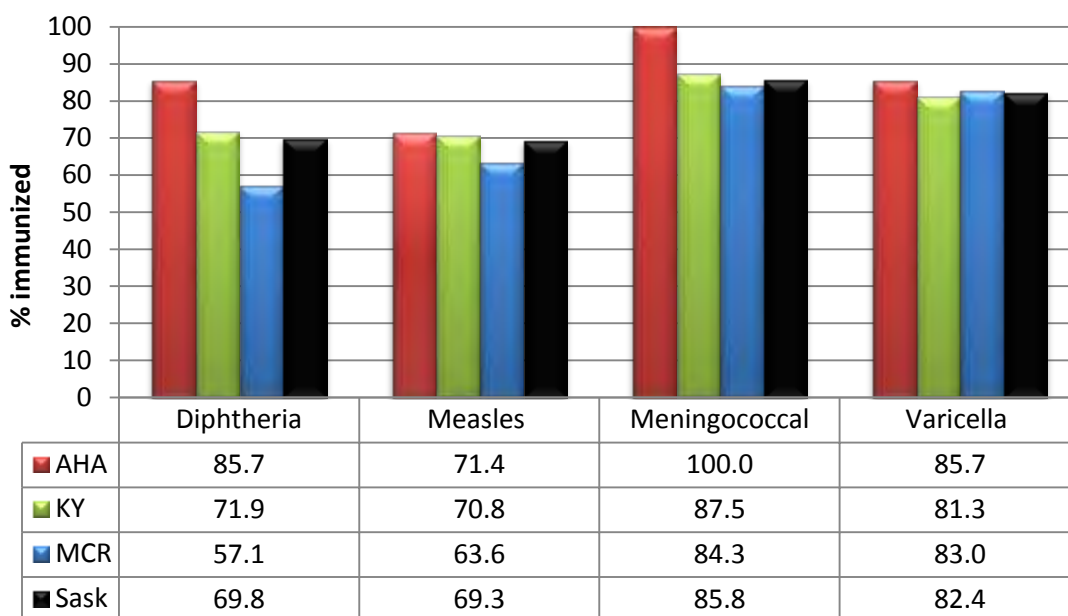
Childhood immunizations

Immunization is an important, effective public health strategy to reduce illness and improve health. The Canadian Public Health Association states that immunization has probably saved more lives in Canada in the last 50 years than any other health intervention.

Immunization coverage is shown for some of the major components of the children's immunization program of Saskatchewan, including diphtheria, measles, meningococcal and varicella (chicken pox). The coverage rates are based on the proportion of clients that are registered in the Saskatchewan Immunization Management System (SIMS) that have received the minimum number of vaccinations for the selected antigen (e.g. measles) before their second birthday.

It is thought that the SIMS coverage rates will underestimate the true coverage rates of the three northern health authorities due to differing usage of the SIMS database between health region staff and First Nations health authority staff. Upon receiving any immunization services within a health region, a northern First Nations client will be registered into the SIMS database as a northern health authority client. However, as the First Nations health authority staff do not use SIMS for immunization data entry, the client's complete immunization history is not captured and may appear to lack several immunizations. This can result in many First Nations clients getting included in the SIMS database with partial data, resulting in an overall lowering of the immunization rates for the northern health authorities. This impact is likely most noticeable in MCRHR and AHA. We have tried to address this issue by excluding clients from the coverage rate who list Northern Inter-Tribal Health Authority communities as the address on their provincial health cards.

Figure 226 Immunization coverage at 2nd birthday, northern Saskatchewan, off-reserve clients registered in SIMS, 2009-2010



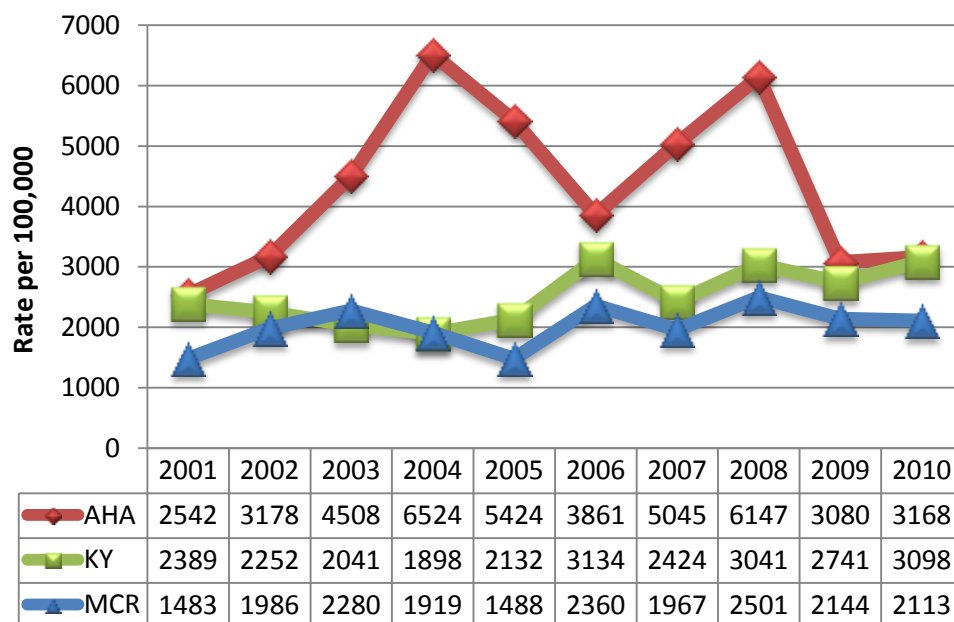
Source: SaskHealth (SIMS) Prepared by PHU July 2011

In 2009-2010, immunization coverage rates in KYHR were similar to provincial rates for diphtheria, measles, meningococcal and varicella vaccines, while AHA had similar rates for measles and varicella, but higher rates for diphtheria and meningococcal vaccines. MCRHR had similar coverage rates compared to the province for meningococcal and varicella, but lower rates for diphtheria and measles vaccines.

Sexually transmitted infections

Two of the most commonly diagnosed sexually transmitted infections (STIs) in northern Saskatchewan are chlamydia and gonorrhoea.

Figure 227 Estimated crude chlamydia rate by northern health authority by year, 2001-2010



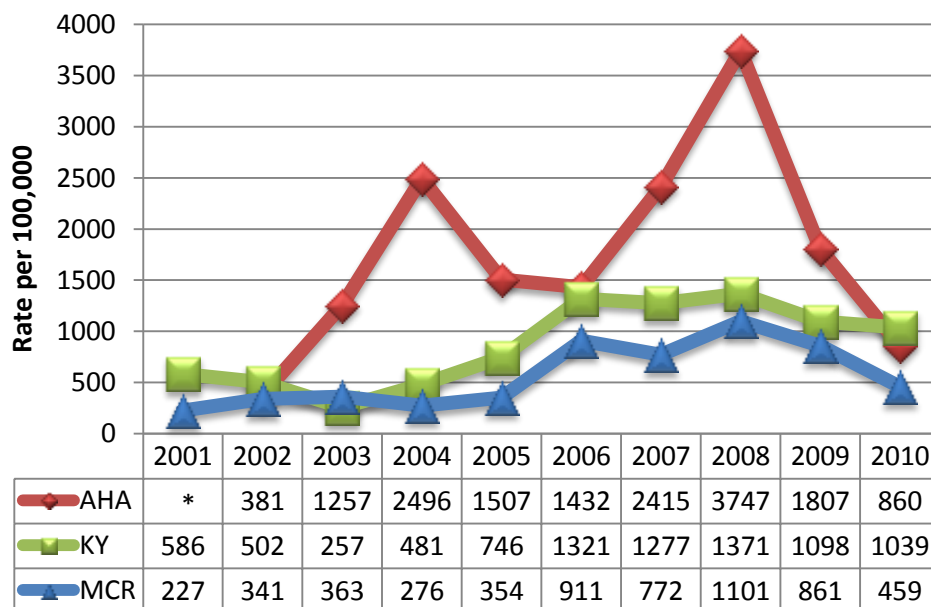
Source: PHAC, PHU, Prepared by PHU Jan 2011

Across the north, there have been yearly fluctuations in the crude rates of chlamydia between 2001 and 2010. However, the overall trend has been for increasing rates, from a 25% increase in AHA, 30% in KYHR and 43% in MCRHR. Although data is not available at the provincial or national levels for 2010, rates have increased between 2000 and 2008. In Saskatchewan, rates increased by 78%, while Canadian rates increased by 65%.

Figure 228 Estimated crude gonorrhoea rate by northern health authority by year, 2001-2010

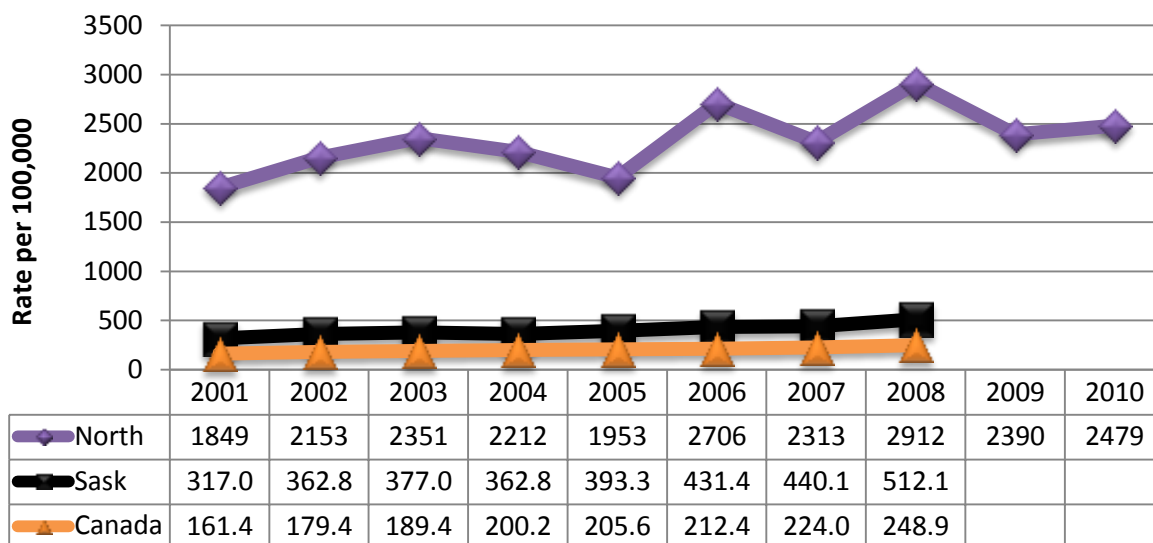
Crude gonorrhoea rates have increased over the past ten years across the north, with some year to year fluctuations. The largest increase was in AHA, while the smallest increase occurred in KYHR. MCRHR also had a large increase in its crude gonorrhoea rate.

Rates of gonorrhoea in Saskatchewan and Canada are also on the rise. Between 2000 and 2008, Saskatchewan rates increased from 46 cases per 100,000 to 131 cases per 100,000. During the same time Canadian rates increased from 20 cases per 100,000 to 38 cases per 100,000.



Source: PHU, Prepared by PHU Jan 2011, * data suppressed as < 5

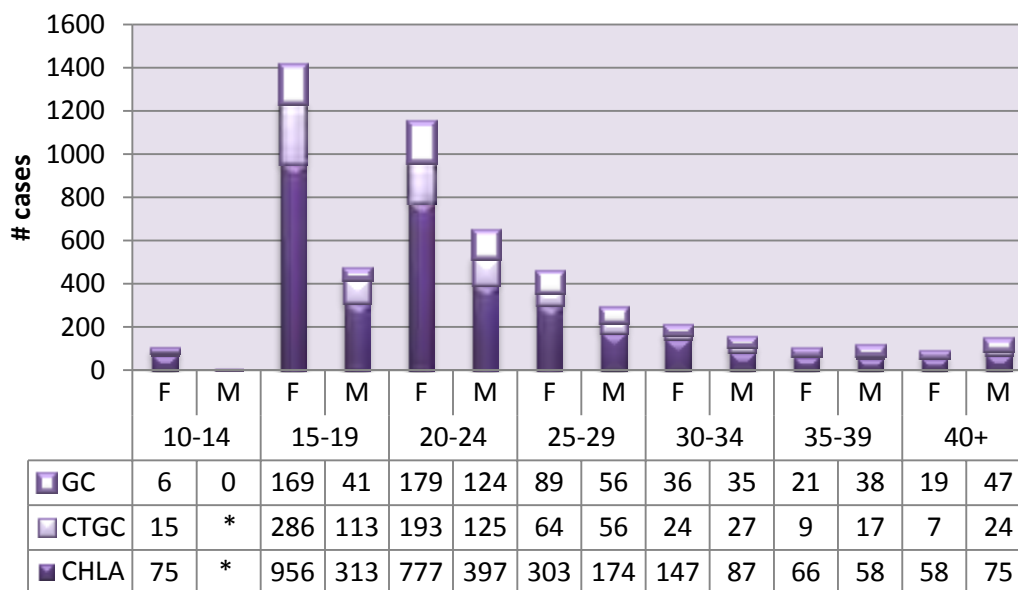
Figure 229 Estimated crude chlamydia rate by region and year, 2001-2010



Source: PHAC, PHU, Prepared by PHU Jan 2011

Crude rates of chlamydia have all risen in Canada, Saskatchewan and northern Saskatchewan between 2000 and 2008, by 58% in northern Saskatchewan, 65% in Canada and 78% in Saskatchewan. However, rates remained between 6 and 12 times higher in northern Saskatchewan in 2008, compared to either Canada or Saskatchewan, respectively. Data for 2009 and 2010 is currently not available for either Saskatchewan or Canada but a slight decrease from 2008 levels was observed in northern Saskatchewan.

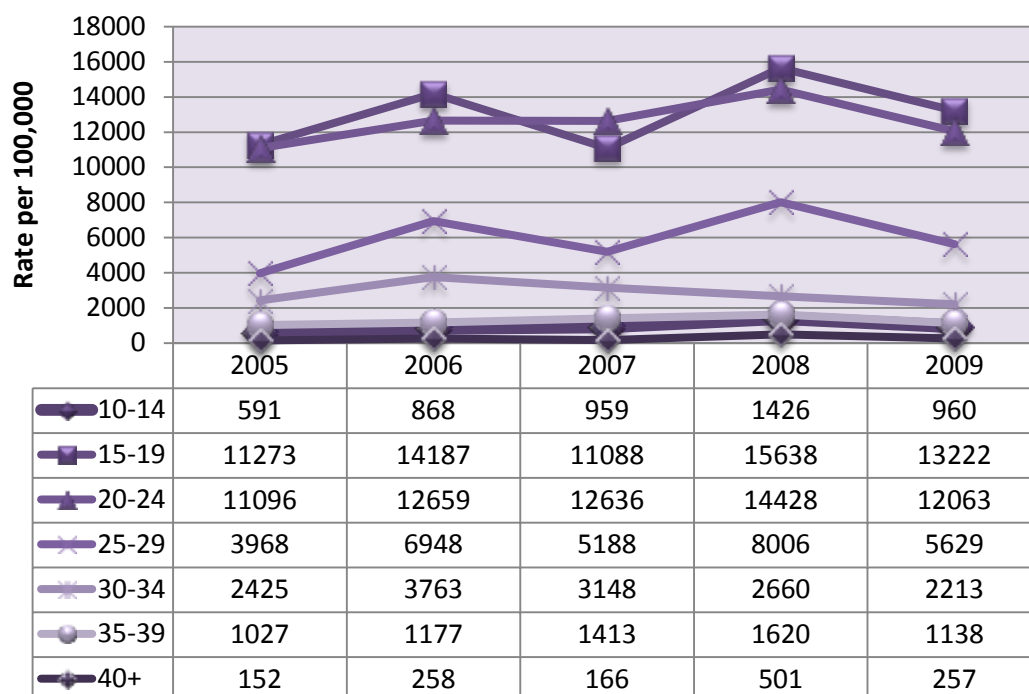
Figure 230 Estimated chlamydia, gonorrhoea and chlamydia gonorrhoea co-infections by sex and age, northern Saskatchewan, 2005-2009



Source: PHU, Prepared by PHU Apr 2010 (* suppressed as < 5)

The greatest numbers of chlamydia (CHLA), gonorrhoea (GC) and chlamydia gonorrhoea co-infections (CTGC) in females were in the 15-19 year group, followed by the 20-24 year age group. For males, the highest numbers were in the 20-24 year age group, followed by the 15-19 year age group. Many individuals diagnosed with chlamydia do not have symptoms at the time of diagnosis. Screening during routine check-ups for prenatal care, contraceptive counselling, or Pap smear screening likely contributes to higher chlamydia rates in females compared to males.

Figure 231 Estimated female chlamydia rates by age and year, northern Saskatchewan, 2005-2009

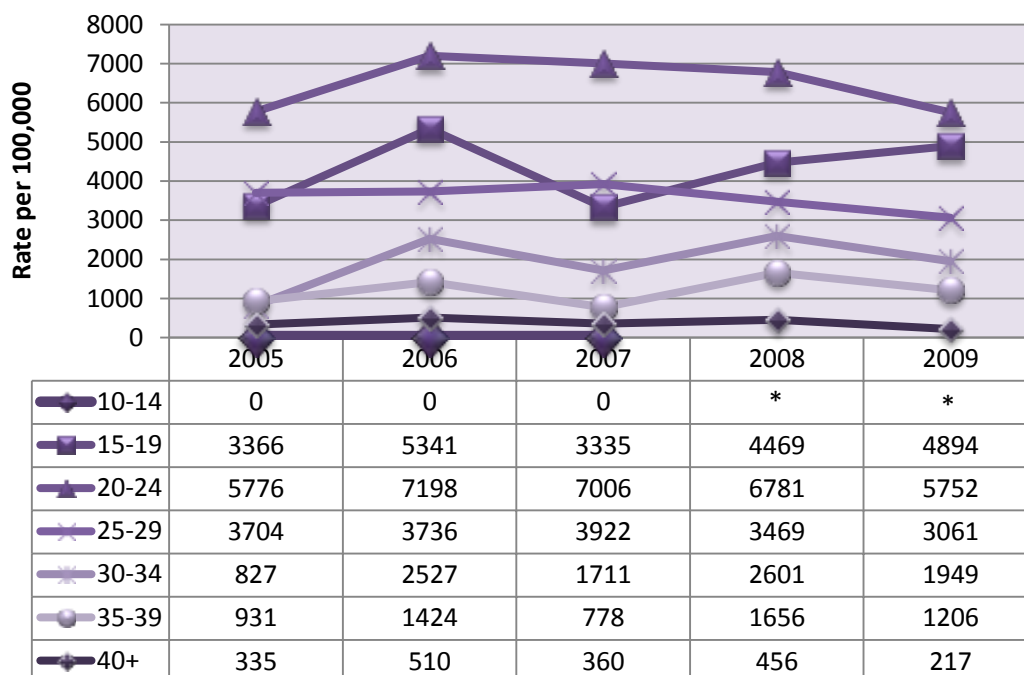


Source: PHU, Prepared by PHU Apr 2010 * data suppressed as cell < 5

The highest chlamydia rates in northern females were in the 15-19 and 20-24 year age groups, although the difference between the two was very small. Although the rates in some of the other categories are relatively small compared to the 15-24 year age groups, some disturbing trends have been occurring. The chlamydia rate for 10-14 year old girls more than doubled between 2005 and 2008, and then declined in 2009. In absolute numbers, there were 12 girls, ages 10-14, diagnosed with chlamydia in 2005, 26 in 2008, and 17 in 2009.

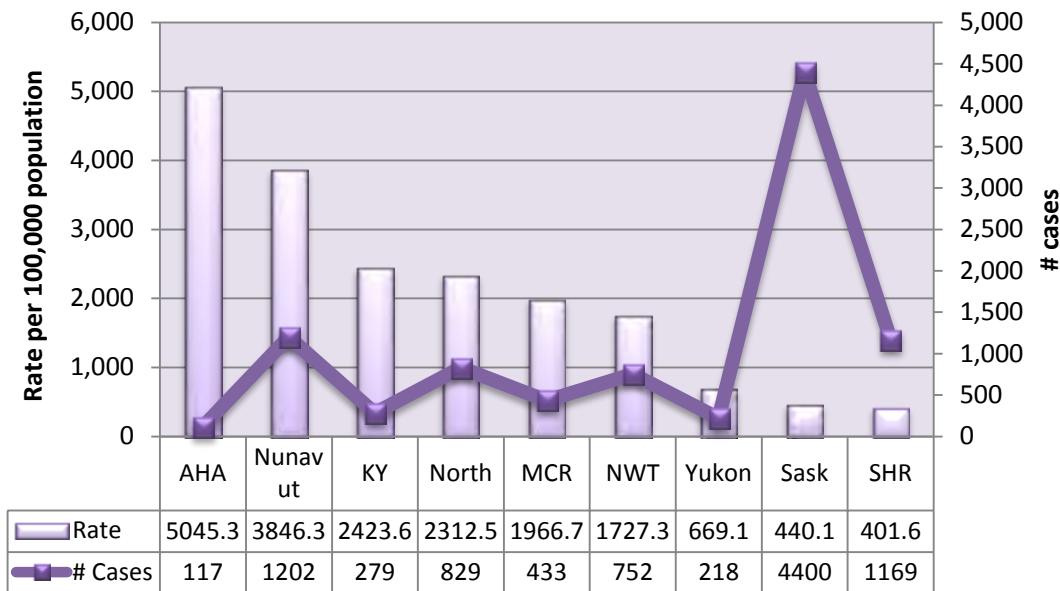
Figure 232 Estimated male chlamydia rates by age and year, northern Saskatchewan, 2005-2009

The highest chlamydia rates in northern males are in the 20-24 year age group, followed by the 15-19 year age group. However, rates in 20-24 year old males decreased from 2007 to 2009, whereas the rates for the 15-19 year age group decreased during the same time period. The male chlamydia rate was 2.1 times higher in the 20-24 year age group than in the 15-19 year age group in 2007, but only 1.2 times higher by 2009.



Source: PHU, Prepared by PHU Apr 2010 * data suppressed as cell < 5

Figure 233 Estimated crude chlamydia number and incidence rate by selected areas, 2007



Source: PHAC, Saskatoon RHA Health Status Report 2008, PHU, Prepared by PHU, Apr 2010

In 2007, northern Saskatchewan accounted for almost 19% of the provincial chlamydia infections, despite only making up approximately 3.5% of its total population. The crude rate of chlamydia in northern Saskatchewan was lower than in Nunavut, yet higher than in NWT, Yukon, Saskatchewan and Saskatoon Health Region.

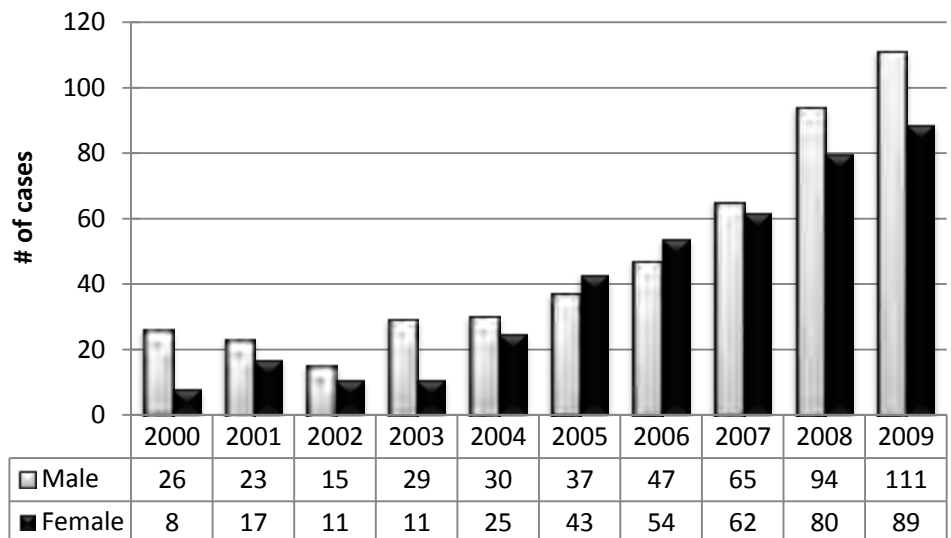
HIV

Human Immunodeficiency Virus (HIV) is the virus that causes AIDS (Acquired Immune Deficiency Syndrome). This virus has an impact on most health regions across Canada. Though there are some uncertainties in the information on ethnicity in the national and provincial data, there are some general trends noted for HIV in Aboriginal people in Saskatchewan (Public Health Agency of Canada, 2004).

- Aboriginal peoples are over-represented in the HIV epidemic in Saskatchewan.
- Aboriginal peoples make up a growing percent of positive HIV test reports and reported AIDS cases.
- Injection drug use continues to be a key method of transmission in the Aboriginal community.
- HIV/AIDS has a substantial impact on Aboriginal women.
- Aboriginal people are being infected with HIV at younger age compared to non-Aboriginal people.

Figure 234 Proportion of new HIV cases by sex and year diagnosed, Saskatchewan, 2000-2009

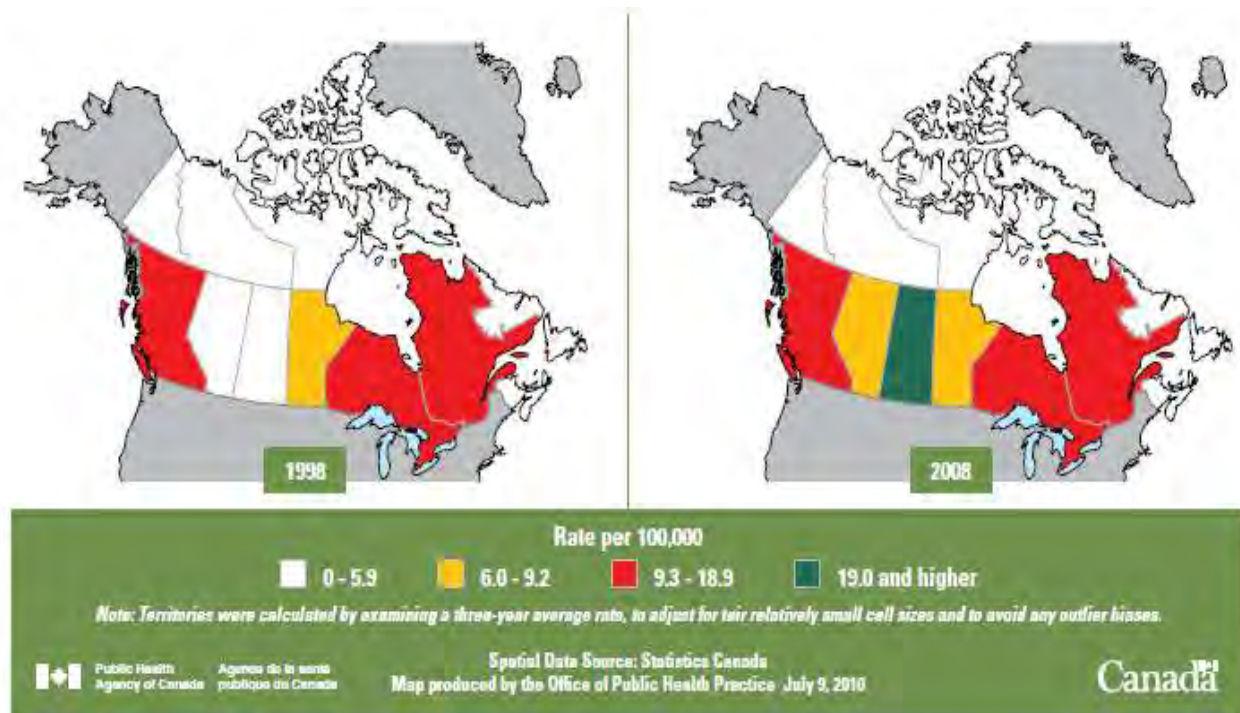
In Saskatchewan, there was a dramatic increase in the total number of new HIV cases between 2000 and 2009. In addition to a true increase in the rate of HIV infection, this increase may partially reflect public health efforts to identify cases early and establish early interventions such as treatment and education to curtail the exponential spread of infection. In 2004, the number of female cases began to increase, surpassing the number of male cases in 2005 and 2006. However this trend reversed in 2007, 2008 and 2009.



Source: SaskHealth 2010, Prepared by PHU Jan 2011

The rate of HIV infection in Saskatchewan has increased substantially over the past 10 years. Saskatchewan's rate of newly diagnosed HIV infections was one of the lower rates in the country, and now is the highest.

Figure 235 Rate (per 100,000 population) of diagnosis of HIV infection in Canada, 1998 and 2008 (both sexes)

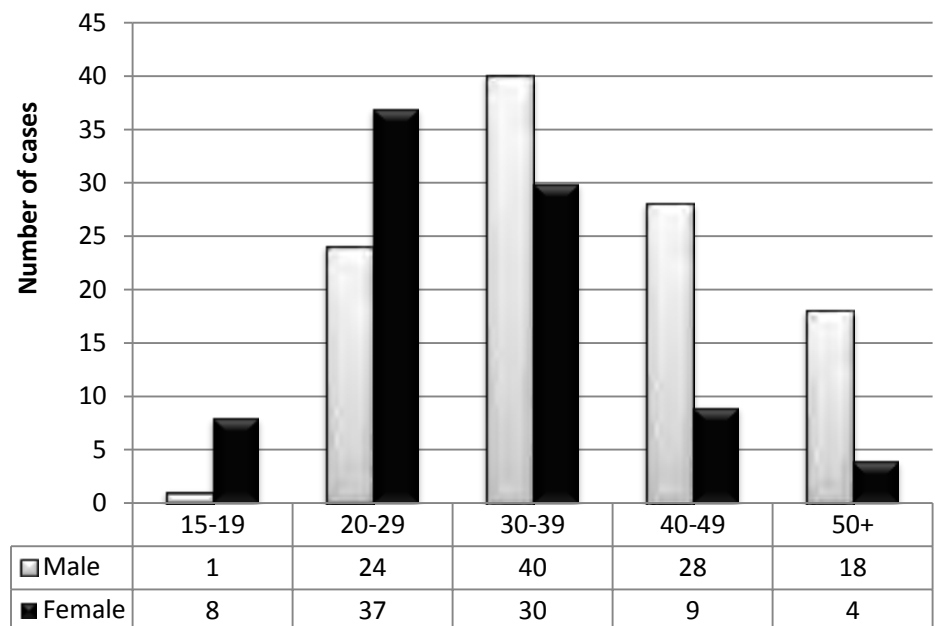


Source: (Statistics Canada & PHAC/Office of Public Health Practice July 2010 In Saskatchewan Ministry of Health, 2010)

Ethnicity data is important as it further characterizes populations to support targeted program planning and resource allocation. In 2009, 79% of the cases were of Aboriginal ethnicity, an increase from 76% in 2008.

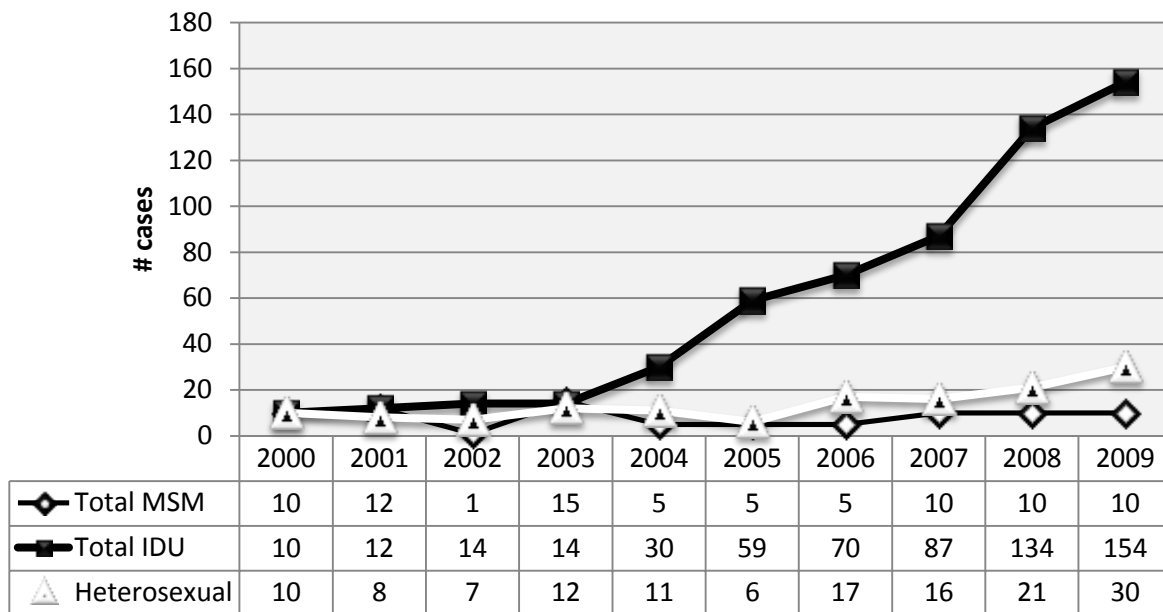
Figure 236 HIV cases by age and sex, Saskatchewan, 2009

In 2009, there were fewer new female (44.5% of all cases) HIV cases identified than male (55.5%) HIV cases. However, female cases exceeded male cases in the younger age groups including 15-19 years and 20-29 years. On the other hand, there were more male cases in the age groups above 30 years of age. The age discrepancy was greater in the Aboriginal population, as 38% of Aboriginal female cases, compared to 14% of Aboriginal male cases, were 25 years of age or younger.



Source: SaskHealth 2010 Prepared by PHU Jan 2011

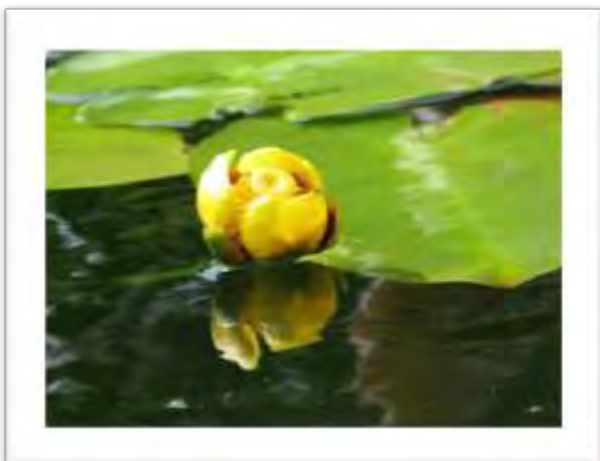
Figure 237 New HIV cases by reported source risk factor, Saskatchewan, 2000-2009



Source: SaskHealth 2010 Prepared by PHU Jan 2011

The categories of risk exposures are self-disclosed by the client and indicate the most likely reason for acquiring HIV infection. Injection drug use (IDU) remains one of the major risk exposures reported by HIV infected cases in the province of Saskatchewan. In 2009 IDU was reported in 77% of the cases (154/200). From our in-house data we know that IDU is also the most common risk factor for transmission associated with HIV infection in northern Saskatchewan.

Of the new HIV cases diagnosed in Saskatchewan, 69% were residents of Saskatoon, Regina or Prince Albert between 2000 and 2009, and over 75% lived in one of those communities in 2009. New cases of HIV in Saskatchewan are counted where they live at the time of diagnosis. Individuals may be diagnosed in an urban location and could later visit or move to their original home community in northern Saskatchewan or other rural areas. Northern Saskatchewan's rates of newly diagnosed HIV, for individuals with their residence indicating northern Saskatchewan, have increased along with the provincial rate over the past few years. There was an average of seven northern Saskatchewan residents newly diagnosed with HIV for each of the past three years. This is consistent with the average rate across the province. The locations of individuals diagnosed with HIV are spread across the north, although as in other parts of the province, cases tend to live in some of the larger communities.



Hepatitis C

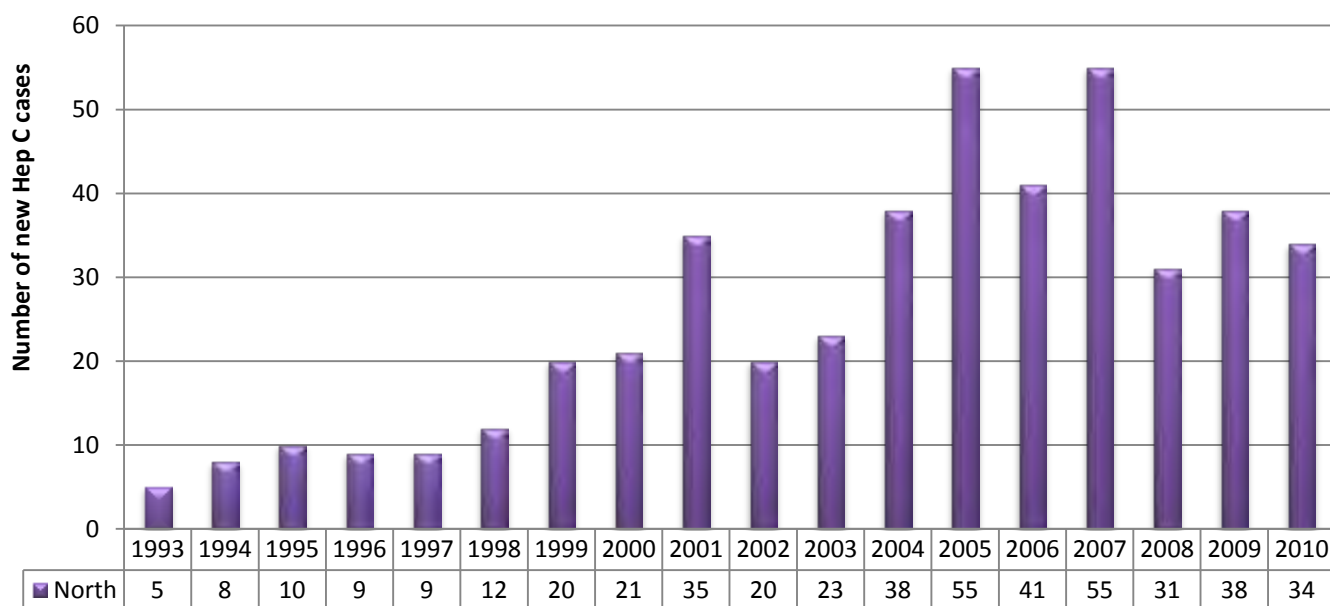
Hepatitis C (HCV) is a virus that can infect the liver and cause hepatitis C disease. HCV is transmitted through blood contact with someone infected with hepatitis C. In Canada (Public Health Agency of Canada, 2009b), people who are at most risk of hepatitis C include those who:

- are involved in recreational injection drug use (IDU), due to sharing of needles, syringes, and other injection equipment. IDU is associated with 70-80% of newly acquired HCV cases in Canada.
- travel to or live in a HCV endemic region (the second largest risk factor in larger Canadian cities).
- share equipment for inhalation drug use (e.g. crack pipes, straws, etc.).
- undergo tattooing or body piercing with contaminated equipment.
- share personal hygiene items (e.g. razors, toothbrushes) with someone infected with HCV, or have occupational blood exposure.

Sexual and mother-to-child transmission of HCV is thought to be uncommon. While there have been cases of HCV transmission via contaminated blood transfusions in the past, the enhanced screening procedures of Canada's blood supply since 1990 has virtually eliminated this risk.

Many individuals with hepatitis C infection may not know they have it as the infection may not cause symptoms, though they may go on to develop chronic liver disease and its complications. This is why individuals who may have had any of the risk factors for hepatitis C are encouraged to be tested.

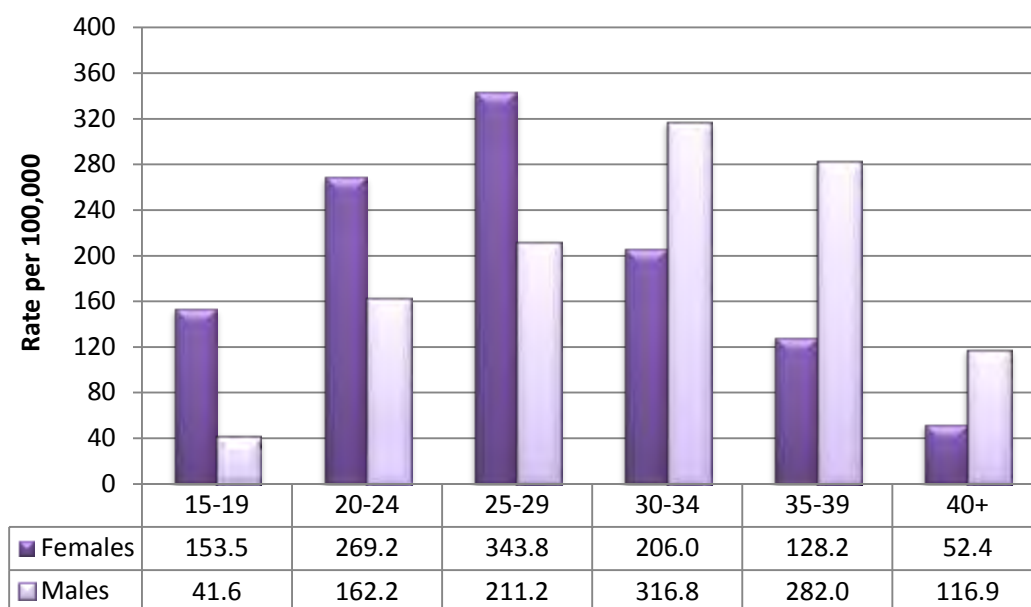
Figure 238 Estimated hepatitis C cases by year diagnosed, northern Saskatchewan, 1993-2010



Source: PHU, Prepared by PHU Jan 2011

Over the past two decades, the numbers of hepatitis C have been increasing in northern Saskatchewan, although there have been year to year fluctuations. The greatest numbers of cases were in 2005 and 2007, with 55 cases occurring in each year.

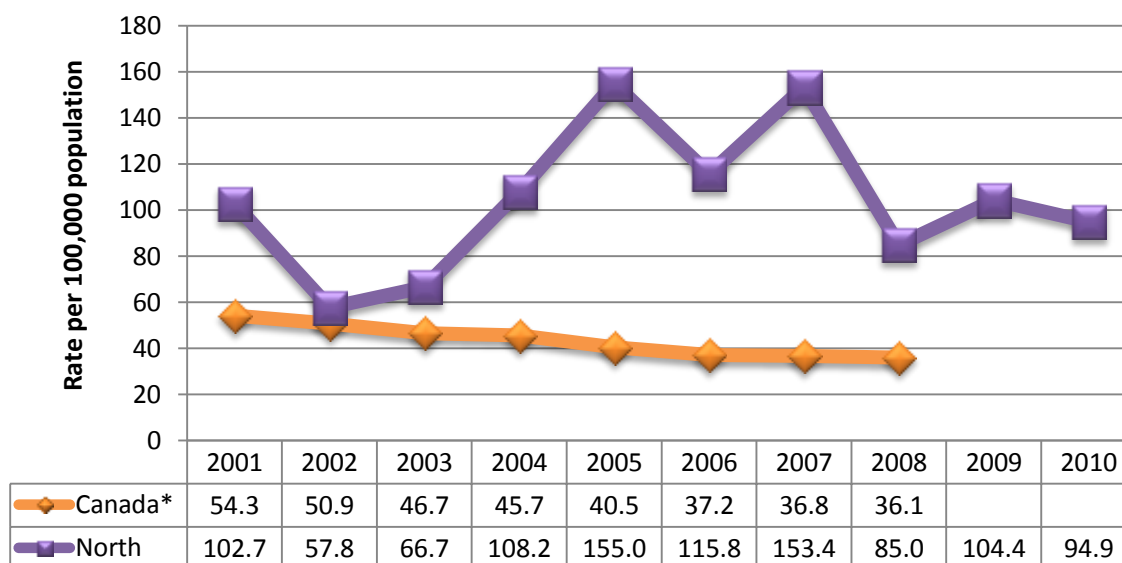
Figure 239 Estimated hepatitis C, 10-year average rates, by age group and sex, northern Saskatchewan, 2001-2010



Source: PHU, Prepared by PHU Jan 2011

The highest rates of hepatitis C in females occurred in those aged 20-29 years, whereas the highest rates in males occurred in those aged 30-39 years of age. However, the greatest disparities in the rates occur in those aged 15-19 and 40+ years. In the 15-19 year old group, the female rate is almost 4 times the male rate, whereas the male rate for the 40+ age group is 2.2 times the rate of females.

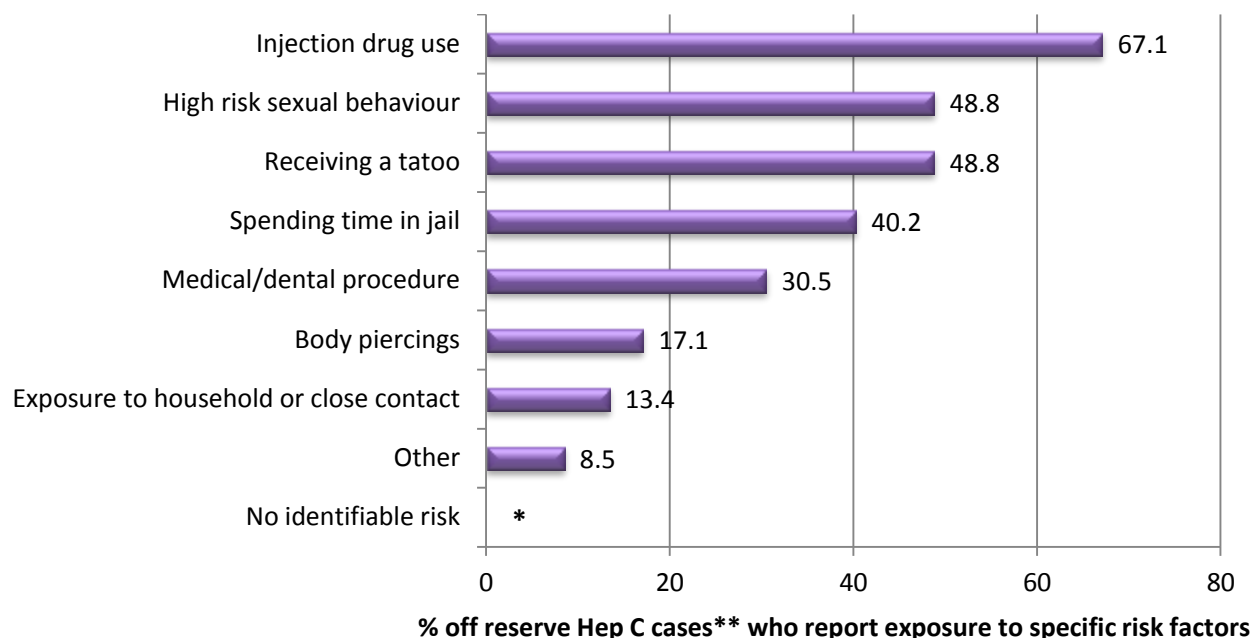
Figure 240 Estimated hepatitis C by year diagnosed, northern Saskatchewan and Canada, 2001-2010



Source: PHU and PHAC 2010, Prepared by PHU Jan 2011 (2008 Canada data is preliminary)

Rates of hepatitis C in northern Saskatchewan and Canada were similar ten years ago, with the northern rate being slightly higher than the Canadian rate. From 2000 to 2008, the Canadian rate steadily declined to 36.1 cases per 100,000, while the northern rate increased, with yearly fluctuations, to 85.0 cases per 100,000. In 2010, the northern Saskatchewan rate was 94.9 cases per 100,000.

Figure 241 Risk factors for hepatitis C among off-reserve cases, who were interviewed for risk factors, northern Saskatchewan, 2004-2009



Source: IPHIS 2010, Prepared by PHU Aug 2010 suppressed as less than 5 **57% response rate, n = 82/144.

In northern Saskatchewan, among the 82 off-reserve hepatitis C cases that were interviewed for risk factors, close to 70% reported having used or were currently using injection drugs. Other frequent risk factors reported included engaging in high risk sexual behaviour (having sex with high risk cases or known hepatitis C case, multiple sex partners, etc.), receiving a tattoo, and spending time in jail.

It is important to note that this chart does not indicate what actually caused the hepatitis C infection. It does illustrate the most common risk factors in northern Saskatchewan, most notably injection drug use.

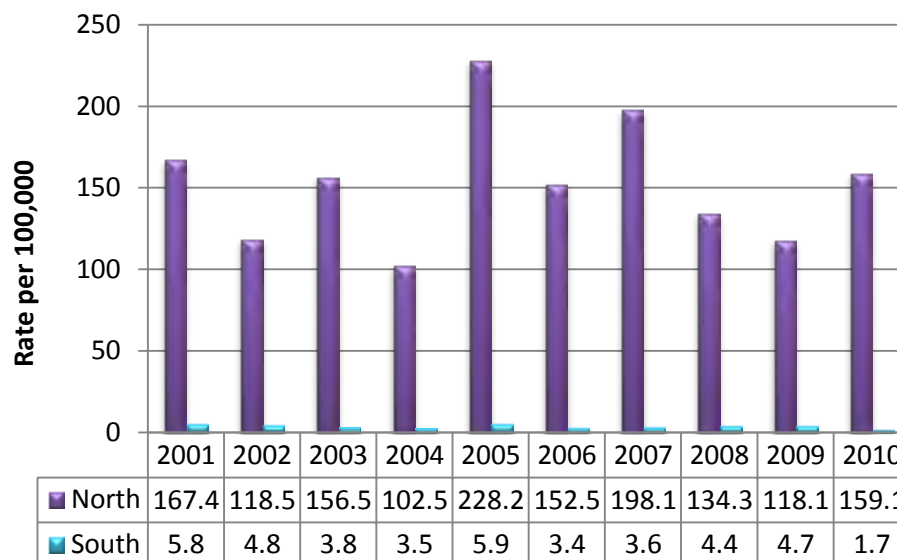


Tuberculosis

For most people in Canada, the risk of developing tuberculosis (TB) is very low. However, population groups in Canada with an increased risk of TB infection include people born in countries where TB is widespread, Aboriginal people, homeless people, and people who live in long-term care or correctional facilities (Government of Canada, 2008; Hernandez-Garduno & Elwood, 2008; Public Health Agency of Canada & Correctional Service of Canada, 2004). In northern Saskatchewan, TB continues to be a health problem.

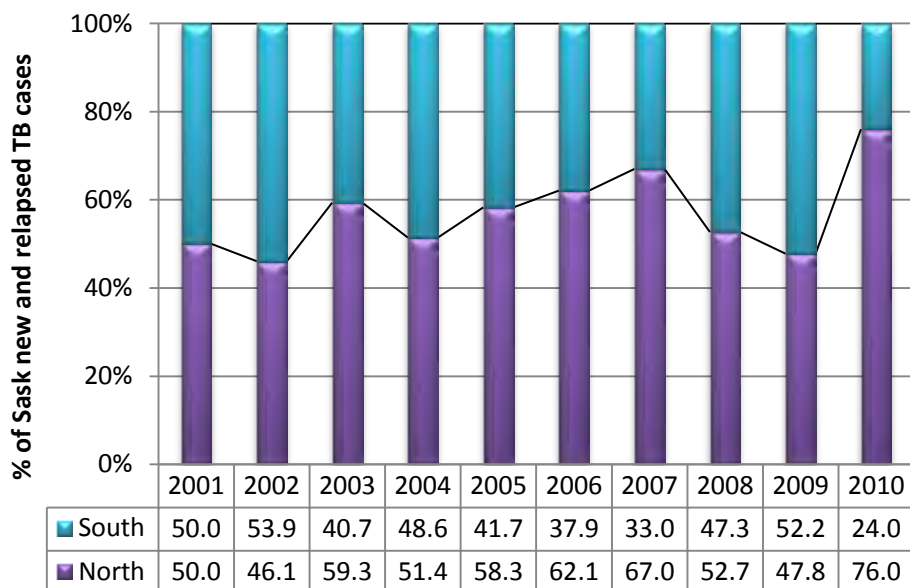
Figure 242 Reported new active and relapsed crude TB incidence rate by year of diagnosis northern Saskatchewan and Saskatchewan, 2001-2010

Between 2001 and 2010, the rate of new active and relapsed TB cases in northern Saskatchewan remained substantially elevated, although there were yearly fluctuations. The rate in northern Saskatchewan was highest in 2005 (228 cases per 100,000), and then decreased to 159 cases per 100,000 in 2010. During the same time period the rate in southern Saskatchewan declined from 5.7 to 1.7 cases per 100,000. The 10-yr rate in northern Saskatchewan was 37 times greater than in southern Saskatchewan for the 2001 and 2010 time period.



Source: Sask TB Control Program 2001-2010, Prepared by PHU Jan 2011

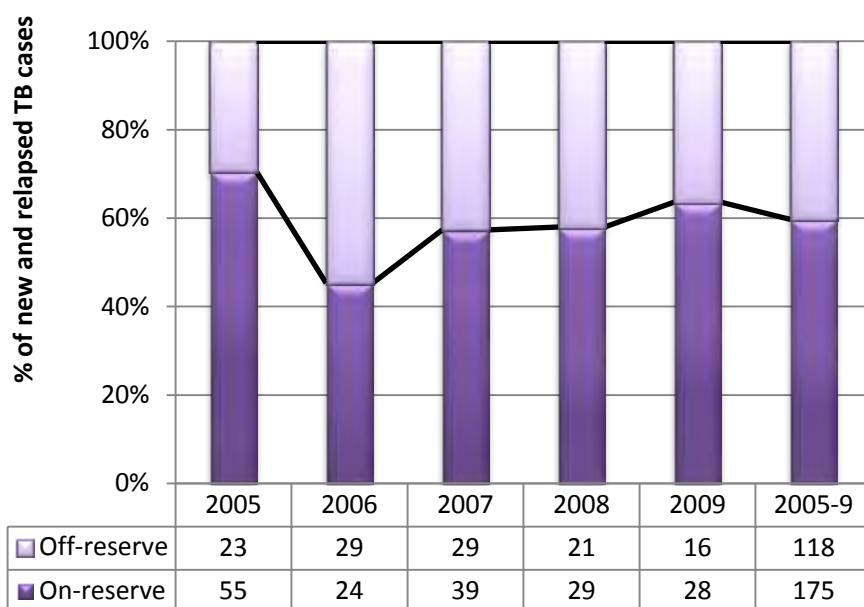
Figure 243 Proportion of new and relapsed TB cases occurring in Saskatchewan by year and location, 2001-2010



Source: Sask TB Control Program, 2001-2010, Prepared by PHU Jan 2011

Northern Saskatchewan has an increasing share in the number of new and relapsed TB cases occurring in Saskatchewan. In 2001, northern Saskatchewan residents accounted for 50% of new and relapsed TB cases, and 76% in 2010 (with 18 individuals being diagnosed with TB in southern Saskatchewan and 57 in northern Saskatchewan). Overall, between 2001 and 2010, northern Saskatchewan had 57% of the new and relapsed TB cases occurring in Saskatchewan. This is remarkable as the north made up only 3.5% of the total provincial population during this time frame.

Figure 244 New and relapsed tuberculosis in northern Saskatchewan by year and reserve residence, 2005-2009

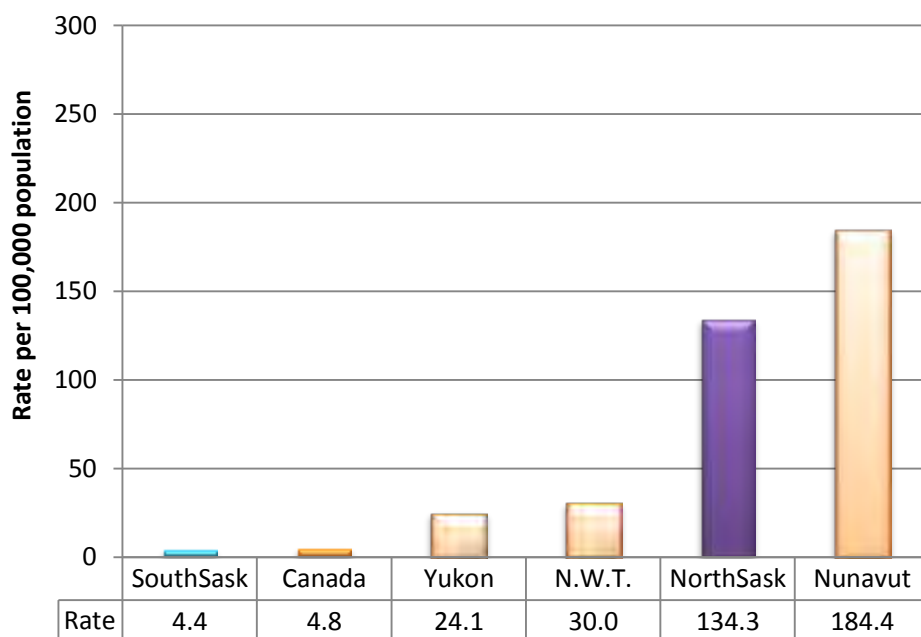


Source: Sask TB Control Quarterly Reports, Prepared by PHU Dec 2010

For the most part, services such as TB medication delivery, contact tracing, screening, and prevention programs are provided by First Nations health authorities for clients living in First Nations communities (on-reserve) and by northern health authority staff for clients living in northern villages and towns (off-reserve). People diagnosed with tuberculosis who live in off-reserve communities are becoming a greater portion of the total cases of tuberculosis in northern Saskatchewan. The proportion of new and relapsed cases of TB living off-reserve ranged from about 30% to 55% between 2005 and 2009. Overall, between 2005 and 2009, the off-reserve population accounted for 40% of the new and relapsed TB cases in the north.

Figure 245 Selected Canadian new and relapsed TB case rate, 2008

The northern Saskatchewan rate of 134 new and relapsed TB cases per 100,000 population is dramatically higher than most Canadian comparators. Only Nunavut has a higher rate of new and relapsed TB cases, while NWT and Yukon, although relatively high when compared to the Canadian rate, have lower rates than northern Saskatchewan.



Source: Sask TB Control Program 2010, TB in Canada pre-release 2008 Prepared by PHU Mar 2010

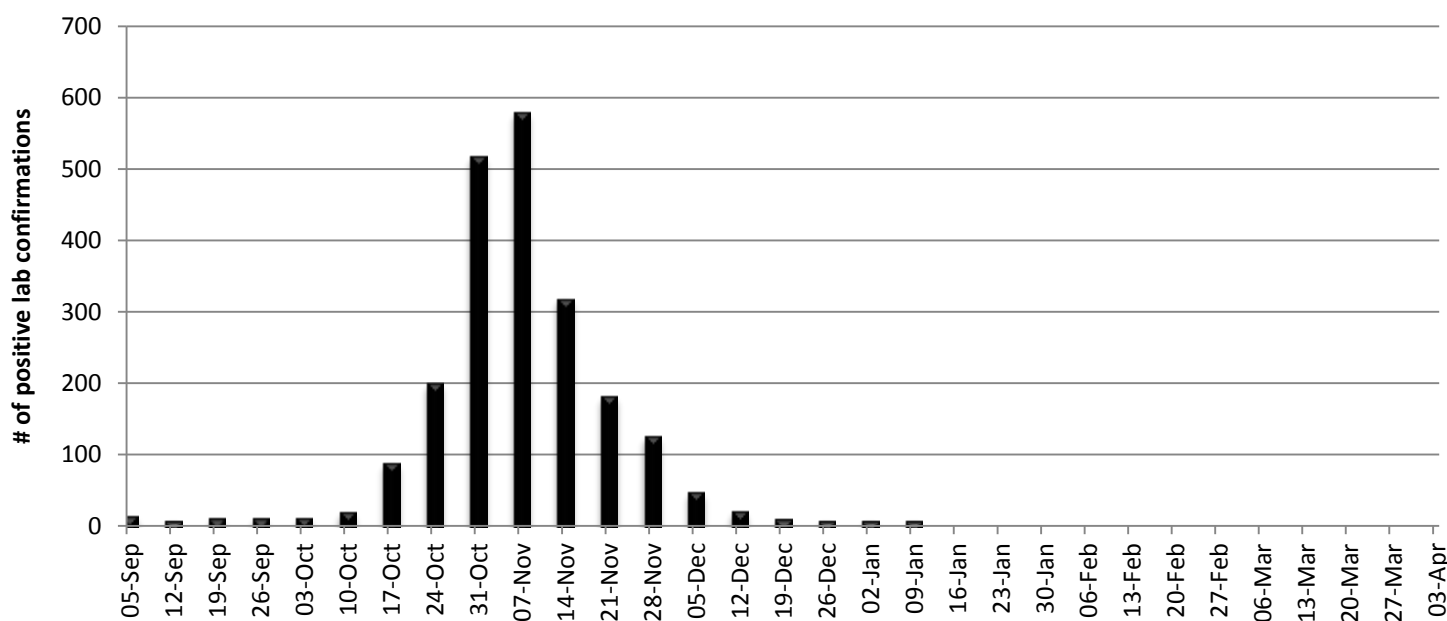
Emerging issues in communicable and infectious diseases

Influenza

Each year we see outbreaks of influenza in northern Saskatchewan. Over the past number of years, there have been concerns regarding the potential for a large, world-wide or “pandemic” outbreak of influenza as a result of a major change in the influenza virus. In 2009, as the result of the emergence of a novel influenza virus known as pandemic H1N1 (pH1N1), we experienced the first pandemic of the 21st century. The outbreak began in March 2009 in Mexico with cases soon occurring throughout the world (World Health Organization, 2009a). On June 11, 2009, the World Health Organization assessed the outbreak at the highest level of six, indicating the start of the 2009 Influenza Pandemic (World Health Organization, 2009b).

According to the Public Health Agency of Canada, the first case in Canada occurred on April 26, 2009, with the first case reported from Saskatchewan occurring soon after, on May 7, 2009 (Public Health Agency of Canada, 2009c). Over the next couple of weeks, the first major wave of the pandemic occurred throughout Saskatchewan, followed by the second wave in late October and November. During both waves there were cases throughout Saskatchewan, including northern Saskatchewan. Northern Saskatchewan health authorities worked with the Saskatchewan Ministry of Health monitoring the impact of the pandemic using sentinel physician clinics, sentinel schools, emergency rooms, and laboratory diagnosis of pH1N1.

Figure 246 Lab confirmations of pH1N1 in Saskatchewan by collection week, September 2009 – April 2010



Source: SDCL, Sask Ministry of Health, Prepared by PHU Apr 2010

The above chart illustrates the number of positive lab confirmations of pH1N1 in Saskatchewan between September 2009 and April 2010. There were over 2000 lab confirmed cases of pH1N1 in Saskatchewan between September 2009 and April 2010. However, it is important to note that this would underestimate the true number of cases of pH1N1 as not everyone who had pH1N1 would have tested. The chart also illustrates that the second wave of the pandemic peaked in Saskatchewan during the reporting weeks of October 24 and November 21, with the final cases occurring in December. The pH1N1 virus dominated during the 2009/10 season, as only one lab confirmed seasonal influenza was detected in Saskatchewan.

Figure 247 Estimated pandemic H1N1 flu immunization coverage (first dose) by health authority, 2009/10*

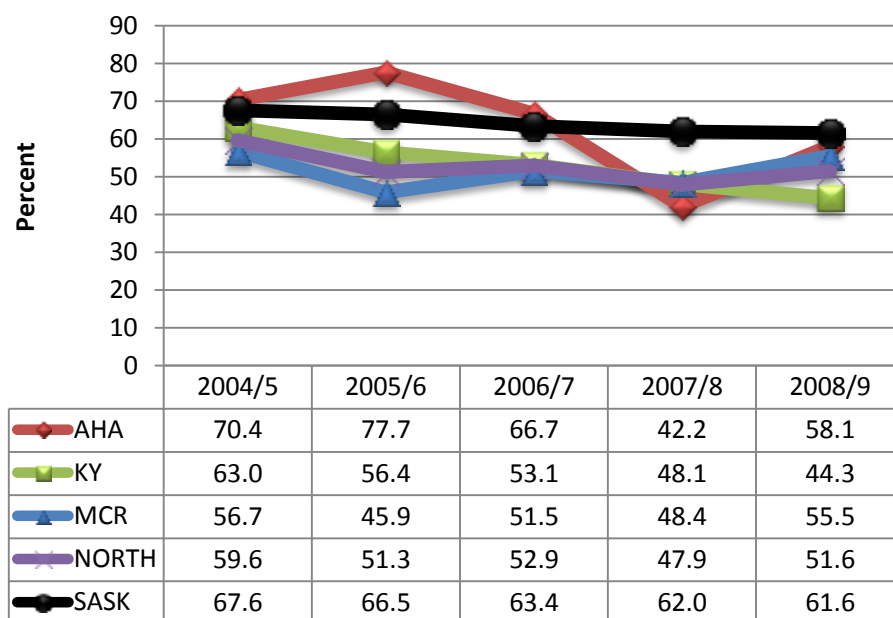
	# pH1N1 first doses given by RHA** & First Nations Staff***	2009 Covered population	Estimated Coverage Rate
AHA****	2,276	2,435	93.5
KYHR	9,431	11,199	84.2
MCRHR	17,375	22,766	76.3
North	29,082	36,400	79.9

* The data in this report may include some double counting as it is combining region wide data from RHA and NITHA ** RHA data is coming from a provincial SIMS report and includes data up to May 28, 2010, *** NITHA data is coming from a NITHA report and includes data up until January 24, 2010. ****The total for AHA is coming solely from SIMS as the SIMS database is complete (both RHA and First Nations) for AHA.

Of the 843 pandemic influenza A viruses that were characterized in 2009/10, over 99% were similar to the California strain, which was the reference virus selected by WHO as the 2009 H1N1 vaccine (National Microbiology Laboratory, March 31, 2010). Therefore, the pH1N1 vaccine provided excellent coverage for the 2009/10 season. Data from NITHA and the Ministry of Health illustrate that estimated coverage rates in northern Saskatchewan with the first dose of the pH1N1 vaccine was very good, ranging from 76.3% in MCRHR to 93.5% in AHA. Overall, in the north, there was approximately 80% coverage with the first dose of the pH1N1 vaccine. As the chart is combining two region wide data sources, there may be some double counting, although it is expected that this would be minimal.

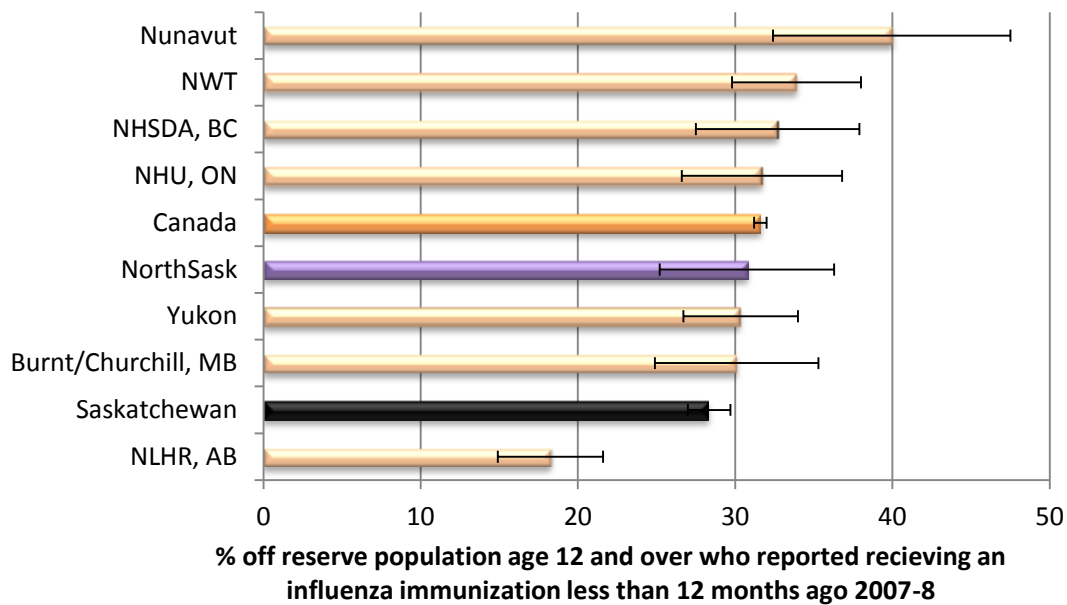
Figure 248 Seasonal influenza vaccine coverage rate, on and off-reserve, aged 65 and over by northern health authority and year, 2004/5 to 2008/9

There are several population groups that are at greater risk of complications of influenza, including individuals with a variety of chronic diseases, as well as everyone over the age of 65 years. The goal in Canada is for 80% immunization coverage among elders over 65 years each year (Public Health Agency of Canada, 2008b). The trend between 2004/5 and 2007/8 was for a steady decline in coverage rates across the north and in Saskatchewan as a whole. The declining trend continued between 2007/8 and 2008/9 in KYHR, with a smaller decrease in Saskatchewan, and increasing in both MCRHR and AHA. Rates in 2008/9 for Saskatchewan and the three northern health authorities remained well below the target of 80%.



Source: Sask Health (Manual counts), Prepared by PHU, Apr 2010

Figure 249 Influenza immunization in past 12 months, population aged 12 and over, off-reserve, by northern region, 2007-2008



Source: StatsCan (CCHS- health indicators), Prepared by PHU July 2009

The groups who most benefit from influenza immunization are those with chronic underlying health conditions or obesity, those who are pregnant, over the age of 65 years, between 6 months and 5 years of age and health care workers. For the general population over the age of 12, the rate of having an influenza immunization within the past 12 months in northern Saskatchewan in 2007-8 was 31%, similar to the Canadian rate of 32%, and slightly higher than the provincial rate of 28%. Compared to other northern regions, the northern Saskatchewan rate was higher than for Yukon, Burntwood/Churchill, and NLHR, but lower than for NHU, NHSDA, and Nunavut.



Antimicrobial resistance

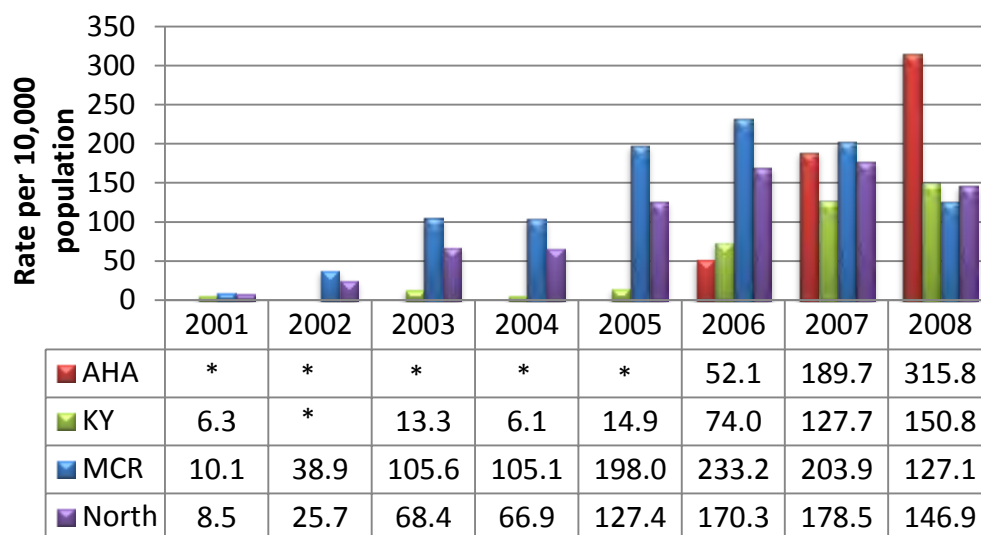
Antimicrobial resistance is when a microbial organism (bacteria, parasite or virus) is resistant to some of the medications usually used to treat that infection. Antibiotic resistance is when the usual antibiotics are not effective in treating specifically a bacterial infection.

Methicillin-resistant staphylococcus aureus (MRSA)

Methicillin-resistant staphylococcus aureus (MRSA) is a bacterium called staphylococcus aureus (or sometimes referred to as simply 'Staph', pronounced 'staff') that is resistant to commonly used antibiotics including methicillin. MRSA can live on humans without causing any problems. When this happens it is called "colonizing" MRSA. However, under certain circumstances MRSA can cause infections and must be treated. This type of MRSA is termed a "case". MRSA cases greater than two months apart from one another have been tracked in northern Saskatchewan since 2001.

Figure 250 Total MRSA rate by northern health authority, on and off-reserve, 2001-2008

Within northern Saskatchewan the rate of MRSA cases have been increasing since 2001. Initially the highest rates were in MCRHR peaking in 2006, before declining in 2007 and 2008. Rates within KYHR and AHA began to rise between 2006 and 2008 and now are higher than in MCRHR.



Source: PHU & NITHA 2001-8 , Prepared by PHU June 2009 * Data suppressed as cell < 5



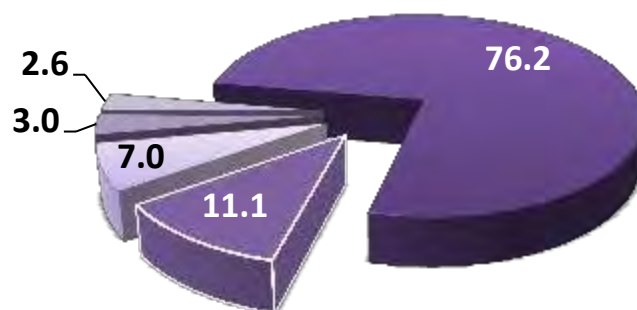
Figure 251 MRSA cases by cluster type, northern Saskatchewan, 2004-2008

■ CA-MRSA (Cluster 7 & 10) ■ HA-MRSA (Cluster 2, 6 & 8)



Figure 252 MRSA cases by clinical picture, northern Saskatchewan, 2001-2008

■ Skin & Soft Tissue ■ Unspecified
 ■ Ear ■ Other*
 ■ Urogenital



Source: PHU & NITHA 2004-2008, Prepared by PHU July 2009

Source: PHU & NITHA 2004-2008, Prepared by PHU July 2009

MRSA has been known to occur in hospital settings and over the past few years has become increasingly recognized in community settings. Those that appear to have arisen in a community setting are referred to as community-acquired MRSA or CA-MRSA. Those that appear to have arisen in the hospital or other health care setting are referred to as healthcare-acquired MRSA or HA-MRSA. Beginning in 2004, we were able to test a selection (n = 404) of the positive MRSA lab results to see if they were CA-MRSA strains (cluster types 7 and 10) or HA-MRSA (cluster types 2, 6, & 8). This objective analysis indicated that 97% of the cases seen in the north were CA-MRSA.

CA-MRSA is known for affecting the younger age groups and causing mainly skin infections. In the north, we also see these trends, as 53% of the cases between 2001 and 2008 occurred in individuals younger than 20 years old and just over 70% in those under 30 years. Over 75% of the cases in northern Saskatchewan occurred as skin and soft tissue infections.

Widespread use and misuse of antibiotics can increase the incidence of MRSA both in the hospital and in the community. Overuse of antibiotics as well as inappropriate use, such as not completing the prescribed treatment, can increase the risk of resistant bacteria including MRSA. Other factors that can increase the risk for CA-MRSA include overcrowding, close contact between people, and decreased access to and use of hand washing and bathing.



West Nile virus

North America first began experiencing West Nile Virus (WNV) in 1999 when an outbreak occurred in the New York area. Since that time it has spread throughout most of North America. During the summer of 2010, due to environmental conditions, there was only one reported case of WNV in southern Saskatchewan. All individuals diagnosed with WNV across the province spent considerable time in southern WNV risk areas.

This disease is spread through specific types of mosquitoes, *Culex tarsalis* being the most common spreader in Saskatchewan. Mosquito surveillance using special mosquito traps helps determine if the types of mosquitoes that could possibly spread the WNV are present and if those mosquitoes are infected with WNV. This infection can also cause illness in birds and horses when they are bitten by infected mosquitoes, therefore surveillance of these animals serves as an early warning system for WNV in humans.



Ongoing surveillance over the past seven years has not detected West Nile infection of any birds, horses or mosquito pools in northern Saskatchewan health authority areas. The presence of WNV spreading mosquitoes (e.g. *Culex Tarsalis*) has been found in several locations across northern Saskatchewan; however, the environmental conditions required for sustained levels of these mosquitoes are rare. There have been no mosquito pools containing the WNV identified in northern Saskatchewan testing sites.

Active bird surveillance was discontinued in Saskatchewan in 2006, leaving horses and mosquitoes as the main components of the early warning surveillance system in Saskatchewan. Human testing will continue for individuals showing illnesses that possibly could be from WNV.

Figure 253 Positive West Nile Virus samples and cases, Saskatchewan, 2003-2009

Year	Human Cases	Positive Samples		
		Mosquito Pools	Horses	Birds
2003	947	37	157	133
2004	5	30	0	29
2005	60	110	14	10
2006	20	36	0	NA
2007	1348	460	57	NA
2008	17	19	2	NA
2009	1	11	0	NA
Total	2398	703	230	172

Source: SaskHealth WNV surveillance website Apr 2010, Prepared by PHU Apr 2010

Advisories continue to recommend measures to reduce:

- the potential reproduction of *Culex tarsalis* mosquitoes by reducing stagnant water in the community and near homes by draining clogged eave troughs, removing old tires or tin cans;
- the potential for mosquito bites by repairing screens on windows, wearing long-sleeved shirts and trousers, using insect-repellents containing DEET.

References

- Adami, H. O., Day, N. E., Trichopoulos, D., & Willett, W. C. (2001). Primary and secondary prevention in the reduction of cancer morbidity and mortality. *Eur J Cancer*, 37 Suppl 8, S118-127.
- Alberta Centre for Injury Control & Research. (2010). *Take Action to prevent alcohol-related injuries*. Retrieved February 22, 2011, from http://www.acicr.ca/Upload/acicr/updates/prevention-information/take-action-sheets/alcohol-and-injury/AlcoholFINAL_2010.pdf
- Aljohani, N., Rempel, B. M., Ludwig, S., Morris, M., Cheang, M., Murray, R., et al. (2008). Impact of diabetes on maternal-fetal outcomes in Manitoba: Relationship with ethnic and environmental factors. *Clin Invest Med*, 31(6), E338-345.
- Armstrong, I. E., Robinson, E. J., & Gray-Donald, K. (1998). Prevalence of low and high birthweight among the James Bay Cree of northern Quebec. *Can J Public Health*, 89(6), 419-420.
- Baliunas, D., Patra, J., Rehm, J., Popova, S., Kaiserman, M., & Taylor, B. (2007). Smoking-attributable mortality and expected years of life lost in Canada 2002: conclusions for prevention and policy. *Chronic Dis Can*, 27(4), 154-162.
- Bonnefoy, X., Annesi-Maesano, I., Aznar, L.M., Braubach, M., Croxford, B., Davidson, M., Ezratty, V., Fredouille, J., Gonzalez-Gross, M., van Kamp, I., Maschke, C., Mesbah, M., Moissonnier, B., Monolbaev, K., Moore, R., Nicol, S., Niemann, H., Nygren, C., Ormandy, D., R  bbe, N., Rudnai, P.,. (2004). *Fourth Ministerial Conference on Environment and Health - Review of evidence on housing and health*: World Health Organization (Europe).
- Bougie, E. (2010). Family, community, and Aboriginal language among young First Nations children living off reserve in Canada. *Canadian Social Trends*, 2010(November 9).
- Bryant, T., & Chisholm, S. (2002). *Housing as a Determinant of Health*. Retrieved February 26, 2010, from http://www.phac-aspc.gc.ca/ph-sp/oi-ar/09_housing-eng.php
- Canadian Cancer Society. (2010a). *Cancer Statistics: Powerpoint slides of cancer statistics figures*. Retrieved March 1, 2011, from http://www.cancer.ca/Canada-wide/Publications/Cancer%20statistics.aspx?sc_lang=en
- Canadian Cancer Society. (2010b). *General cancer statistics for 2010*. Retrieved March 1, 2011, from http://www.cancer.ca/Canada-wide/About%20cancer/Cancer%20statistics/Stats%20at%20a%20glance/General%20cancer%20stats.aspx?sc_lang=en
- Canadian Cancer Society. (2010c). *Reduce your risk*. Retrieved March 9, 2011, from http://www.cancer.ca/Canada-wide/Prevention/Reduce%20your%20risk.aspx?sc_lang=en
- Canadian Cancer Society. (2010d). *Statistics at a glance*, from http://www.cancer.ca/Canada-wide/About%20cancer/Cancer%20statistics/Stats%20at%20a%20glance.aspx?sc_lang=en
- Canadian Cancer Society & Cancer Care Ontario. (2003). *Targeting Cancer: An action plan for cancer prevention and detection: Cancer 2020 Summary Report*. Retrieved March 2, 2011, from <http://www.cancercare.on.ca/common/pages/UserFile.aspx?fileId=13794>
- Canadian Cancer Society's Steering Committee. (2009). *Canadian Cancer Statistics 2009*. Retrieved February, 2009, from <http://www.cancer.ca/~media/CCS/Canada%20wide/Files%20List/English%20files%20heading/pdf%20not%20in%20publications%20section/Stats%202009E%20Cdn%20Cancer.ashx>
- Canadian Institutes of Health Information. (2010). *Health Indicators 2010*, from http://secure.cihi.ca/cihiweb/products/HealthIndicators2010_en.pdf
- Canadian Public Health Association. (2010). *12 Great Achievements July: Decline in deaths from coronary heart disease and stroke*. Retrieved December 17, 2010, from <http://cpha100.ca/12-great-achievements/july-decline-deaths-coronary-heart-disease-and-stroke>
- Canadian UNICEF Committee. (2009). *Canadian Supplement to The state of the world's children 2009 - Aboriginal children's health: Leaving no child behind*. Toronto, ON.
- Cannon, E. A., Bonomi, A. E., Anderson, M. L., Rivara, F. P., & Thompson, R. S. (2010). Adult health and relationship outcomes among women with abuse experiences during childhood. *Violence Vict*, 25(3), 291-305.
- Commission on Social Determinants of Health. (2008). *Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health*. Geneva: World Health Organization.
- Dummer, T. J. (2008). Health geography: supporting public health policy and planning. *Cmaj*, 178(9), 1177-1180.
- Elections Canada. (2010). *Elections Canada: Past Elections*. Retrieved August 25, 2010, from <http://www.elections.ca/intro.asp?section=pas&document=index&lang=e>
- Elections Saskatchewan. *Provincial Constituencies (Map)*. Retrieved June 22, 2010, from <http://www.elections.sk.ca/provincialmaps/pdfs/prov-map.pdf>
- First Nations Bands of Saskatchewan. *Tribal Councils of Saskatchewan*. Retrieved June 22, 2010, from <http://www.sicc.sk.ca/bands/>

- FPTDD Working Group. (2005). *A Canadian Oral Health Strategy: Federal, Provincial, Territorial Dental Director's*. Retrieved June 23, 2010, from <http://www.fptdwg.ca/assets/PDF/Canadian%20Oral%20Health%20Strategy%20-%20Final.pdf>
- Garriguet, D. (2009). Diet quality in Canada. *Health Rep*, 20(3), 41-52.
- Goldenberg, R. L., & Culhane, J. F. (2007). Low birth weight in the United States. *Am J Clin Nutr*, 85(2), 584S-590S.
- Government of Canada. (1999). *Towards a Healthy Future - The Second Report on the Health of Canadians*.
- Government of Canada. (2008). *The Chief Public Health Officer's Report on the State of Public Health in Canada 2008 - Addressing Health Inequalities*.
- Hanson, R. F., Sawyer, G. K., Begle, A. M., & Hubel, G. S. (2010). The impact of crime victimization on quality of life. *J Trauma Stress*, 23(2), 189-197.
- Harder, T., Rodekamp, E., Schellong, K., Dudenhausen, J. W., & Plagemann, A. (2007). Birth weight and subsequent risk of type 2 diabetes: a meta-analysis. *Am J Epidemiol*, 165(8), 849-857.
- Harder, T., Roepke, K., Diller, N., Stechling, Y., Dudenhausen, J. W., & Plagemann, A. (2009). Birth weight, early weight gain, and subsequent risk of type 1 diabetes: systematic review and meta-analysis. *Am J Epidemiol*, 169(12), 1428-1436.
- Health Canada. (2007). *Findings and Recommendations of the Fluoride Expert Panel (January 2007)*. Retrieved July 15, 2010, 2010, from http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/water-eau/2008-fluoride-fluorure/2008-fluoride-fluorure-eng.pdf
- Health Canada. (2008). *Healthy Canadians: A federal report on comparable health indicators 2008*. Retrieved June 2, 2009, from http://www.hc-sc.gc.ca/hcs-sss/alt_formats/hpb-dgps/pdf/pubs/system-regime/2008-fed-comp-indicat/index-eng.pdf
- Health Canada. (2009). *Fluoride in Drinking Water*. Retrieved July 15, 2010, 2010, from http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/consult/2009/fluoride-fluorure/consult_fluor_water-eau-eng.pdf
- Heart & Stroke Foundation of Saskatchewan. (2010). *Statistics*. Retrieved December 17, 2010, from <http://www.heartandstroke.sk.ca/site/c.inKMILNIEmG/b.3657463/k.3490/Statistics.htm>
- Hernandez-Garduno, E., & Elwood, R. K. (2008). The prevalence and predictors of tuberculin positivity in subjects screened for reasons other than contact investigation. *Can Respir J*, 15(4), 181-187.
- Indian and Northern Affairs Canada. *First Nations of Saskatchewan (Map)*. Retrieved June 22, 2010, from <http://www.ainc-inac.gc.ca/ai/scr/sk/fni/pubs/fnl-eng.pdf>
- Ip, S., Chung, M., Raman, G., Chew, P., Magula, N., DeVine, D., Trikalinos, T., Lau, J.,. (2007). *Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries*. Retrieved April 20, 2007, from <http://www.ahrq.gov/downloads/pub/evidence/pdf/brfout/brfout.pdf>
- Irvine, J., Alvi, R., Tan, L., Stockdale, D. (1999). *Hospitalization trends among northern Saskatchewan residents and Saskatchewan registered First Nations 1982-94*: Northern Medical Services, University of Saskatchewan.
- Jaipaul, J. V., Newburn-Cook, C. V., O'Brien, B., & Demianczuk, N. (2009). Modifiable risk factors for term large for gestational age births. *Health Care Women Int*, 30(9), 802-823.
- Johnson, S. L., Solomon, B. S., Shields, W. C., McDonald, E. M., McKenzie, L. B., & Gielen, A. C. (2009). Neighborhood violence and its association with mothers' health: assessing the relative importance of perceived safety and exposure to violence. *J Urban Health*, 86(4), 538-550.
- Kantomaa, M. T., Tammelin, T. H., Ebeling, H. E., & Taanila, A. M. (2008). Emotional and behavioral problems in relation to physical activity in youth. *Med Sci Sports Exerc*, 40(10), 1749-1756.
- Keown, L. (2009). 2008 General Social Survey Report: Social networks help Canadians deal with change. *Canadian Social Trends*.
- Key, T. J., Schatzkin, A., Willett, W. C., Allen, N. E., Spencer, E. A., & Travis, R. C. (2004). Diet, nutrition and the prevention of cancer. *Public Health Nutr*, 7(1A), 187-200.
- King, K. M., Sanguins, J., McGregor, L., & LeBlanc, P. (2007). First Nations people's challenge in managing coronary artery disease risk. *Qual Health Res*, 17(8), 1074-1087.
- Kondo, N., Sembajwe, G., Kawachi, I., van Dam, R. M., Subramanian, S. V., & Yamagata, Z. (2009). Income inequality, mortality, and self rated health: meta-analysis of multilevel studies. *Bmj*, 339, b4471.
- Langford, L., V. Wittrock, M. Johnston, E. Wheaton, J. Irvine, and W. Osei. (2006). *Relationships of forest, climate, wildfires, and respiratory ailments in northern Saskatchewan*. (No. Publication No. 11667-1E05). Saskatoon, SK.
- Lantz, P. M., & Pritchard, A. (2010). Socioeconomic indicators that matter for population health. *Prev Chronic Dis*, 7(4), A74.
- Lau, D. C., Douketis, J. D., Morrison, K. M., Hramiak, I. M., Sharma, A. M., & Ur, E. (2007). 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children [summary]. *Cmaj*, 176(8), S1-13.

- Lee, D. S., Chiu, M., Manuel, D. G., Tu, K., Wang, X., Austin, P. C., et al. (2009). Trends in risk factors for cardiovascular disease in Canada: temporal, socio-demographic and geographic factors. *Cmaj*, 181(3-4), E55-66.
- Lemstra, M., Neudorf, C., & Opondo, J. (2006). Health disparity by neighbourhood income. *Can J Public Health*, 97(6), 435-439.
- Luo, W., Morrison, H., de Groh, M., Waters, C., DesMeules, M., Jones-McLean, E., et al. (2007). The burden of adult obesity in Canada. *Chronic Dis Can*, 27(4), 135-144.
- Marmot, M., Allen, J., Goldblatt, P., Boyce, T., McNeish, D., Grady, M., Geddes, I. (2010). *Fair Society, Healthy Lives - The Marmot Review: strategic review of health inequalities in england post-2010*.
- Martin, C. K., Church, T. S., Thompson, A. M., Earnest, C. P., & Blair, S. N. (2009). Exercise dose and quality of life: a randomized controlled trial. *Arch Intern Med*, 169(3), 269-278.
- Metis Nation of Saskatchewan. (2010).
- Ministry of Health, G. o. S. (2008). *Saskatchewan Comprehensive Injury Surveillance Report, 1995-2005*. Retrieved February 23, 2011, from <http://www.health.gov.sk.ca/injury-report-1995-2005>
- Moloughney, B. (2004). *Housing and Population Health. The State of Current Research Knowledge*: Canadian Institute of Health Information.
- Moynihan, P., & Petersen, P. E. (2004). Diet, nutrition and the prevention of dental diseases. *Public Health Nutr*, 7(1A), 201-226.
- National Collaborating Centre for Environmental Health. (2010). *Fact Sheets for Promoting Healthy Built Environments*.
- Nault, F. (1997). Infant mortality and low birthweight, 1975 to 1995. *Health Rep*, 9(3), 39-46 (Eng); 43-51 (Fre).
- Orpana, H. M., Lemyre, L., & Gravel, R. (2009). Income and psychological distress: the role of the social environment. *Health Rep*, 20(1), 21-28.
- Ortega, F. B., Ruiz, J. R., Castillo, M. J., & Sjostrom, M. (2008). Physical fitness in childhood and adolescence: a powerful marker of health. *Int J Obes (Lond)*, 32(1), 1-11.
- Pampalon, R., Hamel, D., & Gamache, P. (2009). A comparison of individual and area-based socio-economic data for monitoring social inequalities in health. *Health Rep*, 20(4), 85-94.
- Pan, S. Y., Cameron, C., Desmeules, M., Morrison, H., Craig, C. L., & Jiang, X. (2009). Individual, social, environmental, and physical environmental correlates with physical activity among Canadians: a cross-sectional study. *BMC Public Health*, 9, 21.
- Peron, Y., & Strohmenger, C. (1985). *Demographic and Health Indicators: Presentation and interpretation*. Ottawa: Statistics Canada.
- Prentice, A. (2004). Diet, nutrition and the prevention of osteoporosis. *Public Health Nutr*, 7(1A), 227-243.
- Public Health Agency of Canada. (2003). *What Make Canadians Healthy or Unhealthy*. Retrieved June 7, 2010, from <http://www.phac-aspc.gc.ca/ph-sp/determinants/determinants-eng.php#unhealthy>
- Public Health Agency of Canada. (2004). *HIV/AIDS Epi Notes: Understanding the HIV/AIDS Epidemic among Aboriginal Peoples in Canada: The Community at a Glance*. Retrieved June 23, 2010, from http://www.phac-aspc.gc.ca/publicat/epiu-aepi/epi-note/pdf/epi_notes_aboriginal_e.pdf
- Public Health Agency of Canada. (2005). *Injuries Associated with Non-Fatal Dog Bites: Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) database, 1990-2003*, from http://www.phac-aspc.gc.ca/injury-bles/chirpp/pdf/CHIRPP_INJURY_BRIEF_DOG_BITE_update.pdf
- Public Health Agency of Canada. (2008a). *Canadian Perinatal Health Report, 2008 Edition*. Retrieved December 10, 2008, from <http://www.phac-aspc.gc.ca/publicat/2008/cphr-rspp/pdf/cphr-rspp08-eng.pdf>
- Public Health Agency of Canada. (2008b). Final report of outcomes from the National Consensus Conference for Vaccine-Preventable Diseases in Canada, June 12-14, 2005 - Quebec City, Quebec. *Can Commun Dis Rep*, 34 Suppl 2, 1-56.
- Public Health Agency of Canada. (2009a). *2009 Tracking Heart Disease and Stroke in Canada*. Retrieved August 7, 2009, from <http://www.phac-aspc.gc.ca/publicat/2009/cvd-avc/pdf/cvd-avs-2009-eng.pdf>
- Public Health Agency of Canada. (2009b). *Epidemiology of Acute Hepatitis C Infection in Canada Results from the Enhanced Hepatitis Strain Surveillance System (EHSSS)*. Retrieved April 20, 2010, from <http://www.phac-aspc.gc.ca/sti-its-surv-epi/pdf/hcv-epi-eng.pdf>
- Public Health Agency of Canada. (2009c). *H1N1 Surveillance Archive*. Retrieved April 14, 2010, from <http://www.phac-aspc.gc.ca/alert-alerte/h1n1/surveillance-archive/surveillance-archive-eng.php>
- Public Health Agency of Canada. (2009d). *Report from the National Diabetes Surveillance System: Diabetes in Canada, 2009*. Retrieved March 23, 2010, from <http://www.phac-aspc.gc.ca/publicat/2009/ndssdic-snsddac-09/pdf/report-2009-eng.pdf>
- Public Health Agency of Canada. (2010a). *National Diabetes Fact Sheets Canada 2008: Type 2 Diabetes Prevention*. Retrieved March 1, 2011, from http://www.phac-aspc.gc.ca/publicat/2008/ndfs-fnrd-08/ndfs_prevention-fnrd_prevention-eng.php

- Public Health Agency of Canada. (2010b). *National Diabetes Surveillance System*. Retrieved March 1, 2011, from <http://www.phac-aspc.gc.ca/ccdpc-cpcmc/ndss-snsd/english/index-eng.php>
- Public Health Agency of Canada & Correctional Service of Canada. (2004). *Infectious Disease Surveillance in Canadian Federal Penitentiaries 2002-2004*. Ottawa, ON.
- Raghavan, M. (2008). Fatal dog attacks in Canada, 1990-2007. *Can Vet J*, 49(6), 577-581.
- Ramage-Morin, P. L. (2008). Chronic pain in Canadian seniors. *Health Rep*, 19(1), 37-52.
- Reading, J., Kmetz, A., & Gideon, V. (2007). *First Nations wholistic policy and planning model: Discussion paper for the World Health Organization Commission on Social Determinants of Health*.: Assembly of First Nations.
- Reardon, J. Z. (2007). Environmental tobacco smoke: respiratory and other health effects. *Clin Chest Med*, 28(3), 559-573, vi.
- Rehm, J., Giesbrecht, N., Patra, J., & Roerecke, M. (2006). Estimating chronic disease deaths and hospitalizations due to alcohol use in Canada in 2002: implications for policy and prevention strategies. *Prev Chronic Dis*, 3(4), A121.
- Rehm, J., Patra, J., & Popova, S. (2006). Alcohol-attributable mortality and potential years of life lost in Canada 2001: implications for prevention and policy. *Addiction*, 101(3), 373-384.
- Rhymes, J., & Colman, R. (2009). *The cost of tobacco use in Saskatchewan*. Retrieved March 1, 2011, from http://www.cancer.ca/saskatchewan/how%20you%20can%20help/sk-take%20action/sk-tobacco%20control%20in%20saskatchewan/saskatchewan%20-%20issues%20and%20actions/~media/CCS/Saskatchewan/Files%20List/English%20files%20heading/pdf%20not%20in%20publications%20section/ski_CostTobaccoUserposrt.ashx
- Saskatchewan Environment and Resource Management. (1999). *Saskatchewan's state of the environment report 1999: the Boreal Shield Ecozone: a land of lakes and forests*. Regina.
- Saskatchewan Ministry of Education. (2008). *Saskatchewan Education Core Indicators - Prekindergarten to Grade 12*.
- Saskatchewan Provincial Health Council. (1996). *Your health, my health, our health, our individual and collective responsibilities: a discussion paper on the determinants of health*. Regina.
- Saskatoon Health Region Public Health Services. (2011). Dental surgeries in children in Saskatoon hospitals.
- Savoie, J. (2008). *Analysis of the Spatial Distribution of Crime in Canada: Summary of Major Trends 1999, 2001, 2003 and 2006*.
- Search Institute Survey. (2010). *Developmental Assets: A profile of your youth*.
- Shields, M., Gorber, S. C., & Tremblay, M. S. (2008). Estimates of obesity based on self-report versus direct measures. *Health Rep*, 19(2), 61-76.
- Shields, M., Tremblay, M. S., Laviolette, M., Craig, C. L., Janssen, I., & Gorber, S. C. (2010). Fitness of Canadian adults: results from the 2007-2009 Canadian Health Measures Survey. *Health Rep*, 21(1), 21-35.
- Sin, D. D., Spier, S., Svenson, L. W., Schopflocher, D. P., Senthilselvan, A., Cowie, R. L., et al. (2004). The relationship between birth weight and childhood asthma: a population-based cohort study. *Arch Pediatr Adolesc Med*, 158(1), 60-64.
- Smith, K., Findlay, L., and Crompton, S. (2010). *Participation in sports and cultural activities among Aboriginal children and youth*. Retrieved Nov, 2010, from <http://www.statcan.gc.ca/pub/11-008-x/2010002/article/11286-eng.pdf>
- Srinath Reddy, K., & Katan, M. B. (2004). Diet, nutrition and the prevention of hypertension and cardiovascular diseases. *Public Health Nutr*, 7(1A), 167-186.
- Statistics Canada. *Census Dictionary*. Retrieved June 22, 2010, from <http://www12.statcan.ca/census-recensement/2006/ref/dict/geo008-eng.cfm>
- Statistics Canada & PHAC/Office of Public Health Practice July 2010 In Saskatchewan Ministry of Health. (2010). *Saskatchewan's HIV Strategy 2010-14*. Retrieved March 4, 2011, from <http://www.health.gov.sk.ca/hiv-strategy-2010-2014>
- Steyn, N. P., Mann, J., Bennett, P. H., Temple, N., Zimmet, P., Tuomilehto, J., et al. (2004). Diet, nutrition and the prevention of type 2 diabetes. *Public Health Nutr*, 7(1A), 147-165.
- Swinburn, B. A., Caterson, I., Seidell, J. C., & James, W. P. (2004). Diet, nutrition and the prevention of excess weight gain and obesity. *Public Health Nutr*, 7(1A), 123-146.
- Syme, S. L. (1998). Social and economic disparities in health: thoughts about intervention. *Milbank Q*, 76(3), 493-505, 306-497.
- Syme, S. L. (2004). Social determinants of health: the community as an empowered partner. *Prev Chronic Dis*, 1(1), A02.
- Tan, L., Irvine, J., Habbick, B., & Wong, A. (1992). *Vital Statistics in Northern Saskatchewan, 1974-88*: Northern Medical Services, Department of Family Medicine, University of Saskatchewan.
- Taylor, B., Rehm, J., Patra, J., Popova, S., & Baliunas, D. (2007). Alcohol-attributable morbidity and resulting health care costs in Canada in 2002: recommendations for policy and prevention. *J Stud Alcohol Drugs*, 68(1), 36-47.
- The Canadian Dental Association. (2010). *CDA Position on Use of Fluorides in Caries Prevention*. Retrieved July 15, 2010, from http://www.cda-adc.ca/_files/position_statements/Fluorides-English-2010-06-08.pdf

- Tremblay, M. S., Shields, M., Lavolette, M., Craig, C. L., Janssen, I., & Gorber, S. C. (2010). Fitness of Canadian children and youth: results from the 2007-2009 Canadian Health Measures Survey. *Health Rep*, 21(1), 7-20.
- van Rossum, C. T., Shipley, M. J., van de Mheen, H., Grobbee, D. E., & Marmot, M. G. (2000). Employment grade differences in cause specific mortality. A 25 year follow up of civil servants from the first Whitehall study. *J Epidemiol Community Health*, 54(3), 178-184.
- Vasan, R. S., Larson, M. G., Leip, E. P., Evans, J. C., O'Donnell, C. J., Kannel, W. B., et al. (2001). Impact of high-normal blood pressure on the risk of cardiovascular disease. *N Engl J Med*, 345(18), 1291-1297.
- Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Cmaj*, 174(6), 801-809.
- Wilkins, K., Campbell, N. R., Joffres, M. R., McAlister, F. A., Nichol, M., Quach, S., et al. (2010). Blood pressure in Canadian adults. *Health Rep*, 21(1), 37-46.
- World Health Organization. (1998). *Health Promotion Glossary*. Retrieved April 4, 2011, from http://www.who.int/hpr/NPH/docs/hp_glossary_en.pdf
- World Health Organization. (2003). *Global strategy for infant and young child feeding*. Retrieved June 23, 2010, from <http://whqlibdoc.who.int/publications/2003/9241562218.pdf>
- World Health Organization. (2004). *WHO Global Status Report on Alcohol 2004 - Country Profiles: Canada*. Retrieved March 9, 2010, from http://www.who.int/substance_abuse/publications/en/canada.pdf
- World Health Organization. (2005). *WHO expert consultation on rabies, first report*. Retrieved June 28, 2010, from http://whqlibdoc.who.int/trs/WHO_TRS_931_eng.pdf
- World Health Organization. (2009a). *Influenza-like illness in the United States and Mexico*. Retrieved April 14, 2010, from http://www.who.int/csr/don/2009_04_24/en/print.html
- World Health Organization. (2009b). *Statement to the press by WHO Director-General Dr Margaret Chan: World now at the start of 2009 influenza pandemic*. Retrieved April 14, 2010, from http://www.who.int/mediacentre/news/statements/2009/h1n1_pandemic_phase6_20090611/en/print.html
- Yusuf, S., Hawken, S., Ounpuu, S., Dans, T., Avezum, A., Lanas, F., et al. (2004). Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet*, 364(9438), 937-952.
- Zheng, H. (2009). Rising U.S. income inequality, gender and individual self-rated health, 1972-2004. *Soc Sci Med*, 69(9), 1333-1342.