The Environment and Health

Chapter Contents

Key Findings

Social environment:

Saskatchewan 2006 labour participation rates tended to be one of the highest in Canada;

In 2006, Saskatchewan had the third lowest unemployment rate for the provinces and territories, lower than that reported for Canada as a whole;

Income levels reported for 2006 Saskatchewan residents tended to be below the Canadian average; and,

Education levels for 2006 population indicate education levels were below the Canadian average with a high proportion having less than high school education and a low proportion having post-secondary education.

Physical environment:

Air quality in Saskatchewan was consistently excellent to good, based on the air quality index (AQI);

Drinking water advisories/orders by health regions showed a clear seasonal peak; there were fewer in the winter months with a peak occurring in June and July; and,

A warming temperature trend was evident for Saskatchewan.

Introduction

This chapter provides a description of the environment as it has effects on health in Saskatchewan. For the purposes of this chapter, environment is separated into two types: the social environment and the physical environment. The social environment includes factors such as employment, education, housing, food availability, etc. Physical environment factors include water, soil and air quality, and temperature. The environment impacts the health status and need for health services.

When using environment data as evidence for planning, limitations and interpretative cautions regarding the data must be considered.

The Statistic Canada Canadian Census collects basic demographical information such as age and sex (Statistics Canada, 2009). Although an attempt is made to sample every household, hard to reach populations may be underrepresented including homeless people and First Nations communities that chose not to participate. Self identified variables, such as ethnicity, are not verified. Until the 2011 Census, twenty percent of households were surveyed with a more detailed questionnaire to assess economic and social aspects of life. As of 2011, the protocol has been changed to a voluntary survey.

Definitions and references are provided at the end of the chapter.

Social Environment

For public health purposes, the social environment is all the pieces of the community which are not built or natural. A person's social environment includes their living and working conditions, income level, educational background and their communities. The social environment is often influenced by both the natural and built environments. The social environment is associated with disease and mortality risks, independent of individual risk factors.

Education

Health status has been shown to improve with the level of education, which is also closely tied to socioeconomic status (Public Health Agency of Canada 2003). Education increases opportunities for job and income security, and job satisfaction; however, a higher level of education does not always ensure a good job with higher income. Education equips people with knowledge and skills for problem solving, and helps provide a sense of control and mastery over life circumstances. It also improves people's ability to access and understand information to help keep them healthy.

In 2006, Saskatchewan had the fourth highest percent of residents over the age of 15 years (30.2 percent) indicating that they had not obtained a post-secondary certificate, diploma or degree of the Canadian provinces and territories which was higher than that seen for Canada as a whole (23.6 percent). (Figure 4.1) Unlike the Canadian situation, a higher percentage of Saskatchewan females indicated that they had post-secondary education than males (45.6 percent compared to 40.1 percent, respectively).

Of the three prairie provinces, Saskatchewan had the highest percentage of residents indicating they had not obtained a post-secondary certificate, diploma or degree - Alberta had the lowest percentage followed by Manitoba, 23.4 percent and 29.5 percent, respectively.

When education attainment was analysed by highest level of education attained, it was seen that the majority of respondents indicated that they had high school or less (57 percent with approximately 30 percent indicating having not completed high school). (Figure 4.2) This was higher than that found for Canadian residents, of which approximately 49 percent indicated that they had high school education or less.

The urban RHAs of Saskatoon (SRHA) and Regina (RQRHA) had the highest percentages of residents indicating a post-secondary education; whereas the northern RHAs had the lowest percentages. In addition, residents of the northern RHAs indicated the highest percentages of not having a high school certificate (in some cases, over double the percentages of the non-northern RHAs).

Fig: 4.1 **Education: No certificate, degree or diploma, province/territory, 2006**

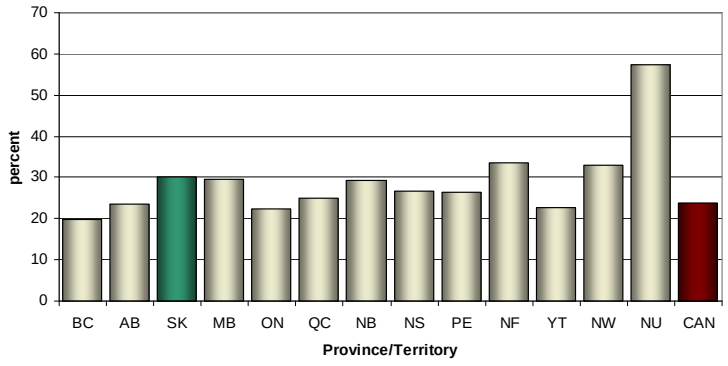
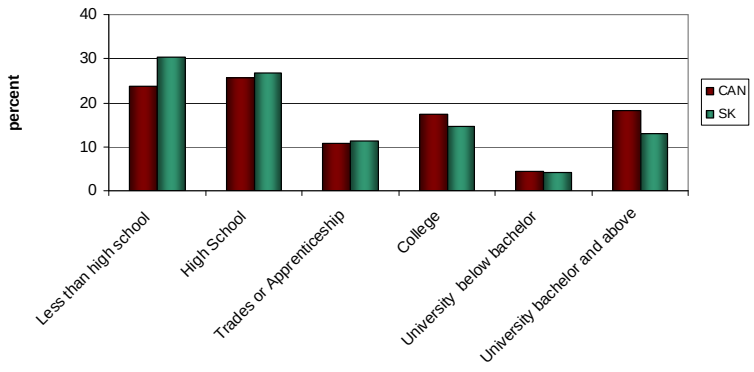


Fig: 4.2 **Education: Attainment, Canada and Saskatchewan, 2006**



Income

Health status has been shown to improve as income and social hierarchy improve (Public Health Agency of Canada 2003). Income determines living conditions and degree of control over life circumstances.

In 2006, Saskatchewan had the third lowest median earnings ($35,948) reported for all residents 15 years and over who worked a full year for the provinces and territories, lower than that reported for Canada as a whole ($53,634). (Figure 4.3) Saskatchewan male residents reported a median income of $39,991 and female residents reported a median income of $32,097, both lower than that seen for male and female residents for Canada as a whole ($46,778 and $35,830, respectively).

Of the three prairie provinces, Saskatchewan had the lowest median earnings reported for all residents 15 years and over who worked a full year. Alberta was found to have the highest ($43,964) followed by Manitoba at $36,692.

Saskatchewan had the sixth highest percent of residents (14.4 percent) whose income was calculated to be in the low range for income before tax for the provinces and territories, lower than that reported for Canada as a whole (15.3 percent). (Figure 4.4) Of Saskatchewan male residents, 13.2 percent) were found to have low income and of female residents, 15.6 percent were found to have low income, both lower than that seen for male and female residents of Canada as a whole (14.1 and 16.5 percent, respectively).

Of the three prairie provinces, Saskatchewan had the middle percentage of residents with low income. Manitoba was found to have the highest (16.7 percent) and Alberta had the lowest percent at 12.2 percent.

The urban RHAs of Saskatoon and Regina had the highest median earning for residents 15 years and over who have worked the full year at $39,792 and $37,739 respectively. The rural RHAs of Kelsey Trail (KTRHA) and Heartland (HRHA) were the lowest at $29,414 and $29,629 respectively.

For the median earnings for all private households, RQRHA and SRHA were found to have the highest median earnings, $52,516 and $48,989 respectively and Keewatin Yatthé (KYRHA) and Sunrise (SRRHA) were found to have the lowest, $34,136 and $37.860, respectively.

When the RHA percentages of residents whose income was calculated to be in the low income before tax range was analyzed, KYRHA and Mamawetan Churchill River (MCRRHA) were found to have the highest percentages of residents with low income rates, 27.4 percent and 25.6 percent respectively, and Sun Country (SCRHA) and Athabasca (AHA) were found to have the lowest percentages at 10.1 percent and 10.3 percent, respectively.

Fig: 4.3 Income: Median earnings, persons 15+ years, worked full year, province/territory, 2006

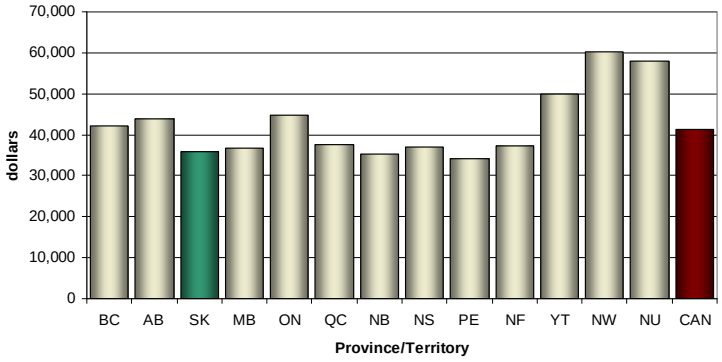
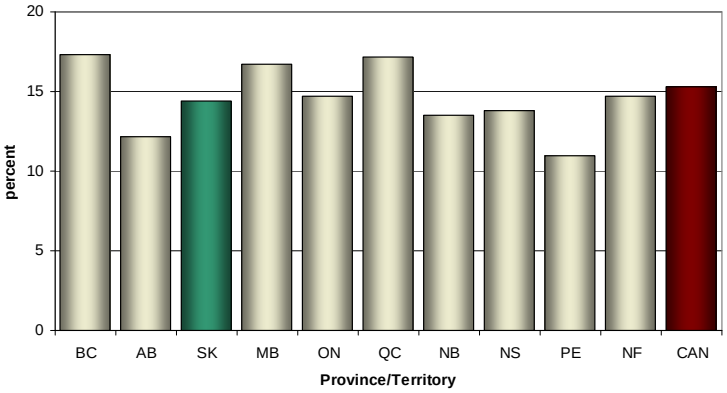


Fig: 4.4 Income: Low income rate, province/territory, 2006



Unemployment

Unemployment and underemployment are associated with poorer health (Public Health Agency of Canada 2003). Unemployed people tend to experience more health problems. Unemployment may be associated with difficult living conditions, low socio-economic status, and health and social problems.

In 2006, Saskatchewan had the fourth highest labour force participation rate (68.4 percent) for the provinces and territories, higher than that reported for Canada as a whole (66.8 percent). (Figure 4.5) Saskatchewan male residents reported a labour participation rate of 74.4 percent and female residents reported a labour participation rate of 62.8 percent, both higher than that seen for males and females of Canada as a whole (72.3 percent and 61.6 percent, respectively).

Of the three prairie provinces, Saskatchewan had the middle labour force participation rate. Alberta was found to have the highest rate (74.0 percent) and Manitoba had the lowest rate at 67.3 percent.

Saskatchewan had the third lowest unemployment rate for the provinces and territories at 5.6 percent, lower than that reported for Canada as a whole (6.6 percent). (Figure 4.6) Saskatchewan male residents reported an unemployment rate of 5.9 percent and female residents reported a rate of 5.3 percent, both lower than that seen for males and females of Canada as a whole (6.5 percent and 6.6 percent, respectively).

Of the three prairie provinces, Saskatchewan had the highest percentage of unemployed residents. Manitoba was found to have the next highest (5.5 percent) and Alberta had the lowest percent at 4.3 percent.

The rural RHAs of HRHA and CRHA had the highest labour participation rates at 72.8 and 72.1 percent respectively and the three northern RHAs, MCRRHA, KYRHA and AHA had the lowest at 55.5, 44.3 and 40.5 percent, respectively. For the unemployment rates, the three northern RHAs were found to have the highest rates, KYRHA at 24.8 percent, MCRRHA at 18.2 percent and AHA at 15.3 percent.

Fig: 4.5 Employment: Labour force participation rate, province/territory, 2006

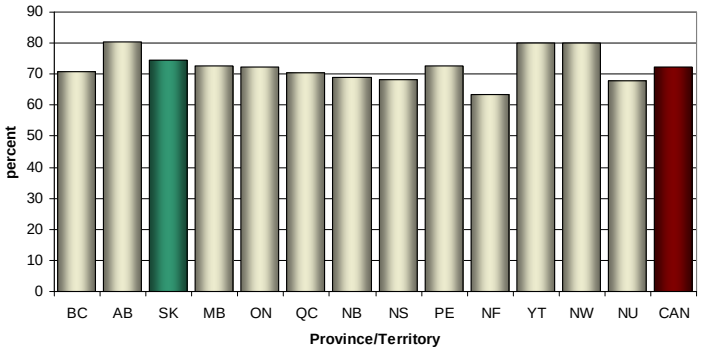
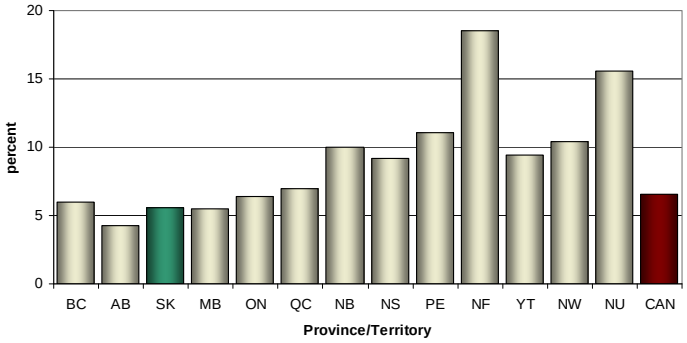


Fig: 4.6 Population: Unemployment rate, province/territory, 2006



Social Support

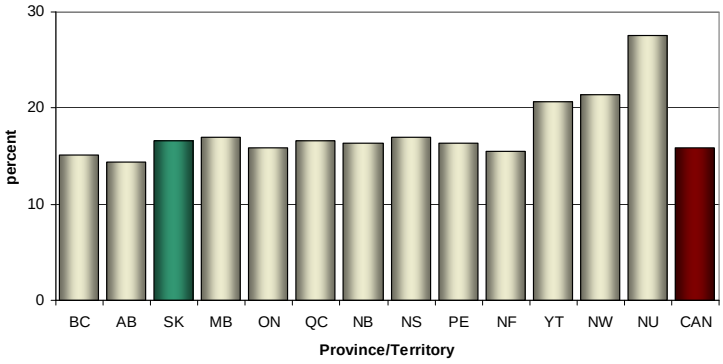
Support from families, friends and communities is associated with better health (Public Health Agency of Canada 2003). Social relationships may provide a coping strategy during adversity. The title "social support" is not meant to imply receiving social assistance.

According to the Canadian census, 2006, Saskatchewan had the sixth highest percent (16.6 percent) of single parent families with one or more children, slightly higher than Canada as a whole (15.9 percent). (Figure 4.7)

The vast majority of these families were female lone parents. In Saskatchewan, 79.1 percent of the single parent families were female lone parents, which was slightly lower than that seen for Canada at 80.1 percent.

Of the three prairie provinces, Saskatchewan was found to have the middle percentage of single parent families, while Manitoba reported the highest single parent families at 17 percent and Albert reported the lowest at 14.4 percent.

Fig: 4.7 **Social support: Lone-parent families, province/territory, 2006**



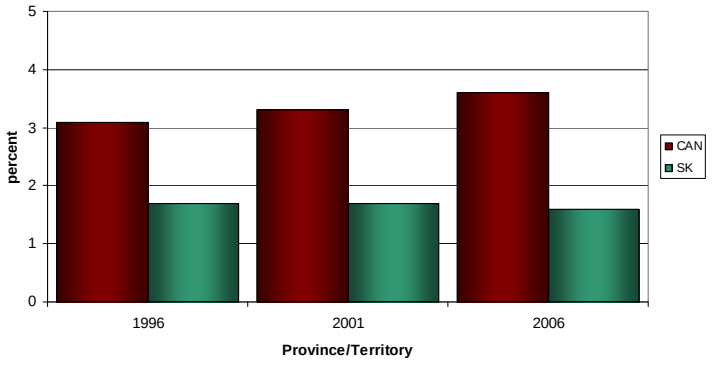
Population Density

Population density affects human well-being. Overall, Saskatchewan's population density was approximately 1.6 people per square kilometre, slightly less than half of the Canadian population density of 3.6 people per square kilometer. Saskatchewan had one of the lowest population densities in Canada with only Newfoundland and the three territories being lower. (Figure 4.8)

Canada's overall population density steadily increased from 1996 to 2006, from 3.1 to 3.6 people per square kilometer. Saskatchewan's population density, however, stayed approximately the same, 1.6 - 1.7 people per square kilometer during the same time period.

As expected, the population densities for Saskatchewan's RHAs reflected the urban/rural population percentages, with RQRHA and SRHA having the highest populations densities and the three northern RHAs having the smallest population densities.

Fig: 4.8 **Environment: Population density, Canada and Saskatchewan, 2006**



Physical Environment

The physical environment, e.g., safe water and clean air, healthy workplaces, safe houses, communities and roads, is one of the determinants of health (PHAC 2003). Saskatchewan is a province with an abundance of natural resources – lakes, rivers, fresh air, wildlife, farmland, boreal forest, and countless others. The Ministry of Environment, the Ministry of Health and the Regional Health Authorities work together to ensure our natural resources are available for generations of healthy Saskatchewan residents to come. Protection of Saskatchewan's air, water and land rests with the Ministry of Environment. Protection of water is a shared responsibility with the Water Security Agency (WSA). The Saskatchewan Ministry of Health and the Regional Health Authorities work to mitigate impacts on human health from the environment.

Air Quality

The Air Quality Index (AQI) is a calculated value that is intended to provide an easy-to-understand distillation of air quality information. This measure compares the effects of air pollution on the environment to a common scale. Parameters included in the measure are: carbon monoxide, ground level ozone, sulfur dioxide, nitrogen dioxide, and fine particulate matter. It is a uniform index, allowing different locations to be compared and a combination of all the major pollutants to be included. Data from the air monitoring network in Saskatchewan are used to calculate the AQI, which describes local air quality conditions. Air quality is measured on the following scale: 0-25 good, 26-50 fair, 51-100 poor and 100+ very poor.

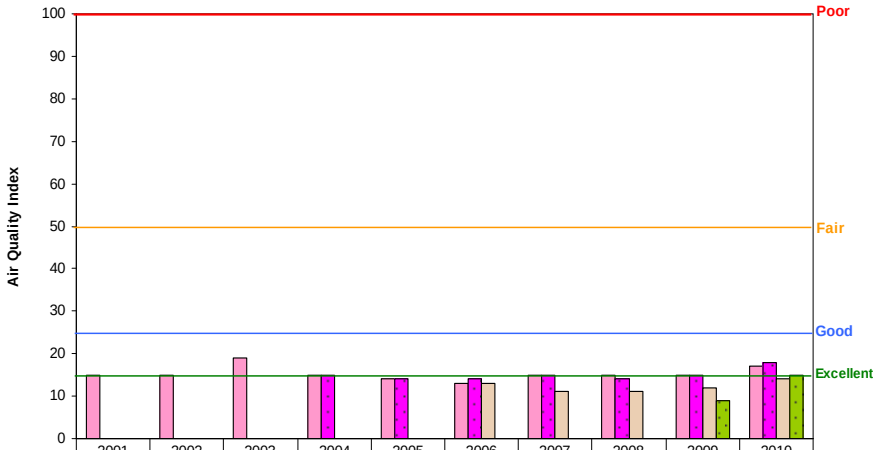
Air quality measurements in Saskatchewan are available in locations where monitoring stations exist. By the end of 2010, four Ministry of Environment monitoring stations were in place representing the south, central and northern parts of the province.

Average annual air quality in Saskatchewan has remained excellent to good. (Figure 4.9) The rise in 2003, which was still categorized as 'good', may have been related to the wildfires in the province of British Columbia (BC) during the summer. Similarly, the rise in 2010 from 'excellent' toward 'good' in Regina and Saskatoon was a result of wildfires occurring in BC's interior and drifting east.

In addition, the South East Saskatchewan Air Shed Association monitors 30 sites in the southeast corner of the province. All of these sites have recorded, since 2006, 'excellent' or 'good' air quality.

Fig: 4.9

Saskatchewan Annual Air Quality Index Summary 2001 - 2010



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Regina	15	15	19	15	14	13	15	15	15	17
Saskatoon				15	14	14	15	14	15	18
Prince Albert						13	11	11	12	14
La Loche									9	15

The Air Quality Health Index (AQHI) is a relatively new measure, developed to help make air quality measures relevant for health messaging. The AQHI can assist individuals, who are adversely affected by poor air quality, make decisions about their outdoor activities. It is intended to be similar to weather indices such as wind chill factors and the UV index. The AQHI is a summarized measure of ground level ozone, particulate matter and nitrogen dioxide and is intended to provide a daily health risk assessment. The website provides the AQHI for today, tonight and tomorrow in the south (Regina), Central (Saskatoon) and Northern (Prince Albert) parts of the province. (http://ww.ec.gc.ca/cas-aqhi/default.asp?lang=En&n=DCE017F0-1)

The AQHI is measured on a scale ranging from 1-10+ and the index values are also grouped into health risk categories as shown below.

1-3 Low health risk
4-6 Moderate health risk
7-10 High health risk
10 + Very high health risk

The AQHI communicates four primary factors;

1- A number from 1 and 10+ equates to the quality of air. The higher the number, the greater the health risk associated with the air quality. When the amount of air pollution is very high, the number will be reported as 10+.

2- A category that describes the level of health risk associated with the index reading (e.g. Low, Moderate, High, or Very High Health Risk).

3- Health messages customized to each category for both the general and 'at risk' populations.

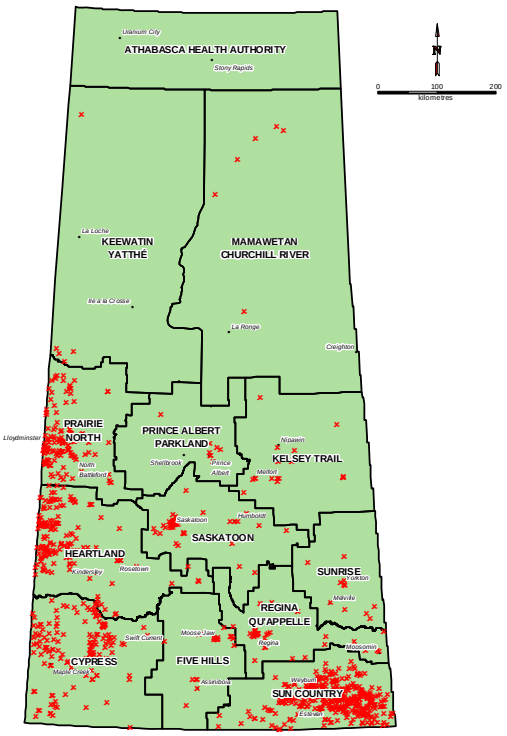
4- Current hourly AQHI readings and maximum forecasted values for today, tonight and tomorrow (Environment Canada, 2010).

National Pollutant Release Inventory: Identification of risks to human health and the environment from pollution is complex. A pollutant's potential to cause harm to human health and the environment depends on a variety of factors, including its toxicity; whether it is released to air, land or water; if and to what extent it is broken down in the environment; and the resulting amount, nature, level of exposure and health of the population. Understanding the risk to human health involves monitoring and research of the physical environment.

Since 2002, polluters are required, by law, to report emissions to the National Pollutant Release Inventory (NPRI). The NPRI serves as a source of legislated, publicly accessible inventory on pollutants released into air, water and on land in Canada. It represents the most comprehensive information on emissions of pollutants available.

Facilities reporting to the NPRI in Saskatchewan are primarily located in the southeast corner of the province and along the Alberta border to the west. (Figure 4.10) This corresponds well with areas of the province where industrial development has occurred. In 2009, 669 facilities in Saskatchewan reported to the NPRI and 347 substances or substance groups were captured. Facilities are required to report these substances if, in 2009, they were manufactured, processed or otherwise used at the facility in a quantity of 10 tonnes or more and employees (including contractors) worked 20,000 hours or more. The NPRI data report emissions of pollutants, not exceedances of guidelines aimed to protect human health. Additionally, some pollutants of concern are not reported to the NPRI, eg., pesticides or greenhouse gases. Identification of risks to human health and the environment from pollution is complex and cannot be determined from NPRI data alone. [NPRI http://www.ec.gc.ca/inrp-npri/default.asp?lang=En&n=4A577BB9-1]

Fig: 4.10 Locations of facilities with iIndustrial emissions as reported to the National Pollutant Release Inventory, Saskatchewan, 2009



Drinking Water

Saskatchewan residents value a good supply of safe, clean drinking water. In Saskatchewan, the Water Security Agency (WSA) implements, inspects and regulates compliance for licensed municipal waterworks, permitted pipelines, regional or provincial park waterworks, industrial waterworks, other permitted waterworks (such as trailer courts, institutions and Hutterite colonies), and wastewater facilities under *The Water Regulations, 2002*. In past years, the Ministry of Environment provided that function. Under the *Health Hazards Regulations,* Saskatchewan health regions are responsible for regulating public water supplies that are not regulated by the WSA, such as rural municipal wells, tourist accommodations and small campgrounds.

In Saskatchewan, Precautionary Drinking Water Advisories (PDWAs) and Emergency Boil Water Orders (EBWOs) can be issued against regulated waterworks. In general, advisories are precautionary in nature; issued by a Regional Health Authority or the WSA when there is a concern with water quality. EBWOs are issued by the local Regional Health Authority when there is a confirmed public health threat due to microbial contamination.

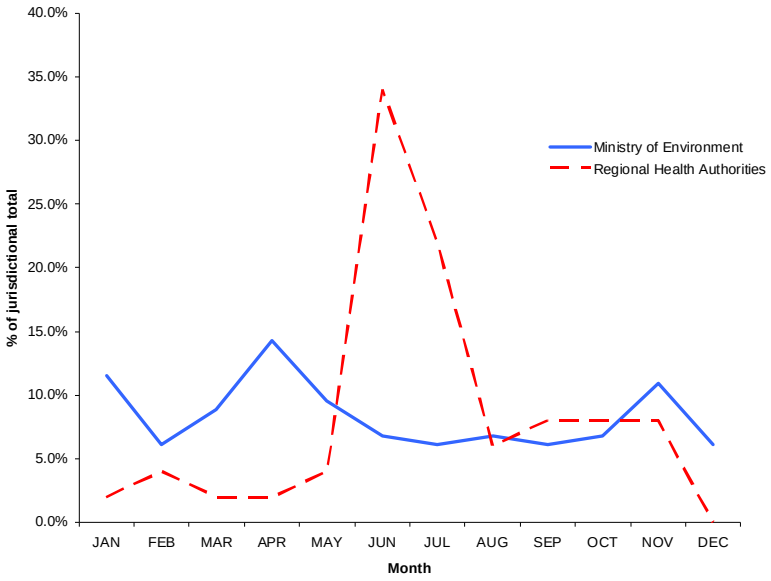
In Saskatchewan, EBWOs occur infrequently compared to PDWA. The majority of issuances in Saskatchewan are advisory in nature (95%).

The issuances by health regions showed a clear seasonal peak; there were fewer in the winter months with a peak occurring in June and July (Figure 4.11). These summer health region issuances were more frequently EBWOs. This is most likely demonstrating the increase in the number of seasonal water supplies set up in summer months (eg, campgrounds, tourist accommodations, etc.).

The advisories issued by the WSA (previously, by the Ministry of Environment) were fairly stable in number throughout the year, with some evidence of a peak in early spring (highest peak in April). Similarly, spring is a time when many seasonal works are commissioned and are issued advisories until such time as monitoring results prove the water to be clear of bacteriological contamination.

In Saskatchewan only large municipal water systems regulated by the WSA are required to conduct health and toxicity testing. Health Region regulated water works do not undergo mandatory health and toxicity testing. At the Saskatchewan Disease Control Laboratory the panel of testing includes: aluminum, arsenic, barium, boron, copper, lead, selenium, zinc, chromium, cadmium, uranium, iron, and manganese.

Fig: 4.11 **Drinking water advisories/orders, by issuing jurisdiction, SK, 2010 (n=162)**



Food Safety

To ensure food safety, public eating establishments (e.g., restaurants, fast food outlets, mobile food vendors and similar establishments) are subject to inspections by the Regional Health Authorities and other regulatory authorities. Inspection frequency is based on factors associated with the operation of the facility such as type and variety of food served, extent of food handling and history of non-compliance. In all Regional Health Authorities, the majority of public eating establishments are inspected at least once annually.

Following a routine inspection, the facility will receive a follow-up inspection if the re-inspection priority is rated as high or moderate. It is important to understand that when restaurants are deemed to have a moderate or high re-inspection priority, it does not mean that the food prepared within that establishment is not safe to eat.

Public health personnel assess the number and type of unsatisfactory items when determining re-inspection priorities, and if necessary, will use enforcement methods to gain compliance. Ratings correspond to re-inspection priority:

- High re-inspection priority: Facilities receiving a high re-inspection priority will normally be re-inspected within one month of the original inspection date.
- Moderate re-inspection priority: Facilities receiving a moderate re-inspection priority will normally be re-inspected within six months of the original inspection date.
- Low re-inspection priority: Facilities receiving a low re-inspection priority will be inspected on the next routinely scheduled inspection date.

Five Hills Health Region had the largest proportion of establishments rated moderate or high, followed by Cypress and Heartland. The deficiency most cited in 2009 was 'inadequate cleaning or sanitizing of equipment or utensils'. (Table 4.1)

On May 12, 2009, the Saskatchewan Online Restaurant Inspection Information (ORII) website was launched. It provides a public health inspection summary concerning the results of each public eating establishment inspection. Inspection results by establishment name and location may be accessed by visiting http://orii.health.gov.sk.ca.

Table 4.1 Public eating establishments, inspection rates, re-inspection priorities and top deficiencies by RHAs, Saskatchewan, 2009

RHA	Minimum one inspection (%)	Moderate/High re-inspection priority (%)	Top critical deficiency
Sun Country	88.7	18.7	Refrigeration/Cooling/Thawing (must be 4 degrees or lower)
Five Hills	98.6	51.8	Cleaning/Sanitizing of Equipment/Utensils
Cypress	98.9	44.0	Refrigeration/Cooling/Thawing (must be 4 degrees or lower)
Regina Qu'Appelle	94.7	13.2	Food Protection
Sunrise	87.5	15.1	Cleaning/Sanitizing of Equipment/Utensils
Saskatoon	98.2	21.6	Cleaning/Sanitizing of Equipment/Utensils
Heartland	94.9	38.1	Food Protection
Kelsey Trail	100.0	6.7	Hand Washing Facilities/Practices and Food Protection*
PA Parkland	95.0	28.6	Hand Washing Facilities/Practices
Prairie North	92.3	27.2	Cleaning/Sanitizing of Equipment/Utensils
Northern RHAs	77.9	21.2	Storage/Preparation of Foods

*The top two deficiencies in moderate/high rated public eating establishments in Kelsey Trail Health Region were equally cited; therefore both appear (Hand Washing Facilities/Practices and Food Protection)

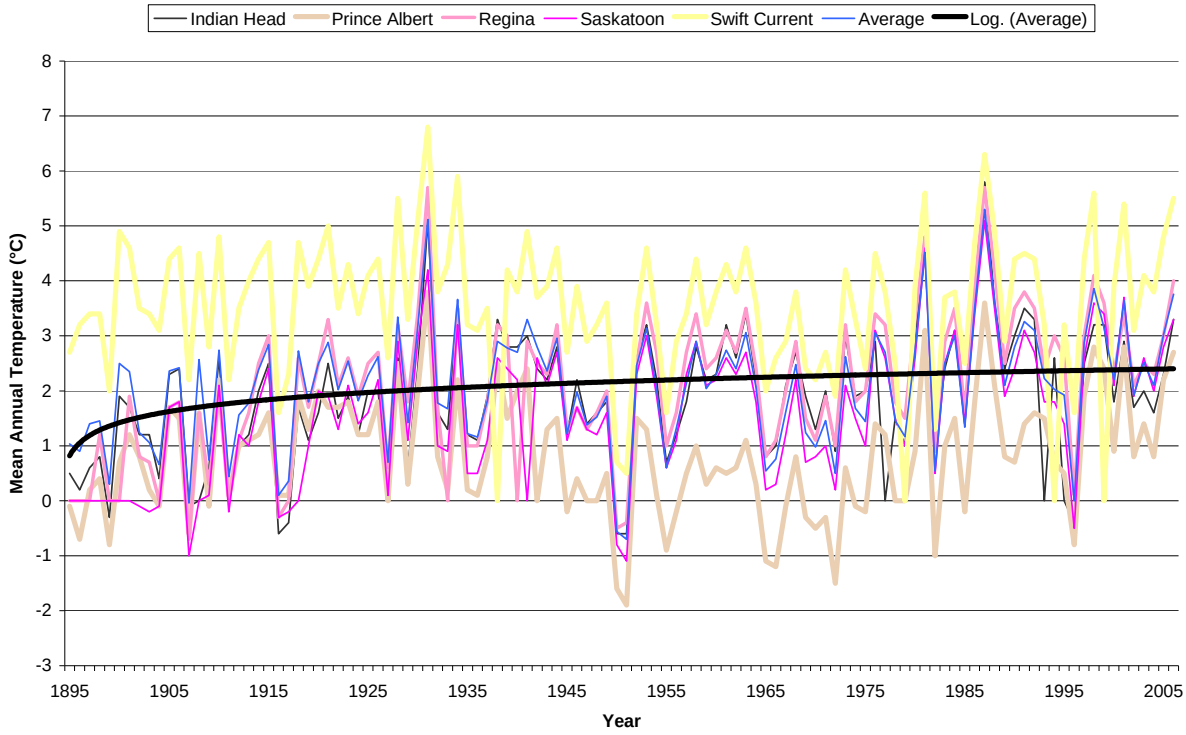
Climate Change

Climate change is a difficult and complex subject to display in a small number of graphs or tables. In general, global warming predictive models universally vary in data used and statistical methods employed, yet all demonstrate the same trend of rapid warming of the planet in the last 50 years compared to the previous 50 years.

The average temperature readings each year, in degrees Celsius, of five weather monitoring stations in Saskatchewan are presented. (Data source: Environment Canada. Canadian Daily Climate Data) These five stations are mostly urban locations and may not be representative of the province as a whole. They were selected for the longest history of temperature data available and representing various geographical points in the province – the same stations were used in the 'Prairies' chapter in the comprehensive report, 'From Impacts to Adaptation: Canada in a Changing Climate' (Sauchyn, 2008).

The trend in the average mean annual temperature ranged from 0.8 degrees in the late 1800s to 2.5 degrees Celsius by 2006 (Figure 4.13). There was great variability from year to year and between locations in the province; however, the trend line demonstrates a gradual upward trend (warming).

Fig: 4.13 **Trends in mean annual temperature for selected Saskatchewan climate stations, 1895-2006**



Definitions

Air Quality Health Index (AQHI) - A relatively new measure, developed to help make air quality measures relevant for health messaging.

Air Quality Index (AQI) - A calculated value that is intended to provide an easy-to-understand distillation of air quality information.

Confidence Interval (CI) - The probability that a population parameter will fall between two set values. CIs may be used as a test of statistical significance when comparing rates. If the CIs overlap, then the difference between the estimates is not considered to be statistically significant.

Emergency Boil Water Orders (EBWO) - Issued by the local Regional Health Authority when there is a confirmed public health threat due to microbial contamination.

Physical environment - E.g., safe water and clean air, healthy workplaces, safe houses, communities and roads, are one of the determinants of health.

Precautionary Drinking Water Advisories (PDWA) - Precautionary in nature; issued by a regional health authority or the Water Security Agency when there is a concern with water quality.

Statistically significant - Occurs when the difference is probably true and not due to chance.

Social environment - All the pieces of the community which are not built or natural.

Data Sources

Canadian Network for Public Health Intelligence (CNPHI). Drinking water advisories module.

Saskatchewan Ministry of Health. Environmental Health System (EHS).

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Saskatchewan Ministry of Health. Laboratory Information Management System (LIMS).

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