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First Nations Health Status Report 2012

Saskatchewan Region

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Message from the Medical Health Officers

It is our pleasure to present the ***First Nations Health Status Report 2012 - Saskatchewan Region***. This report is the result of a collaborative effort between the Health Canada First Nations and Inuit Health Branch, Saskatchewan (FNIHB-SK) and Northern Inter-Tribal Health Authority (NITHA).

The purpose of this joint report is to:

- provide an overview of the health status of First Nations communities (on-reserve population) in Saskatchewan;
- make comparisons, where applicable, between northern Saskatchewan and south central First Nations communities;
- provide information to identify critical issues that require priority setting, strategic planning, advocacy, and program and policy development to positively impact the health status of Saskatchewan's First Nations on-reserve population.

This joint health status report provides a portrait of a population whose health status is significantly below those of Saskatchewan and Canadian residents. As you read this report, it will become clear that Social Determinants of Health contribute to the observed health inequity among the First Nations communities we serve. Undoubtedly, a multi-sectoral approach will be required to address these challenges. It is with a deep sense of humility that we acknowledge the enormous amount of work that is still required to bridge this gap.

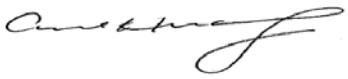
This joint health status report is being shared with First Nations communities in Saskatchewan, our key partners, as well as decision makers and program staff within FNIHB-SK and NITHA. As this is the very first report on the health status of First Nations communities in Saskatchewan, we appreciate your feedbacks and suggestions on how future reports can better assist with health program planning and priority setting.

We thank the First Nations communities in Saskatchewan, the senior managements of FNIHB-SK and NITHA for supporting this joint project. We want to commend the project team for its seamless effort in compiling this report and wish to express our gratitude to the many external reviewers who provided invaluable feedback.

We hope the knowledge gleaned from this report can serve as the basis for building collaborative and integrated responses to improve the health status of First Nations on-reserve populations in Saskatchewan.

Respectfully,

Dr. Nnamdi Ndubuka
MBBS, DHM, MPH, PhD
Medical Health Officer
Northern Inter-Tribal Health Authority



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Executive Summary

The ***Saskatchewan First Nations Health Status Report*** is the first of its kind. The report is a joint effort between Northern Inter-Tribal Health Authority (NITHA) and Health Canada First Nations and Inuit Health Branch, Saskatchewan (FNIHB-SK). It is designed to provide Health Directors, decision-makers, and health professionals in First Nations communities with information for short-term and long-term program planning and community action, in the areas of maternal and child health, communicable diseases, diabetes and social determinants of health. A definition for all of the populations discussed throughout this report can be found in Appendix B.

Demographics

The Demographics section provides population characteristics of Saskatchewan First Nations (FN) living on-reserve. This section (and the overall report) primarily uses unadjusted registered Indian (RI) data from Aboriginal Affairs and Northern Development Canada (AANDC). Adjusted RI data, which incorporates the late reporting of births and deaths, is ideal but current data is unavailable.

- In 2012, Saskatchewan's registered FN population numbered 141,379, representing 13% of the overall Saskatchewan population.
    - Of the 141,379 Saskatchewan registered FN, 49% reside on-reserve and 51% reside off-reserve.

- In 2012, 36,461 (52.7%) of Saskatchewan FN living on-reserve reside in south and central Saskatchewan, supported by FNIHB-SK; while 32,743 (47.3%) reside in northern Saskatchewan, serviced by NITHA.

- The Saskatchewan FN living on-reserve population is young and growing.
    - In 2012, 54.5% of the Saskatchewan FN living on-reserve population were under the age of 25. In comparison, 33.0% of the overall Saskatchewan population were under the age of 25, in 2012.
    - The Saskatchewan FN living on-reserve population has increased by 17% from a population of 59,072 in 2004 to 69,204 in 2012.

- Data from 2012 suggests there are proportionally fewer FN individuals over 50, living on-reserve, when compared to the overall Saskatchewan population. Although the current number of elderly FN is small, research indicates that the rate of senior Aboriginal growth is increasing compared to the non-Aboriginal population. This has far-reaching health care policy implications.

Vital Statistics

The Vital Statistics section provides birth and mortality related measurements of Saskatchewan First Nations living on-reserve.

Vital Statistics Indicators

Life Expectancy

- In 2001, life expectancy at birth was 70.4 years for Canadian registered FN men and 75.5 years for Canadian registered FN women. The life expectancies at birth for Canadian men and women in 2001 were 76.6 and 81.9 years respectively.
- 2017 projections indicate a narrowing of the life expectancy gap between Canadian FN and the general Canadian population.

Potential Years Life Lost (PYLL)

- In 2001, injury was the primary cause of PYLL for Canadian FN; at a rate almost 3.5-times that of the overall Canadian population.

Birth

- Between 1999 and 2007, the natural growth rate for Saskatchewan FN living on-reserve was nearly five times the rate of the overall Saskatchewan population.
- Higher natural growth for Saskatchewan FN living on-reserve is fueled by consistently higher crude birth rates when compared to the overall Saskatchewan population.

Mortality

- The age-standardized mortality rates of Saskatchewan FN living on-reserve declined during the nine-year period (1999 to 2007), which brought them on par with the overall Saskatchewan rates.
- According to the literature, Aboriginal Infant Mortality Rates (IMR) are typically underestimated due to data quality issues surrounding the location of where the infant is born and dies (on-or off-reserve). The Saskatchewan FN living on-reserve data presented reflects a similar trend.

The following outlines the leading causes of death among Saskatchewan FN living on-reserve for each age group:

- **Infants (age < 1 year old):** abnormal clinical findings and congenital anomalies.
- **Children (age 1-14 years old):** external causes (such as transportation accidents and fire accidents) and nervous system diseases.
- **Youth (age 15-24 years old):** external causes (such as intentional self-harm and transportation accidents) and neoplasms (cancer).
- **Middle-aged adults (age 25-44 years old):** external causes (such as transportation accidents and intentional self-harm) and neoplasms (cancer).
- **Older adults (age 45-64 years old):** circulatory diseases and neoplasms (cancer).
- **Seniors (65 years or older):** circulatory diseases and neoplasms (cancer).

Social Determinants of Health

The Social Determinants of Health section focuses on social factors which may affect the health of Saskatchewan's registered FN. The factors included in this chapter are based on the social determinants of health identified by the Public Health Agency of Canada.

Income

- In 2011, the median income for Saskatchewan's registered FN population is less-than-half of the non-Aboriginal Saskatchewan population; indicating a wide income gap.

Employment

- In 2011, the Saskatchewan FN living on-reserve unemployment rate is six times higher than the Saskatchewan non-Aboriginal population rate. The Saskatchewan non-Aboriginal employment rate is more than twice the rate of the Saskatchewan FN living on-reserve rate.

Education

- In 2011, less than a quarter of Saskatchewan FN living on-reserve aged 25-64 had a postsecondary certificate, diploma or degree; compared to the overall Saskatchewan population which had over half of the population with a postsecondary degree. Over half of the Saskatchewan FN living on-reserve aged 25-64 had no high school diploma or equivalent; compared to only 19% of the overall Saskatchewan population.

Physical Environment

- Saskatchewan FN living on-reserve reside in dwellings which require major repairs at a proportion three times that of Saskatchewan FN living off-reserve or the overall Saskatchewan population, in 2011.
- In 2011, Saskatchewan FN living on-reserve experienced a higher proportion of bedroom short fall crowding (14%), when compared to their off-reserve counterparts (5%) and the overall Saskatchewan population (1%). There is a high proportion of Saskatchewan FN living on-reserve households who have more than one person per room (36%). This is more than double that of Saskatchewan FN living off-reserve (16%) and more than seven times the proportion for the overall Saskatchewan population (5%).
- An internal Health Canada report found that there was an absence of adequate grocery stores situated in the northern parts of Saskatchewan (north of 55^{o} latitude).
- In 2010-11, national incarceration statistics showed that Saskatchewan had the second highest percentage of Aboriginal admissions in custody (with Northwest Territories being first).
- In 2001, Saskatchewan's total offenders' population had the highest percentage (76%) of individuals belonging to Aboriginal descent in western Canada.

Culture

- Of the 43.3% of Saskatchewan FN living on-reserve who have detailed knowledge of Aboriginal languages; 32% speak Cree, followed by 8.6% who speak Dene and 1.5% who speak Ojibway.

Immunization

The following outlines immunization rates for one, two and six/seven year old Saskatchewan FN children living on-reserve from 2004-2012:

- **One-year-old** immunization coverage rates in south central averaged 75%, while NITHA immunization coverage rates averaged approximately 84%.
- **Two-year-olds** immunization coverage rates in South Central have remained consistent at about 70% from 2004 to 2012, whereas NITHA coverage rates remained approximately 80%.
- **Six/seven-year-olds** immunization coverage rates for south central and NITHA have average coverage rates of 88% and 91%, respectively between 2004 and 2012.

Communicable Diseases

The Communicable Disease section examines the reported rates of sexually transmitted infections (STI), bloodborne pathogens (BBP) and other notifiable diseases diagnosed in Saskatchewan FN living on-reserve from 2004 to 2012. This section focuses on communicable diseases with the highest burden to this population.

- Both chlamydia and gonorrhea rates have increase between 2004 and 2012. Most recently, in 2012, the Saskatchewan FN living on-reserve chlamydia rate was 2,069.2 per 100,000 population; while the Canadian rate was 298.7 per 100,000 population. In 2012, the Saskatchewan FN living on-reserve gonorrhea rate was 638.7 per 100,000 population; while the Canadian rate was 36.2 per 100,000 population.
- From 2004 to 2012, there were 51 syphilis cases reported in the Saskatchewan FN population living on-reserve; with 15 cases reported in 2010.
- HIV rates in the Saskatchewan FN living on-reserve population increased between 2004 and 2011; spiking in 2011 at 70.4 per 100,000 population.
- In 2012, Saskatchewan FN living on-reserve HCV rate was 140.2 per 100,000 population. The Canadian rate was 29.3 per 100,000 population.
- Active tuberculosis (TB) rates in the Saskatchewan FN living on-reserve spiked in 2005 at 115 per 100,000 population. This is followed by a significant decrease between 2006 and 2012 resulting in a TB rate of 39 per 100,000 population in 2012.
- The most reported enteric diseases among the Saskatchewan FN living on-reserve between 2004 and 2012 were shigellosis, campylobacteriosis, aeromonas and salmonellosis.
- The most reported vaccine-preventable disease among the Saskatchewan FN living on-reserve between 2004 and 2012 was pertussis, with the majority of those cases being reported in 2010.
- The most reported diseases transmitted by respiratory routes among the Saskatchewan FN living on-reserve between 2004 and 2012 were influenza, invasive streptococcal A and invasive pneumococcal disease.

Maternal and Child Health

The Maternal and Child Health section provides detailed information on fertility, contraception prescription claims, stillbirths and growth and nutrition.

- From 2004 to 2007, the average general fertility rate of Saskatchewan FN women living on-reserve was 92 per 1,000 women aged 15-44. This is 1.3 to 1.6 times greater than the overall Saskatchewan female population aged 15-44 during the same period.
- The Non-Insured Health Benefits (NIHB) Drug Utilization Data indicates that the overall rates of contraception prescription claims among Saskatchewan's registered FN female population aged 15-44 have remained relatively stable over the 13-year period (2000-2012), ranging between 15.8% and 17.8%.
- During the 14-year period (1995 to 2007), the stillbirth rates of Saskatchewan FN living on-reserve has remained greater than the overall Saskatchewan stillbirth rates. The Saskatchewan FN living on-reserve three-year stillbirth moving average experienced much variability between 1995 and 2007. For the most recent years of data (2005-2007), the three-year stillbirth moving average spiked to the highest point at 12.9 per 1,000 live and stillbirths.
- In terms of newborn baby length for a cohort, southern Saskatchewan FN newborns living on-reserve, 22% of female newborns and 24% of male newborns were in the 97th percentile (based on a standardized scale developed by the World Health Organization). **Note: The data relates to this specific cohort and cannot be generalized to the entire Saskatchewan FN living on-reserve population.**

Diabetes

The Diabetes section looks at the estimated prevalence and estimated incidence rates of diabetes in Saskatchewan based on available literature and data in order to better understand the impact of diabetes within this population. In addition, the chapter also uses pharmacy transaction data from Health Canada's Non-Insured Health Benefits (NIHB) program to approximate and further estimate the prevalence of diabetes in the Saskatchewan registered FN population.

- Literature shows that during the 26-year period between 1980 and 2005, the age-standardized estimate of diabetes incidence and prevalence among FN adults (aged 20 or older) in Saskatchewan were significantly greater than non-FN adults.
- The 3-year average age-standardized diabetes incidence rate and prevalence rate in FN children was similar to the rates of non-First Nations children from 1980 to 2003.
- Between 2000 and 2012, the anti-diabetic drug usage prevalence among FN increased consistently and female prevalence of anti-diabetic drug usage was significantly greater than males.

Introduction

> ***"Indigenous ideologies embrace a holistic concept of health that reflects physical, spiritual, emotional and mental dimensions." - C.L. Reading and F. Wien***

The ***Saskatchewan First Nations Health Status Report*** is the first of its kind; a joint report between Northern Inter-Tribal Health Authority (NITHA) and the Health Canada First Nations and Inuit Health Branch, Saskatchewan (FNIHB-SK). It is designed to provide Health Directors, decision-makers, and health professionals in First Nations (FN) communities with information for program planning and community action in the areas of social determinants of health, immunization, communicable diseases, maternal and child health and diabetes. As the information provided in this report is based on available data; important issues such as mental health and chronic diseases are not discussed due to limited access to quality data. As this is the first report of its kind, the baseline data presented can be used as a comparison in subsequent health status reports. However, interpretations should be made with caution as some FN communities have very small sample sizes which tend to misrepresent results.

Health services to Saskatchewan FN living on-reserve are provided by a variety of agencies including: FNIHB-SK, NITHA, tribal councils, regional health authorities and individual bands. This complex administrative arrangement poses a unique challenge in the coordination of health services delivery to FN people. FNIHB-SK supports the delivery of community-based health promotion and health protection services on FN reserves in Saskatchewan. In south and central Saskatchewan FN communities, FNIHB-SK is mandated by the federal government to provide public health services. Communities who have accepted responsibilities for the delivery of some or most health services and have received funding to do so are referred to as transferred communities. Transferred communities may hire their own health professionals or enter into agreements with provincial or regional health authorities for the provision of these services. FNIHB-SK provides consultation and support to transferred communities, as requested.

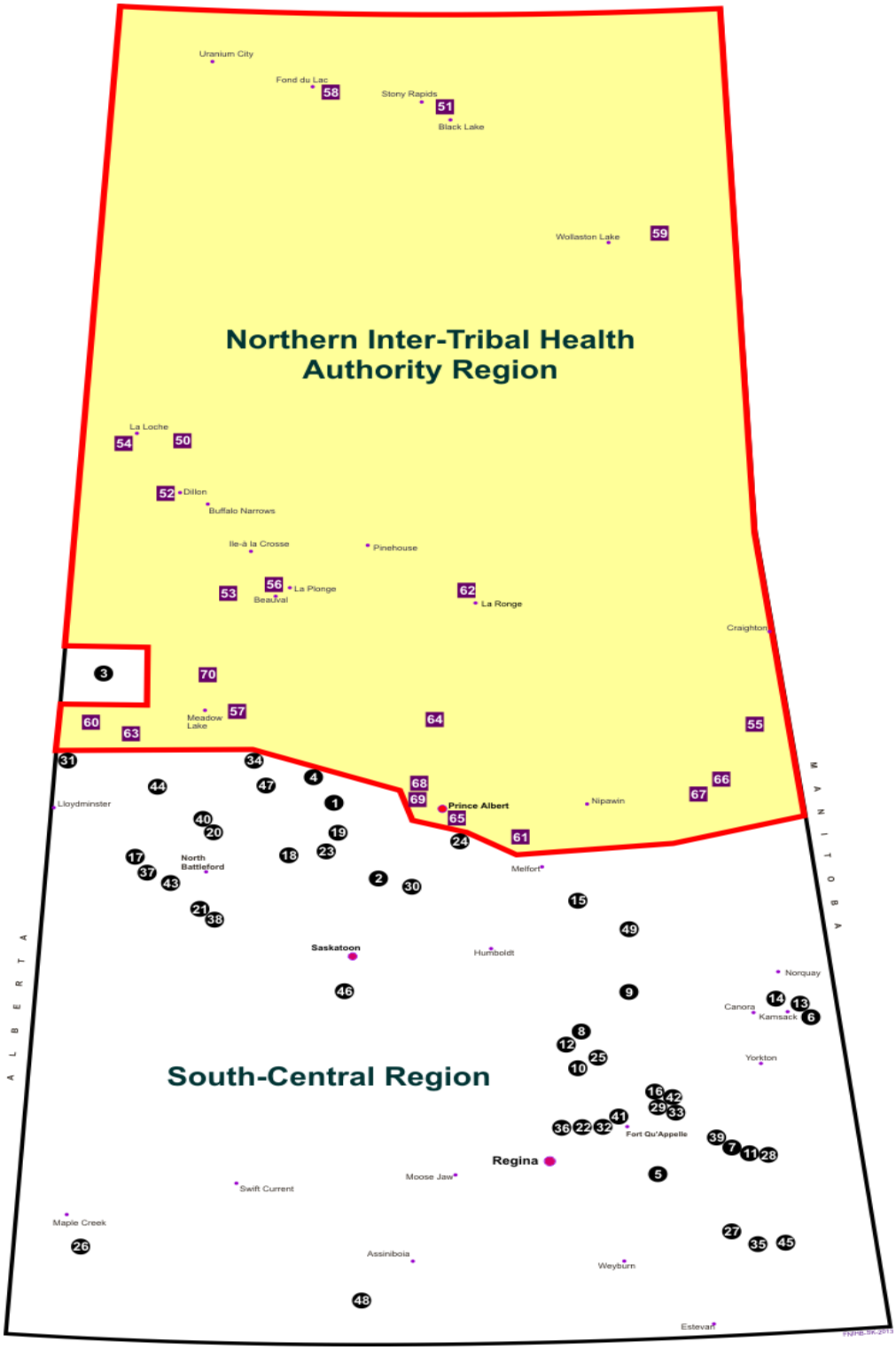
According to the Aboriginal Affairs and Northern Development Canada (AANDC) map on page 12, FNIHB-SK provides services through a regional and community-based structure in south and central Saskatchewan. The regional office in Regina provides region-wide services and support, while the North Service Centre (covering central Saskatchewan) and the South Service Centre (covering southern Saskatchewan) provide services in their respective geographic areas. In northern Saskatchewan, NITHA and its member partners (Prince Albert Grand Council, Meadow Lake Tribal Council, Peter Ballantyne Cree Nation and Lac La Ronge Indian Band) are responsible for public health and primary care services in FN communities within their jurisdiction. NITHA provides public health oversight, professional support, advice and guidance to its partners, enabling them to better meet the health needs of their communities. This is directed by the partners and accomplished through research, data collection, proposal development, two-way communication, information sharing, policy review, training and standards development.

FNIHB-SK and NITHA work collaboratively in areas of common interest. A complete list of Saskatchewan FN can be found on pages 14-15. As the map shows, there are approximately 70 Saskatchewan FN. These communities vary in size, ranging from populations of 113 to 9,725.

The majority of this report uses available data for Saskatchewan FN living on-reserve up to December 31, 2012. Unfortunately, due to lack of data, there may be different years of data presented and population comparisons in each section. At times, sections do include data for other Aboriginal groups as well as the entire Saskatchewan registered FN population, which includes individuals both on-and -off reserve. Where possible, FN data is compared to the overall Saskatchewan population. A definition for all of the populations discussed throughout this report can be found in Appendix B. The information presented in this report reflects data taken at particular points in time. As a result, the data reported may not accurately capture the dynamic mobility of FN populations moving on-and off-reserve. Many of the sections use unadjusted Indian Register (IR) total population counts for the denominator when expressing rates. IR data is sourced from AANDC.

It is the intention of FNIHB-SK to produce similar reports on a regular basis to assist communities with planning and evaluating their health status. It is anticipated that lessons learned both in the development of the report and as a result of its use by stakeholders will increase both the scope and quality of information that is available for future reports.

Map of First Nations in Saskatchewan by NITHA and South-Central (FNIHB-SK) regions



Aboriginal Affairs and Northern Development Canada (AANDC) reports 70 First Nations within Saskatchewan.
(Note: As some First Nations include more than one community, the community numbers reported by NITHA may differ from the number of First Nations reported by AANDC).

South-Central Region (FNIHB-SK) ●

1	Ahtahkakoop First Nation
2	Beardy's and Okemasis First Nation
3	Big Island Lake Cree Nation
4	Big River First Nation
5	Carry the Kettle First Nation
6	Cote First Nation
7	Cowessess First Nation
8	Day Star First Nation
9	Fishing Lake First Nation
10	Gordon First Nation
11	Kahkewistahaw First Nation
12	Kawacatoose First Nation
13	Keeseekoose First Nation
14	The Key First Nation
15	Kinistin Saulteaux Nation
16	Little Black Bear First Nation
17	Little Pine First Nation
18	Lucky Man First Nation
19	Mistawasis First Nation
20	Moosomin First Nation
21	Mosquito, Grizzly Bear's Head, Lean Man First Nation
22	Muscowpetung First Nation
23	Muskeg Lake First Nation
24	Muskoday First Nation
25	Muskowekwan First Nation
26	Nekaneet First Nation
27	Ocean Man First Nation
28	Ochapowace First Nation
29	Okanese First Nation
30	One Arrow First Nation
31	Onion Lake First Nation
32	Pasqua First Nation
33	Peepeekisis First Nation
34	Pelican Lake First Nation
35	Pheasant Rump Nakota First Nation
36	Piapot First Nation
37	Poundmaker First Nation
38	Red Pheasant First Nation
39	Sakimay First Nation
40	Saulteaux First Nation
41	Standing Buffalo First Nation
42	Star Blanket First Nation
43	Sweetgrass First Nation
44	Thunderchild First Nation
45	White Bear First Nation
46	Whitecap Dakota First Nation
47	Witchekan Lake First Nation
48	Wood Mountain First Nation
49	Yellow Quill First Nation

Northern Inter-Tribal Health Authority Region ■

50	Birch Narrows First Nation
51	Black Lake First Nation
52	Buffalo River Dene Nation
53	Canoe Lake Cree First Nation
54	Clearwater River Dene First Nation
55	Cumberland House Cree Nation
56	English River First Nation
57	Flying Dust First Nation
58	Fond du Lac First Nation
59	Hatchet Lake First Nation
60	Island Lake First Nation
61	James Smith First Nation
62	Lac La Ronge First Nation
63	Makwa Sahgaiehcan First Nation
64	Montreal Lake First Nation
65	Peter Ballantyne Cree Nation
66	Red Earth First Nation
67	Shoal Lake Cree Nation
68	Sturgeon Lake First Nation
69	Wahpeton Dakota Nation
70	Waterhen Lake First Nation

Chapter 1: Demographics

The Demographics chapter provides population characteristics of the Saskatchewan First Nations (FN) population living on-reserve using the 2012 Aboriginal Affairs and Northern Development (AANDC) population data. This chapter also examines the growth in the Saskatchewan FN population living on-reserve.

The Demographics chapter uses the 2012 data from Aboriginal Affairs and Northern Development Canada (AANDC).

The Demographics chapter covers topics on:

- Growing First Nations Population
- Population Pyramid: A Young First Nations Population

Saskatchewan has one of the largest percentages of registered FN population in Canada at 13% of the overall provincial population in 2011.[1] The Saskatchewan registered FN population, which includes those living on- and off-reserve, has experienced considerable growth over the past several decades. In fact, population projections by AANDC estimate that registered FN populations in Saskatchewan will continue growing significantly; estimating 70% growth between 2001 and 2026.[2]

According to AANDC, "Understanding future trends of the Aboriginal population through demographic projections is a powerful planning tool".2 As will be apparent in subsequent chapters, a growing Saskatchewan FN population presents many opportunities and challenges with regards to health policies and programming.

[1] *First Nations Health Protection Report 2010* – First Nations and Inuit Health Branch, Saskatchewan Region.
[2] Indian and Northern Affairs Canada (2011): *Aboriginal Demography - Population, Household and Family Projections, 2001-2026*.

A Growing Population

As mentioned previously, the data presented in this chapter is from AANDC. It reflects unadjusted Indian Register (IR) data based on the population registered in the Indian Registry System as of December 31 of each year. Unadjusted IR data has not been adjusted for the late reporting of life events such as births and deaths. Adjusted IR data is preferred and considered the most accurate but reporting of this nature occurs approximately every five years; limiting the availability of current data. As a result, the breakdown between on- and off-reserve is difficult and the true on-reserve population may be slightly higher or lower than the AANDC figures. For example, if the on-reserve population was underestimated, disease rates may be overestimated. However, because the same source of population data was used for all years covered in this report, it is less likely that disease trends from year to year would be affected.[3]

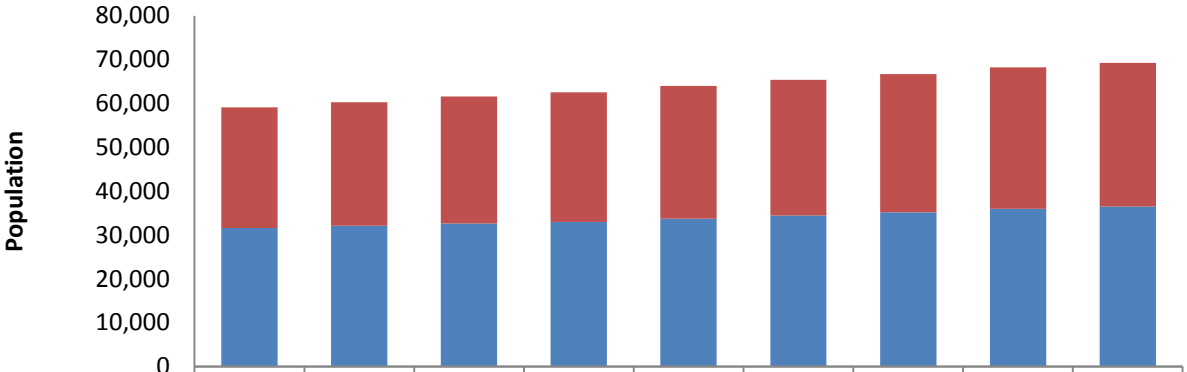
According to Figure 1.1, in 2012, Saskatchewan's registered FN population numbered 141,379, representing 13% of the overall Saskatchewan population in 2012. Due to jurisdictional divisions in health care service delivery, Saskatchewan's registered FN population is often broke down into those living on-reserve and those living off-reserve. Of the 141,379 registered Saskatchewan FN, 49% of FN reside on-reserve and 51% reside off-reserve.

Figure 1.1 also indicates that the Saskatchewan FN population living on-reserve has increased by 17% from a population of 59,072 in 2004 to 69,204 in 2012. Data from the AANDC's Indian Registration System indicates that the Saskatchewan FN population living on-reserve represented 6.4% of the overall Saskatchewan population in 2012.

A further breakdown of Figure 1.1 reveals that in 2012, 36,461 (52.7%) of Saskatchewan FN living on-reserve reside in south and central Saskatchewan, serviced by the Saskatchewan First Nations and Inuit Health Branch (FNIHB-SK; while 32,743 (47.3%) reside in Northern Saskatchewan, serviced by the Northern Inter-Tribal Health Authority (NITHA). Additionally, the population growth in the NITHA region was slightly greater than the South Central region during the 9-year period (19% versus 16%, respectively).

[3] Denominator guidelines for health surveillance in First Nations populations in Canada [electronic resource] / prepared by the Surveillance, Health Information Policy and Coordination Unit, First Nations and Inuit Health Branch, Health Canada. Ottawa: Health Canada, c2012

Figure 1.1: Saskatchewan First Nations population living on-reserve, 2004-2012



	2004	2005	2006	2007	2008	2009	2010	2011	2012
NITHA	27,511	28,151	28,914	29,574	30,275	30,945	31,560	32,234	32,743
South Central	31,561	32,098	32,650	32,988	33,716	34,426	35,147	35,956	36,461
Total	59,072	60,249	61,564	62,562	63,991	65,371	66,707	68,190	69,204

Source: AANDC, 2012

Population Pyramid

The population pyramid for Saskatchewan FN living on-reserve displays an overall wide base representing growth in the younger age group (Figure 1.2). In 2012, 54.5% of the Saskatchewan FN population living on-reserve were under the age of 25. In comparison, 33.0% of the overall Saskatchewan population were under the age of 25. According to the 2011 National Household Survey, the median age of those who self-report as First Nations, in Saskatchewan, were 20 years of age.4 The young Saskatchewan FN on-reserve population is likely the result of high fertility rates and lower life expectancies when compared to the overall Saskatchewan population.[4] A large proportion of young Saskatchewan FN individuals living on-reserve provide program and policy makers with opportunities to address economic issues, such as labour shortages, to benefit both the FN and overall Saskatchewan population.

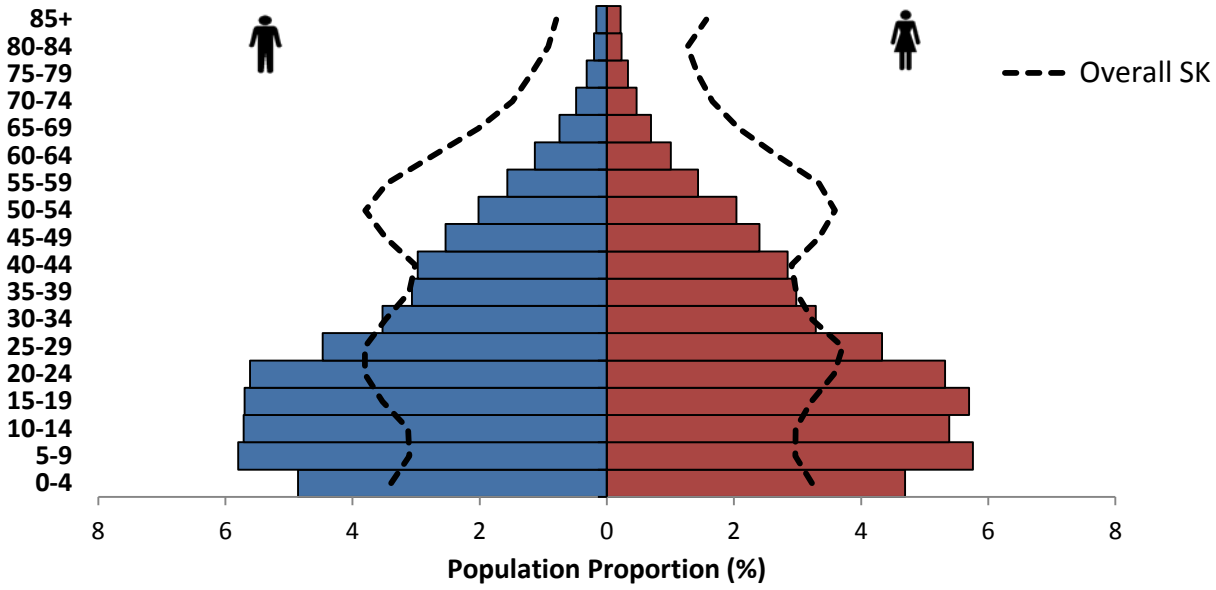
According to Figure 1.2, the narrow section of the population pyramid at the 0-4 year old age group is likely a reflection of the unadjusted IR data. Since it is common for children to be recorded into the Indian Registry System between the ages of 1 to 5 years; late reported births may not be captured in the in the unadjusted 0-4 year old age group data. It is estimated that close to 70% of births recorded for one year actually occurred in a previous year.[5]

Figure 1.2 also shows that there were proportionately fewer Saskatchewan FN living on-reserve, over the age of 50, when compared to the overall Saskatchewan population. Although the current number of elderly FN is small; an article by Beatty et. al indicates that the rate of senior Aboriginal growth is increasing when compared to the non-Aboriginal senior population. The article further states that the senior Aboriginal population is often neglected by policy makers due to their low numbers. This often leads to inadequate support for a growing Aboriginal senior population which requires complex solutions to address several physical, mental and social issues. [6]

Regarding the gender break down, according to Figure 1.2, there are similar distributions between males and females when looking at both the Saskatchewan FN living on-reserve and the overall Saskatchewan population. The one exception is the larger female proportion in the 85+ age group for the overall Saskatchewan population. This can likely be attributed to the higher life expectancy among women.

[4] Statistics Canada (2013): *Aboriginal Peoples in Canada: First Nations People, Métis and Inuit*.
[5] Denominator guidelines for health surveillance in First Nations populations in Canada [electronic resource] / prepared by the Surveillance, Health Information Policy and Coordination Unit, First Nations and Inuit Health Branch, Health Canada. Ottawa : Health Canada, c2012
[6] Beatty, B. B. , Berdahl, L. (2011). Health Care and Aboriginal Seniors in Urban Canada: Helping a Neglected Class. *The International Indigenous Policy Journal,* 2(1).

Figure 1.2: Population distribution as proportion, Saskatchewan FN living on-reserve and overall Saskatchewan, 2012



Sources: AANDC; Statistics Canada, 2012

Demographics Methodology

Who is included in this chapter and data sources

1. **Overall Saskatchewan population**
   - Total Saskatchewan population, including First Nations on- and off-reserve
   - Data source
     - Statistics Canada, CANSIM, 2012

2. **Saskatchewan registered First Nations population**
   - Registered to a Saskatchewan FN band; living on- and off-reserve
   - Data source
     - AANDC, 2012 – unadjusted data

3. **Saskatchewan First Nations population living on-reserve**
   - Registered to a Saskatchewan FN band and residing on-reserve
   - Does not include non-registered First Nations or non-First Nations that may be living on-reserve.
   - Data source
     - AANDC, 2012 – unadjusted data

Approach to Data Analysis

Data was analyzed using Microsoft Excel 2010.

Data Limitations

- Unadjusted AANDC population may not be complete due to late reporting of life events. Adjusted data not available for years analyzed.
- As the place of residence field on the Indian Register is not regularly updated, information shared in this chapter represents a snapshot in time on whether an individual lives on- or off-reserve. This may not be a true reflection of the proportion of FN individuals living on-reserve due to high mobility trends associated with FN.
- Statistics pertaining to the overall SK population do include FN living on-reserve. As a result, it is not possible to make a true direct comparison between FN living on-reserve and the rest of the SK population. This may minimize apparent differences between populations than if a comparison was made between truly separate populations. This is a limitation that will also apply to subsequent chapters in this report.
- Census data excludes those living in incompletely enumerated Indian reserves.

Chapter 2: Vital Statistics

The Vital Statistics chapter examines the death of Saskatchewan First Nations (FN) living on-reserve and overall Saskatchewan population by age groups from infants to seniors. In addition, the chapter provides birth related trends.

The Vital Statistics chapter provides birth death related measurements of Saskatchewan First Nations (FN) individuals living on-reserve from 1999 to 2007. The chapter also summarizes the causes of death in Saskatchewan's FN population living on-reserve from 2003 to 2007.

Note: Due to limited data availability, "cause of death" are only available from 2003 to 2007.

This section provides mortality data from 1999 to 2007 as well as causes of death from 2003 to 2007. The lack of current data restricts a more up-to-date analysis of these indicators.

Additionally, limited data also prevents the analysis of age-specific death rates for <1-14 year olds.

Life Expectancy - 2001

Life expectancy is the "number of years a person would be expected to live, starting from birth . . . on the basis of the mortality statistics for a given observation period, typically a calendar year." [7]

According to Table 2.1, in 2001 life expectancy at birth was 70.4 years for Canadian registered FN men and 75.5 years for Canadian registered FN women. The life expectancies at birth for Canadian men and women in 2001 were 76.6 and 81.9 years respectively. [8] From this data we can see that women generally have a higher life expectancy than men, by approximately five years. Additionally, there is a considerable gap in life expectancies between Canadian FN and the overall Canadian population (Table 2.1).

A Statistics Canada report describing life expectancy projections predicts a life expectancy increase for the Canadian FN population by 2017. According to this report, the projected Canadian FN life expectancy will increase to 73.3 years for males and 78.4 years for females.[9] For the overall Canadian population, the 2017 life expectancy estimates are 78.7 years for males and 83.3 years for females.9 The projections indicate a narrowing of the life expectancy gap between Canadian FN and the general Canadian population (Table 2.1).

Lower Canadian FN life expectancies likely stem from a higher rate of death among Aboriginal infants (twice the national average) and higher rates of injury and accidental death among Aboriginal children, youth and young adults.[10]

Table 2.1: Life expectancies (LE) of Canadian Registered First Nations (CRFN) and overall Canadian population (OC), 2001 and 2017

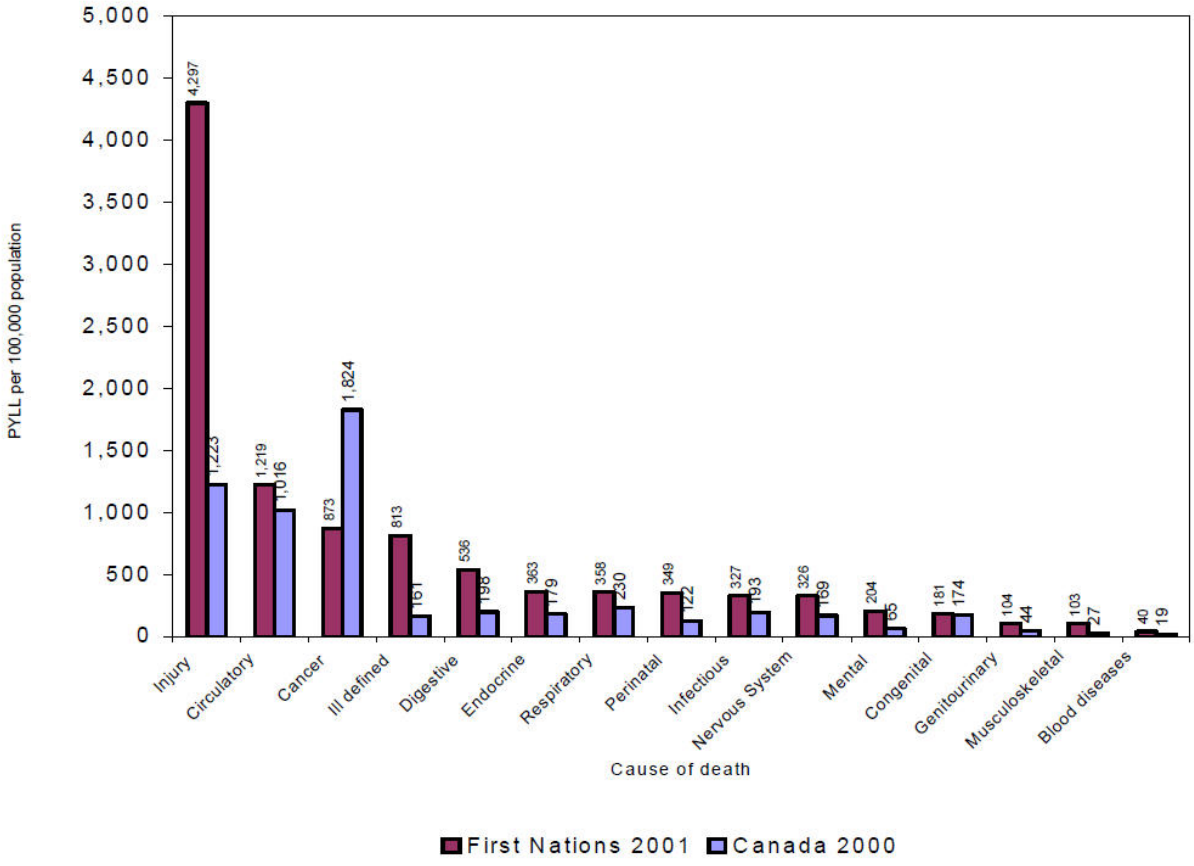
Population	2001 LE (yr)		2017 Projected LE (yr)		Changes in LE/LE Gap (2017-2011) (yr)	
	Male	Female	Male	Female	Male	Female
Canadian Registered First Nations	70.4	75.5	73.3	78.4	+2.9	+2.9
Overall Canadian	76.6	81.9	78.7	83.3	+2.1	+1.4
Gap (OC –CRFN)	6.2	6.4	5.4	4.9	-0.8	-1.5

[7] Statistics Canada (2004): *Comparable Health Indicators 2004: Healthy Canadians (HLT) Life Expectancy*.
[8] Aboriginal Affairs and Northern Development Canada (2005): *Basic Departmental Data 2014*.
[9] Statistics Canada (2005): *Projections of Aboriginal populations, Canada, provinces and territories 2001-2017*.
[10] Aboriginal Affairs and Northern Development Canada (1996): *Highlights from the report of the Royal Commission on Aboriginal Peoples*.

Potential Years Life Lost (PYLL)

Another vital statistic health indicator evaluates the number of years a person would have lived, given a full life span, typically by the age of 75. This indicator is referred to as Potential Years Life Lost (PYLL).[11] The difference between life expectancy and PYLL is that life expectancy focuses more on deaths at older ages while PYLL focuses on premature mortality, or deaths at a younger age.[12] PYLL can be expressed for all causes of death as shown in Figure 2.1.[13]

Figure 2.1: Potential Years Life Lost (PYLL) by cause of death for Canadian FN, 2001 and overall Canadian population, 2000



Source: AANDC Basic Department Data 2004, 2005

[11] Statistics Canada (2011): Potential years of life lost at ages 25 to 74 among Status Indians, 1991 to 2001.
[12] Health Canada (2011): *A Statistical Profile on the Health of First Nations in Canada Vital Statistics for Atlantic and Western Canada, 2001/2002*.
[13] Aboriginal Affairs and Northern Development Canada (2005): *Basic Departmental Data 2004*.

According to Figure 2.1, injury is the primary cause of PYLL for Canadian FN; at a rate almost 3.5-times that of the overall Canadian population.[14] The injury category includes suicide as a cause of death. A Health Canada report estimates that between 2003 and 2007, the PYLL due to suicide was 1908.0 per 1,000 FN men and women in Western Canada.[15]

Cancer is the leading cause of PYLL for the overall Canadian population with Canadian FN reporting a lower PYLL than the overall Canadian population. 14 For a discussion about age-specific causes of death for Saskatchewan FN living on-reserve, refer to the mortality section.

Births 1999-2007

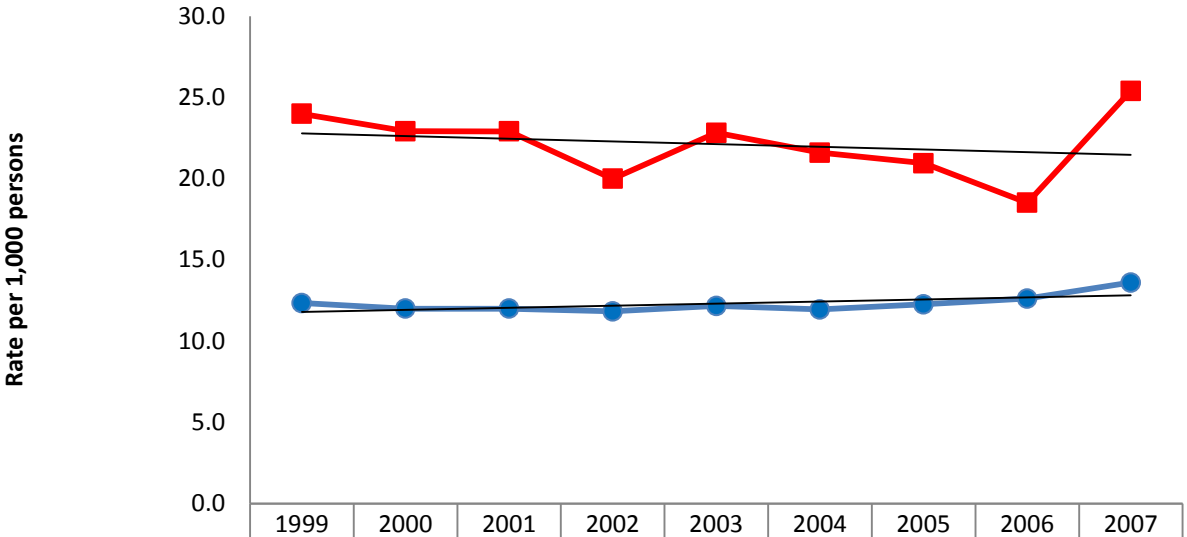
Live birth refers to babies born to mothers, which after delivery shows evidence of life, regardless of pregnancy duration.[16] Collecting information on the number of live births allows for a better understanding of reproduction variations in order to evaluate population changes.

Crude Birth Rate, 1999-2007

Crude birth rate for a given geographical area refers to the number of live births, in a given year, per 1,000 mid-year total population in the same year.[17] Although crude birth rates represent a measure of fertility within a population at a specific time, comparisons between populations with different demographic distributions are cautioned as there are no controls for age or gender. Typically, younger populations are predicted to have higher crude birth rates.[18] This is the case in Figure 2.2 where the younger Saskatchewan FN living on-reserve population has higher crude birth rates when compared to the overall Saskatchewan population. For a more age-specific population comparison of birth rates, see the Maternal and Child Health section with regards to general fertility rate.

[16] World Health Organization (2013): *Maternal Mortality Ratio*.
[17] Statistics Canada (2012): *Crude Birth Rate*.
[18] Regina Qu'Appelle Health Region, Population and Public Health Services: *Health Status Report, 2010*. Regina, Saskatchewan.

Figure 2.2: Crude birth rate, Saskatchewan FN living on-reserve and overall Saskatchewan, 1999-2007



	1999	2000	2001	2002	2003	2004	2005	2006	2007
FN (on-reserve)	24.0	22.9	22.9	20.0	22.8	21.6	20.9	18.5	25.4
SK	12.3	12.0	12.0	11.8	12.2	11.9	12.3	12.6	13.6

Sources: Government of Saskatchewan Vital Statistics System; AANDC; Statistics Canada

High crude birth rates are those above 30 per 1,000 population and low crude birth rates are considered those below 18 per 1,000 population.[19] Looking at the crude birth rates trend in the Saskatchewan FN living on-reserve population, there was a slow-gradual decrease in the crude birth rates between 1999 and 2007 (Figure 2.2). The average birth rate between 1999 and 2007 is 22.1, which is considered a typical birth rate. Comparatively, the overall Saskatchewan crude birth rate increased slightly over the nine year span, with an average birth rate of 12.3; however, this is still considered a low crude birth rate.

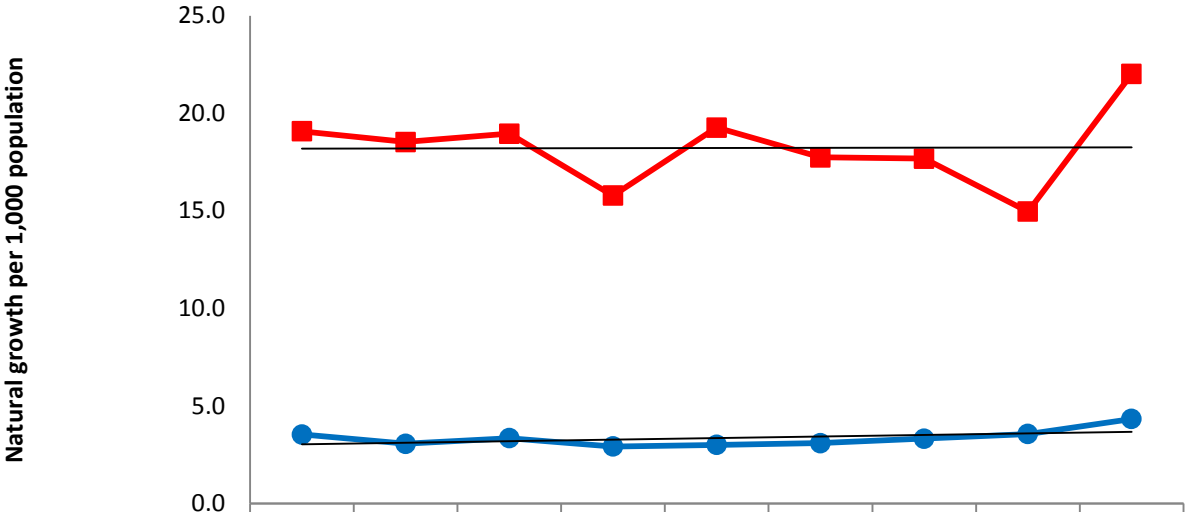
Natural Growth, 1999-2007

The natural rate of growth is calculated by subtracting the crude death rate from crude birth rate for the same year. Natural growth represents dynamic population movement excluding migration.[20]

Looking at the natural growth trend between 1999 and 2007, Saskatchewan FN living on-reserve had a natural growth rate approximately four times the rate of the overall Saskatchewan population (Figure 2.3). This is consistent with recent reports from Statistics Canada which state that high Aboriginal fertility rates are causing this population to grow faster than the general Canadian population.[21]

[19] Government of Saskatchewan Department of Finance (2013): *Population, Labour Force and Employment*.
[20] World Bank Indicators: *Birth rate, crude (per 1,000 people)/Data/Map*.
[21] Human Resources and Skills Development Canada (2013): *Canadians in Context - Aboriginal Population*.

Figure 2.3: Natural growth, Saskatchewan FN living on-reserve and overall Saskatchewan, 1999-2007



	1999	2000	2001	2002	2003	2004	2005	2006	2007
FN (on-reserve)	19.1	18.5	19.0	15.8	19.3	17.7	17.7	15.0	22.0
SK	3.5	3.1	3.3	2.9	3.0	3.1	3.3	3.6	4.3

Sources: Government of Saskatchewan Vital Statistics System; AANDC; Statistics Canada

Mortality 1999-2007

Policies and programs designed to improve public health require an evaluation component to ensure they are meeting their desired health objectives. This is typically accomplished by analyzing data related to adverse health outcomes, often surrounding mortality. By observing and evaluating the frequency of death by age and gender as well as the specific causes of death, the impact of disease and injury in a population can accurately be assessed and interventions appropriately applied. [22]

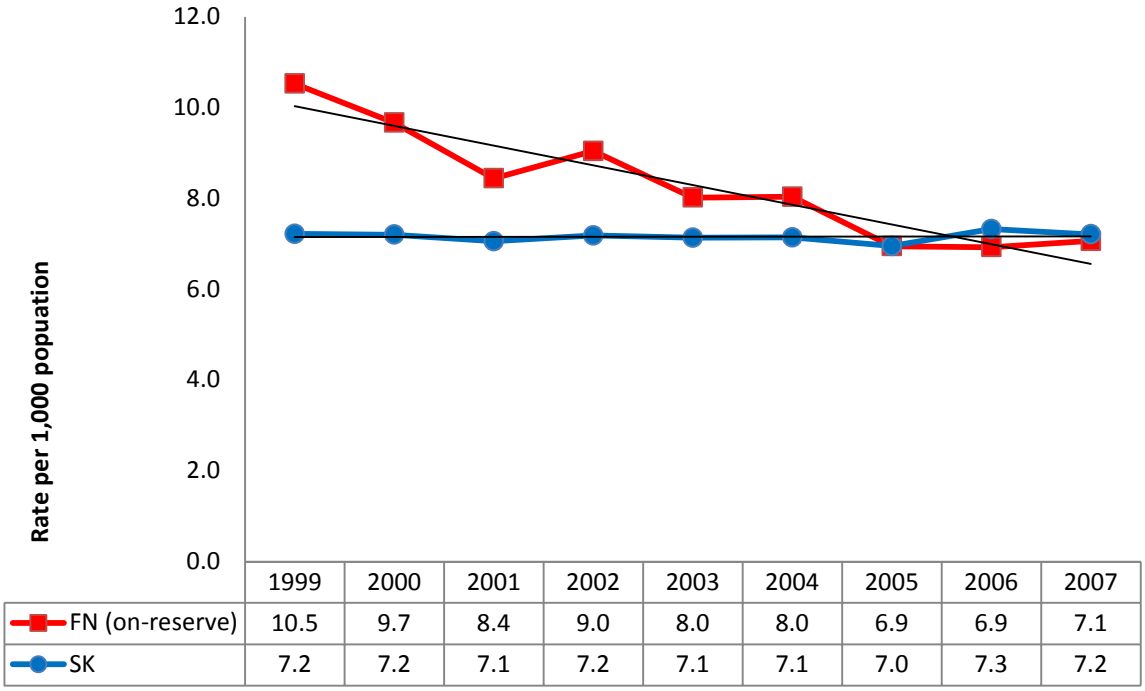
Age-Standardized Mortality Rate, 1999-2007

The age-standardized mortality rate is defined as the weighted average of the age-specific mortality rates in the population.[23] As the age distributions of populations influence the number of deaths; age-standard mortality adjusts for these differences by "applying the observed age-specific mortality rates to a standard population".[24] Essentially, age-standardized mortality rates allow for the evaluation of community health status between two different geographical areas.[25]

Figure 2.4 indicates that between 1999 and 2007, the age-standardized mortality rates of Saskatchewan FN living on-reserve have seen a significant decrease over nine years. The age-standardized mortality rate for Saskatchewan FN living on-reserve has improved to the point where it's comparable to the overall Saskatchewan population. This mortality rate decline may be attributed to the decrease in seniors' mortality rates (age 65 or older) - as discussed in the previous demographics section which stated that the rate of senior Aboriginal growth is increasing.

[22] Mathers CD, Ma Fat D, Inoue M, Rao C, Lopez AD. Counting the dead and what they died from: an assessment of the global status of causes of death data. Bulletin of the World Health Organization 2005; 83: 171-177.
[23] World Health Organization: *Age-standardized death rates by 100,000 by cause*.
[24] World Health Organization: *World health statistics 2012 indicator compendium*.
[25] Naing NN. Easy way to learn standardization: direct and indirect methods. Malays J Med Sci. 2000 Jan; 7(1):10-15.

Figure 2.4: Age-Standardized* mortality rates, Saskatchewan FN living on-reserve and the overall Saskatchewan population, 1999-2007



	1999	2000	2001	2002	2003	2004	2005	2006	2007
FN (on-reserve)	10.5	9.7	8.4	9.0	8.0	8.0	6.9	6.9	7.1
SK	7.2	7.2	7.1	7.2	7.1	7.1	7.0	7.3	7.2

Sources: Government of Saskatchewan Vital Statistics System; AANDC; Statistics Canada

***Direct standardization using 1991 Canadian census population**

Age-Specific Mortality Rates and Causes of Death

The next section will explore age-specific mortality rates and causes of death. Age-specific mortality rates identify the burden of disease among certain age groups; allowing for targeted interventions. As was mentioned, there are no age-specific mortality rates in the <1 year and 1-14 year age categories due to a lack of available data.

Causes of death often have a significant proportion related to external causes. External causes of mortality include "environmental events and circumstances as the cause of injury, poisoning and other adverse effects".[26] External causes of death also include deaths related to suicides and homicides. The mortality data analyzed follows the International Classification of Diseases, 10th revision (ICD-10), which has numerous codes for external causes of disease. A detailed evaluation of these ICD codes will occur for age groups reporting a high percentage of mortality relating to external causes. Where the sample sizes allowed, a gender breakdown of the specific causes of death were also included.

Infants (<1 Year)
Infant Mortality Rate, 1999-2007

Although age-specific mortality rates are not available for the <1 year old age group, there is another indicator that we can evaluate.

The infant mortality rate (IMR) is defined as the number of infant deaths in a population, less than one year of age, for every thousand live births.[27] In other words, it is the probability of a child dying within the first year of life per 1000 live births. IMR is a comprehensive reflection of population health; including the physical, social and economic conditions that a child is born into. [28]

Saskatchewan FN living on-reserve IMRs show high variability between 1999 and 2007 (Figure 2.5). According to an article by Smylie et al., there may be data quality issues relating to the accuracy of reporting Aboriginal IMRs with regards to the location of where infant birth and death data are recorded (on- or off-reserve). If an infant birth is recorded on-reserve but the death is captured off-reserve, this may result in an underestimate of IMRs among the Aboriginal population.[29]

Data capture inconsistencies are likely what is reflected in Figure 2.5; especially between 2003 and 2005, which shows Saskatchewan FN living on-reserve IMRs are below that of the overall Saskatchewan population. The 2008 Canadian Perinatal Health Report released by the Public Health Agency of Canada (PHAC) states that IMRs among Aboriginals have historically been twice as high as the non-Aboriginal Canadian population for more than a century. Recent reports indicating Aboriginal IMRs are similar to the non-Aboriginal population are generally viewed as having underestimated Aboriginal IMRs.

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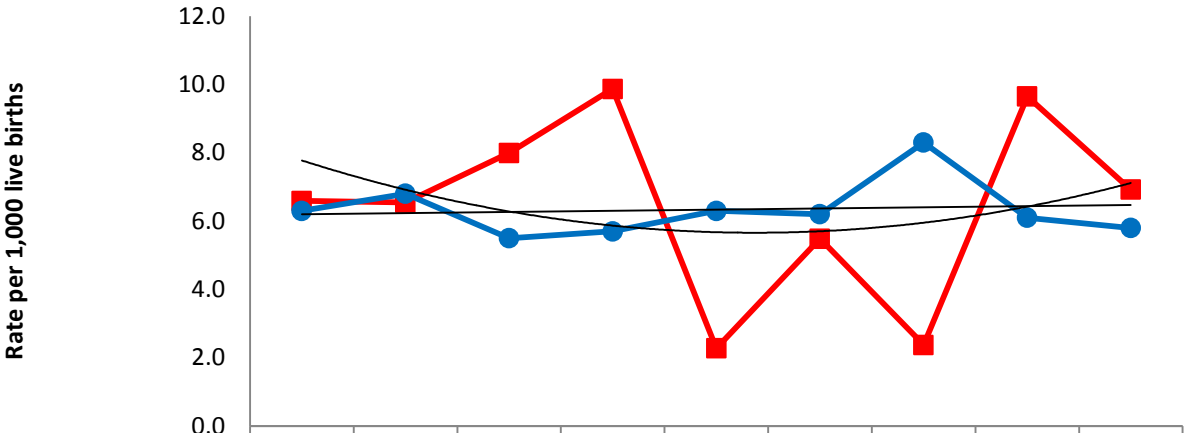
[26] NCHS. *ICD–10: External cause of injury mortality matrix*.
[27] Smylie J, Fell D, Ohlsson A. A review of Aboriginal infant mortality rates in Canada: striking and persistent Aboriginal/Non-Aboriginal inequities. *Can J Public Health* 2010; 101(2):143-48.
[28] Wold Health Organization: *World health statistics 2012 indicator compendium*.
[29] Smylie J, Anderson M. Understanding the health of Indigenous peoples in Canada: key methodological and conceptual challenges. *CMAJ* 2006; 175(6):602-05.

A consequence of underreporting IMRs for FN populations is a lack of data to support policy and programming for pre and postnatal services to prevent infant illness and death.[30] A vital statistics report on the health of FN in Canada provides the following comment on IMR: "Inability to provide reliable estimates of the most important indicator of infant health constitutes a major reporting gap, and addressing this deficiency must be a high priority for improving First Nations health statistics."[31]

Figure 2.5: Infant Mortality Rate, Saskatchewan FN (on-reserve) and overall Saskatchewan, 1999-2007



	1999	2000	2001	2002	2003	2004	2005	2006	2007
FN (on-reserve)	6.6	6.5	8.0	9.9	2.3	5.5	2.4	9.6	6.9
SK	6.3	6.8	5.5	5.7	6.3	6.2	8.3	6.1	5.8

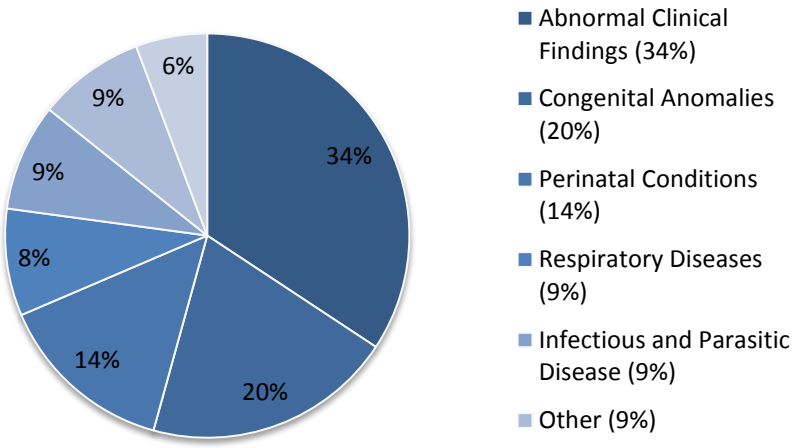
Sources: Government of Saskatchewan Vital Statistics System; AANDC; Statistics Canada

Causes of Death, 2003-2007

There were 35 infant deaths among the Saskatchewan FN living on-reserve population from 2003-2007. Overall, these infant deaths represent 3% of all Saskatchewan FN living on-reserve deaths between 2003 and 2007 (Figure 2.25). Figure 2.6 indicates that the leading causes of deaths among Saskatchewan FN living on-reserve infants were abnormal clinical findings (34%), followed by congenital anomalies (20%), perinatal conditions (14%) and respiratory diseases (9%).

[30] Canadian Perinatal Health Report: 2008 Edition. Public Health Agency of Canada; 2008.
[31] Health Canada (2011): *A Statistical Profile on the Health of First Nations in Canada: Vital Statistics for Atlantic and Western Canada, 2001/2002.*

Figure 2.6: Proportion of leading causes of infant death (under 1 year) in Saskatchewan FN living on-reserve, 2003-2007, n=35



Sources: Government of Saskatchewan Vital Statistics System; AANDC

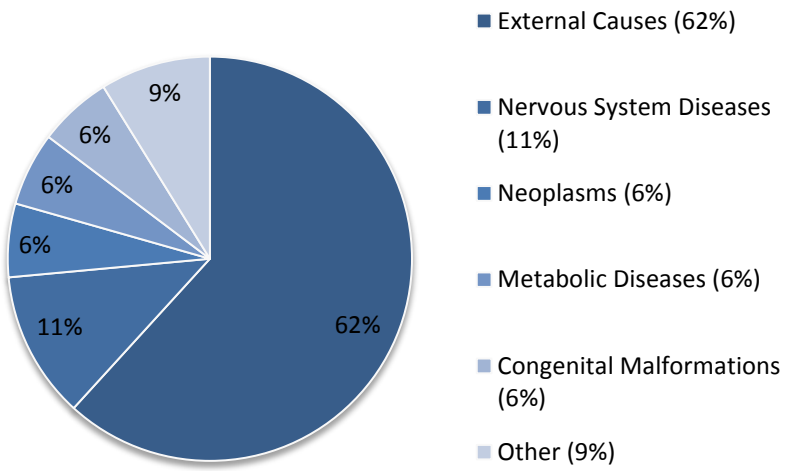
Children (1-14 Years)

As mentioned, due to lack of available data, age-specific mortality rates are not available for this age group.

Causes of Death, 2003-2007

Between 2003 and 2007, there were 34 deaths among FN living on-reserve children, aged 1-14 years old, ranging from three to nine deaths per year. According to Figure 2.25, these deaths represent 3% of all Saskatchewan FN living on-reserve deaths within the reporting period. Figure 2.7 depicts that the leading causes of deaths among Saskatchewan FN living on-reserve children were external causes, (62%) followed by nervous system diseases (11%) and neoplasms, i.e. different cancer types (6%). The 'other' category represents diseases relating to circulatory and digestive systems as well as conditions originating in the prenatal period.

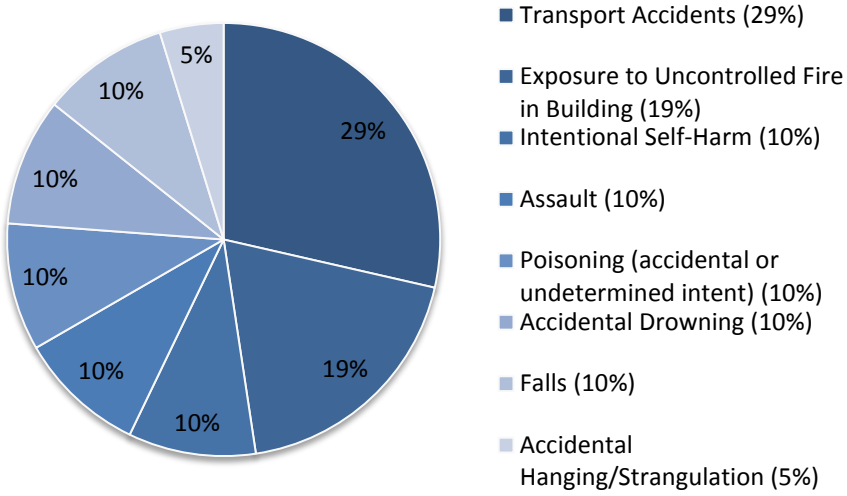
Figure 2.7: Proportion of leading causes of death in age group 1-14 years in Saskatchewan FN living on-reserve, 2003-2007, n=34



Sources: Government of Saskatchewan Vital Statistics System; AANDC

When looking at the specific reasons for external causes of mortality in Figure 2.8, land transport accidents tend to be the most frequent external cause of mortality in the 1-14 year age group. Other notable external causes of mortality include those relating to fire exposure, intentional self-harm and assault.

Figure 2.8 Proportion of external causes of death in age group 1-14 years in Saskatchewan FN living on-reserve, 2003-2007, n=21



Sources: Government of Saskatchewan Vital Statistics System; AANDC

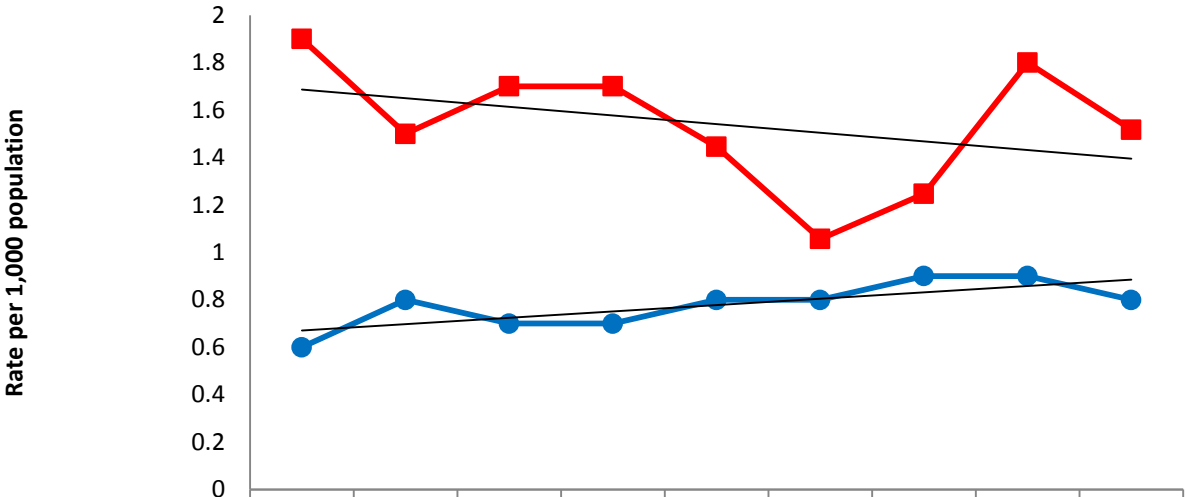
Youth (15-24 Years)

Age-Specific Mortality Rate, 1999-2007

Although there is much variation in the Saskatchewan FN living on-reserve 15-24 year old mortality rate between 1999 and 2007, the trend lines in Figure 2.9 indicate that the Saskatchewan FN living on-reserve 15-24 year old population experienced a higher rate of mortality when compared to the overall Saskatchewan youth population over the nine year span.

Figure 2.9 also depicts a slow, downward trend for 15-24 year old age-specific mortality in Saskatchewan FN living on-reserve, from 1999 to 2007. The highest age-specific mortality rate was observed in 2006 (1.9 deaths per 1,000 population) and the lowest mortality rate occurred in 2004 (1.1 deaths per 1,000 population). The overall Saskatchewan 15-24 year old mortality rate remained relatively consistent between 1999 and 2007 with a median mortality rate of 0.8 deaths per 1,000 population.

Figure 2.9: Age-Specific mortality rates among youth (15-24 years), Saskatchewan FN living on-reserve and overall Saskatchewan, 1999-2007



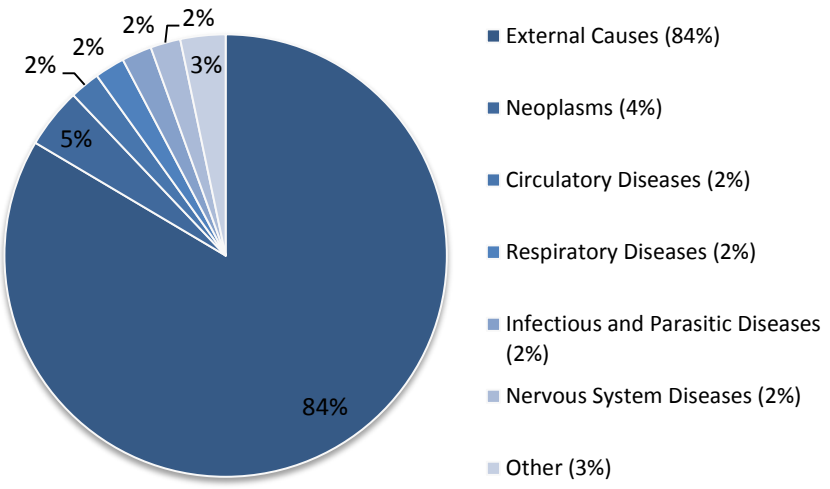
	1999	2000	2001	2002	2003	2004	2005	2006	2007
FN (on-reserve)	1.9	1.5	1.7	1.7	1.4	1.1	1.2	1.8	1.5
SK	0.6	0.8	0.7	0.7	0.8	0.8	0.9	0.9	0.8

Sources: Government of Saskatchewan Vital Statistics System; AANDC

Causes of Death, 2003-2007

There were 91 deaths among Saskatchewan FN living on-reserve aged 15-24 years old from 2003-2007. Figure 2.25 illustrates that these deaths represent 9% of all Saskatchewan FN living on-reserve deaths. The highest number of deaths within this period occurred in 2006, resulting in 24 deaths. Figure 2.10 illustrates the leading causes of death among Saskatchewan FN living on-reserve youth were external causes (84%) and neoplasms (4%).

Figure 2.10: Proportion of leading causes of death in age group 15-24 years in Saskatchewan FN living on-reserve, 2003-2007, n=91

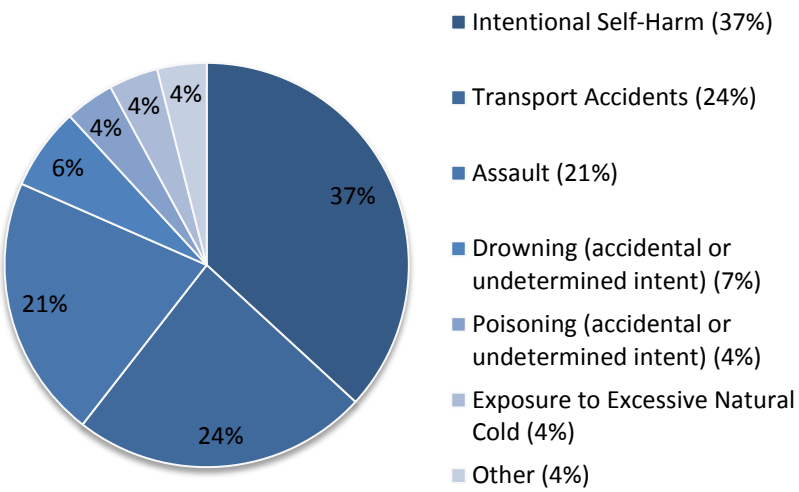


Sources: Government of Saskatchewan Vital Statistics System; AANDC

External Causes (Youth – 15-24 Years)

Figure 2.11 breaks down the prominent external causes of death categories among Saskatchewan FN living on-reserve youth. The main cause of death in this category was intentional self-harm (37%), followed by transport accidents (24%) and assault (21%).

Figure 2.11: Proportion of deaths due to external causes among youth (15-24 years), Saskatchewan FN living on-reserve, 2003-2007, n=76



Sources: Government of Saskatchewan Vital Statistics System; AANDC

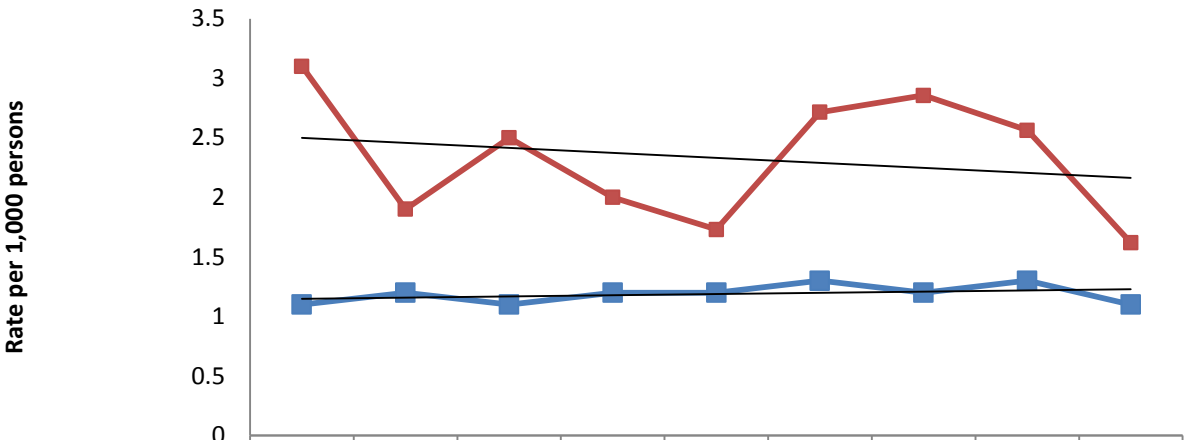
Adults (25-44 Years)

Age-Specific Mortality Rate, 1999-2007

As was observed for the 15-24 year old Saskatchewan living on-reserve mortality rate, the 25-44 year old mortality rate among Saskatchewan FN living on-reserve exhibits a high degree of variation between 1999 and 2007 (Figure 2.12). Similarly, the Saskatchewan FN living on-reserve 25-44 year old mortality rate is consistently higher than the overall Saskatchewan 25-44 year old mortality rate throughout the nine years of data. Peak Saskatchewan FN living on-reserve 25-44 year old mortality rates can be identified in 1999 (3.1 deaths per 1,000 population) and 2005 (2.9 deaths per 1,000 population). Following the 2005 peak, there was a decline in Saskatchewan FN living on-reserve 25-44 year old mortality rates resulting in a 2007 rate of 1.6 deaths per 1,000 population.

Generally, the line trend indicates there was a slow downward trend seen in the Saskatchewan FN living on-reserve 25-44 year old mortality rates between 1999 and 2007. In contrast, the overall Saskatchewan 25-44 year old mortality rate remained steady with a median rate of 1.2 deaths per 1,000 population.

Figure 2.12: Age-Specific mortality rates among adults (25-44 years), Saskatchewan FN living on-reserve and overall Saskatchewan, 1999-2007



	1999	2000	2001	2002	2003	2004	2005	2006	2007
FN (on-reserve)	3.1	1.9	2.5	2	1.7	2.7	2.9	2.6	1.6
SK	1.1	1.2	1.1	1.2	1.2	1.3	1.2	1.3	1.1

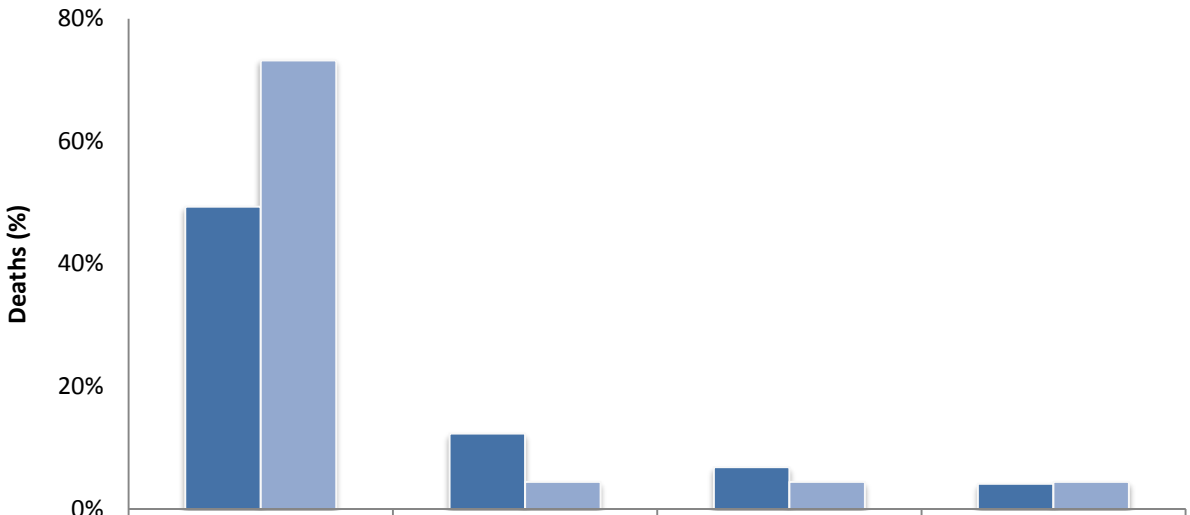
Sources: Government of Saskatchewan Vital Statistics System; AANDC

Causes of Death, 2003-2007

There were 185 deaths among Saskatchewan FN living on-reserve adults aged 25 to 44 years from 2003-2007. As per Figure 2.25, this represents 17% of Saskatchewan FN living on-reserve deaths from 2003 to 2007. The number of deaths per year ranged from 27-46 deaths. According to Table 2.2, the primary cause of death in the 25-44 year old age group was external causes (64%), followed by neoplasms (8%), digestive diseases (5%) and circulatory diseases (4%).

A larger sample size allows for a gender comparison. In general, males represent 61% of deaths while 39% of deaths are attributed to females. According to Figure 2.13, the primary cause of death among males is external causes (73%), followed by neoplasms (4%), digestive diseases (4%) and circulatory diseases (4%). A similar trend can be seen among females with external causes of disease being the primary cause of death (49%), followed by neoplasms (12%), digestive diseases (7%) and circulatory diseases (4%).

Figure 2.13: Proportion* of leading causes of death in age group 25-44 years by gender in Saskatchewan FN living on-reserve, 2003-2007, n=185



	External Causes	Neoplasms	Digestive Diseases	Circulatory Diseases
Female	49%	12%	7%	4%
Male	73%	4%	4%	4%

Sources: Government of Saskatchewan Vital Statistics System; AANDC

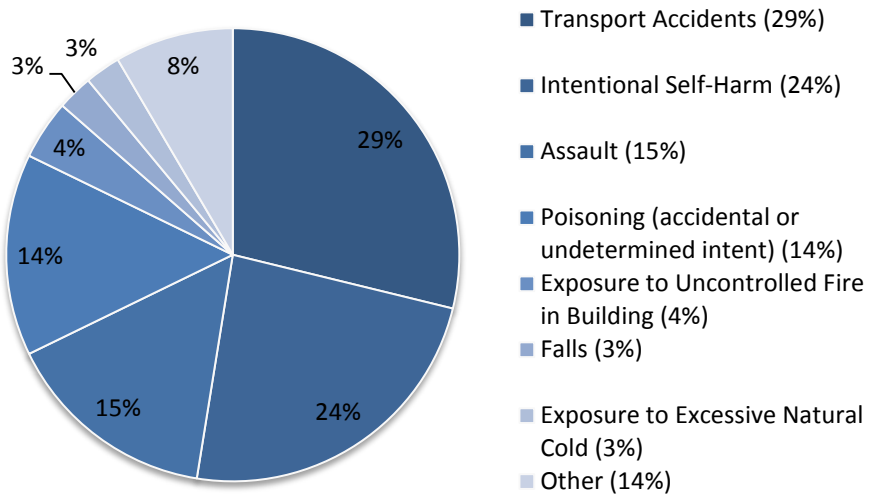
***Not all causes of death are included; therefore the sum of the above percent of deaths does not equal 100.**

Proportionately, Saskatchewan FN living on-reserve adults deaths resulting from external causes were higher among males (73%) compared to females (49%). The opposite pattern is seen with neoplasms and digestive diseases where the proportion of females is higher than males (Figure 2.13).

External Causes (Adults – 25-44 Years)

The main cause of death in this category was transport accidents (29%), followed by intentional self-harm (24%) and assaults (15%) (Figure 2.14). The 'other' category represents external causes of death such as exposure to inanimate mechanical force, inhalation of gastric contents and drowning.

Figure 2.14: Proportion of deaths due to external causes among adults (25-44 years), Saskatchewan FN living on-reserve, 2003-2007 (n=118)



Source: Government of Saskatchewan Vital Statistics System; AANDC

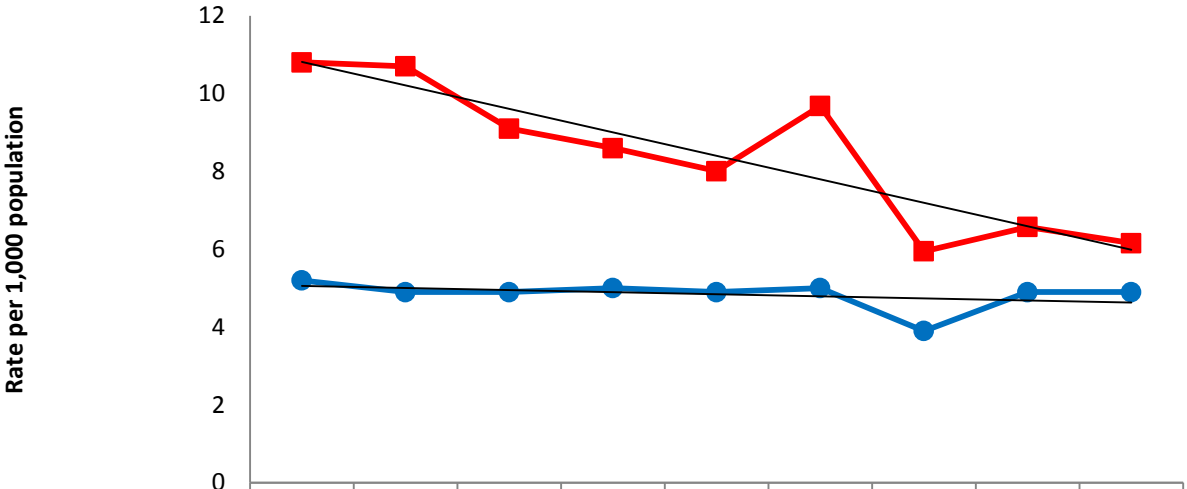
Adults (45-64 Years)

Ages-Specific Mortality Rate, 1999-2007

Looking at the trend line in Figure 2.15, between 1999 and 2007, the age-specific mortality rates among Saskatchewan FN living on-reserve adults aged 45-64 years was consistently higher than the overall Saskatchewan 45-64 year old adult population.

With the exception of 2004, there is an obvious downward trend seen in the 45-64 year old mortality rates of Saskatchewan FN living on-reserve adults (Figure 2.15). The rates declined from 10.8 deaths per 1,000 population in 1999 to 6.2 deaths per 1,000 population in 2007 (43% decrease). There was a peak observed in 2004 resulting in a 45-64 year old mortality rate of 9.7 deaths per 1,000 population. The overall Saskatchewan 45-64 year old mortality rate remained relatively stable over the nine-year span resulting in a median 45-64 year old mortality rate of 4.9 deaths per 1,000 population.

Figure 2.15: Age-Specific mortality rates among adults (45-64 years), Saskatchewan FN living on-reserve and overall Saskatchewan, 1999-2007



	1999	2000	2001	2002	2003	2004	2005	2006	2007
FN (on-reserve)	10.8	10.7	9.1	8.6	8.0	9.7	5.9	6.6	6.2
SK	5.2	4.9	4.9	5.0	4.9	5.0	3.9	4.9	4.9

Sources: Government of Saskatchewan Vital Statistics System; AANDC

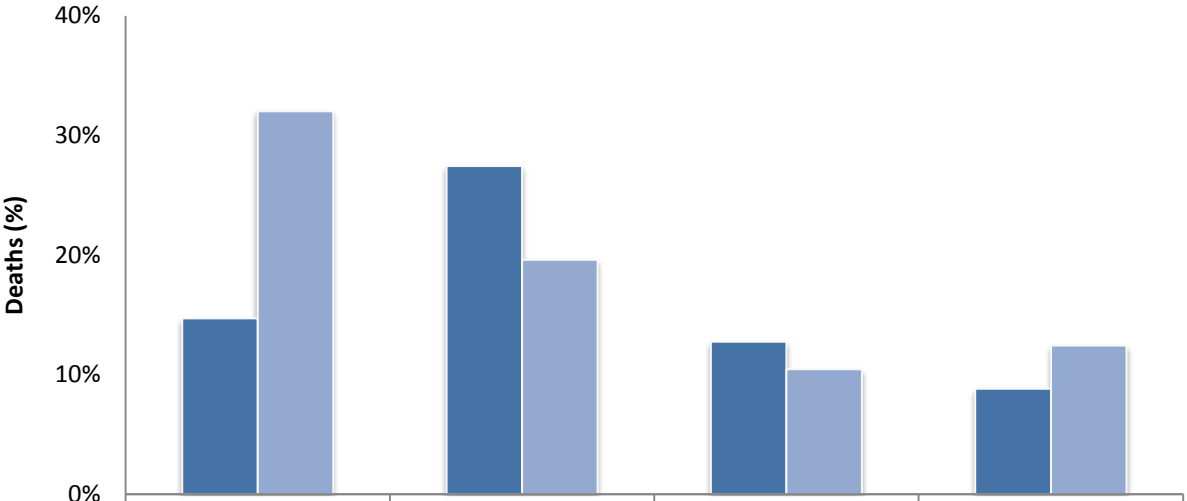
Causes of Death

There were 255 deaths among 45-64 year old Saskatchewan FN living on-reserve adults from 2003-2007. According to Figure 2.25, 24% of Saskatchewan FN living on-reserve deaths occurred in this age group. The number of deaths per year ranged from 42-65 deaths. According to Table 2.2 on page 47, the leading causes of death among 45-64 year old Saskatchewan FN living on-reserve were circulatory diseases (heart attacks and strokes) (25%), neoplasms (23%), metabolic diseases (11%) and external causes (11%).

Again, the larger sample size allows for a gender comparison and shows a similar gender breakdown to the 25-44 year old causes of death. Out of the 255 deaths, 60% of these were males and 40% were female. Figure 2.16 shows that among Saskatchewan FN living on-reserve males, the leading cause of death is circulatory diseases (32%), followed by neoplasms (20%), metabolic diseases (10%) and external causes (12%). For Saskatchewan FN living on-reserve females, the primary cause of disease was neoplasms (27%), followed by circulatory diseases (15%), metabolic diseases (13%) and external causes (9%).

Proportionately, Saskatchewan FN living on-reserve adult deaths resulting from circulatory diseases were higher among males (32%) compared to females (15%). The opposite pattern is seen with neoplasms and metabolic diseases where the proportion of females is higher than males (Figure 2.16).

Figure 2.16: Proportion* of leading causes of death in age group 45-64 years by gender in Saskatchewan FN living on-reserve, 2003-2007, n=255



	Circulatory Diseases	Neoplasms	Metabolic Diseases	External Causes
Female	15%	27%	13%	9%
Male	32%	20%	10%	12%

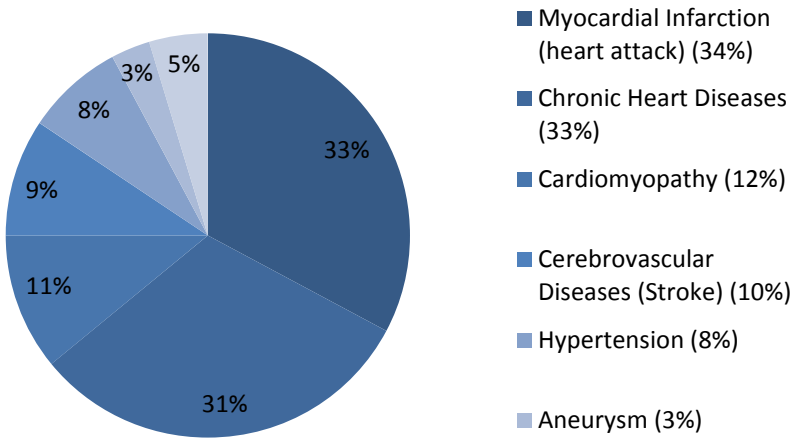
Sources: Government of Saskatchewan Vital Statistics System; AANDC

***Not all causes of death are included; therefore the sum of the above percent of deaths does not equal 100.**

Circulatory Diseases (Adults – 45-64 Years)

Circulatory diseases were the leading cause of death among Saskatchewan FN living on-reserve adults aged 45 to 64 years. The main cause of death in this category was myocardial infarctions (33%), followed by chronic heart diseases (31%) (Figure 2.17).

Figure 2.17: Proportion of deaths due to circulatory diseases among adults (45-64 years), Saskatchewan FN living on-reserve, 2003-2007 (n=64)

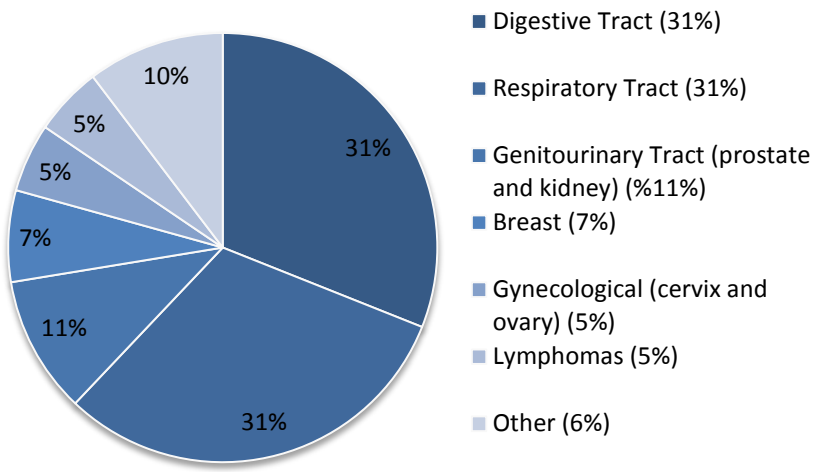


Sources: Government of Saskatchewan Vital Statistics System; AANDC

Neoplasms (Adults – 45-64 Years)

Neoplasms were the second leading cause of death among Saskatchewan FN living on-reserve adults aged 45 to 64 years. The main causes of death in this category were cancers of the respiratory and digestive tract (31% each) (Figure 2.18).

Figure 2.18: Proportion of deaths due to neoplasms among adults (45-64 years), Saskatchewan FN living on-reserve, 2003-2007 (n=58)



Sources: Government of Saskatchewan Vital Statistics System; AANDC

Seniors (65 Years or Older)

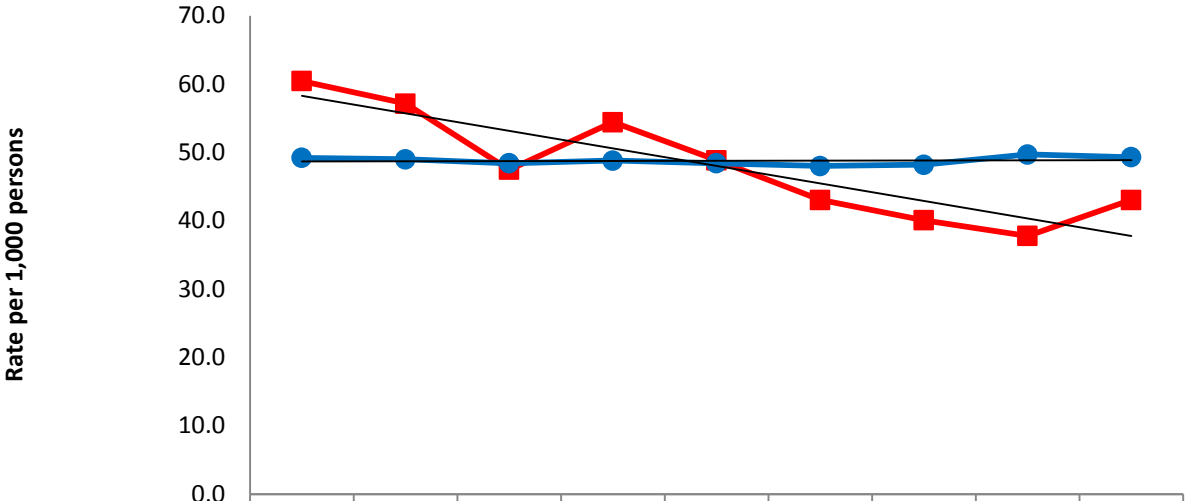
Age-Specific Mortality Rate, 1999-2007

Between 1999 and 2007, the age-specific mortality rates among Saskatchewan FN living on-reserve seniors were comparable to the rates of the overall Saskatchewan senior population (Figure 2.19). This is consistent with other jurisdictions as similar trends between senior mortality rates in the FN and the overall populations of Alberta and Canada have also been reported.[32] Although the mortality trends between the Saskatchewan FN living on-reserve and overall Saskatchewan seniors population are similar, the Saskatchewan seniors FN mortality rates were typically higher than the overall Saskatchewan seniors population between 1999 and 2003 and subsequently lower between 2004 and 2007.

Overall, the line trend indicates that seniors' mortality rates among Saskatchewan FN living on-reserve has declined during the 9-year period (1999 to 2007). The recent reduction in the Senior FN living on-reserve mortality rate confirms our discussion in the demographics section regarding an increase in the rate of senior Aboriginal growth.

[32] Health Canada. First Nations Health Status Report: Alberta Region 2010-2011. 2012: Edmonton, Alberta: First Nations and Inuit Health. *Catalogue no.: H26-4/2011E.*

Figure 2.19: Age-Specific mortality rates among seniors (65 years or older), Saskatchewan FN living on-reserve and overall Saskatchewan, 1999-2007



	1999	2000	2001	2002	2003	2004	2005	2006	2007
FN (on-reserve)	60.4	57.1	47.5	54.4	48.8	43.0	40.1	37.8	43.0
SK	49.2	49.0	48.4	48.8	48.4	48.0	48.2	49.7	49.3

Sources: Government of Saskatchewan Vital Statistics System; AANDC

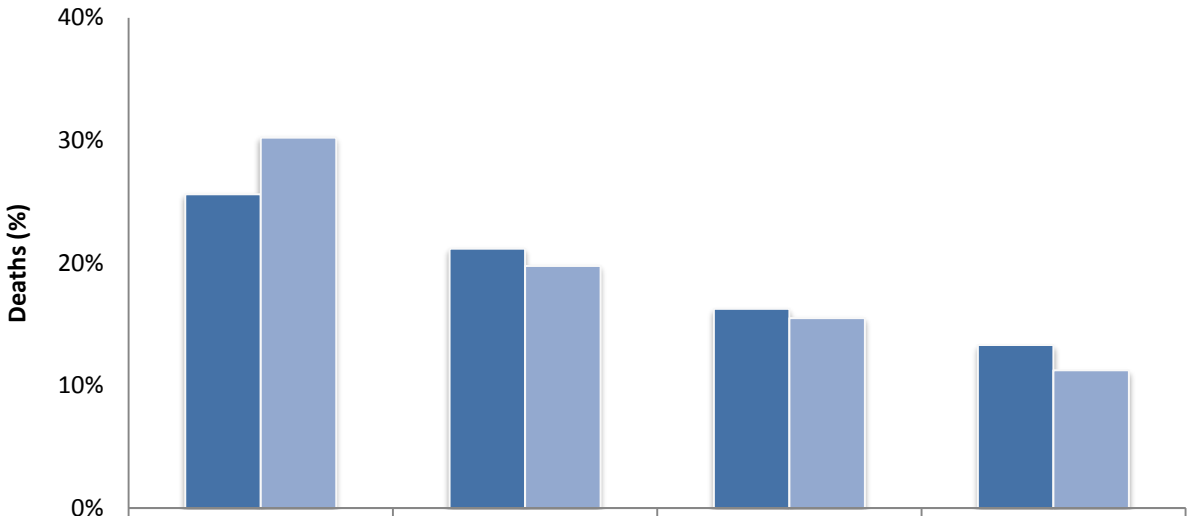
Causes of Death

The highest number of deaths occurred in the senior population. There were 461 deaths among Saskatchewan FN living on-reserve seniors, representing 43% of all deaths between 2003 and 2007 (Figure 2.25). The number of deaths per year ranged from 84-101 deaths. Table 2.2 on page 47 illustrates that the leading causes of death in this age group are circulatory diseases (28%), neoplasms (20%), respiratory diseases (16%) and metabolic diseases (12%).

Males represent 56% of all deaths while females represent 44%. According to Figure 2.20, the primary causes of death among males are circulatory diseases (30%), followed by neoplasms (20%), respiratory diseases (16%) and metabolic diseases (11%). A similar trend can be seen among females with circulatory diseases being the leading cause of death (26%), followed by neoplasms (21%), respiratory diseases (16%) and metabolic diseases (13%).

Proportionately, Saskatchewan FN living on-reserve seniors deaths resulting from circulatory diseases were higher among males (30%) compared to females (26%). For the remaining prominent causes of death, the break down is quite similar between male and females (Figure 2.20).

Figure 2.20: Proportion* of leading causes of death in seniors (65 years or older) by gender in Saskatchewan FN (on-reserve), 2003-2007, n=461



	Circulatory Diseases	Neoplasms	Respiratory Diseases	Metabolic Diseases
Female	26%	21%	16%	13%
Male	30%	20%	16%	11%

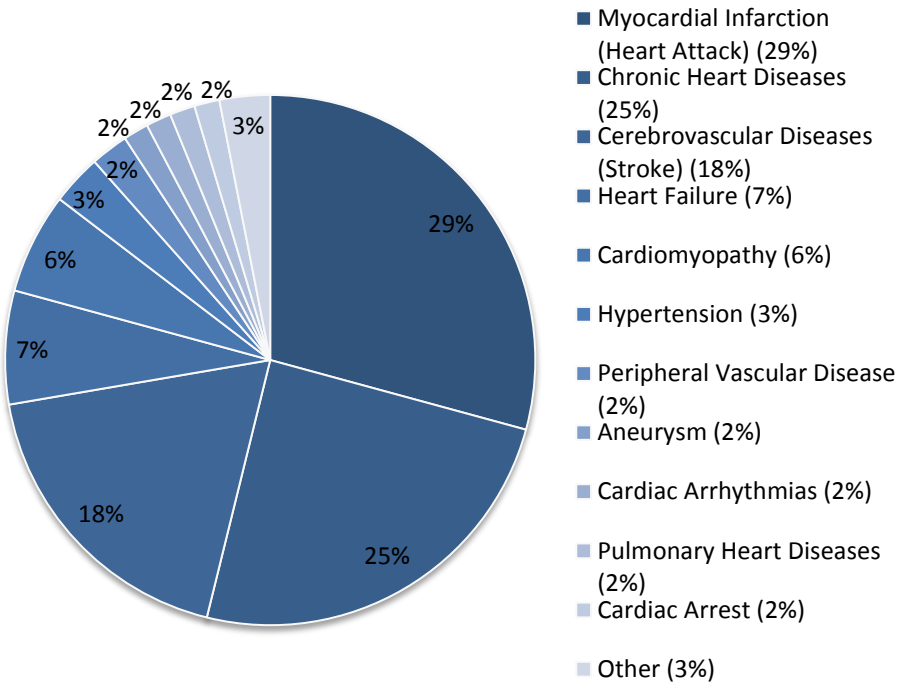
Sources: Government of Saskatchewan Vital Statistics System; AANDC

***Not all causes of death are included; therefore the sum of the above percent of deaths does not equal 100.**

Circulatory Diseases (Seniors – 65 Years or Older)

Circulatory diseases were the leading cause of death among Saskatchewan FN living on-reserve seniors. The main cause of death in this category was acute myocardial infarctions (29%), followed by chronic heart diseases (25%) and cerebrovascular disease (stroke) (18%) (Figure 2.21).

Figure 2.21: Proportions of deaths due to circulatory disease among seniors (65 years or older), Saskatchewan FN living on-reserve, 2003-2007 (n=130)

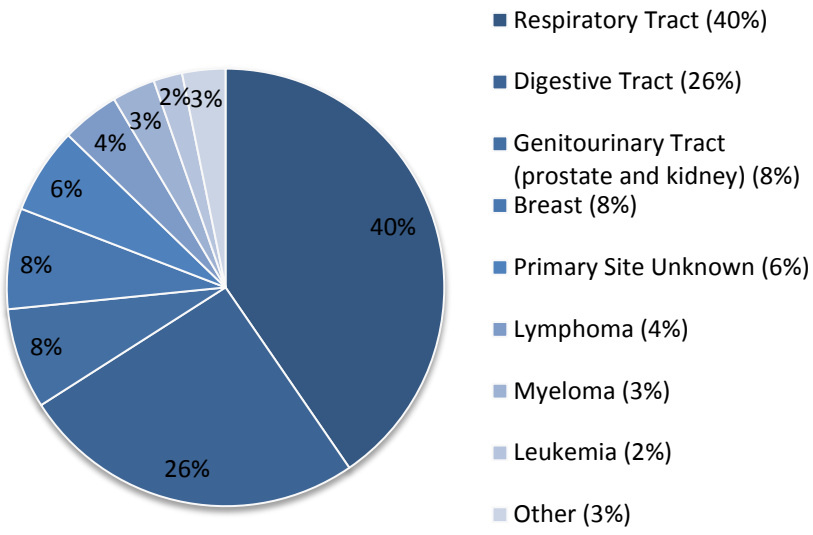


Sources: Government of Saskatchewan Vital Statistics System; AANDC

Neoplasms (Seniors – 65 Years or Older)

Neoplasms were the second leading cause of death among Saskatchewan FN living on-reserve seniors. The main cause of death in this category was neoplasms of the respiratory tract (40%), followed by neoplasms of the digestive tract (26%) (Figure 2.22).

Figure 2.22: Proportion of deaths due to neoplasms among seniors (65 years or older), Saskatchewan FN living on-reserve, 2003-2007 (n=94)

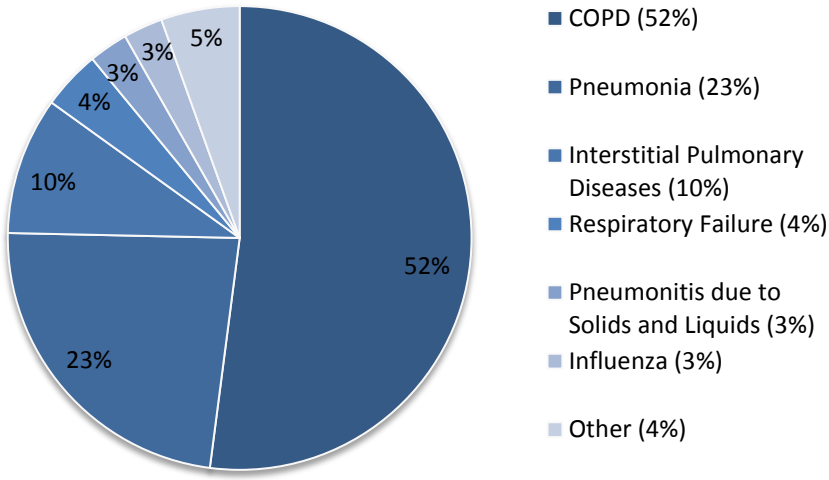


Sources: Government of Saskatchewan Vital Statistics System; AANDC

Respiratory Diseases (Seniors – 65 Years or Older)

Respiratory diseases were the third leading cause of death among Saskatchewan FN living on-reserve seniors. The main cause of death in this category was chronic obstructive pulmonary disease (COPD) (52%), followed by pneumonia (23%) (Figure 2.23).

Figure 2.23: Proportion of deaths due to respiratory diseases among seniors (65 years or older), Saskatchewan FN (on-reserve), 2003-2007 (n=73)

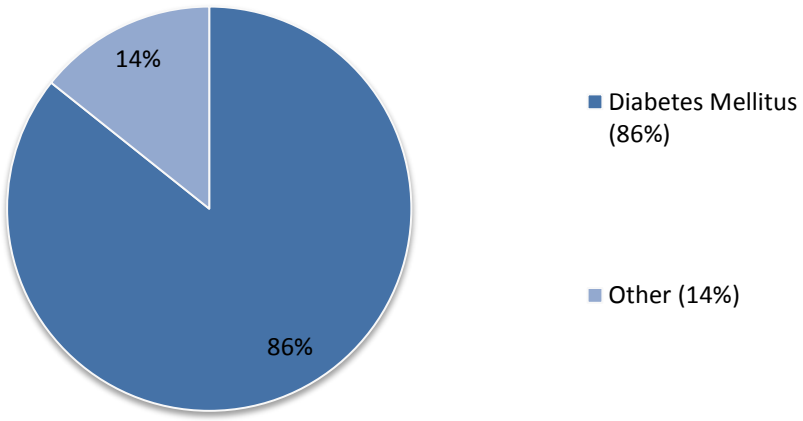


Sources: Government of Saskatchewan Vital Statistics System; AANDC

Metabolic Diseases (Seniors – 65 Years or Older)

Metabolic diseases were the fourth leading cause of death among Saskatchewan FN living on-reserve seniors. The main cause of death in this category was diabetes mellitus (86%) (Figure 2.24). The remainder of the 'other' metabolic diseases are related to malnutrition, obesity and dehydration.

Figure 2.24: Proportion of deaths due to metabolic diseases among seniors (65 years or older), Saskatchewan FN living on-reserve, 2003-2007 (n=56)



Sources: Government of Saskatchewan Vital Statistics System; AANDC

Summary: Causes of Death, 2003 - 2007

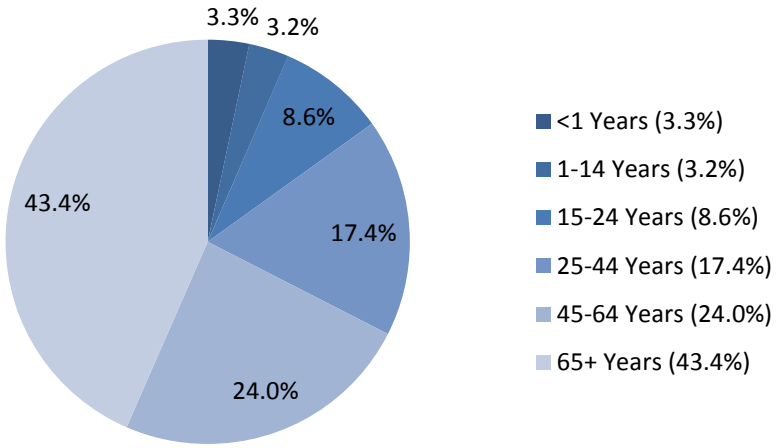
The leading causes of death among Saskatchewan FN living on-reserve from 2003-2007 were external causes, followed by circulatory diseases, neoplasms and respiratory diseases. In contrast, the leading causes of death in the overall Saskatchewan population for the same period were circulatory diseases, followed by neoplasms, external causes and respiratory diseases.

Table 2.2: Distribution of leading causes of death in Saskatchewan FN living on-reserve, 2003-2007

Rank	First Nations On-Reserve n (%) AGE GROUPS (YEARS) <1	1-14	15-24	25-44	45-64	65+	First Nations On-Reserve n (%)	Overall SK n (%)
1	Abnormal Clinical Findings 12 (34)	External Causes 21 (62)	External Causes 76 (84)	External Causes 118 (64)	Circulatory Diseases 64 (25)	Circulatory Diseases 130 (28)	External Causes 266 (25)	Circulatory Diseases 14,908 (33)
2	Congenital Anomalies 7 (20)	Nervous System Diseases 4 (12)	Neoplasms 4 (4)	Neoplasms 14 (8)	Neoplasms 58 (23)	Neoplasms 94 (20)	Circulatory Diseases 205 (19)	Neoplasms 11,570 (26)
3	Perinatal Conditions 5 (14)	Congenital Anomalies 2 (6)	Circulatory Diseases 2 (2)	Digestive Diseases 10 (5)	Metabolic Diseases 29 (11)	Respiratory Diseases 73 (16)	Neoplasms 172 (16)	External Causes 4,422 (10)
4	Respiratory Diseases 3 (9)	Neoplasms 2 (6)	Respiratory Diseases 2 (2)	Circulatory Diseases 8 (4)	External Causes 28 (11)	Metabolic Diseases 56 (12)	Respiratory Diseases 97 (9)	Respiratory Diseases 3,996 (9)
	Others 8 (23)	Others 5 (15)	Others 7 (8)	Others 35 (19)	Others 76 (30)	Others 108 (24)	Others 321 (31)	Others 9,859 (22)
Total	**35 (3.3% of all deaths)**	**34 (3.2% of all deaths)**	**91 (8.6% of all deaths)**	**185 (17.4% of all deaths)**	**255 (24.0% of all deaths)**	**461 (43.4% of all deaths)**	**1061 (100%)**	**44,755 (100%)**

Sources: Government of Saskatchewan Vital Statistics System; AANDC

Figure 2.25: Summary of the Proportion of deaths among Saskatchewan FN living on-reserve by age group, 2003-2007



Sources: Government of Saskatchewan Vital Statistics System; AANDC

Vital Statistics Methodology

Who is included in this chapter and data sources

1. **Overall Canadian population**
   - Total Canadian population including First Nations on-and off-reserve.
   - Data Source:
     - Statistics Canada (2005). Projections of the Aboriginal populations, Canada, provinces and territories 2001-2017
       - Life Expectancy

2. **Canadian First Nations population**
   - Self-Identified in the 2001 Census as being registered to a Canadian FN band; living on- and off-reserve
   - Data Source:
     - Statistics Canada (2005). Projections of the Aboriginal populations, Canada, provinces and territories 2001-2017.
       - Life Expectancy

3. **Overall Saskatchewan population**
   - Total Saskatchewan population, including First Nations on-and off-reserve
   - Data sources:
     - Statistics Canada, CANSIM, 2012
       - Crude birth rate, natural growth, age-standardized mortality rate, infant mortality rate
     - Saskatchewan Ministry of Health
       - Age-specific mortality rates

4. **Saskatchewan First Nations population living on-reserve**
   - Registered to a Saskatchewan FN band and residing on-reserve
   - Does not include non-registered First Nations or non-First Nations that may be living on-reserve.
   - Data sources:
     - Government of Saskatchewan Vital Statistics System (VSS), ICD-10 Codes
       - All sections in this chapter
       - Status Verification System (SVS) identifies on-reserve Saskatchewan FN from the VSS
     - AANDC, 2012 (unadjusted data)
       - Denominator for crude death rates and age-specific mortality rates

Approach to Data Analysis

Data was analyzed using Microsoft Excel 2010. The proportion of a cause of death among a given population shows how common a given cause of death is within the same population.

The following formula is used to calculate the proportion of a cause of death (within a category):

$$\frac{Number\ of\ deaths\ by\ given\ cause\ (within\ the\ categoy)}{Total\ number\ of\ deaths\ (within\ the\ same\ category)} \times 100\%$$

The following formula is used to calculate the crude death rates (CDR) and age-specific death rates:

$$\frac{Number\ of\ deaths\ (within\ the\ same\ age\ group)}{Total\ number\ of\ people\ (within\ the\ same\ age\ group)} \times 1{,}000\ persons$$

The following formula is used to calculate infant mortality rate:

$$\frac{Number\ of\ deaths\ in\ a\ given\ period\ (<1\ year\ age)}{Total\ number\ of\ live\ births\ during\ the\ same\ period} \times 1{,}000\ live\ births$$

The following formula is used to calculate natural growth rate:

$$Crude\ Birth\ Rate\ given\ year - Crude\ Death\ Rate\ given\ year = Natural\ growth\ rate\ given\ \ year$$

Data Limitations

- Unadjusted AANDC population may not be complete due to late reporting of life events. Adjusted data previously not available for years analyzed.
- The Vital Statistics data may not include Saskatchewan FN living on-reserve individuals who died outside of Saskatchewan. As a result, some FN living on-reserve individuals may not be captured by VSS.
- Overall Saskatchewan rates may or may not include Saskatchewan FN (on-reserve) population.
- Age specific-death rates for age group <1 and 1-14 years are excluded due to limited data availability.
- Limited data for overall Saskatchewan causes of death by age group. Consequently, this chapter could not compare causes of death by age group between overall Saskatchewan and FN living on-reserve populations.
- Limited data available for causes of death prior to 2003.

Chapter 3: Social Determinants of Health

This chapter examines how the social environment affects health by analyzing Saskatchewan First Nations (FN) income, employment, education, housing and language data from the 2011 National Household Survey (NHS). Additionally, food security and incarceration rates are studied to provide a more detailed assessment of the social impacts on health.

The Social Determinants of Health chapter primarily uses 2011 National Household Survey (NHS) data to provide detailed information on a handful of health determinant factors among Saskatchewan First Nations people including:

- Income status
- Employment status
- Education status
- Physical environment (dwelling conditions)
- Culture (language)

The factors chosen are generally limited to data availability. The goal of this section is to better identify the role the social environment plays in influencing health in order to provide detailed information for programs and decision-makers.

According to the World Health Organization (WHO), "the social determinants of health are the circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies, and politics."[33]

As outlined by WHO, there are many factors which affect an individual's health. These include social, economic and physical environments as well as personal characteristics and behaviours.[34]

[33] World Health Organization: *Social Determinants of Health*.
[34] World Health Organization (2013): *Health Impact Assessment*.

More specifically, the Public Health Agency of Canada (PHAC) identifies the following as the social determinants of health:[35]

- Income and social status
- Social support networks
- Education and literacy
- Employment/Working Conditions
- Social Environments
- Physical environments
- Personal health practices and coping skills
- Healthy child development
- Gender
- Culture

Research shows that Canadian Aboriginal people, including FN, face gaps and disparities in factors such as community well-being, literacy and economic opportunities.[36] In other words, FN people are more likely to face socio-economic barriers and challenges than the general population. Evidence of these inequities is also captured in the Community Well-Being (CWB) index, developed by Aboriginal Affairs and Northern Development Canada (AANDC). The CWB index measures the well-being of Canadian communities using socio-economic Statistics Canada Census indicators relating to housing, education, income and employment. According to an AANDC report which analyzed Canadian FN and non-Aboriginal CWB index scores between 1981 and 2006, Canadian FN communities have typically experienced a lower score when compared to non-Aboriginal Canadian communities. More specifically, analyzing scores from 2001 to 2006 reveals a widening score gap between Canadian FN communities and non-Aboriginal Canadian communities. The report also suggests that prairie FN scores are lower when compared to FN scores in other regions. Further, prairie FN regions have the widest gap of scores between FN and non-Aboriginal people than any other region in Canada.[37]

[35] Public Health Agency of Canada: *Social Determinants of Health*.
[36] Reading CL, Wien F. Health Inequalities and Social Determinants of Aboriginal People's Health. National Collaborating Centre for Aboriginal Health; 2009.
[37] O'Sullivan E.The Community Well-Being Index (CWB): Measuring Well-Being in First Nations and Non-Aboriginal Communities, 1981-2006. Aboriginal Affairs and Northern Development Canada; 2011.

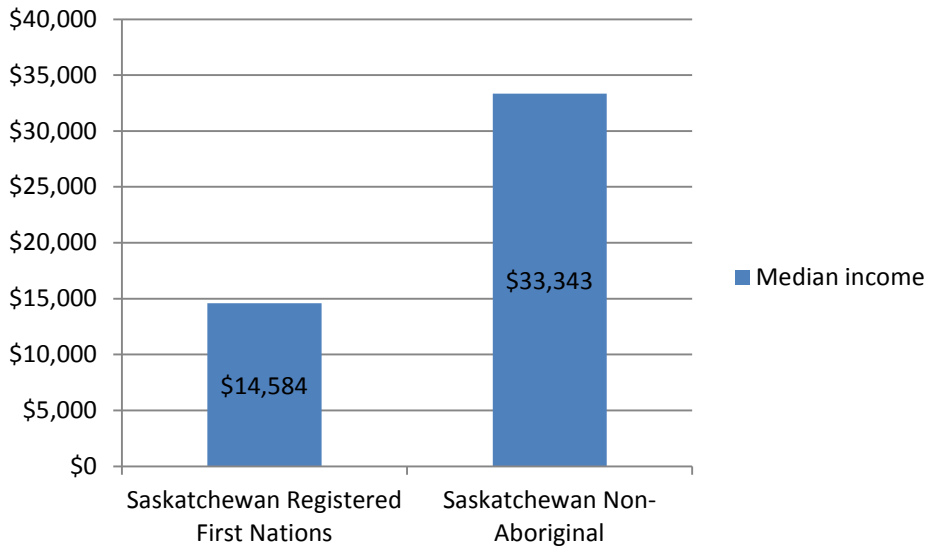
Income, 2011

Income is thought to be one of the most important determinants of health. It is generally understood that higher income and social status translates to improved health outcomes resulting in less sickness and a longer life expectancy. According to PHAC, income may affect health in several ways. At the most basic individual level, high income is associated with safer living conditions and better access to healthy food. Additionally, it is thought that higher incomes result in increased control over life circumstances which reduces stress. There is a growing body of evidence which links psychosocial stress with addictions and violence often resulting in poor mental health, increased infections, diabetes, high blood pressure, heart attack and stroke.[38]

Large gaps between high and low incomes typically create poor overall health at the population level. Essentially, a high degree of poverty leads to social problems such as increased crime as well as stagnant economic growth through loss of productivity and higher health care costs. This income disparity inherently affects the overall population.38

According to Figure 3.1, Saskatchewan does experience a wide income gap when comparing Saskatchewan Registered FN to the Non-Aboriginal Saskatchewan population. NHS data indicates that the median income for Saskatchewan's registered FN population ($14,584) is less-than-half of the non-Aboriginal Saskatchewan population ($33,343).

Figure 3.1: Median income amounts of Saskatchewan registered First Nations and the non-Aboriginal Saskatchewan population, age 15 and above, 2011



Source: 2011 National Household Survey, Statistics Canada, Table 99-014-X2011032

[38] Public Health Agency of Canada: *Toward a Healthy Future: Second Report on the Health of Canadians*.

Employment, 2011

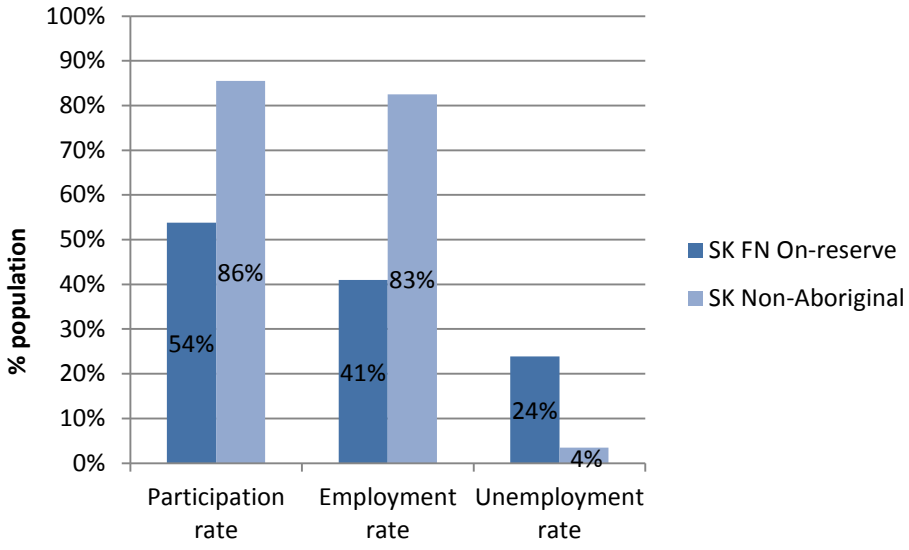
PHAC reports that employment has the ability to affect the Canadian population's mental, physical and social health. Employment and income social determinants of health tend to be closely related as being employed allows for a higher income and thus greater control over circumstances. This results in reduced stress, better health and longer lives. Mentally, employment provides a sense of identity and allows for personal growth. Further, work conditions tend to be more favourable for higher paying jobs; likely resulting in a safer work environment.[39]

The NHS provides some insight on labour force features. The labour force consists of individuals who are employed or unemployed. The participation rate is a proportion of those in the labour force (employed plus unemployed) compared to the total population. The rest of the population is deemed 'out of the labour force'. The employment rate compares those who are employed (currently working in a full-time, part-time or self-employed position) to the total population. The unemployment rate involves those who are unemployed (not currently working but looking for work) compared to the total population. All of these rates are calculated on a population of individuals 15 years of age and older.[40]

When analyzing the 2011 Saskatchewan FN living on-reserve labour force characteristics, there are a few trends. Just a little over half (54%) of the Saskatchewan FN living on-reserve population participated in the labour force, compared to 86% of the Saskatchewan non-Aboriginal population. Additionally, the Saskatchewan FN living on-reserve unemployment rate (24%) was six times higher than the Saskatchewan non-Aboriginal population (4%) rate. Further, the Saskatchewan non-Aboriginal employment rate (83%) was more than twice the rate of the Saskatchewan FN living on-reserve rate (41%). (Figure 3.2)

[39] Public Health Agency of Canada: *Toward a Healthy Future: Second Report on the Health of Canadians*.
[40] Reading CL, Wien F. Health Inequalities and Social Determinants of Aboriginal People's Health. National Collaborating Centre for Aboriginal Health; 2009

Figure 3.2: Labour trends of Saskatchewan FN living on-reserve and Saskatchewan non-Aboriginal population, ages 15 years and above, 2011



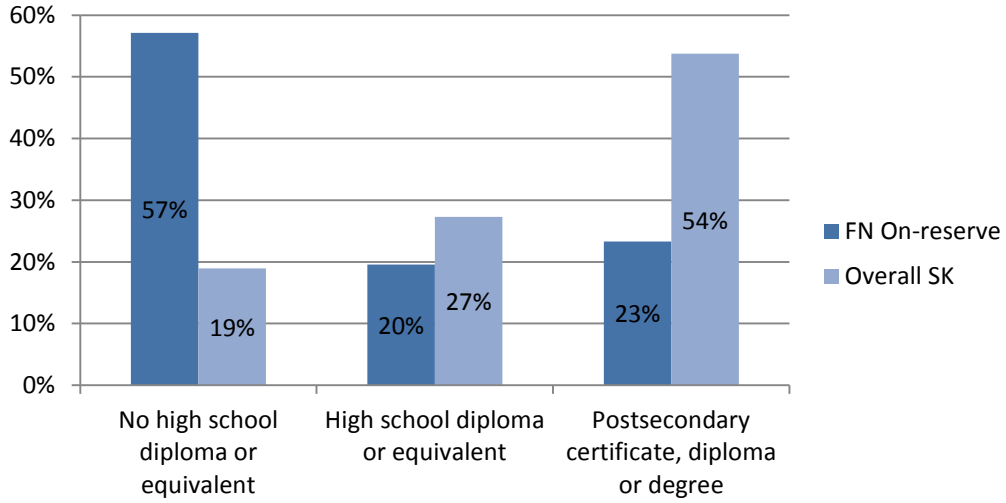
Source: 2011 National Household Survey, Statistics Canada, Table 99-014-X2011044

Education, 2011

Education is an important determinant of health observed in many countries.[41] Education provides opportunities for stable employment and income resulting in lower rates of unemployment, higher incomes and thus better health outcomes.[42] Further, education better equips people with improved problem solving skills and abilities to gain control over circumstances; reducing psychosocial stress. Additionally, advanced education improves health literacy which involves knowing where to access appropriate health information and services.[43]

According to the 2011 NHS (Figure 3.3), less than a quarter (23%) of Saskatchewan FN living on-reserve aged 25-64 had a postsecondary certificate, diploma or degree. In comparison, over half (54%) of the overall Saskatchewan population of the same age group had obtained a postsecondary certificate, diploma or degree. Conversely, over half (57%) of the Saskatchewan FN living on-reserve aged 25-64 had no high school diploma or equivalent; compared to only 19% of the overall Saskatchewan population. In general, both the Saskatchewan FN living on-reserve and overall Saskatchewan population had similar proportions of individuals who had high school as their highest level of educational attainment; ranging between 20% and 27%, respectively. The age group 25-64 years of age was chosen as it eliminates the 15-24 years of age group who have likely not completed their education.

Figure 3.3: Highest level of educational attainment, Saskatchewan self-idenfied registered FN versus overall Saskatchewan population, aged 25-64, 2011



Source: 2011 National Household Survey, Statistics Canada, Table 99-012-X2011044

[41] Albert C, Davia MA. Education is a key determinant of health in Europe: a comparative analysis of 11 countries. *Health Promotion International*; 2011. 26(2):163-70.
[42] Bartley M, Plewis . Accumulated labour market disadvantage and limiting long-term illness: data from the 1971–1991 Office for National Statistics' longitudinal study. *Int. J. Epidemiol*; 2001. 31:336–41.
[43] Public Health Agency of Canada: *Toward a Healthy Future: Second Report on the Health of Canadians*.

Physical Environment
Housing, 2011

Housing is an important determinant of health as inadequate dwelling (housing conditions) and crowding are associated with significant adverse health outcomes.[44] Poor quality housing and crowding are connected with poor mental health, an increase in infectious disease, elevated chronic conditions and a greater number of childhood injuries.

With regards to mental health, crowding may cause stress which is associated with learning and behaviour problems in children, who have no room to study or play; or addiction problems in adults who have no personal space to relax.[45] Further, inadequate housing conditions such as excessive hot, cold or damp indoor conditions are known to be associated with irritability, anxiety and depression which may exacerbate existing crowding stressors. [46]

Additionally, close contact conditions created by crowding allow for the increased transmission of infectious diseases such as influenza-like illnesses (ILI) and tuberculosis (TB).[47,48] Insufficient dwellings may also increase the spread of infectious disease through inadequate drinking water and improper food storage.47

Adverse chronic conditions associated with housing are generally linked with inadequate housing conditions such as inferior materials and design. Poor living conditions such as substandard indoor air quality and mould are linked with respiratory illnesses such as asthma.[49] Further, poor ventilation from furnaces can result in exposure to nitrogen dioxide and carbon monoxide. Building materials that were common 50 years ago, such as lead paint and asbestos, are now known to be associated with neurological issues and lung cancer.47 These materials may still exist in older buildings which are not well maintained.

Similar to chronic conditions, substandard housing design and material contribute to increased prevalence of unintentional injuries among preschoolers.[50] Dwellings which contain "exposed heating sources, unprotected upper-story windows and low sill heights, slippery surfaces, breakable window glass in sites with a high likelihood of contact, and poorly designed stairs with inadequate lighting"[46] tend to increase the risk of injury.

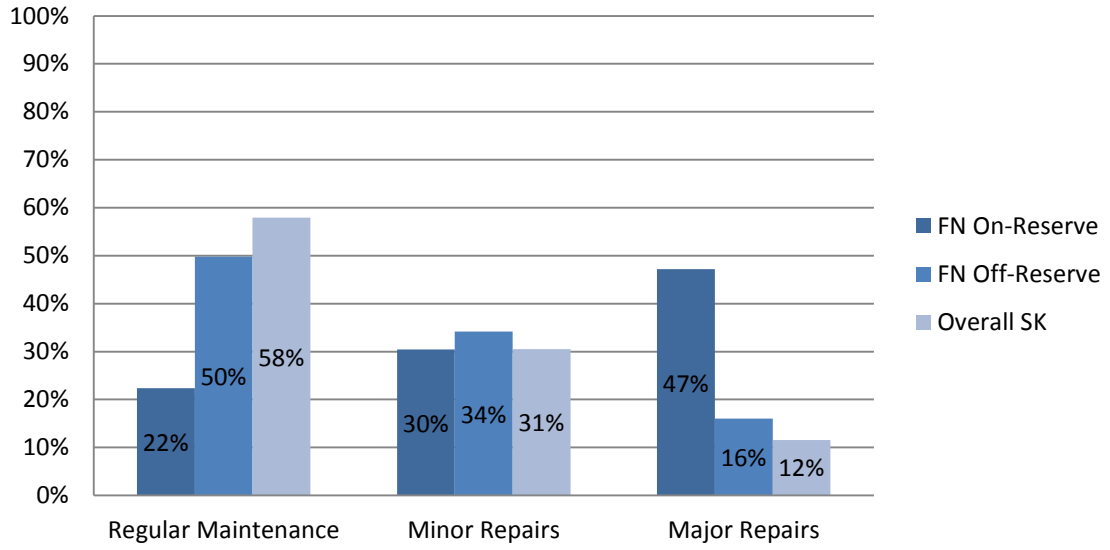
[44] Bryant T. The Current State of Housing in Canada as a Social Determinant of Health. Paper given at The Social Determinants of Health Across the Life-Span Conference: Toronto. November 2002.
[45] Reading CL, Wien F. Health Inequalities and Social Determinants of Aboriginal People's Health. National Collaborating Centre for Aboriginal Health; 2009
[46] Krieger J, Higgins DL. Housing and Health: Time Again for Public Health Action. (Am J Public Health. 2002;92:758–768.
[47] Janjua NZ, Skowronski DM, Hottes DM, Osei W, Adams E, Martin Petric, Lem M, Tang P, Serres GD, Patrick DM, Bowering D. Transmission dynamics and risk factors for pandemic H1N1-related illness: outbreak investigation in a rural community of British Columbia, Canada. Influenza and Other Respiratory Virus. 2012; 6(3):e54-e62.
[48] Baker M, Das D, Venugopal K, Howden-Chapman P. Tuberculosis associated with household crowding in developed countries. J Epidemiol Community Health. 2008; 62:715–721.
[49] Health Evidence Network. Is housing improvement a potential health improvement strategy? World Health Organization European Division; 2005.
[50] Garzon DL. Contributing factors to preschool unintentional injury. J Pediatr Nurs 2005; 20(6): 441-7.

Dwelling Conditions, 2011

Figure 3.6 illustrates the difference in dwelling conditions between Saskatchewan FN living on-reserve, Saskatchewan FN living off-reserve, and the overall Saskatchewan population. The 2011 NHS specifies that dwellings which require major repairs represent inadequate housing. Major repairs were those associated with "plumbing or electrical wiring, structural repairs to walls, floors or ceilings, etc." Minor repairs consisted of "missing or loose floor tiles, bricks or shingles, defective steps, railing or siding, etc." Finally, regular maintenance was considered as "painting, furnace cleaning, etc."[51]

Looking at the dwelling conditions presented in Figure 3.6, Saskatchewan FN living on-reserve reside in housing which requires major repairs at a proportion approximately three times that of Saskatchewan FN living off-reserve and roughly four times that of the overall Saskatchewan population. This data reflects the overall housing inequality associated with living on-reserve.

Figure 3.6: Saskatchewan dwelling conditions, 2011



Source: 2011 National Household Survey, Statistics Canada, Table 99-011-X2011035

Crowding, 2011

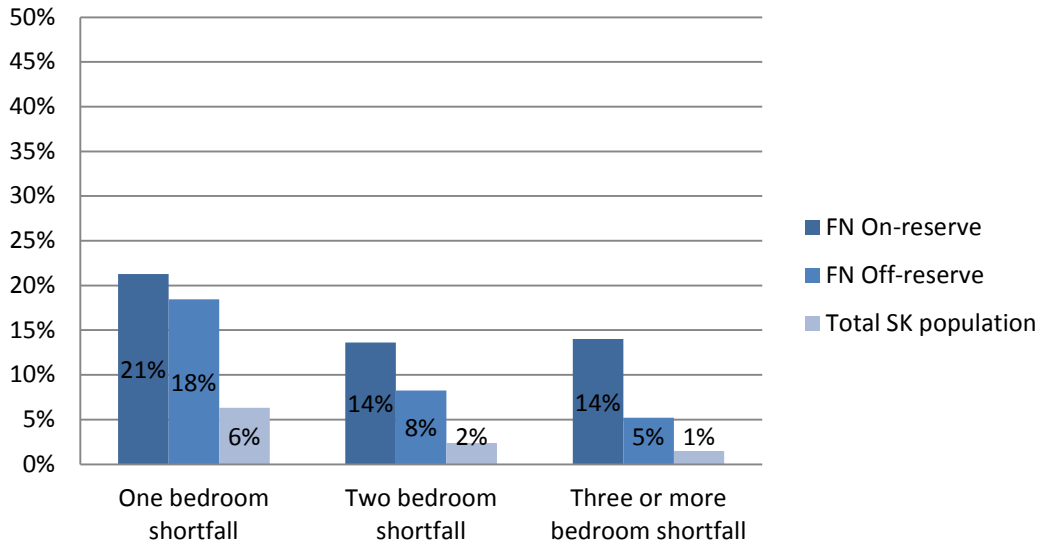
As mentioned previously, household crowding can potentially lead to several adverse health outcomes. NHS measures crowding in two ways: by assessing housing suitability and by the number of persons per room. Housing suitability is determined by evaluating if the dwelling has enough bedrooms for the size and composition of the household according to National Occupancy Standards (NOS). NOS are developed by the Canada Mortgage and Housing Corporation (CMHC) and take into considerations factors such as age, sex and relationship among household members.

[51] Statistics Canada (2013): *Housing Reference Guide, National Household Survey, 2011*.

A house is deemed not suitable if there is a lack of bedrooms, also known as a bedroom shortfall. The NHS further assesses the degree of suitability by enumerating the number of bedroom shortfalls. As mentioned, the number of persons per room is also an indicator of crowding. It is calculated by dividing the number of people in a dwelling by the total number of rooms. Rooms include kitchens, bedrooms and finished rooms in the attic or basement. A higher number of people per room indicates a higher level of crowding.[52]

Figure 3.7 compares bedroom shortfall in Saskatchewan FN living on-reserve, Saskatchewan FN off-reserve and the overall Saskatchewan population. Generally, Saskatchewan FN living on-reserve experience a higher proportion of crowding, as it relates to bedroom shortfall, when compared to their off-reserve counterparts and the overall Saskatchewan population. Of concern is the high proportion of Saskatchewan FN living on-reserve who report having three or more bedroom shortfall (14%). This is in contrast to the Saskatchewan FN living off-reserve (5%) and the overall Saskatchewan population (1%) who report considerably lower percentages of three or more bedroom shortfall.

Figure 3.7: Crowding condition in Saskatchewan dwellings: bedroom shortfalls, 2011



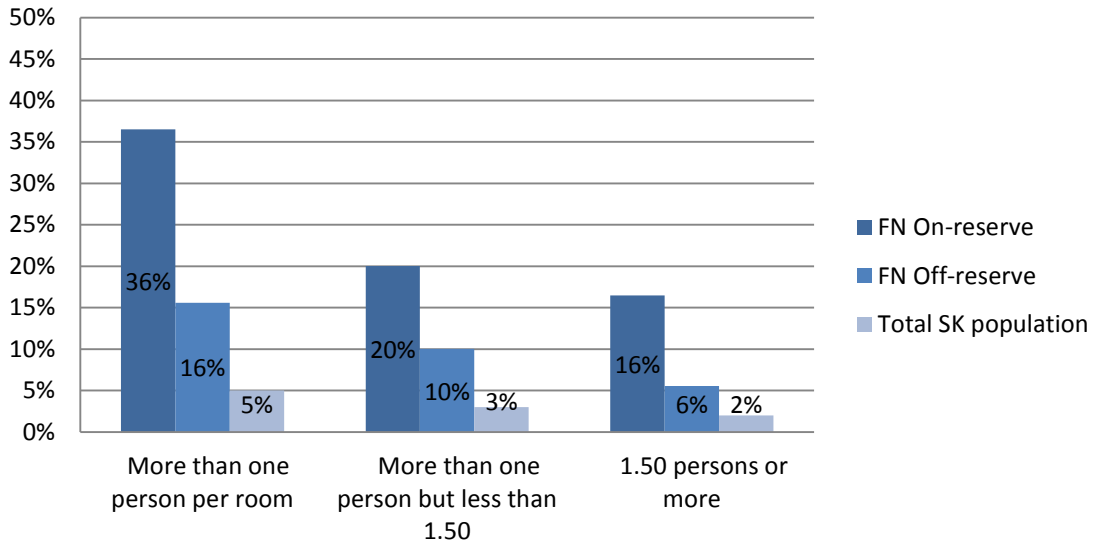
Source: 2011 National Household Survey, Statistics Canada, Table 99-011-X2011035

When assessing crowding with regards to the number of persons per room, Saskatchewan FN living on-reserve again are proportionally higher when compared to Saskatchewan FN living off-reserve and the overall Saskatchewan population (Figure 3.8). What is concerning is the high proportion of Saskatchewan FN living on-reserve households who have more than one person per room (36%). This is more than double that of Saskatchewan FN living off-reserve (16%) and more than seven times the proportion for the overall Saskatchewan population (5%).

[52] Statistics Canada (2013): *Housing Reference Guide, National Household Survey, 2011*.

Further, when looking at the proportion of dwellings with more than 1.50 people per room, Saskatchewan FN living on-reserve are again proportionally higher (16%) than Saskatchewan FN living off-reserve (6%) and the overall Saskatchewan population (2%).

Figure 3.8: Crowding condition in Saskatchewan dwellings: number of persons per room, 2011



Source: 2011 National Household Survey, Statistics Canada, Table 99-011-X2011035

Food Security

Food security is a state when an individual has physical, social and economic access to nutritious food for a healthy life.[53] Food insecurity is best defined as the lack of nutritious and safe foods or the inability to acquire these foods in socially accepted ways. [54] Food insecurity is an important public policy issue in Canada as malnutrition is strongly associated with poor general and mental health.[55]

The 2008 Canadian Community Health Survey indicated that approximately 11.3% of Canadian households (3.4 million Canadians aged 12 or older) experienced food insecurity.[56] By 2012, the proportion of Canadians experiencing food insecurity rose to 13%; indicating food insecurity is a growing concern in Canada.[57] A report by the Council of Canadian Academics identifies that food insecurity is particularly a problem in northern and remote Aboriginal communities.

[53] Food and Agricultural Organization of United Nations: *Committee on World Food Security*.

[54] Anderson, S.A. (1990) Core indicators of nutritional state for difficult-to-sample populations. *J Nutr*, 120, 1559–600.

[55] Willows, N., Veugelers, P., Raine, K., & Kuhle, S. Associations between household food insecurity and health outcomes in the Aboriginal population (excluding reserves). *Canadian Centre for Health Information.* 2011; *22* (2), 15-20.

[56] Health Canada (2013). *Canadian Community Health Survey: Households Food Insecurity in 2007-2008: Key Statistics and Graphics*.

[57] Tarasuk V, Mitchell A, Dachner N.: *Household Food Insecurity in Canada, 2013*. Toronto: Research to identify policy options to reduce food insecurity (PROOF); 2014 [Cited on 2014 April 15].

Additionally, the report estimates that off-reserve Aboriginal households face food insecurity at more than double the rate compared to the general Canadian population (28.6% versus 12.6%).[58]

A 2013 internal Health Canada report reviewed grocery store accessibility for Saskatchewan FN living on-reserve. Looking at the number of Saskatchewan grocery stores situated near or on reserves, the report highlights the need for better access to adequate grocery stores in many northern communities. Grocery stores were classified as being 'adequate' (selling items such as fresh protein; 1% or fat free milk; high fiber bread; two types of fresh fruit; and three types of fresh vegetables); or 'limited' (the default if a store did not meet the adequate criteria). For the sake of this discussion, we will focus on access to adequate grocery stores. Communities were then classified as having 'lower', 'some' or 'sufficient' access to either adequate or limited grocery stores. 'Lower' access refers to communities which have access to zero to two grocery stores; 'some' access is associated with communities who have access to three to five grocery stores; and 'sufficient' access is associated with communities who have access to five or more grocery stores. All of these classifications involve assessing the number of grocery stores within a 32km radius. [59]

Nearly half of Saskatchewan FN communities (49%) have 'sufficient' access to adequate grocery stores. However, within that 49%, only 13% of Saskatchewan FN communities with 'sufficient' access are in the northern part of the province (north of 55° latitude or north of Prince Albert). In contrast, 23% of Saskatchewan FN communities have 'lower' access to adequate grocery stores. Of concern, 94% of Saskatchewan FN communities experiencing 'lower' access to adequate grocery stores are situated in the northern parts of Saskatchewan (north of Prince Albert). Further, more than a quarter (28%) of Saskatchewan FN communities have 'some' access to adequate grocery stores. Saskatchewan FN communities with 'some' access are generally scattered throughout the province. [60]

Along with inadequate access to grocery stores in the Northern communities, other factors such as expensive food costs also worsen the food security situation in remote communities. According to a recent report by the Saskatchewan Food Costing Task Group (Figure 3.9), residents of northern Saskatchewan have the highest food costs in the province, averaging more than double the cost compared to a large city in Saskatchewan ($394.20 vs. $193.69 weekly food costs).[61]

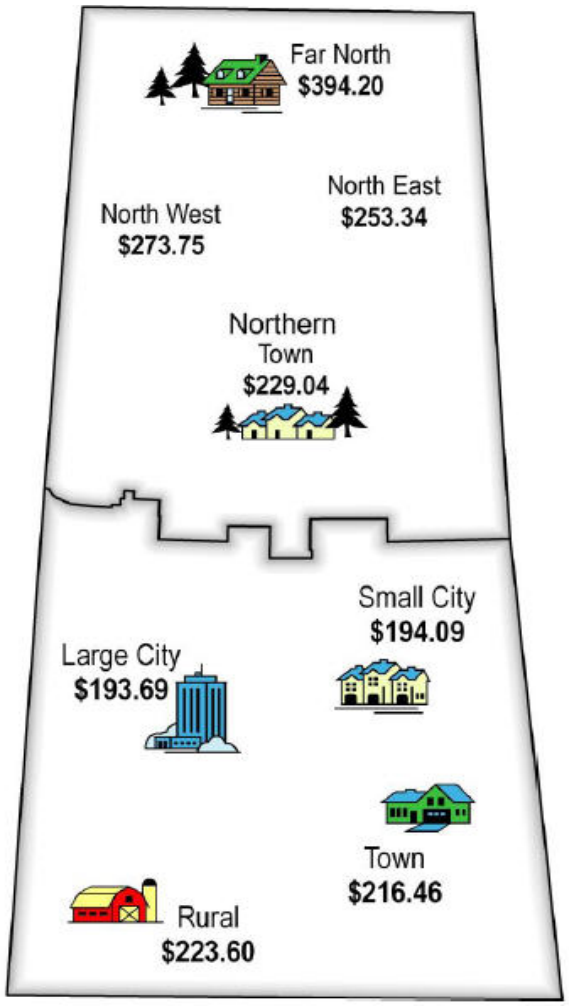
[58] Council of Canadian Academics. *Aboriginal Food Security in Northern Canada: An assessment of the state of knowledge*. Ottawa, ON: The Expert Panel on the State of Knowledge of Food Security in Northern Canada, Council of Canadian Academies; 2014.
[59] Stahl L [Internal report]. Analysis of Food Security on First Nations Reserves in Saskatchewan, Canada. Health Canada: Regina, SK. 2013.
[60] Stahl L [Internal report]. Analysis of Food Security on First Nations Reserves in Saskatchewan, Canada. Health Canada: Regina, SK. 2013.
[61] Saskatchewan Food Costing Task Group (2014). *The Cost of Healthy Eating in Saskatchewan 2012*. Saskatchewan

Figure 3.9: Weekly food costs, for a reference family of four, in Saskatchewan by region

Far North: Low access communities with seasonal roads and air travel is the main form of transportation
North West: Moderately accessible communities with gravel or paved roads, and air access
North East: Moderately accessible communities with gravel roads and some air access
Northern Town: Highly accessible communities with paved roads and air access in all seasons

The border used in this report to differentiate between north and south lies approximately 100km north of Prince Albert.

Large City: Census metropolitan area with population of 100,000 or more
***Small City*:** Population between 5,000 and 99,999
Town: Population between 500 and 4,999
Rural: Population of less than 500



Source: Saskatchewan Food Costing Task Group. The Cost of Healthy Eating in Saskatchewan 2012. Saskatchewan; 2014.

Incarceration, 2001 and 2011

Prison can be described as a social or structural determinant of health. Structurally, limited access to health services and prevention resources, inhumane attitudes and practices of officers toward inmates, malnutrition, infectious disease, overcrowding and inadequate infrastructure may exacerbate existing health conditions. Socially, adverse health conditions may be amplified through a culture that normalizes unhealthy risk-taking behaviours (i.e. tobacco use, injection drug use, violence).[62]

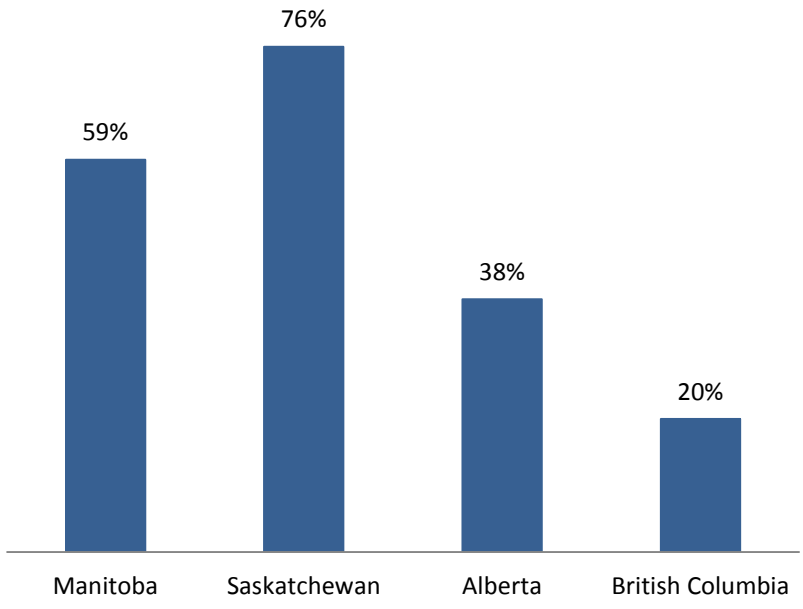
[62] Awofeso, N. (2010). Prisons as Social Determinants of Hepatitis C Virus and Tuberculosis Infections. *Public Health Reports, 125*, 4, 25-33.

Additionally, individuals with poorer health status are often overrepresented in the criminal justice system. Social, behavioural and structural factors that lead to poor health are also associated with increased likelihood of incarceration; therefore, prisons concentrate individuals who are at a higher risk for poorer health outcomes.[63] For example, the prevalence of infectious diseases such as HIV, STIs, hepatitis B and C and tuberculosis are generally higher in the correctional populations compared to the general population. Prisons help facilitate dissemination of infectious disease through the release of infected offenders back into the community and re-entry into the criminal justice system. Inmates experience increased morbidity and mortality following release from prison due to deterioration of health status following incarceration as well as from limited opportunities for employment, stigmatization, social support deficiencies and inadequate access to post-release health care.63

Incarceration Statistics, 2001

According to Correctional Service Canada, self-identified Aboriginal peoples represent 2.8% of the Canadian population but account for 18% of the federally-incarcerated population. [64] As this statistic is from 2001, caution should be taken when interpreting. Additionally, the numbers do not provide further breakdown of First Nations, Métis and Inuit populations. Provincially, Saskatchewan has the highest percentage (76%) of offenders with Aboriginal descent in western Canada (Figure 3.10).

Figure 3.10: Percentage of total offenders' population with Aboriginal ancestry, western Canada, 2001



Source: Correctional Service Canada, 2001

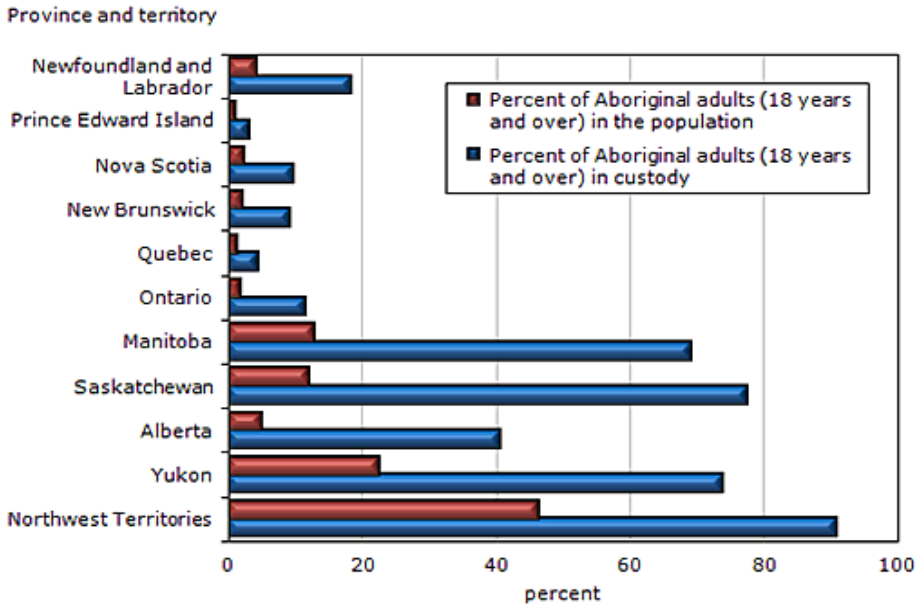
[63] Freudenberg, N. (2002). Adverse effects of US jail and prison policies on the health and well-being of women of color. *American Journal of Public Health, 92*, 1895-1899.

[64] Correctional Service Canada: *Aboriginal Offender Statistics*.

Aboriginal people continue to be over-represented in custody, 2010-2011

According to recent Correctional Service Canada data, Aboriginal peoples continue to be over-represented in custody.[65] Recent adult correctional numbers from 2010-11 show that 27% of adults in provincial and territorial custody, and 20% of those in federal custody, are of Aboriginal descent. This is seven to eight times higher than the proportion of Aboriginal people (3%) in the adult population as a whole. Provincially in 2010-11, Saskatchewan had the second highest percentage of Aboriginal admissions in custody (with Northwest Territories being first) (Figure 3.11).

Figure 3.11: Aboriginal adult admissions in custody, by province and territory*, 2010/2011



Source: Correctional Service Canada, 2011

*** Nunavut data is not available**

As observed by Statistics Canada,

"The over-involvement of Aboriginal people in the criminal justice system has been a long-standing issue. In 1989, for example, concerns about Aboriginal people in the correctional system were raised in a report by the Royal Commission, which examined the prosecution and wrongful conviction of Donald Marshall, Jr. A few years later, in 1996, the Criminal Code was reformed to include a specific requirement for courts to consider all available sanctions other than imprisonment, with particular attention to the circumstances of Aboriginal offenders. In subsequent years, numerous initiatives, inquiries, public policy statements, and task forces have continued efforts to address this problem." [66]

[65] Statistics Canada: *Aboriginal people continue to be over-represented in custody*.
[66] Statistics Canada: *Aboriginal people continue to be over-represented in custody*.

Culture

Culture tends to influence perceptions of health and disease. As culture is a critical component of one's identity, the loss of culture can adversely affect physical and mental well-being resulting in depression, substance abuse and suicide.[67]

Language, 2011

The National Collaborating Centre for Aboriginal Health refers to language as 'a conveyor of culture and the means by which knowledge, skills and cultural values are expressed and maintained.'68 As a result, language barriers impact an individual's ability to connect with others. Language is identified to be a one of the six protective factors against health issues in indigenous populations; along with land and health, traditional medicine, spirituality, traditional foods and traditional activities.[68,69] In 2007, the Assembly of First Nations (AFN) released a National First Nations Language Strategy report outlining a 20-year vision of revitalizing Aboriginal languages in Canada.[70]

According to the National Household Survey (NHS), close to half (43.3%) of the Saskatchewan FN living on-reserve population have knowledge of one or more Aboriginal languages. Knowledge of languages refers to languages in which the respondent can conduct a conversation. This data is based on the respondent's assessment of his or her ability to speak these languages.[71] In addition, almost all (99.5%) of the self-identified Saskatchewan FN living on-reserve have knowledge of the English language (Table 3.1).

Table 3.1: Knowledge of first and second languages spoken by self-identified FN (on-reserve) in Saskatchewan, 2011

Knowledge of Language	%
Aboriginal language	43.3%
English language	99.5%

Source: 2011 National Household Survey, Statistics Canada, Table 99-011-X2011030

According to figure 3.12, of the 43.3% of Saskatchewan FN living on-reserve who have detailed knowledge of Aboriginal languages, 32% speak Cree, followed by 8.6% who speak Dene and 1.5% who speak Ojibway.

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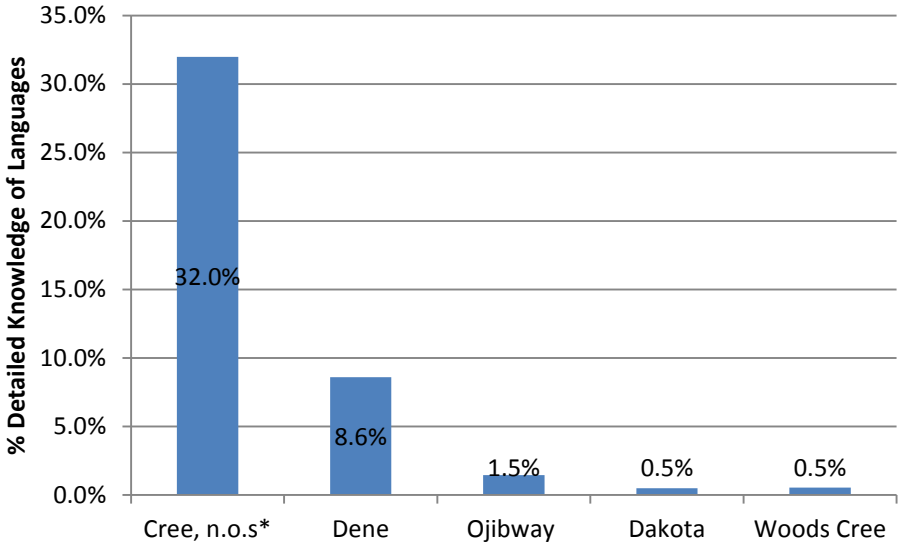
[67] National Collaborating Centre for Aboriginal Health (2010). *Culture and language as social determinants of First Nations, Inuit and Métis health*.
[68] McIvor O, Napolean A, Dickie KM (2009). Language and culture as protective factors for at-risk communities. Journal de la santé autochtone.
[69] Reading CL, Wien F. Health Inequalities and Social Determinants of Aboriginal People's Health. National Collaborating Centre for Aboriginal Health; 2009.
[70] Assembly of First Nations (2007): *National First Nations Language Strategy. Annual General Assembly*.
[71] Statistics Canada (2011*)*: *Housing Reference Guide, National Household Survey*.

Figure 3.12: Knowledge of Aboriginal languages spoken by Saskatchewan FN living on-reserve, 2011



Source: 2011 National Household Survey, Statistics Canada, Table 99-011-X2011030

***n.o.s. = not otherwise specified**

Social Determinants of Health Methodology

Who is included in this chapter and data sources

1. **Overall Saskatchewan population**
   - Total Saskatchewan population, including First Nations on-and off-reserve
   - Data source:
     - National Household Survey (NHS), 2011
       - Dwelling conditions table: 99-011-X2011035
       - Crowding table: 99-011-X2011035

2. **Saskatchewan non-Aboriginal population**
   - According to the NHS, those who do not self-identify as Aboriginal
   - Data Source:
     - National Household Survey, 2011
       - Income table: 99-014-X2011032
       - Employment table: 99-014-X2011044

3. **Saskatchewan registered First Nations population**
   - Self-identified as being registered to a Saskatchewan FN band ; living on-and off-reserve
   - Data source:
     - National Household Survey, 2011
       - Income table: 99-014-X2011032

4. **Saskatchewan First Nations population living on-reserve**
   - Self-identified as being registered to a Saskatchewan FN band and residing on-reserve
   - Does not include non-registered First Nations or non-First Nations that may be living on-reserve
   - Data sources:
     - National Household Survey, 2011
       - Employment table: 99-014-X2011044
       - Dwelling condition table: 99-011-X2011035
       - Crowding table: 99-011-X2011035
       - Language table: 99-011-X2011030

5. **Saskatchewan First Nations population living off-reserve**
   - Self-identified as being registered to a Saskatchewan FN band but address indicates they are residing off-reserve
   - Data sources:
     - National Household Survey, 2011
       - Dwelling conditions table: 99-011-X2011035
       - Crowding table: 99-011-X2011035

Additional data sources include Correctional Service Canada (2001 and 2011) and an internal FNIHB-SK report on food security (2013).

Approach to Data Analysis

Data was analyzed using Microsoft Excel 2010.

Data Limitations

- National Household Survey limitations
    - Excluded from NHS data are 36 incompletely enumerated First Nations communities. There is only one FN community in Saskatchewan which refused to participate.
    - Self-reported data means it is difficult to verify the accuracy of the results
    - NHS is a voluntary survey resulting in a response rate of 69% which represents only 21% of the total Canadian population.
    - Volunteer surveys tend to result in a non-response bias from small populations such as those in low income groups or recent immigrants.
    - As the 2011 NHS is a switch from the mandatory 2006 Census long form, it is difficult to compare to data gathered before 2011.

Chapter 4: Immunization

The Immunization chapter examines the extent of vaccine coverage for Saskatchewan First Nations (FN) living on-reserve by jurisdiction (FNIHB vs NITHA) for 1, 2 and 6/7 age groups. The aim of this chapter is to provide program and decision-makers with more detailed information on populations vulnerable to vaccine-preventable disease as well as explore and celebrate those areas that consistently have high coverage rates. Immunization is one of the most effective and cost-beneficial public health interventions.[72] In order for immunizations to be successful, high levels of vaccine uptake among target populations are important. Immunizations protect not only at the individual level, but also at the community level.

The Immunization chapter uses internal FNIHB and NITHA data to provide detailed information on populations protected from vaccine-preventable disease.

Reporting to Childhood Immunization Coverage Rates (CICR) occurs at the following ages:

- One-year-old
- Two-year-old
- Six/Seven-year-old

When high immunization rates protect unvaccinated individuals in the community by reducing disease transmission; this is referred to as herd immunity. Herd immunity is important to protect those unable to be vaccinated such as young infants or the immunocompromised.[73]

The Saskatchewan Immunization Manual (SIM) provides public health personnel with evidence-based information on Saskatchewan's publically funded immunization programs. This includes providing recommendations on routine immunization chedules based on National Advisory Committee on immunization (NACI) standards. [74] Immunizations are the most effective when they are administered at specific times, especially during child development. [75]

[72] World Health Organization (2005): *Global Health and Immunization Strategy 2006-2015*.
[73] National Institute of Allergy and Infectious Diseases (2010): *Community Immunity ("Herd" Immunity)*.
[74] Saskatchewan Ministry of Health (2015). *Saskatchewan Immunization Manual (SIM) Immunization Schedules*.
[75] Public Health Agency of Canada (2015): *Your Immunization Schedule – Immunize Your Child*.

Childhood Immunization Coverage Rates (CICR)

In Saskatchewan, immunizations are typically reported as Childhood Immunization Coverage Rates (CICRs). CICRs are the percentage of children in the population of interest, at a particular point in time, that have received the recommended number of doses at a specific age. CICRs report children as up-to-date (UTD) if they have received the recommended doses of a vaccination by age 1, 2 and 6/7, as specified in the SIM. Children aged 6/7 will be referenced throughout this chapter to reflect the change from reporting 6-year-old coverage rates to 7-year-old coverage rates in 2012.

CICRs do have their limitations. As the timeliness of vaccine administration is not taken into consideration, CICRs may not capture if a child is delayed with their immunizations. Delayed immunizations may decrease vaccine efficiency resulting in documented outbreaks. As a result, CICRs can provide a false sense of protection within a community – especially in the susceptible, less than 1-year-old population. In addition, as immunization records are captured where individuals received the vaccination, there are jurisdictional challenges when First Nations children receive immunization off-reserve at a Regional Health Authority (RHA) facility. There is the potential for immunization records to be recorded in an RHA information system, which is different from the information system used in FN communities. As a result, FN communities may report lower CICRs which do not accurately reflect the true situation, due to data capture limitations.[76]

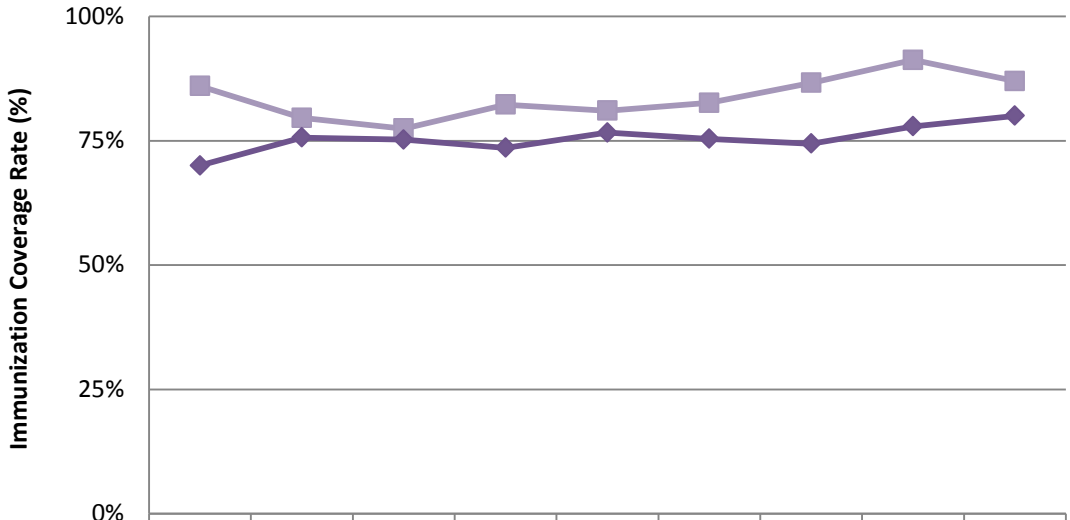
[76] Kohle A. An Analysis of Saskatchewan First Nations Childhood Immunization Rates. Health Canada Internal Report: 2013.

One-Year-Olds, 2004-2012

Children under one year of age are recommended to receive the immunizations listed below. [77] One year old CICRs are calculated based on the uptake of each vaccine as reported by December 31 of the respective year.

- Three doses of diphtheria, tetanus, pertussis, polio, Haemophilus influenza type B (DTap-IPV-Hib) vaccine
    - Given at two months, four months and six months
- Three doses of pneumococcal conjugate-13 (Pneu-C-13) vaccine
    - Given at two months, four months, six months

Figure 4.4: Overall one-year-old Saskatchewan First Nation living on-reserve CICR 2004 to 2012



	2004	2005	2006	2007	2008	2009	2010	2011	2012
NITHA	86%	80%	77%	82%	81%	83%	87%	91%	87%
South Central	70%	76%	75%	74%	77%	75%	74%	78%	80%

Source: FNIHB-SK, Health Canada

One-year-old immunization coverage rates in South Central fluctuated slightly from 2004 to 2012 averaging above 75%, while NITHA immunization coverage rates averaged approximately 84% (Figure 4.4). NITHA rates were higher than South Central rates for all nine years analyzed.

[77] Saskatchewan Ministry of Health (2012). *Saskatchewan Immunization Manual (SIM) Immunization Schedules*.

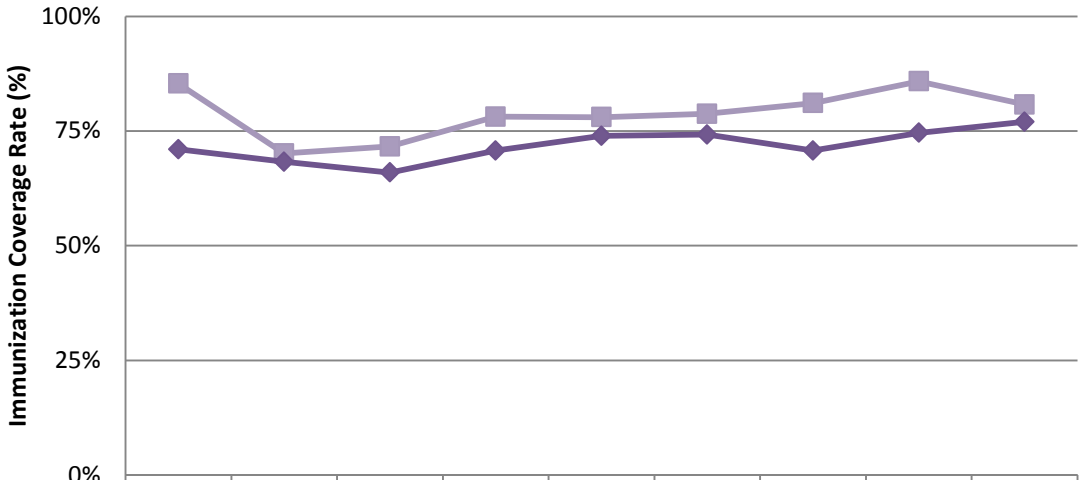
Two-Year-Olds, 2004-2012

Children less than two years of age are recommended to receive the immunizations listed below.77 Two-year-old CICRs are calculated based on the uptake of each vaccine as reported by December 31 of the respective year. Two year CICRs are often considered the gold standard as the majority of immunizations are recommended during the first two years of life.

- Four doses of diphtheria, tetanus, pertussis, polio (DTap-IPV) and Haemophilus influenza type B (Hib) vaccine
- Four doses of pneumococcal conjugate-13 (Pneu-C-13) vaccine
- One dose of meningococcal type C (Men-C-C) vaccine
- Two doses of measles, mumps, rubella (MMR) and varicella/chickenpox (VZV) vaccine
- Two doses of hepatitis A (HA) vaccine

Two-year-old immunization coverage rates in South Central have remained consistent at about 70% since 2004, with only slight variations from year-to-year (Figure 4.5). Immunization coverage rates in NITHA peaked in 2011 at 86%; otherwise, the coverage rates remained roughly around 80%. As with the one-year-old coverage rates, NITHA rates are higher than South Central rates for all nine years analyzed.

Figure 4.5: Overall two-year-old Saskatchewan First Nation living on-reserve CICR 2004 to 2012



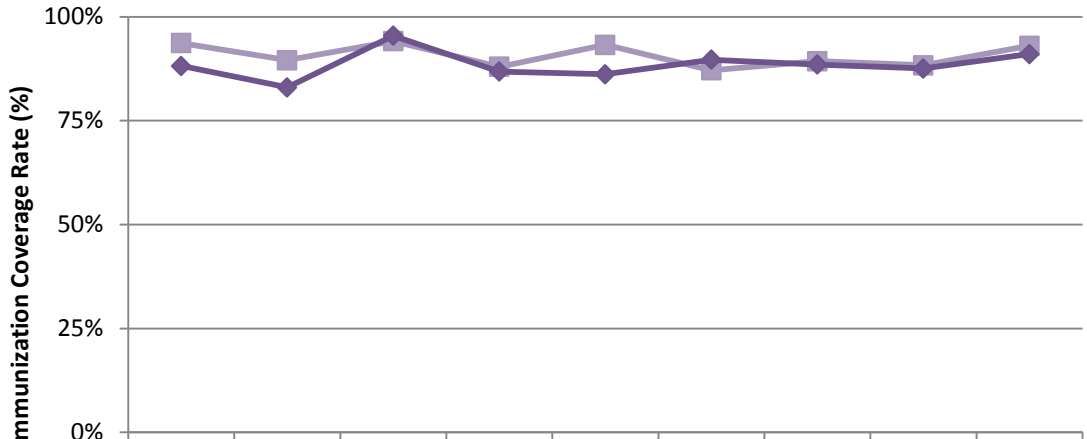
	2004	2005	2006	2007	2008	2009	2010	2011	2012
NITHA	85%	70%	72%	78%	78%	79%	81%	86%	81%
South Central	71%	68%	66%	71%	74%	74%	71%	75%	77%

Source: FNIHB-SK, Health Canada

Six/Seven-Year-Olds, 2004-2012

Routine immunizations should be completed by age six/seven. An assessment at six/seven years of age provides a picture of the level of completion for these recommended vaccinations.

Figure 4.6: Overall six/seven-year-old Saskatchewan First Nation living on-reserve CICR 2004 to 2012



	2004	2005	2006	2007	2008	2009	2010	2011	2012
NITHA	94%	90%	94%	88%	93%	87%	89%	88%	93%
South Central	88%	83%	95%	87%	86%	90%	88%	88%	91%

Source: FNIHB-SK, Health Canada

Overall six/seven-year-old coverage rates for South Central and NITHA have fluctuated slightly between 2004 and 2010, with the nine year average coverage rates of 88% and 91%, respectively (Figure 4.6).

Immunization Methodology

Who is included in this chapter and data sources

1. **Overall Saskatchewan population**
   - Total Saskatchewan population, including First Nations on-and off-reserve
   - Data source:
     - Saskatchewan Ministry of Health

2. **Saskatchewan First Nations population living on-reserve**
   - Self-identified as being registered to a Saskatchewan FN band and residing on-reserve
   - Does not include non-registered First Nations or non-First Nations that may be living on-reserve.
   - Data sources:
     - FNIHB and NITHA communities - Childhood Immunization Coverage Rates

Approach to Data Analysis

Data was analyzed using Microsoft Excel 2010.

The following formula is used to calculate the immunization coverage rate:

$$\frac{Number\ of\ children, at\ a\ specific\ point\ in\ time, that\ have\ received\ the\ recommended\ number\ of\ doses, at\ a\ specific\ age}{Total\ number\ of\ children\ born\ in\ the\ same\ given\ period, at\ a\ specific\ age} \times 100\%$$

Chapter 5: Communicable Diseases

The Communicable Diseases chapter examines the reported rates of sexually transmitted infections (STI), bloodborne pathogens (BBP), tuberculosis (TB) and other notifiable diseases (including enteric, food and waterborne diseases; vaccine-preventable diseases; and diseases transmitted by respiratory routes) in Saskatchewan's registered FN populations living on-reserve from 2004 to 2012. The aim is to provide program and decision-makers with more detailed information on the burden of communicable disease to help plan population interventions, reduce the incidence of disease and identify areas where increased efforts for health promotion and prevention can be directed.

The Communicable Diseases chapter provides incidence of reported STIs, BBPs, TB and other notifiable diseases reported in the Saskatchewan First Nations living on-reserve population from 2004 to 2012. The chapter makes comparisons between NITHA and South Central FNIHB-SK jurisdictions.

STI, BBP and other notifiable disease date were obtained from the Integrated Public Health Information System (iPHIS).

TB data was obtained from the Tuberculosis Information System (TBIS).

The Public Health Act, 1994 and its regulations are the statutory basis for the reporting, investigating and controlling of communicable diseases in Saskatchewan. The Act and regulations outline the roles and responsibilities of individuals and agencies as they relate to communicable disease control. Saskatchewan Ministry of Health identifies 75 communicable diseases that must be reported to public health officials and the Saskatchewan Ministry of Health.[78] Under the Act, South Central and NITHA communities are responsible for overseeing communicable disease reporting for Saskatchewan First Nations (FN) individuals living on-reserve in their respective jurisdictions.

[78] Saskatchewan Ministry of Health: *Communicable Disease Control Manual, Appendix A* (reviewed November 2012).

Health service delivery for Saskatchewan FN living on-reserve differs between the NITHA and South Central communities. NITHA has 13 FN communities equipped with nursing stations that provide basic diagnostic, treatment and primary care services. In contrast, most communities in South Central Saskatchewan only provide public health services on-reserve and people must go off-reserve for diagnosis and treatment. This difference in the delivery of health services can potentially affect rates of reportable diseases.

Sexually Transmitted Infections

As we saw from the population pyramid in the demographics section, the population distribution between Saskatchewan FN individuals living on-reserve is different when compared to the overall Saskatchewan population. In 2012, 54.5% of the Saskatchewan FN population living on-reserve were under the age of 25. In comparison, 33.0% of the overall Saskatchewan population were under the age of 25. The Public Health Agency of Canada reports that in 2011, 15-24 year olds had the highest rate of STIs in Canada. [79] As a result, age-standardized rates would be ideal to compare sexually transmitted infection among these populations; but unfortunately, provincial data is not available to allow for this age-standardized comparison.

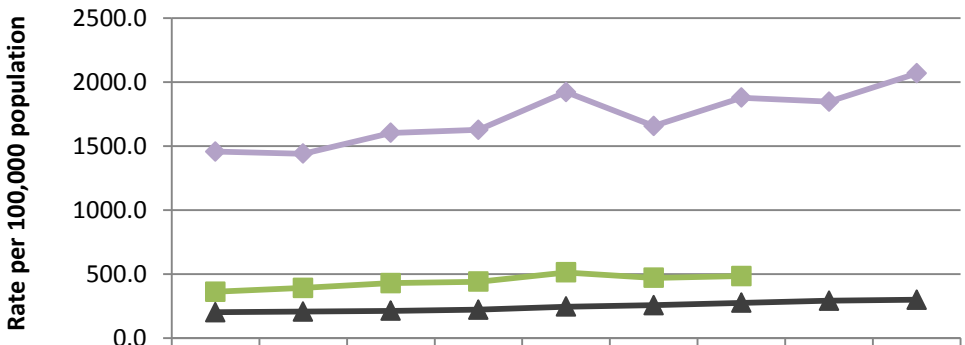
Chlamydia, 2004-2012

Chlamydia is the most commonly diagnosed and reported STI in Canada.[80] Chlamydia can be transmitted through sexual contact with an infected individual or through vertical transmission from infected mothers to their newborns. The majority of individuals with chlamydia have no symptoms, creating challenges for early detection and diagnosis. Untreated, chlamydia can potentially be infectious for years and can lead to pelvic inflammatory disorder in females. Chlamydia infection also increases the risk of acquiring HIV.[81] Co-infection of chlamydia with gonorrhea is common.[82]

Looking at the overall reported chlamydia incidence rates in the Saskatchewan FN living on-reserve population, there was a steady increase between 2004 and 2012 from 1457.5 to 2069.2 per 100,000 population (Figure 5.1). In 2012, the Saskatchewan FN living on-reserve chlamydia rate was 2,069.2 per 100,000 population. The Canadian rate was 298.7 per 100,000 population. Unfortunately, Saskatchewan provincial data is not available for 2011 and 2012.

[79] Public Health Agency of Canada (2011): *Report on Sexually Transmitted Infections in Canada: 2011*.
[80] Public Health Agency of Canada (2010): *Canadian guidelines on sexually transmitted infections*.
[81] Public Health Agency of Canada (2003): *Genital Chlamydia.*
[82] Public Health Agency of Canada (2003): *Gonorrhea.*

Figure 5.1: Chlamydia incidence rates for Saskatchewan First Nations living on-reserve, overall Saskatchewan population and Canada, 2004 to 2012

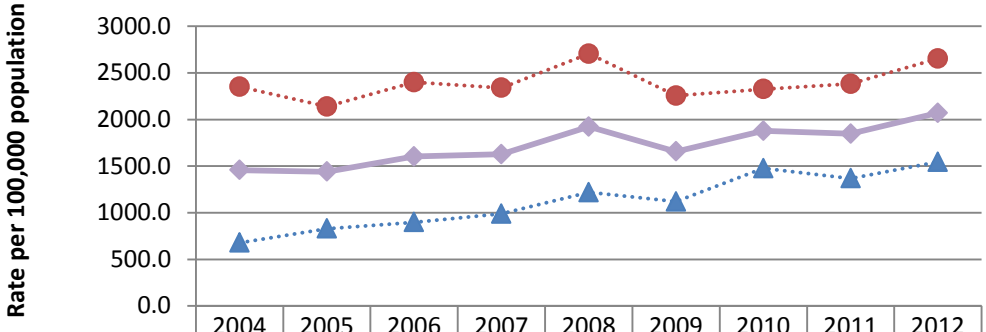


	2004	2005	2006	2007	2008	2009	2010	2011	2012
Saskatchewan FN on-reserve	1457.5	1440.7	1603.2	1627.2	1922.1	1656.7	1878.4	1847.8	2069.2
Saskatchewan (overall)	361.8	391.9	428.9	439.8	513.2	470.2	484.0		
Canada (overall)	200.9	206.2	212.7	221.3	244.8	256.2	274.7	291.6	298.7

***Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012. PHAC, Centre for Communicable Disease and Infection Control* (Saskatchewan rates verified November 2011). PHAC, Canadian Notifiable Disease Surveillance System (Canada rates retrieved April 2014).**

Reported chlamydia rates in NITHA were, on average, two-times higher than the rates of South Central communities between 2004 and 2012 (Figure 5.2).

Figure 5.2: Chlamydia incidence rates by jurisdiction, Saskatchewan First Nations living on-reserve, 2004 to 2012

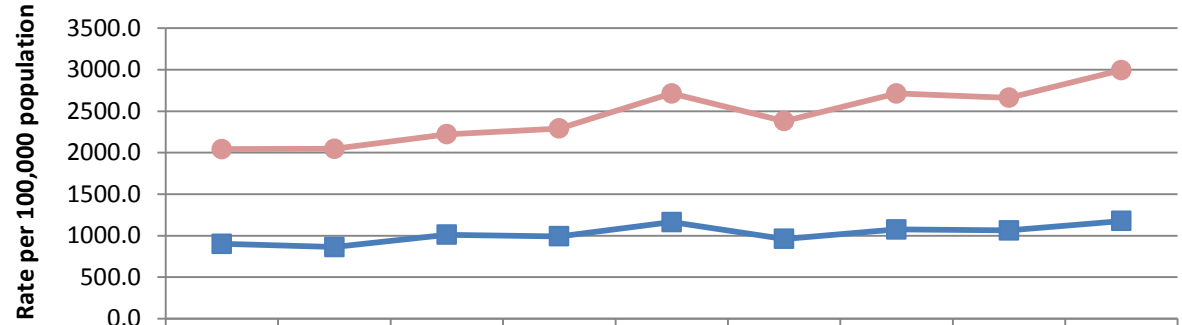


	2004	2005	2006	2007	2008	2009	2010	2011	2012
NITHA	2351.8	2138.5	2400.2	2339.9	2705.2	2255.6	2325.7	2382.6	2654.0
South Central	678.1	828.7	897.4	988.2	1219.0	1118.3	1476.7	1368.3	1544.1
FN on-reserve (NITHA + SC)	1457.5	1440.7	1603.2	1627.2	1922.1	1656.7	1878.4	1847.8	2069.2

Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012.

The overall reported chlamydia rates in the Saskatchewan FN on-reserve population for females are consistently two-times greater than those of males from 2004 to 2012 (Figure 5.3). It is important to note that frequent screening during routine health visits for prenatal care or contraception may result in a higher number of reported cases of chlamydia among females, when compared to males.

Figure 5.3: Chlamydia incidence rates by gender, Saskatchewan First Nations living on-reserve (NITHA and south central combined), 2004 to 2012

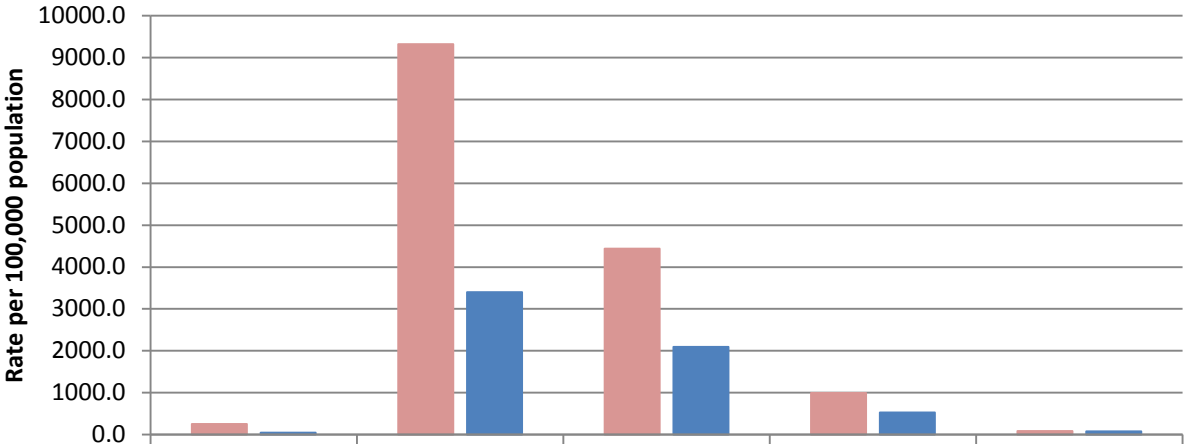


	2004	2005	2006	2007	2008	2009	2010	2011	2012
Females	2042.1	2047.1	2221.8	2290.5	2713.0	2379.9	2714.0	2660.9	2994.7
Males	901.6	862.5	1011.0	992.0	1163.5	960.6	1073.9	1063.2	1175.8

Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012.

Females aged 15 to 24 years represented 50% of all the reported chlamydia cases in the Saskatchewan FN living on-reserve population in 2012 – a rate of 9324.6 per 100,000 population (Figure 5.4).

Figure 5.4: Chlamydia incidence rates by age group and gender, Saskatchewan First Nations living on-reserve (NITHA and South Central combined), 2012



	0 to 14	15 to 24	25 to 34	35 to 44	45+
Females	255.5	9324.6	4441.9	992.1	81.9
Males	44.1	3398.5	2096.1	526.2	78.9

Age group

Sources: FNIHB-SK and NITHA, iPHIS, 2012.

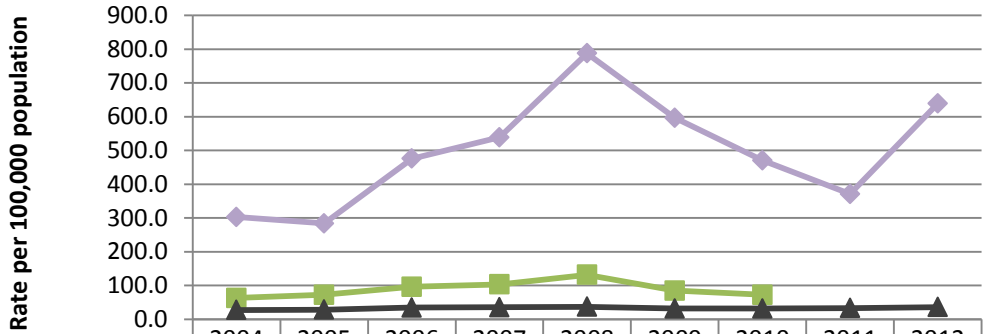
Gonorrhea, 2004-2012

Gonorrhea is the second most commonly reported STI in Canada.[83] Like chlamydia, gonorrhea is an STI that can be spread through sexual contact with an infected individual or from an infected mother to her newborn. Although symptoms of gonorrhea are common in men, the majority of women are asymptomatic. Untreated gonorrhea infection in females may result in complications like pelvic inflammatory disease which can cause tubal infertility, chronic pelvic pain, ectopic pregnancy, or complications in newborns. Gonorrhea can be treated with antibiotics; however, drug resistance to certain antibiotics has been increasing, which is a public health concern.[84]

The overall reported gonorrhea incidence rates in the Saskatchewan FN living on-reserve population increased from 303 per 100,000 population in 2004, to a high of 787.6 per 100,000 population in 2008. The gonorrhea rates then decreased steadily to 371 per 100,000 population in 2011. The gonorrhea rates again increased to 638.7 per 100,000 population in 2012 (Figure 5.5).

Looking at the most recently available data, in 2012, the Saskatchewan FN living on-reserve gonorrhea rate was 638.7 per 100,000 population. The Canadian rate was 36.2 per 100,000 population. Unfortunately, Saskatchewan provincial data is not available for 2011 and 2012.

Figure 5.5: Gonorrhea incidence rates for Saskatchewan First Nations living on-reserve, overall Saskatchewan population and Canada, 2004 to 2012



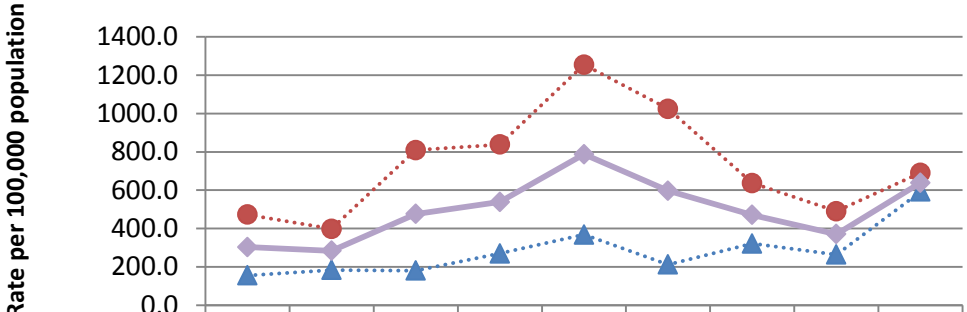
	2004	2005	2006	2007	2008	2009	2010	2011	2012
Saskatchewan FN on-reserve	303.0	283.8	475.9	538.7	787.6	596.6	470.7	371.0	638.7
Saskatchewan (overall)	63.1	72.5	96.2	103.3	131.6	85.0	72.6		
Canada (overall)	27.5	28.5	34.7	35.7	36.9	31.7	31.6	33.2	36.2

***Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012. PHAC, Centre for Communicable Disease and Infection Control* (Saskatchewan rates verified November 2011). PHAC, Canadian Notifiable Disease Surveillance System (Canada rates retrieved April 2014).**

[83] Public Health Agency of Canada (2010): *Canadian guidelines on sexually transmitted infections*.
[84] Public Health Agency of Canada (2011): *Important Notice on Gonococcal Infection.*

Reported gonorrhea rates in NITHA were on average three-times higher than the rates of South Central from 2004 to 2012. In 2012, however, the gap between gonorrhea incidence rates in both jurisdictions narrowed – 690.2 and 592.4 per 100,000 population, respectively (Figure 5.6).

Figure 5.6: Gonorrhea incience rates by jurisdiction, Saskatchewan First Nations living on-reserve, 2004 to 2012

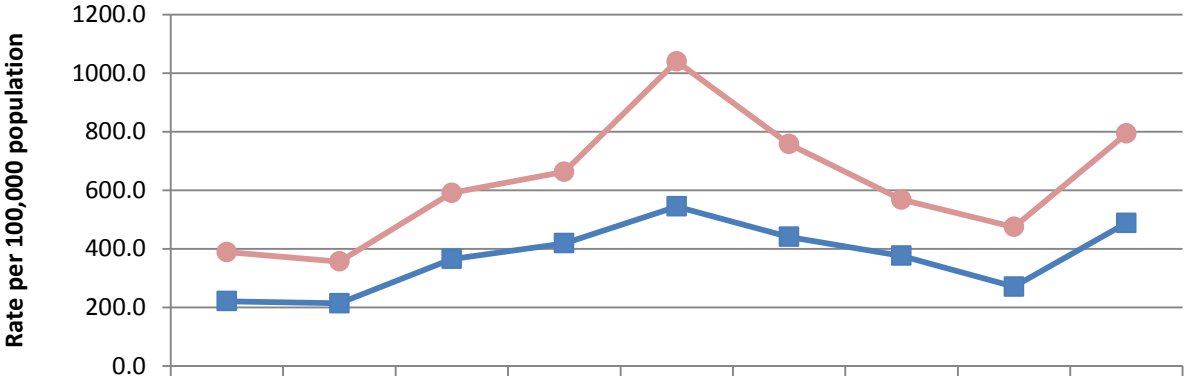


	2004	2005	2006	2007	2008	2009	2010	2011	2012
NITHA	472.5	397.9	809.3	838.6	1255.2	1024.4	636.9	490.2	690.2
South Central	155.3	183.8	180.7	269.8	367.8	212.0	321.5	264.2	592.4
FN on-reserve (NITHA + SC)	303.0	283.8	475.9	538.7	787.6	596.6	470.7	371.0	638.7

Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012.

The overall reported gonorrhea rates in the Saskatchewan FN living on-reserve population are consistently one-and-a-half-times higher for females than males from 2004 to 2012 (Figure 5.7). As was observed with the chlamydia rates among females, routine health visits for prenatal care or contraception often involve screening for STIs which may result in a higher number of reported cases of gonorrhea among females, when compared to males.

Figure 5.7: Gonorrhea incidence rates by gender, Saskatchewan First Nations living on-reserve (NITHA and south central combined), 2004 to 2012

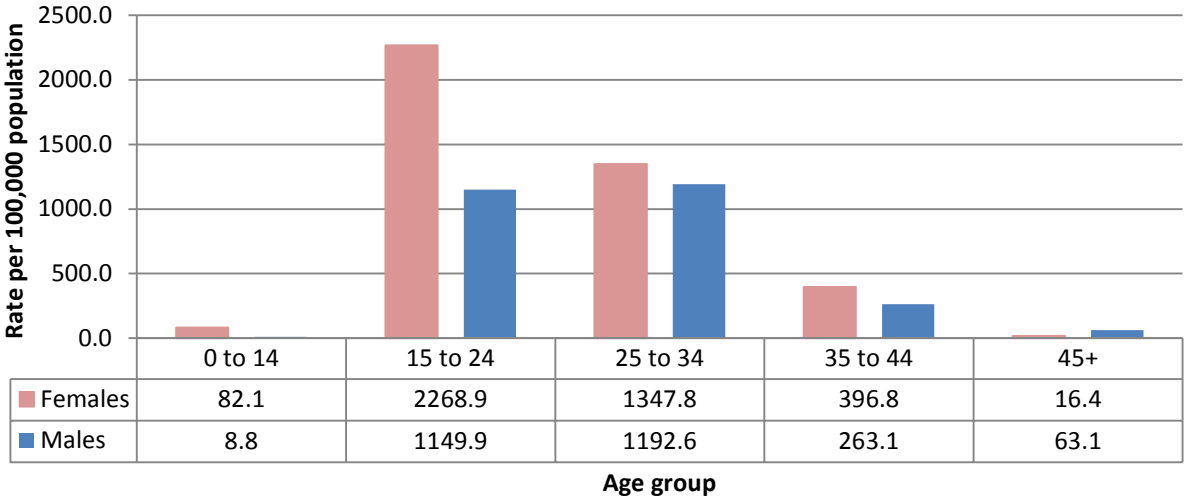


	2004	2005	2006	2007	2008	2009	2010	2011	2012
Females	389.0	357.0	591.1	663.3	1040.5	758.0	568.5	474.8	794.3
Males	221.3	214.0	365.6	419.3	545.0	441.3	376.6	270.9	488.5

Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012.

Females aged 15 to 24 years represented 20% of all the reported gonorrhea cases in the Saskatchewan FN living on-reserve population in 2012 – a rate of 2268.9 per 100,000 population (Figure 5.8).

Figure 5.8: Gonorrhea incidence rates by gender and age group, First Nations living on-reserve in Saskatchewan, 2012



	0 to 14	15 to 24	25 to 34	35 to 44	45+
Females	82.1	2268.9	1347.8	396.8	16.4
Males	8.8	1149.9	1192.6	263.1	63.1

Sources: FNIHB-SK and NITHA, iPHIS, 2012.

Syphilis, 2004-2012

Syphilis is an STI that can either be symptomatic or latent. Latent syphilis occurs when an individual is infected with syphilis but does not have any symptoms. One third of untreated syphilis cases progress to tertiary syphilis in which the bacteria invades the brain, nerves, eyes, heart, blood vessels, liver, bones, or joints. Syphilis infection increases an individual's risk of acquiring HIV. Syphilis can effectively be treated with antibiotics.[85]

According to table 5.2, from 2004 to 2012, there were 51 syphilis cases reported in the Saskatchewan FN population living on-reserve. 15 of the cases were reported in 2010, and females represented 73% (37 out of 51) of the reported syphilis cases. This trend differs from that of overall Saskatchewan and Canada where there is a higher rate of syphilis in males than in females.[86,87]

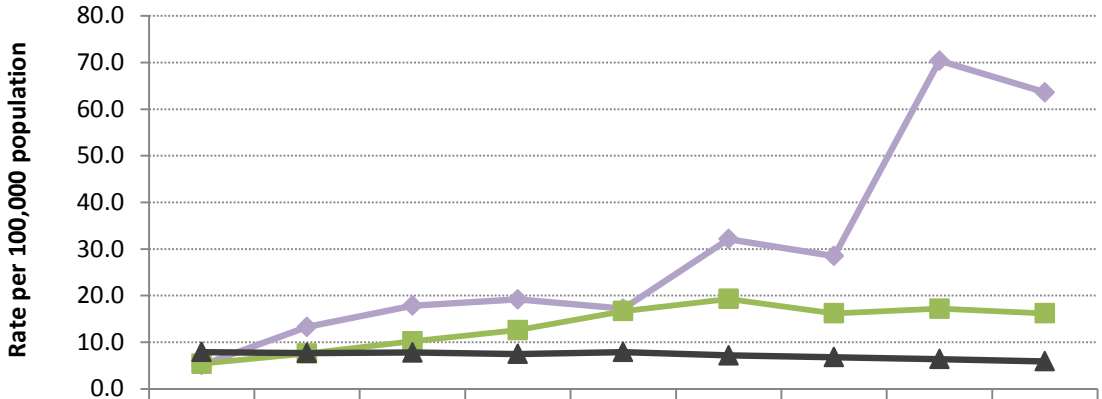
[85] Public Health Agency of Canada (2003). *Syphilis.*
[86] Public Health Agency of Canada: Report on Sexually Transmitted Infections in Canada: 2008.
[87] Public Health Agency of Canada: Centre for Communicable Diseases and Infection Control. *Reported cases and rates of gonorrhea, chlamydia, syphilis and hepatitis C by province/territory and sex, 1980 to 2010.*

Bloodborne Pathogens
Human Immunodeficiency Virus, 2004-2012

Human Immunodeficiency Virus (HIV) is an infection of the immune system that results in a chronic illness and makes individuals more susceptible to other infections and cancers. Acquired Immunodeficiency Syndrome (AIDS) may develop once an individual is no longer able to fight the HIV infection. HIV can be acquired through unprotected sexual intercourse, shared needles or equipment for injecting drugs, or from a mother to a newborn during pregnancy, delivery, or breastfeeding.[88]

The overall reported HIV rates in the Saskatchewan FN living on-reserve population steadily increased between 2004 and 2010 from 5.1 to 28.5 per 100,000 population, followed by a sharp increase in HIV rates to 70.4 per 100,000 population in 2011, and a small decrease to 63.6 per 100,000 population in 2012 (Figure 5.9). The dramatic peak in 2011 is likely related to known HIV testing initiatives in select Saskatchewan FN communities.

Figure 5.9: HIV incidence rates for Saskatchewan First Nations living on-reserve, overall Saskatchewan population and Canada, 2004 to 2012



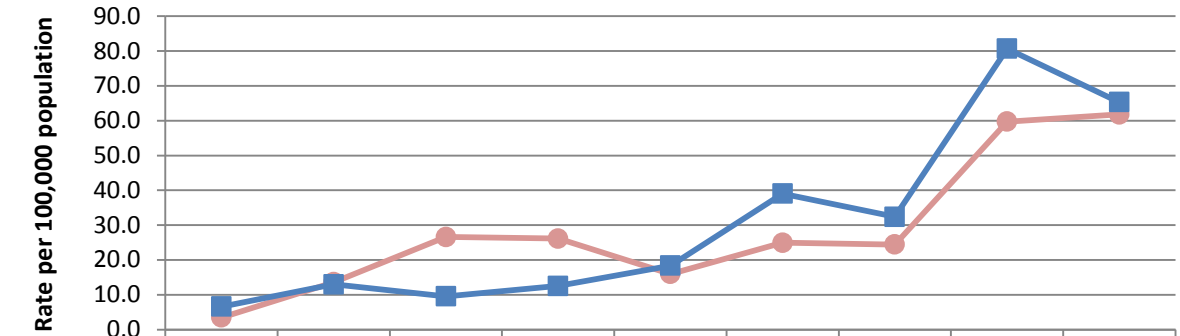
	2004	2005	2006	2007	2008	2009	2010	2011	2012
FN on-reserve	5.1	13.3	17.9	19.2	17.2	32.1	28.5	70.4	63.6
Overall SK	5.4	7.6	10.2	12.6	16.7	19.3	16.2	17.2	16.2
Canada	7.9	7.7	7.8	7.5	7.9	7.2	6.8	6.4	5.9

Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012. Saskatchewan Ministry of Health, HIV/AIDS Annual Report – 2012.

Between 2004 and 2012, the reported HIV incidence rates for Saskatchewan FN living on-reserve males and females show similar trends. Females report higher incidence of HIV in 2006 and 2007 (26.6 per 100,000 and 26.1 per 100,000 population respectively) when compared to males. However, from 2008 to 2012, the male incidence of HIV surpasses that of females; although similar trends among the genders are observed during this time period (Figure 5.10).

[88] Public Health Agency of Canada (2008): *What is HIV/AIDS?*

Figure 5.10: HIV incidence rates by gender, First Nations living on-reserve in Saskatchewan, 2004 to 2012

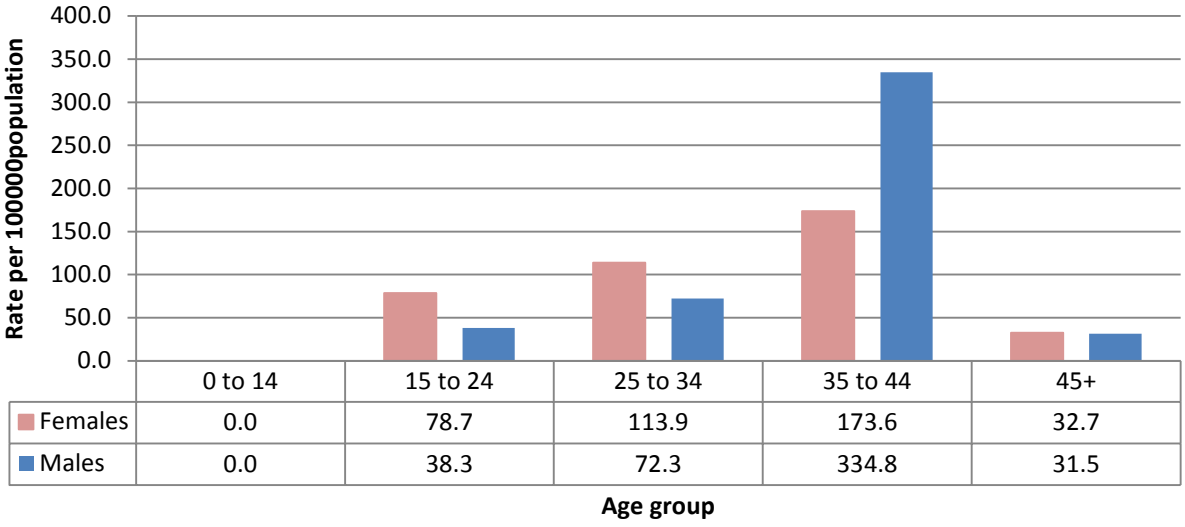


	2004	2005	2006	2007	2008	2009	2010	2011	2012
Females	3.5	13.6	26.6	26.1	16.0	25.0	24.5	59.7	61.8
Males	6.6	13.0	9.5	12.5	18.4	39.0	32.4	80.7	65.3

Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012.

Males aged 35 to 44 years represented over 30% of all the reported HIV cases in the First Nations on-reserve population in 2012 – a rate of 334.8 per 100,000 population (Figure 5.11). Among the different age groups, females have higher rates of HIV in the 15 to 24 and 25 to 34 age groups.

Figure 5.11: HIV incidence rates by age group and gender, First Nations living on-reserve in Saskatchewan, 2012



	0 to 14	15 to 24	25 to 34	35 to 44	45+
Females	0.0	78.7	113.9	173.6	32.7
Males	0.0	38.3	72.3	334.8	31.5

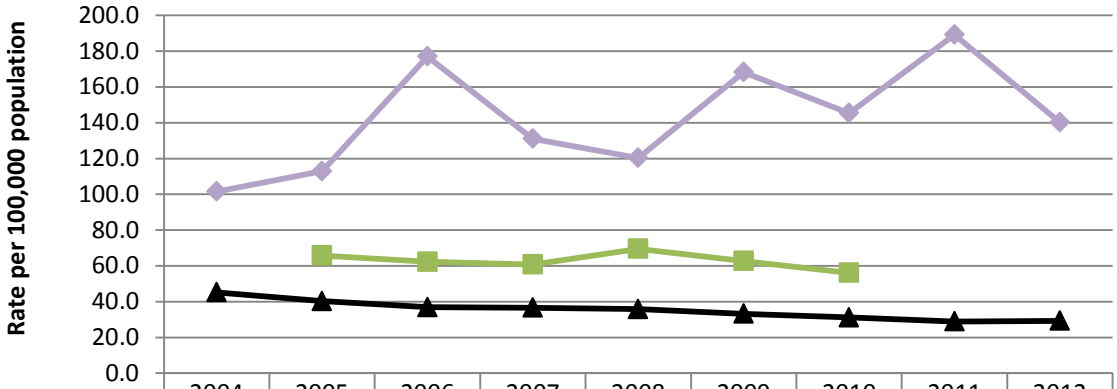
Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012.

Hepatitis C Virus, 2004-2012

The hepatitis C virus (HCV) is a bloodborne pathogen that can be spread through exposure to blood or bodily fluids infected with HCV. It is estimated that 70% to 80% of HCV transmission is due to sharing needles and other drug equipment for injection drug use.[89] Approximately 70% to 80% of individuals infected with HCV are asymptomatic and do not show signs of infection.[90] As a result, an estimated 21% of individuals infected with HCV do not know they are positive and remain undiagnosed.[91] Even without symptoms, these individuals are still infectious and may be spreading the virus without knowing it.89 It is estimated that 15% to 25% of individuals who are HCV positive will recover without treatment, while the remaining 75% to 85% of untreated cases will progress to the chronic infection state and may eventually develop liver damage or liver cancer.89

Although there was a high degree of fluctuation in the reported HCV incidence rates in the Saskatchewan FN living on-reserve population, generally, there was an overall increase between 2004 and 2012 from 101.6 to 140.2 per 100,000 population. The highest period was reported in 2011 with an HCV incidence rate of 189.2 per 100,000 population. (Figure 5.12) As was observed with HIV, a similar spike in 2011 reported HCV incidence rates can be attributed to increased Saskatchewan FN community testing. In 2012, Saskatchewan FN living on-reserve HCV rate was 140.2 per 100,000 population. The Canadian rate was 29.3 per 100,000 population. Unfortunately, Saskatchewan provincial data is not available for 2011 and 2012.

Figure 5.12: Hepatitis C incidence rates for Saskatchewan First Nations living on-reserve, overall Saskatchewan population and Canada, 2004 to 2012



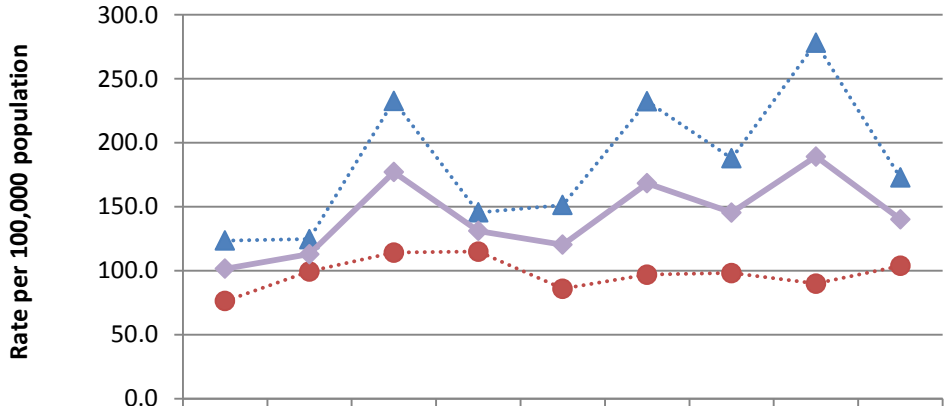
	2004	2005	2006	2007	2008	2009	2010	2011	2012
FN on-reserve	101.6	112.9	177.1	131.1	120.3	168.3	145.4	189.2	140.2
Overall SK		65.8	62.3	60.8	69.5	62.7	56.1		
Canada	45.2	40.3	36.9	36.6	35.8	33.3	31.1	28.9	29.3

***Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012. PHAC, Centre for Communicable Disease and Infection Control* (Saskatchewan rates verified November 2011). PHAC, Canadian Notifiable Disease Surveillance System (Canada rates retrieved April 2014).**

[89] Public Health Agency of Canada (2010): *Hepatitis C: Get the facts.*
[90] Public Health Agency of Canada (2009): *Hepatitis C Fact Sheet.*
[91] Public health Agency of Canada (2010): *Hepatitis C.*

Reported HCV rates in South Central communities were on average two-times higher than the rates of NITHA from 2004 to 2012 (Figure 5.13). The reported HCV incidence rates fluctuated in South Central communities between 2004 and 2012, with a spike observed in 2011 at a rate of 278.1 per 1000,000 population. This is in contrast to the reported NITHA HCV incidence rates, which had very little fluctuation resulting in an average rate of approximately 97.7 per 100,000 population between 2004 and 2012.

Figure 5.13: Hepatitis C incidence rates by jurisdiction, Saskatchewan First Nations living on-reserve, 2004 to 2012

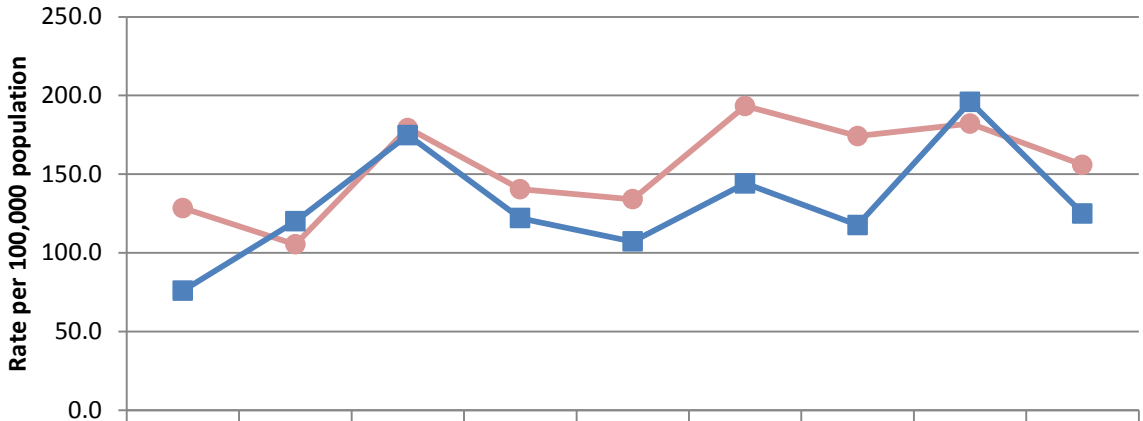


	2004	2005	2006	2007	2008	2009	2010	2011	2012
NITHA	76.3	99.5	114.1	115.0	85.9	96.9	98.2	90.0	103.8
South Central	123.6	124.6	232.8	145.5	151.3	232.4	187.8	278.1	172.8
FN on-reserve (NITHA + SC)	101.6	112.9	177.1	131.1	120.3	168.3	145.4	189.2	140.2

Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012.

Between 2004 and 2012, the reported HCV incidence rates for Saskatchewan FN living on-reserve males and females show similar fluctuating trends (Figure 5.14). A peak during 2006 was observed resulting in reported incidence rates for females at 179.3 per 100,000 population and males at 174.9 per 100,000 population. This was followed by a several years of varying HCV incidence rates between 2007 and 2010. A second peak was observed in 2011 with the male incidence rates at 195.9 per 100,000 population and the female incidence rate at 182.2 per 100,000 population.

Figure 5.14: Hepatitis C incidence rates by gender, Saskatchewan First Nations living on-reserve (NITHA and south central combined), 2004 to 2012

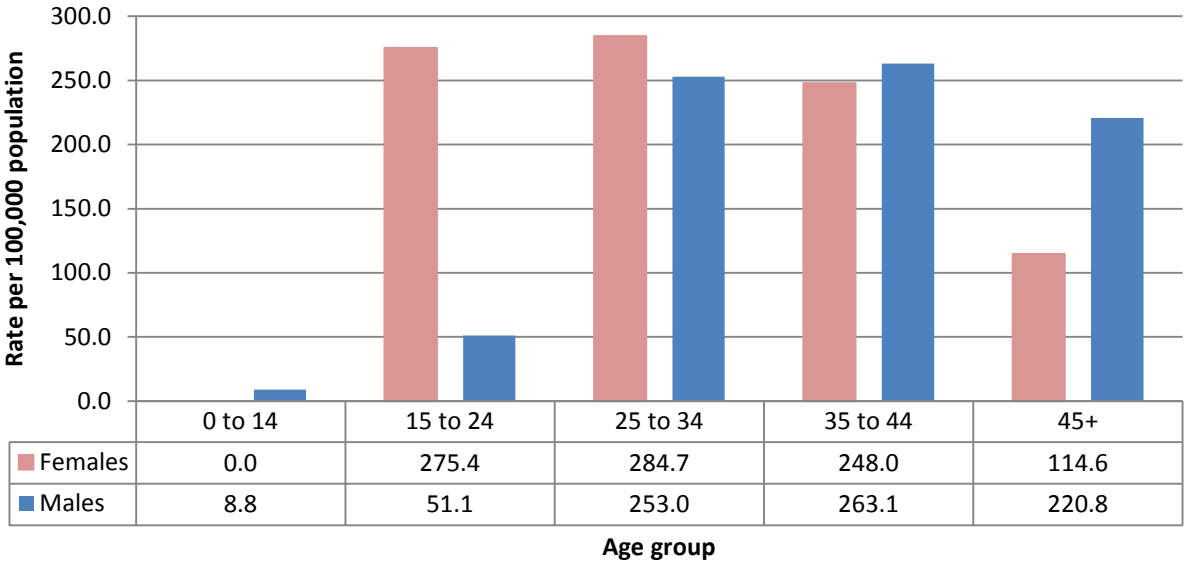


	2004	2005	2006	2007	2008	2009	2010	2011	2012
Females	128.5	105.4	179.3	140.5	134.1	193.4	174.2	182.2	155.9
Males	76.0	120.0	174.9	122.0	107.2	144.1	117.7	195.9	125.0

Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012.

Regarding the age breakdown, the majority of female HCV reported incidence cases were under the age of 25. This is in contrast to males where the majority of reported incidence cases were under 45+ (Figure 5.15)

Figure 5.15: Hepatitis C incidence rates by age group and gender, First Nations living on-reserve in Saskatchewan, 2012



	0 to 14	15 to 24	25 to 34	35 to 44	45+
Females	0.0	275.4	284.7	248.0	114.6
Males	8.8	51.1	253.0	263.1	220.8

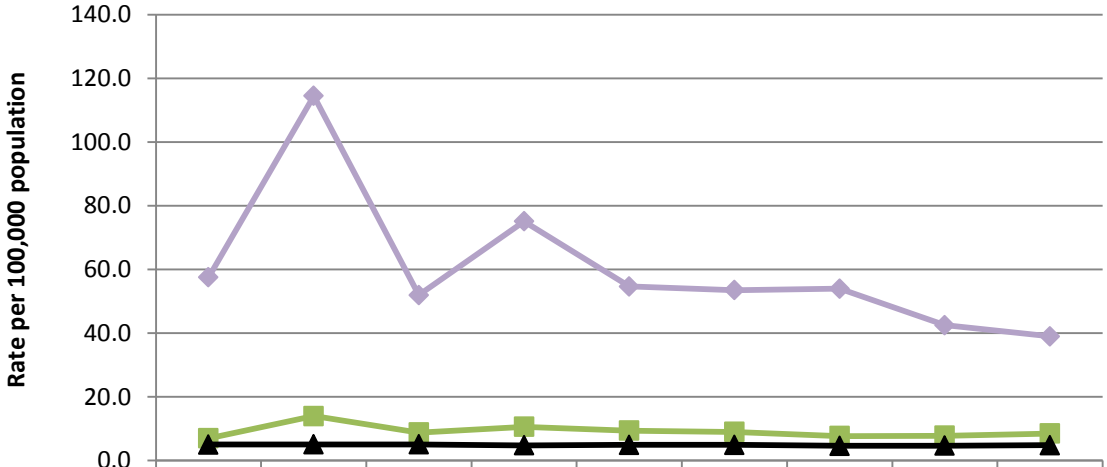
Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012.

Tuberculosis, 2004-2012

Tuberculosis (TB) is a preventable, contagious disease that can be treated and cured with medication. *Mycobacterium tuberculosis* is the bacterium that causes TB. Persons with active TB usually feel sick and may have symptoms such as coughing, fever, and weight loss. They may spread TB bacteria to others. Persons with latent TB infection (LTBI) are infected with TB bacteria but do not have TB disease. They do not feel sick, do not have any symptoms, and cannot spread TB infection to others.[92]

TB remains an ongoing concern for First Nations across Canada. The persistence of tuberculosis in First Nations populations is the result of a complex set of factors. From a public health perspective, these include high-risk sub-populations such as people with HIV, diabetes, mental health issues and addictions, or people who live in high incidence communities and areas with a high prevalence of LTBI.[93]

Figure 5.16: Active tuberculosis incidence rates, First Nations living on-reserve in Saskatchewan, 2004 to 2012



	2004	2005	2006	2007	2008	2009	2010	2011	2012
FN on-reserve	57.6	114.5	52.0	75.1	54.7	53.5	54.0	42.5	39.0
Overall SK	7.0	14.0	8.8	10.6	9.4	9.0	7.7	7.8	8.5
Canada	5.1	5.1	5.1	4.8	4.9	4.9	4.7	4.7	4.9

Sources: TB Prevention and Control Program, TBIS, 2004 to 2012. PHAC, Tuberculosis in Canada 2012 – Pre-Release. PHAC, Canadian Notifiable Disease Surveillance System (retrieved April 2014).

The rates discussed cover both active and retreatment cases. Latent TB is excluded as these cases are screened for TB but do not actively have the disease and are not reservoirs for transmission.

Looking at the overall reported active TB rates in the Saskatchewan FN population living on-reserve, from 2004 to 2012, there is fluctuation in the incidence rates from 2004 to 2007 followed by a gradual decrease between 2007 and 2012 (Figure 5.16).

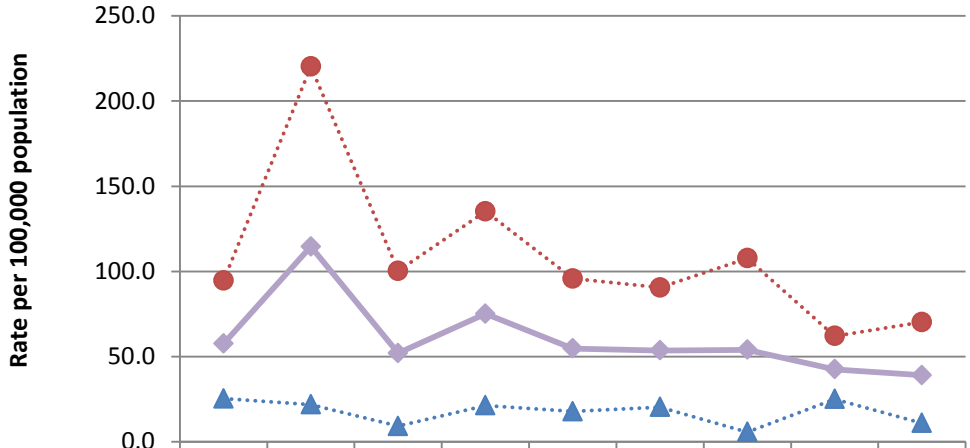
[92] Centers for Disease Control and Infection (2001): *Tuberculosis Fact Sheets*.
[93] Health Canada: *Health Canada's Strategy Against Tuberculosis for First Nations On-Reserve*. 2012.

The highest reported rate was observed in 2005 at an incidence rate of 114.5 per 100,000 population. This is consistent with a documented TB outbreak.

In 2012, the Saskatchewan FN living on-reserve TB rate was 39.0 per 100,000 population. Comparatively, the Saskatchewan and Canadian 2012 TB rates were 8.5 and 4.9 per 100,000 population respectively (Figure 5.16).

The active TB rates in NITHA communities were on average eight-times higher than the rates of South Central communities from 2004 to 2012 (Figure 5.17). In other words, from 2004 to 2012, 85% of all the reported active TB cases were in NITHA communities.

Figure 5.17: Active tuberculosis incidence rates by jurisdiction, Saskatchewan First Nations living on-reserve, 2004 to 2012



	2004	2005	2006	2007	2008	2009	2010	2011	2012
NITHA	94.5	220.2	100.3	135.3	95.8	90.5	107.7	62.0	70.2
South Central	25.3	21.8	9.2	21.2	17.8	20.3	5.7	25.0	11.0
FN on-reserve (NITHA + SC)	57.6	114.5	52.0	75.1	54.7	53.5	54.0	42.5	39.0

Source: TB Prevention and Control Program, TBIS, 2004 to 2012.

Between 2004 and 2012, the reported TB incidence rates for Saskatchewan FN living on-reserve males and females show similar fluctuating trends but a gradual decline (Figure 5.18).

Figure 5.18: Active tuberculosis incidence rates by gender, First Nations living on-reserve in Saskatchewan, 2004 to 2012

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Females	48.6	125.8	43.2	58.8	57.5	43.7	58.1	35.8	32.4
Males	66.1	103.8	60.4	90.7	52.1	63.0	50.0	49.0	45.4

Source: TB Prevention and Control Program, TBIS, 2004 to 2012.

Other Notifiable Diseases
Enteric, Food and Waterborne Diseases

Foodborne diseases are the result of ingestion of food contaminated with microorganisms or chemicals. The contamination of food may occur at any stage in the process from food production to consumption and can result from environmental contamination, including pollution of water, soil or air. The most common clinical presentation of foodborne disease takes the form of gastrointestinal (i.e. enteric) symptoms; however, such diseases can also have neurological, gynaecological, immunological and other symptoms.[94] Foodborne disease may be one of the most common causes of acute illness; however, many cases are unrecognized and underreported.[95]

Some foodborne disease can also be waterborne diseases.[96] Waterborne diseases are transmitted in water that has been contaminated by viral, bacterial, protozoan (i.e. single cell organisms) and helminthic (i.e. worm-like parasites) pathogens.96

Enteric diseases are bacterial, parasitic or viral infections that affect the intestines, causing symptoms ranging from nausea and diarrhea to serious chronic conditions and death.[97] The majority of enteric diseases are mild; however, some cases are severe and result in hospitalization. Enteric diseases enter the body through the mouth and intestinal tract and are usually spread through contaminated food and water (i.e. foodborne and waterborne) or by contact with vomit or feces.[98] Environmental conditions such as crowded housing and limited clean water supply can affect hygiene practices and contribute to the risk of enteric disease.[99]

The most reported enteric, food and waterborne diseases among the Saskatchewan FN living on-reserve population, between 2004 and 2012, were shigellosis, campylobacteriosis, aeromonas and salmonellosis. The shigellosis cases reported between fall 2011 and spring 2012 were the result of an on-reserve outbreak (Table 5.1). Unfortunately, provincial data is not available for a comparison of the most reported enteric, food and waterborne diseases in the overall Saskatchewan population.

[94] World Health Organization: Foodborne diseases.
[95] David L. Heymann, *Control of Communicable Disease Manual, 19th Ed*. 2008. p240.
[96] John M. Last, *A Dictionary of Public Health*. 2007.
[97] Public Health Agency of Canada: *Enteric disease: A major health concern in Canada. 2010*.
[98] Centres for Disease Control and Prevention: *Enteric Disease Epidemiology Branch. 2011*.
[99] Rosenberg T, Kendall O, Blanchard J, Martel S, Wakelin C, Fast M.: *Shigellosis on Indian reserves in Manitoba, Canada: Its relationship to crowded housing, lack of running water and inadequate sewage disposal*. Am J Pub Health 1997; 87(9):1547-1551.

Vaccine-Preventable Diseases

Vaccine-preventable diseases are diseases that can be prevented or controlled by vaccination. As was mentioned in the immunization section, vaccination is one of the most effective illness prevention strategies, as well as one of the most cost-effective public health interventions available.[100] "It is important that Canadians stay protected as outbreaks of vaccine-preventable diseases can, and do, occur in Canada. Immunization is a good prevention measure against vaccine-preventable diseases. Therefore, continued commitment to immunization programs in Canada is essential."[101]

The most reported vaccine-preventable disease among the Saskatchewan FN living on-reserve population between 2004 and 2012 was pertussis, with the majority of those cases being reported in 2010 (Table 5.1).

Diseases Transmitted by Respiratory Routes

As a group, acute respiratory diseases are one of the leading causes of death from any infectious disease.[102] Many of the organisms that cause respiratory diseases are spread via respiratory droplets generated by coughing and sneezing. These organisms are also spread from person to person when they are in close contact with one another or through touching something with organisms on it and then touching their mouth or nose.[103] "Keeping hands clean is one of the most important steps . . . to avoid getting sick and spreading germs to others. Many diseases and conditions are spread by not washing hands with soap and clean, running water."[104] A number of communicable diseases transmitted by respiratory contact and direct contact are preventable through vaccination.103

The most reported diseases transmitted by respiratory routes among the Saskatchewan FN living on-reserve population, between 2004 and 2012 were influenza, streptococcal A-invasive and pneumococcal-invasive (Table 5.1). An important note regarding Table 5.1 Haemophilus influenza data: it is generally recognized that most of the Haemophilus influenza cases in the last 10 years have been non-type B. The vaccine available is specifically for Haemophilus B-type influenza. Unfortunately, the data captured does not consistently identify the specific types of Haemophilus influenza. As such, Haemophilus B is included in the chart as a vaccine-preventable disease but the data has been omitted to limit interpretations on vaccine effectiveness.

[100] Roy Romanow, Building on Values: The Future of Health Care in Canada. 2002.
[101] Public Health Agency of Canada: The Chief Public Health Officer's Report – Infectious Disease. 2013.
[102] David L. Heymann, *Control of Communicable Disease Manual, 19th Ed*. 2008. p515.
[103] Saskatchewan Ministry of Health (2010). *Communicable Disease Control Manual – Respiratory and Direct Contact*.
[104] Centers for Disease Control and Prevention: Handwashing: Clean Hands Save Lives.

Table 5.1: Number of notifiable diseases (excluding STBBIs and TB) by year and jurisdiction, 2004 to 2012																				
Enteric, Food and Waterborne Diseases	2004		2005		2006		2007		2008		2009		2010		2011		2012		Total (2004 to 2012)	
	South Central	NITHA	South Central	NITHA	South Central	NITHA	South Central	NITHA	South Central	NITHA	South Central	NITHA	South Central	NITHA	South Central	NITHA	South Central	NITHA	South Central	NITHA
Aeromonas	< 5	13	8	13	< 5	10	6	5	8	< 5	< 5	5	5	< 5	< 5	< 5	< 5	6	42	60
Amoebiasis	< 5	0	< 5	0	0	< 5	0	< 5	0	0	0	< 5	0	0	0	0	0	< 5	< 5	9
Campylobacteriosis	11	< 5	5	< 5	7	5	13	< 5	6	< 5	< 5	5	< 5	< 5	< 5	< 5	5	< 5	57	27
Cryptosporidiosis	0	0	< 5	0	< 5	0	< 5	0	9	14	< 5	< 5	0	0	0	0	< 5	0	15	15
Giardiasis	5	5	< 5	< 5	< 5	5	5	6	5	6	0	6	< 5	< 5	0	< 5	< 5	< 5	27	42
Hepatitis A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	< 5	0	0	0	< 5	0
Listeriosis	0	0	0	0	0	0	0	0	0	< 5	0	0	0	0	0	0	0	0	0	< 5
Salmonellosis	< 5	< 5	< 5	< 5	< 5	6	8	< 5	< 5	9	6	8	5	7	7	< 5	6	0	42	42
Shigellosis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48	25	40	41	88	66
Vancomycin-resistant enterococci	0	0	0	0	0	0	0	0	0	0	0	0	0	0	< 5	< 5	< 5	< 5	5	< 5
Verotoxigenic E. coli	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	< 5	0	< 5	0
Yersinia enterocolitica	0	0	0	0	0	0	0	0	< 5	0	0	0	0	0	0	0	0	< 5	< 5	< 5
Vaccine-Preventable Diseases																				
Varicella (chicken pox)	< 5	< 5	0	0	< 5	0	5	0	0	0	< 5	0	5	0	0	0	< 5	0	19	< 5
Diphtheria	0	0	0	0	0	0	0	0	0	< 5	0	< 5	0	0	0	0	0	0	0	< 5
H. influenza-invasive	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mumps	0	0	0	0	0	0	0	0	0	0	< 5	0	0	0	0	0	0	0	< 5	0
Pertussis	10	18	0	0	5	0	< 5	0	< 5	6	5	< 5	29	63	7	6	< 5	< 5	60	96
Diseases Transmitted by Respiratory Routes																				
Meningococcal-invasive	0	0	0	0	< 5	< 5	< 5	< 5	0	< 5	< 5	< 5	0	0	< 5	< 5	0	0	7	6
Pneumococcal-invasive	< 5	< 5	< 5	< 5	< 5	5	0	23	< 5	8	0	< 5	6	7	10	< 5	15	7	36	62
Streptococcal A-invasive	< 5	6	< 5	6	< 5	10	6	8	18	9	17	6	9	7	13	6	11	< 5	82	62
Influenza	7	0	< 5	< 5	32	8	6	< 5	15	10	95	148	0	< 5	24	23	20	18	201	215

Sources: FNIHB-SK and NITHA, iPHIS, 2004 to 2012.

Note: < 5 = counts less than five

Communicable Disease Methodology

Who is included in this chapter and data sources

1. **Overall Canadian Population**
   - Total Canadian population, including First Nations on-and off-reserve
     - Canadian Notifiable Disease Surveillance System (PHAC - retrieved April 2014)
       - Chlamydia, gonorrhea, HCV, TB
     - Saskatchewan Ministry of Health's HIV/AIDS Annual Report, 2012
       - HIV

2. **Overall Saskatchewan population**
   - Total Saskatchewan population, including First Nations on-and off-reserve
   - Data sources:
     - Centre for Communicable Disease and Infection Control (PHAC - verified November 2011)
       - Chlamydia, gonorrhea and HCV
     - Saskatchewan Ministry of Health's HIV/AIDS Annual Report, 2012
       - HIV
     - PHAC Tuberculosis in Canada, 2012
       - TB

3. **Saskatchewan First Nations population living on-reserve**
   - Registered to a Saskatchewan FN band and residing on-reserve
   - Does not include non-registered First Nations or non-First Nations that may be living on-reserve
   - Data sources:
     - Integrated Public Health Information System (iPHIS) maintained by Saskatchewan Ministry of Health, 2004-2012
       - STI, BBP and other notifiable diseases
         - NITHA and FNIHB-SK populate iPHIS with positive test results of on-reserve First Nations
     - Tuberculosis Information System (TBIS), 2004-2012
       - TB

Approach to Data Analysis

Communicable disease incidence rates are reported as crude rates (age-specific disease rates for the overall Saskatchewan and Canadian populations were not available to FNIHB-SK).

Crude incidence rates were calculated by dividing the total number of new cases of the disease per year by the total population of that specific year, expressed as the number of cases or events per year per 100,000 population.

$$\frac{Number\ of\ new\ cases\ of\ disease\ (per\ year)}{Total\ number\ of\ people\ (within\ that\ specific\ year)} \times 100{,}000\ population$$

Data Limitations

- Communicable disease data will not include Saskatchewan FN living on-reserve individuals who were diagnosed while living off-reserve.
- The communicable disease data will not include Saskatchewan FN living on-reserve individuals who were diagnosed outside of Saskatchewan.
- The communicable disease data only reflects the proportion of individuals who tested positive for a disease, and do not include individuals who are not tested.
- The difference in age distribution between the First Nations population and overall Saskatchewan and Canadian populations may be one factor that explains the higher incidence of certain communicable disease rates, due to the younger population.
- Increasing incidence of certain communicable diseases may not necessarily reflect a true increase in infection rate; it may reflect increasing detection of the communicable disease due to increasing testing. This is apparent in women who tend to interact more regularly with the health care system.
- The overall Saskatchewan population comparisons is not feasible for the most recent years of data as the overall Saskatchewan data is unavailable for 2011 and 2012

Chapter 6: Maternal and Child Health

The maternal and child health chapter focuses on indicators influencing the well-being of women during pregnancy and the subsequent health of the child. Indicators such as fertility rate and contraception use provide insight into the birthrate of the Saskatchewan First Nations (FN) living on-reserve population.

This chapter uses data sources from Vital Statistics, Non-Insured Health Benefits and Community Health Nurses to provide an overview of maternal and child health status in the Saskatchewan First Nations living on-reserve population. In this chapter:

- General fertility rates
- Contraception prescription claim rates
- Stillbirth rates
- Growth and nutrition

The aforementioned sections focus on First Nations living on-reserve, with the exception of contraception prescription claim rates (which are for both on-and off-reserve clients).

Additionally, using national and international indicators such as rate of stillbirths and newborn's birth weight and length allows for a more comprehensive analysis of maternal and child health.[105,106] With regards to growth and nutrition data – this information was captured solely from on-reserve communities around the First Nations and Inuit Health Branch (FNIHB) South Service Centre. Unfortunately, there are no overall Saskatchewan comparisons available. The goal of this chapter is to provide information to inform policy makers on issues surrounding maternal and child health in order to advocate for upstream preventative initiatives.

Maternal and child health has long been recognized as the cornerstone of primary health care by the World Health Organization (WHO).[107]

[105] Stanton C, Lawn JE, Rahman H, Wilczynska-Ketende K, Hill K. Stillbirth rates: delivering estimates in 190 countries. The Lancet. 2006; 367 (9521): 1487-1494.
[106] Garza C, de Onis M.: *Rationale for developing a new international growth reference.* WHO Multicentre Growth Reference Study Group; 2004.
[107] World Health Organization (1978): *Declaration of Alma-Ata: International Conference on Primary Health Care, Alma-Ata, USSR, 6-12, September 1978.*

Maternal health refers to the health of women during pregnancy, childbirth and the postpartum period.[108]

Maternal and child health are closely linked not only in prenatal stages (prior to birth) but also in the perinatal phase (immediately before and after birth).

As a result, ensuring adequate maternal health is imperative to guarantee future generations are not subjected to preventable and treatable conditions and diseases.108 According to the Public Health Agency of Canada (PHAC), determinants of maternal and child health are categorized into lifestyle behaviours and health services.

Lifestyle behaviours include practices such as maternal smoking, alcohol consumption and various other indicators. Health services include rates of labour induction, caesarean delivery and other types of health service related indicators.[109]

Maternal lifestyle behaviours play a significant role in influencing child health, especially in the First Nations community. Prenatal risk factors such as gestational diabetes, smoking, alcohol use and obesity tend to be more prevalent in First Nations women when compared to other Canadian women.[110] In order to reduce the burden of prenatal and perinatal risks, guidelines have been released by health professionals working with First Nations, Inuit, and Métis highlighting the importance of culturally-appropriate care to individuals and families.[111]

[108] World Health Organization (2014): Maternal Health.
[109] Public Health Agency of Canada (2004*): Canadian Perinatal Surveillance* [Internet].
[110] Tarlier DS, Johnson JL, Browne AJ, Sheps S. Maternal-Infant Health Outcomes and Nursing Practice in a Remote First Nations Community in Northern Canada. CJNR; 2013. 45(2): 76-100.
[111] The Society of Obstetricians and Gynaecologists of Canada: *Health Professionals Working With First Nations, Inuit and Métis Consensus Guideline*. JOGC 2013. 35(6).

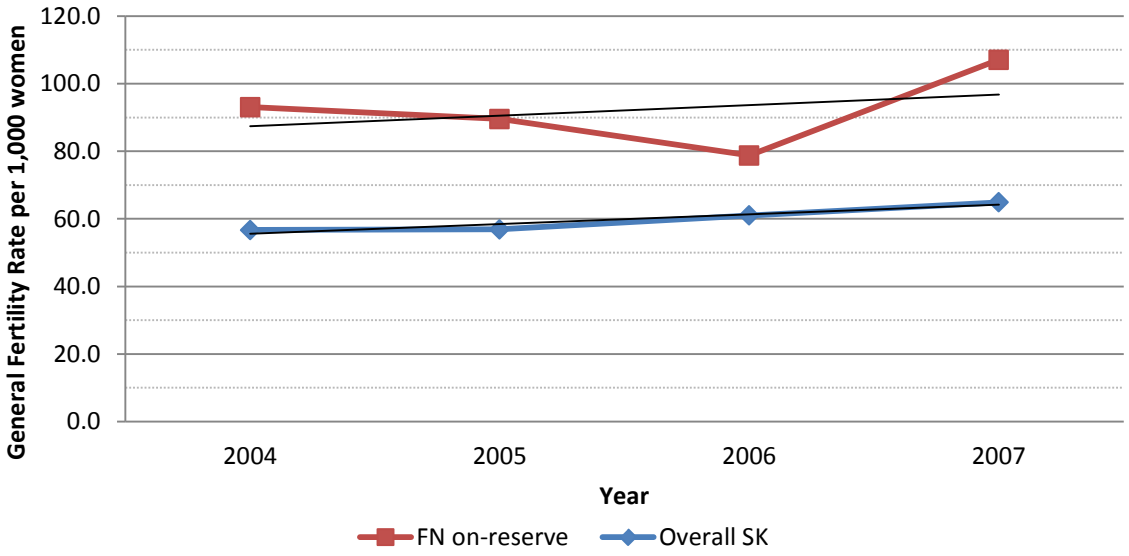
Fertility, 2004-2007

Population fertility refers to the rate of childbirths in a specific cohort over a particular time period. Analyzing fertility rates are important to determine planning services that target mothers, infants and children. The general fertility rate (GFR) is the number of live births in a calendar year per 1,000 female population aged 15-44 years. The GFR (often called fertility rate) is one of the most common measures of fertility.[112]

From 2004 to 2007, the average GFR of Saskatchewan FN women living on-reserve was 92 per 1,000 women (Figure 4.1). The GFR remained stable in 2004 and 2005 at 93 and 90, respectively. In 2006 and 2007, the GFR fluctuated from 79 per 1,000 women in 2006, to 107 per 1,000 women in 2007.

Compared to the overall Saskatchewan population, the GFR was significantly higher among Saskatchewan FN women living on-reserve. Between 2004 and 2007, the GFR of Saskatchewan FN women (aged 15-44) living on-reserve was 1.3 to 1.6 times greater than the females (aged 15-44) in the overall Saskatchewan population.

Figure 4.1: Comparison of General Fertility Rate per 1,000 women by year (2004-2007) between Saskatchewan FN living on-reserve and overall SK population



Sources: VSS; AANDC; Statistics Canada

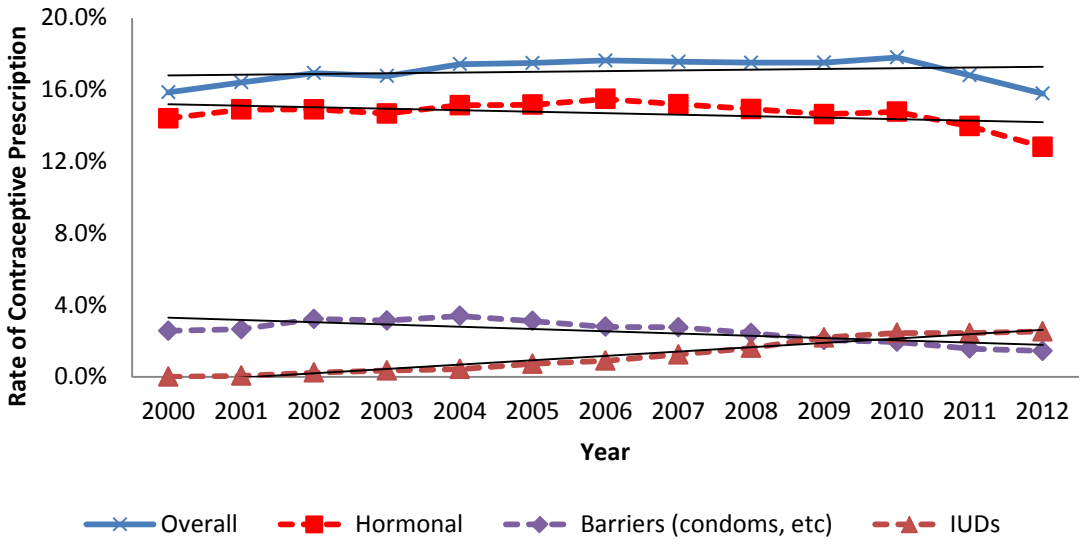
[112] Centers for Disease Control and Prevention: Vital and Health Statistics.

Contraception, 2000-2012

Contraception, also known as birth control, is designed to prevent pregnancy and allows women to plan their family. There are different types of contraception available, including methods such as barrier, hormonal, intrauterine and sterilization.[113]

Health Canada provides a non-insured health benefit (NIHB) program to registered FN individuals, covering a range of goods and services when they are not insured elsewhere. This program is provided to all registered FN individuals, regardless of whether they live on- or off-reserve. One example of a good covered by NIHB is contraception. The NIHB Drug Utilization Database indicates that the overall rates of contraception prescription claims among Saskatchewan's registered FN females aged 15-44 have remained relatively stable over the 13-year period (2000-2012). There was a peak in 2010 at 17.8%, followed by a decline to 15.8% in 2012.

Figure 4.2: Contraception prescription claim rates among Saskatchewan FN females aged 15-44 between 2000 and 2012



Sources: NIHB data cube, FNIHB-SK, Health Canada; AANDC

The NIHB Drug Utilization Database also provides rates of claims for different types of contraception methods except sterilization. Figure 4.2 illustrates that hormonal contraception had the highest rate of prescription claims among the different types of contraception. The hormonal contraception prescription claim rate between 2000 and 2012 shows a slight decrease over 13 years with a peak in 2006 at 15.5%, followed by a general decline to a rate of 12.8% in 2012.

[113] Eunice Kennedy Shriver National Institute of Child Health and Human Development (2012): *What are the different types of contraception*.

The rate of prescription claims relating to the barrier method (which includes condoms, diaphragms and contraceptive sponges), although significantly lower when compared to the prescription claim rates for hormonal contraceptives, shows a slight decline during this 13-year period. There was a peak in 2004 resulting in a prescription claim rate of 3.4% followed by a gradual decrease to 1.4% in 2012.

Prescription claims for intrauterine devices (IUDs) show a different trend when compared to the other contraception methods. Over the 13-year period, there has been a gradual increase in prescription claims starting with 0% claims reported in 2000 and ending with a 2.5% claim rate in 2012. Between 2009 and 2012, the claim rates associated with IUDs surpass those relating to the barrier method. This is an interesting trend as IUDs are devices which are medically inserted into the uterus, providing several years of uninterrupted protection. Common criticisms relating to hormone and barrier methods include the dependency on correct and consistent use, so an increase of IUDs may provide an effective contraception alternative.[114]

[114] Centers for Disease Control (2014): *Contraception - Reproductive Health*.

Stillbirths, 1995-2007

According to the Canadian Perinatal Surveillance System, stillbirths include all fetal deaths with a birth weight ≥500 g and/or with a gestational age ≥20 weeks.[115] A literature review on the causes of stillbirths finds pre-pregnancy obesity, advanced maternal age and socioeconomic factors (such as income) to be strongly associated with stillbirth. As these factors indicate a strong relationship between maternal and newborn health, public health interventions targeting modifiable maternal health risks may reduce stillbirths.[116]

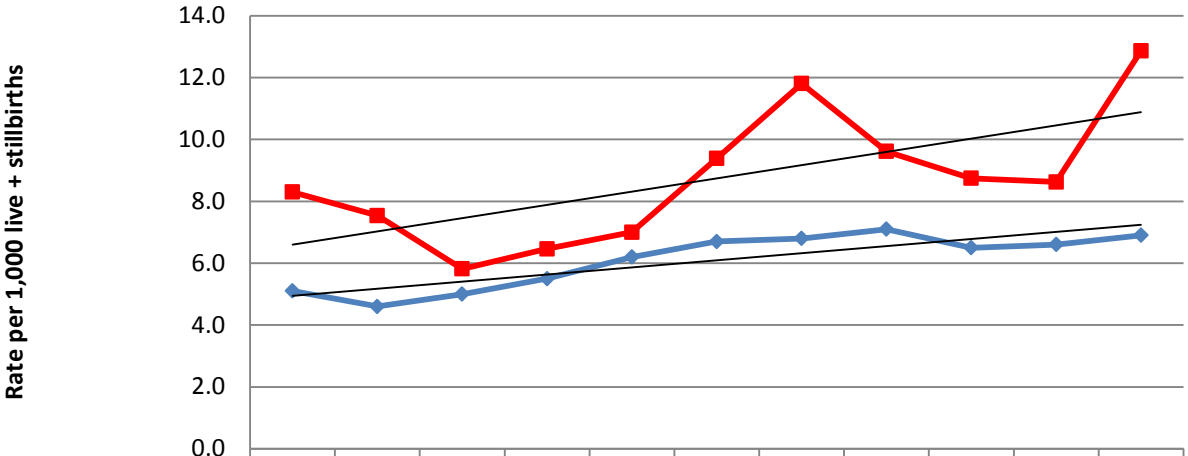
According to the Canadian Perinatal Health Report (2013), the overall Canadian stillbirth rate increased from 5.9 to 6.7 per 1,000 total births between 2001 and 2010.[117] A recent study suggests the increase in stillbirth rates in Canada is associated with the increase in pregnancy terminations due to advances in prenatal diagnosis for congenital anomalies.[118] In Canada, stillbirths (<500g) due to either pregnancy termination or congenital anomalies constituted 40.4% of all stillbirths in 2003. 115

Typically, the stillbirth rate is calculated by dividing the number of stillbirths by the total number of births (number of live births plus the number of stillbirths) during the same time period. The rate is expressed per 1,000 live births plus stillbirths. As the annual stillbirth rate reflects such small numbers, variation between years can occur. One way to compensate for this is to calculate a moving average to reduce large year-to-year fluctuations and provide a clearer view of long-term trends. The rate is determined by summing the number of stillbirths for three years and dividing by the corresponding three-year total births.

The stillbirth rates of both Saskatchewan FN living on-reserve and the overall Saskatchewan population have seen an upward trend (Figure 4.3). Despite the stillbirth rate in the Saskatchewan FN population living on-reserve experiencing wide variability over the 14-year span, this rate was on average twice as high when compared to the overall Saskatchewan stillbirth rate. Two peaks occurred over this time period. One peak was observed between 2001 and 2003 at a moving average of 11.8 per 1,000 live and stillbirths. More recently, a second peak occurred between 2005 and 2007 at a moving average of 12.9 per 1,000 live and stillbirths. The lowest rate was observed between 1997 and 1999 at a moving average of 5.8 per 1,000 live and stillbirths. It is during this time that the stillbirth rate for Saskatchewan FN living on-reserve was most comparable to the overall Saskatchewan stillbirth rate.

[115] Canadian Perinatal Health Report: 2008 Edition. Public Health Agency of Canada; 2008.
[116] Fretts RC. Etiology and prevention of stillbirth. American Journal of Obstetrics & Gynaecology. 2005; 193: 1923-35.
[117] Public Health Agency of Canada (2013): *Perinatal Health Indicators for Canada 2013: A report from the Canadian perinatal surveillance system*.
[118] Joseph KS, Kinniburgh B, Hutcheon JA, Mehrabadi A, Basso M, Davies C, Lee L. Determinants of increases in stillbirth rates from 2000 to 2010. CMAJ. 2013; 185 (8): E345-51.

Figure 4.3: Stillbirth rate, Saskatchewan FN residing on-reserve and overall Saskatchewan, three-year moving average, 1995-2007



	1995-1997	1996-1998	1997-1999	1998-2000	1999-2001	2000-2002	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007
FN (on-reserve)	8.3	7.5	5.8	6.5	7.0	9.4	11.8	9.6	8.7	8.6	12.9
SK	5.1	4.6	5.0	5.5	6.2	6.7	6.8	7.1	6.5	6.6	6.9

Sources: FNIHB-SK, Health Canada; AANDC; Statistics Canada

Growth and Nutrition

WHO has developed standards for assessing the growth and development of children from birth to five years of age. These standards are based on 8,500 children from widely different ethnic backgrounds and cultural settings (Brazil, Ghana, India, Norway, Oman and the United States).[119] Similar standards have also been set by PHAC under its Canadian Perinatal Surveillance System program. According to the Canadian Paediatrics Society, infant growth measurements such as weight and length are a part of standardized measurements used to confirm healthy growth and development. [120] A WHO report on developing new international growth references advocates that these standards are not only applicable to individuals but also for the communities in which these individuals live to assess health and socioeconomic development. [121]

Table 4.1 below summarizes the standard WHO screening process to identify individuals who are "stunted", "wasted" and have risk for being overweight or obese. This section will be using the same WHO standard to evaluate the health status of Saskatchewan First Nations children living on-reserve.

Table 4.1: Recommended cut-offs by the WHO for screening for under-nutrition and over-nutrition[122]

Parameters Age	WHO Child Growth Standards Birth to 5 years	WHO Reference 2007 5-19 years
Underweight weight-for-age	< 3rd centile	< 3rd centile
Stunted length-for-age/height-for-age	< 3rd centile	< 3rd centile
Wasted weight-for-length/ BMI-for-age *	< 3rd centile	< 3rd centile
Risk of overweight weight-for-length/BMI-for-age*	> 85th centile	not applicable
Overweight weight-for-length/BMI-for-age*	> 97th centile	> 85th centile
Obese weight-for-length/ BMI-for-age*	> 99.9th centile	> 97th centile
Severe Obesity BMI-for-age	not applicable	> 99.9th centile

*weight-for-length from birth-2 years: BMI-for-age ≥ 2 years

[119] World Health Organization (2014): *Child growth standards*.
[120] Dietitians of Canada and Canadian Pediatric Society (2010): *Promoting optimal monitoring of child growth in Canada: using the new WHO growth charts*.
[121] Garza C, de Onis M.: *Rationale for developing a new international growth reference*. WHO Multicentre Growth Reference Study Group; 2004.
[122] Dietitians of Canada and Canadian Pediatric Society (2010): *Promoting optimal monitoring of child growth in Canada: using the new WHO growth charts*.

A tool to assess the well-being of newborns, their mothers and the corresponding communities was developed as part of ongoing surveillance conducted by community health nurses (CHNs) in southern Saskatchewan reserves.

As a result, this growth and nutrition section will only focus on 25 south Saskatchewan reserves collecting data over three years (2010-2012) on 1,022 infants (51% females and 49% males). Due to the limited sample, information cannot be generalized to all Saskatchewan reserves.

Birth Weight, 2010-2012

Typically, newborn birth weights are determined by maternal nutrition during pregnancy. Although assessing a newborn's birth weight is primarily used to identify underweight infants, there is evidence to suggest that newborns that experience high birth weights have an increased risk to develop diabetes, leukemia, as well as brain, colon, breast and prostate cancers as an adult. [123,124] Looking at the most recent year of data (2012), southern Saskatchewan FN newborns living on-reserve had a median weight of 3.5 kg ranging from 0.5 kg to 5.5 kg. These newborn statistics include both live births and stillbirths. The previous three year period from 2010 to 2012 showed no change in the median birth weight of newborns in south Saskatchewan reserves (Table 4.2). In addition, during the three year period, the weight of newborns in south Saskatchewan reserves varied from 0.1 kg to 5.6 kg.

Table 4.2. Birth weight of southern Saskatchewan FN newborns living on-reserve, 2010-2012

	Median	Standard Deviation	Maximum	Minimum
2010	3.5 kg	0.7 kg	5.6 kg	0.1 kg
2011	3.5 kg	0.7 kg	5.2 kg	1.1 kg
2012	3.5 kg	0.7 kg	5.5 kg	0.5 kg

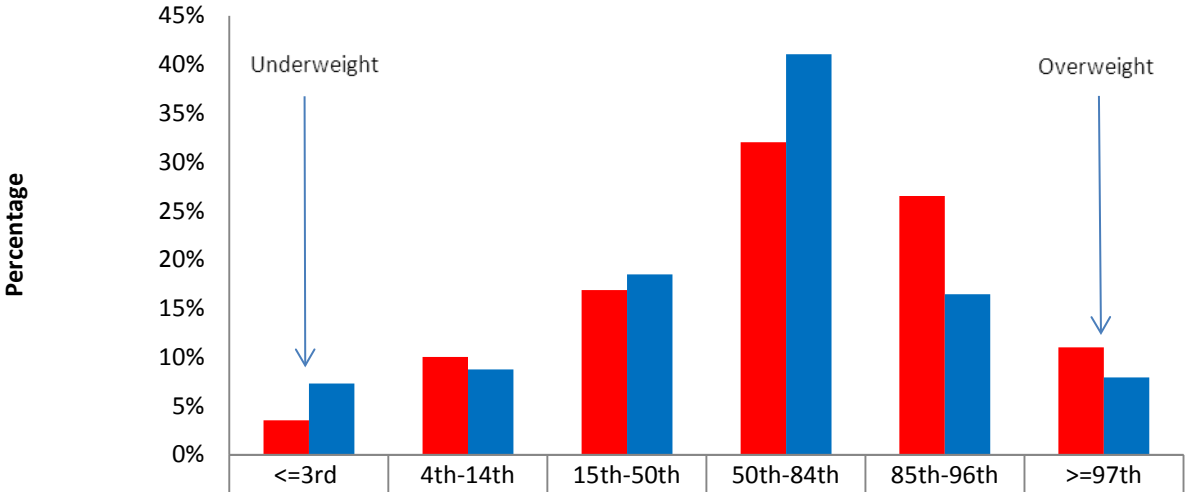
Source: South Saskatchewan Community Health Nurses, FNIHB-SK, Health Canada

Figure 4.7 depicts the gender distribution of southern Saskatchewan FN newborns living on-reserve according to the WHO percentile weight standards. Using these weight standards, 11% of female newborns and 8% of male newborns were overweight (>97th centile). That is nearly two to four times the number of overweight newborns than expected (should be approximately 3%) using the WHO standards.

On the opposite end of the spectrum, a small portion of newborn males (7%) and females (4%) in southern Saskatchewan reserves are underweight or within the <3rd percentile, which could be categorized as "wasted".

[123] Onyango A, de Onis M.: *WHO child growth standards: training course on child growth assessment; 2008*.
[124] Seppa N. Big Babies: High birthweight might signal health risks later in life; 2014. Science News, 185: 22–26. doi: 10.1002/scin.5591851117

Figure 4.7: Distribution of newborns based on WHO's weight-for-age standard by gender, southern Saskatchewan FN newborns living on-reserves, 2010-2012



	<=3rd	4th-14th	15th-50th	50th-84th	85th-96th	>=97th
Female newborn	4%	10%	17%	32%	27%	11%
Male newborn	7%	9%	18%	41%	16%	8%

WHO's standard percentiles for weight

Source: South Saskatchewan Community Health Nurses, FNIHB-SK, Health Canada

Birth Length, 2010-2012

Measuring a newborn's length is typically used to identify stunted growth attributed to lack of nutrition or illness. WHO reports there are seldom health problems associated specifically with tallness (in the upper percentiles) unless it reflects rare endocrine illnesses.[125] In 2012, Southern Saskatchewan FN newborns living on-reserve had a median length of 51.0 cm ranging from 31 cm to 59.5 cm.

Table 4.3. Birth length of southern Saskatchewan FN newborns living on-reserve, 2010-2012

	Median	Standard Deviation	Maximum	Minimum
2010	51.0 cm	3.5 cm	58.0 cm	15.5 cm
2011	51.0 cm	3.9 cm	58.5 cm	19.5 cm
2012	51.0 cm	3.5 cm	59.5 cm	31.0 cm

Source: South Saskatchewan Community Health Nurses, FNIHB-SK, Health Canada

[125] Onyango A, de Onis M.: *WHO child growth standards : training course on child growth assessment; 2008*.

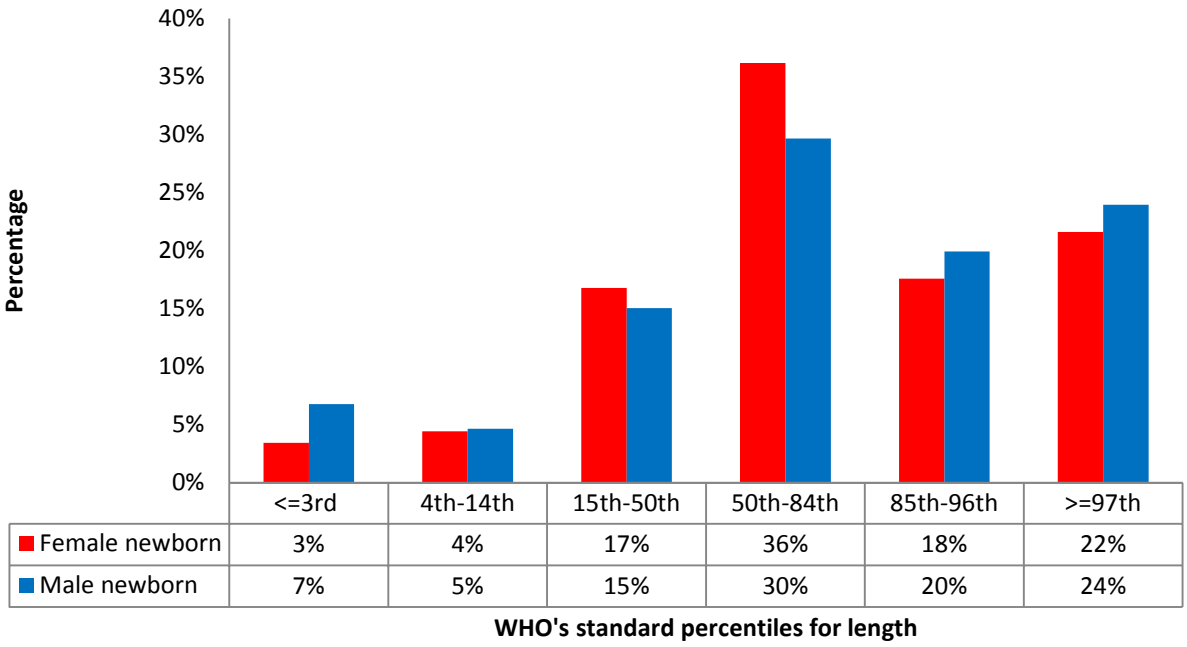
The three-year period from 2010 to 2012 showed almost no change in the median birth length of Southern Saskatchewan FN newborns living on-reserve (Table 4.3).

In addition, during the three-year period, the length of newborn babies in the south Saskatchewan reserves varied from 15.5 cm to 59.5 cm.

Figure 4.8 depicts the gender distribution of southern Saskatchewan FN newborns living on-reserve according to the WHO percentile length standards. Using these length standards, 22% of female newborns and 24% of male newborns were in the 97th percentile. That is nearly seven to eight times the number of newborns in the 97th percentile than what is expected, according to the WHO standards (should be approximately 3%).

Conversely, a small portion of newborn males (7%) and females (3%) in south Saskatchewan reserves could be considered as "stunted" (<3rd percentile), according to the WHO standards.

Figure 4.8: Distribution of newborns based on WHO's length-for-age standard by gender, southern Saskatchewan FN newborns living on-reserves, 2010-2012



	<=3rd	4th-14th	15th-50th	50th-84th	85th-96th	>=97th
Female newborn	3%	4%	17%	36%	18%	22%
Male newborn	7%	5%	15%	30%	20%	24%

Source: South Saskatchewan Community Health Nurses, FNIHB-SK, Health Canada

Maternal and Child Health Methodology

Who is included in this chapter and data sources

1. **Overall Saskatchewan population**
   - Total Saskatchewan population, including First Nations on-and off-reserve
   - Data source:
     - Statistics Canada – stillbirth and fertility records

2. **Saskatchewan registered First Nations population**
   - Registered to a Saskatchewan FN band ; living on-and off-reserve
   - Data sources:
     - NIHB database (de-identified data) – contraception prescription claim rates
     - AANDC, 2012 (unadjusted data) – stillbirth and fertility records

3. **Saskatchewan First Nations population living on-reserve**
   - Registered to a Saskatchewan FN band and residing on-reserve
   - Does not include non-registered First Nations or non-First Nations that may be living on-reserve
   - Data source:
     - Government of Saskatchewan Vital Statistics System (VSS) - stillbirth and fertility records

4. **Southern Saskatchewan First Nations Communities**
   - 25 communities in the southern part of FNIHB-SK region
   - Data Source:
     - FNIHB South Service Centre community health nurses - birth weight and length

Approach to Data Analysis

Data was analyzed using Microsoft Excel 2010.

The following formula is used to calculate the general fertility rate (GFR):

$$\frac{Number\ of\ live\ births\ in\ a\ given\ period}{Midyear\ population\ size\ of\ females\ aged\ 15-44\ old\ in\ the\ same\ given\ period} \times 1{,}000$$

The following formula is used to calculate contraception coverage rate:

$$\frac{Number\ of\ distinct\ claimants\ of\ contraception}{Midyear\ population\ size\ in\ the\ same\ given\ period} \times 100\%$$

The following formula is used to calculate stillbirth rate:

$$\frac{Number\ of\ stillbirths\ in\ a\ given\ period}{Total\ number\ of\ live\ births\ and\ stillbirths\ during\ the\ same\ period\ (total\ births)} \times 1{,}000$$

The following formula is used to calculate the immunization coverage rate:

$$\frac{Number\ of\ children, at\ a\ specific\ point\ in\ time, that\ have\ received\ the\ recommended\ number\ of\ doses, at\ a\ specific\ age}{Total\ number\ of\ children\ born\ in\ the\ same\ given\ period, at\ a\ specific\ age} \times 100\%$$

Data Limitations

- The birth weight and length are from southern Saskatchewan and thus should be interpreted cautiously. The results may not be generalized to all of Saskatchewan First Nations people living on-reserve.
- Contraception prescription claim rate cannot distinguish between claimants living on- or off-reserve.
- Some First Nations children may receive their vaccinations off-reserve through a Regional Health Authority (RHA). FNIHB-SK and NITHA do not have access to the Saskatchewan Immunization Management System (SIMS), where RHAs record their immunization data. As a result, a child could be up-to-date with their immunizations, but if the child was immunized off-reserve this may not be entered in community immunization records.
- Unadjusted AANDC population may not be complete due to late reporting of life events. Adjusted data not available for years analyzed.

Chapter 7: Diabetes

This chapter looks at the estimated prevalence and estimated incidence rates of diabetes in the Saskatchewan registered FN population based on available literature and data in order to better understand the impact of diabetes within this population. In addition, the chapter also shares pharmacy transaction data from the Health Canada Non-Insured Health Benefits (NIHB) program to approximate and further estimate the prevalence of diabetes in the Saskatchewan FN population. Understanding the impact of diabetes among FN in Saskatchewan would show the importance of prevention, screening and management of diabetes. The goal is to reduce the number of FN living with diabetes, as well as the impact of diabetes, through health promotion and management, which would improve their quality of life and also reduce health care expenditure.

This chapter uses two different sources to understand the profile of diabetes in First Nations in Saskatchewan. Both sources look at registered First Nations living on- and-off reserves.

First, the chapter uses aggregate data from published journal articles and publicly available data.

Second, the chapter uses pharmaceutical utilization data from the Health Canada Non-Insured Health Benefits program.

Understanding the impact of diabetes among First Nations in Saskatchewan would show the importance of prevention, screening and management of diabetes. Any reduction in the number of First Nations living with diabetes condition through health promotion would improve the quality of life and also reduce health care expenditure.

Diabetes mellitus (diabetes) is a metabolic disorder characterized by elevated blood glucose due to defective insulin secretion or action o both. There are two most common types of diabetes – Type 1 and Type 2. Type 1 diabetes is an autoimmune disorder where there is an absolute deficiency of insulin due to destruction of the pancreatic beta cells. Type 1 diabetes is most common among children and young adults. Type 2 diabetes is characterised by insulin resistance as well as inadequate secretion of insulin.

Typical onset of Type 2 diabetes is during older age, but the incidence among children and young adults is on the rise.

Gestational diabetes mellitus (GDM) is another category of diabetes defined as glucose intolerance with onset or first recognition during pregnancy. [126]

Diabetes can lead to devastating short term and long term complications across organ systems. These complications can be life threatening if they are not treated in a timely manner. Short-term complications of diabetes include infection, slow wound healing, diabetic ketoacidosis and other metabolic conditions.

Long-term complications include cardiovascular diseases, peripheral vascular disease leading to lower limb amputation, retinopathy, kidney disease, hypertension, and peripheral neuropathy.[127]

The epidemic of diabetes among First Nations (FN) in Canada is well documented in the literature. In the last five decades, diabetes has emerged rapidly among FN populations in Canada. The onset of diabetes among FN is more likely to be at an earlier age and with greater complications than the general Canadian population. The devastating complications of diabetes pose a considerable threat to the well-being of FN populations.[128]

For 2008-2009, the prevalence of diabetes among Canadians was approximately 6.8%. For the same time period, the Saskatchewan age-standardized prevalence was slightly lower at 5.4%.127 Diabetes prevalence among FN individuals living on-reserve has been reported to be nearly three times greater (17.2%) than the general Canadian population. Genetic predisposition and effects of dietary changes due to colonization are thought to be linked to the higher prevalence of diabetes among FN individuals.128 Other factors such as physical and social environment, food insecurity, obesity, and lifestyle such as physical inactivity, unhealthy eating and tobacco smoking have all been associated with diabetes. The increasing burden of diabetes among FN in Canada is an epidemic requiring increased surveillance in order to understand the impact of diabetes across populations.[129]

It is important to understand the cultural concepts and traditional knowledge of FN pertaining to interpretation of different illnesses and treatment regimens. Many FN consider diabetes as a consequence of modern foods and decline in their traditional activities such as hunting and fishing.128 Therefore, diabetes prevention and control require community-based action and collaboration.

Important note: Based on available data, it is not possible to differentiate between Type 1 and Type 2 diabetes.

[126] Senie RT [Book]. *Epidemiology of Women's Health*. Jones and Barlett Learning: Burlington, MA; 2014.
[127] Public Health Agency of Canada (2011): *Diabetes in Canada: Facts and figures from a public health perspective.*
[128] Young TK, Reading J, Elias B, O'Neil JD.:*Type 2 Diabetes Mellitus in Canada's First Nations: status of an epidemic in progress*. Canadian Medical Association Journal, 2000; 163 (5): 561-66.
[129] Assembly of First Nations. *A First Nations diabetes report card.*

Incidence and Prevalence of Diabetes – A Saskatchewan Research Study

Estimating the incidence and prevalence of diabetes is a challenging task due to limited, FN-specific data on diabetes and other chronic conditions. In the literature, incidence and prevalence of diabetes has been estimated using health administrative data to identify the number of new cases. It is considered to be a reasonable approximation. [130,131]

The information provided in this section is based on two Saskatchewan research studies by Dyck, Osgood, Lin, Gao and Stang analyzing the epidemiology of diabetes in FN and non-FN populations. The first article: "Epidemiology of diabetes mellitus among First Nations and non-First Nations adults" was published in 2010 and followed up shortly by the 2012 article: "The epidemiology of diabetes mellitus among First Nations and non-First Nations children in Saskatchewan".

The studies use only health administrative data to provide estimates of diabetes incidence among FN in Saskatchewan. As these diabetes estimates include data up to 2003 for children and up to 2005 for adults, there are limitations in applying this decade-old data to the current diabetes situation. This data does, however, provide us with retrospective trend analysis to determine the growing burden of disease.

The case definition of diabetes for the Saskatchewan-based studies is: one hospital discharge, two physican service claims or a physician claim, followed by hospital discharge for diabetes within two years.[132] This definition is based on the National Diabetes Surveillance System case definitions and is similar to case definitions used in other diabetes epidemiology studies.[130,131,132] This case definition is applied to both adult and child incidence and prevalence discussion.

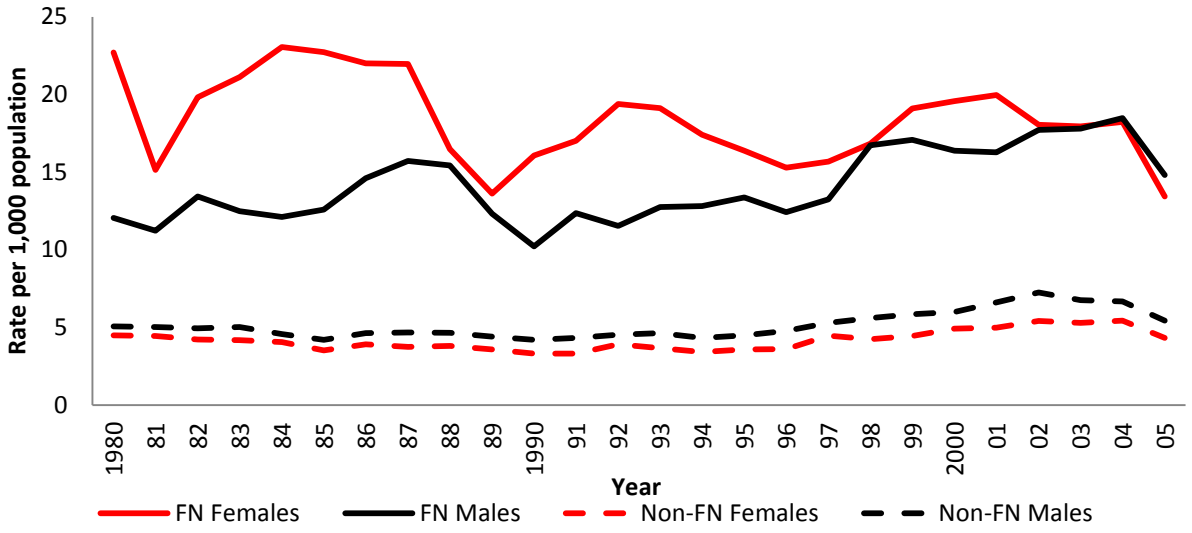
[130] Hux JE, Flintoft V, Ivis F, Bica A. Diabetes in Ontario. Diabetes Care. 2002; 25(3):512-16.
[131] Green C, Young TK, Blanchard JF, Griffith J. The Epidemiology of Diabetes in the Manitoba-Registered First Nation Population. Diabetes Care. 2003; 26(7): 1993-8.

[132] Dyck R, Osgood N, Lin TH, Gao A, Stang MR. Epidemiology of diabetes mellitus among First Nations and non-First Nations adults. CMAJ 2010; 182 (3): 249-256.

Adults (20 Years or Older)

Estimated Adult Incidence of Diabetes, 1980-2005

Figure 6.1: Age-standardized* incidence of diabetes, by gender among First Nations and non-First Nations adults (aged 20 or older) in Saskatchewan, 1980-2005



***Direct standardization based on 1991 Canadian census population**

Source: Dyck R, Osgood N, Lin TH, Gao A, Stang MR. Epidemiology of diabetes mellitus among First Nations and non-First Nations adults. CMAJ 2010; 182 (3): 249-256.

Incidence of diabetes describes the number of new cases of diabetes detected in a population atrisk in a given year. Literature shows that during the 26-year period between 1980 and 2005, the age-standardized estimate of diabetes incidence among FN adults in Saskatchewan were significantly greater than non-FN adults. The estimates of incidence were adjusted for the difference in age distributions between FN and non-FN populations. The rate of new cases of diabetes among FN female adults (aged 20 or over) was more than four times that of the non-FN female adults (Figure 6.1). The rate of new cases among FN adult males was two-to-three times that of the non-FN adult males over the same period.[133]

[133] Dyck R, Osgood N, Lin TH, Gao A, Stang MR. Epidemiology of diabetes mellitus among First Nations and non-First Nations adults. CMAJ 2010; 182 (3): 249-256.

Additionally, contrary to findings in the non-FN population, estimates of diabetes incidence among FN adults in Saskatchewan were more sporadic with several peaks-and-troughs. This illustrates the limitations of the data since FN population sample size is much smaller than non-FN population.

However, according to the literature, the estimates of diabetes incidence among FN adults in Saskatchewan were evidently and significantly greater than non-FN adults (Figure 6.1).[134]

Further interpretations of the 2004 and 2005 data should be done with caution. Although it appears as though the incidence rate for diabetes is declining, this may not be accurate. As a consequence of the case definition requiring two years of administrative data, 2005 will likely have underestimated incidence rates.

Estimated Adult Prevalence of Diabetes, 1980-2005

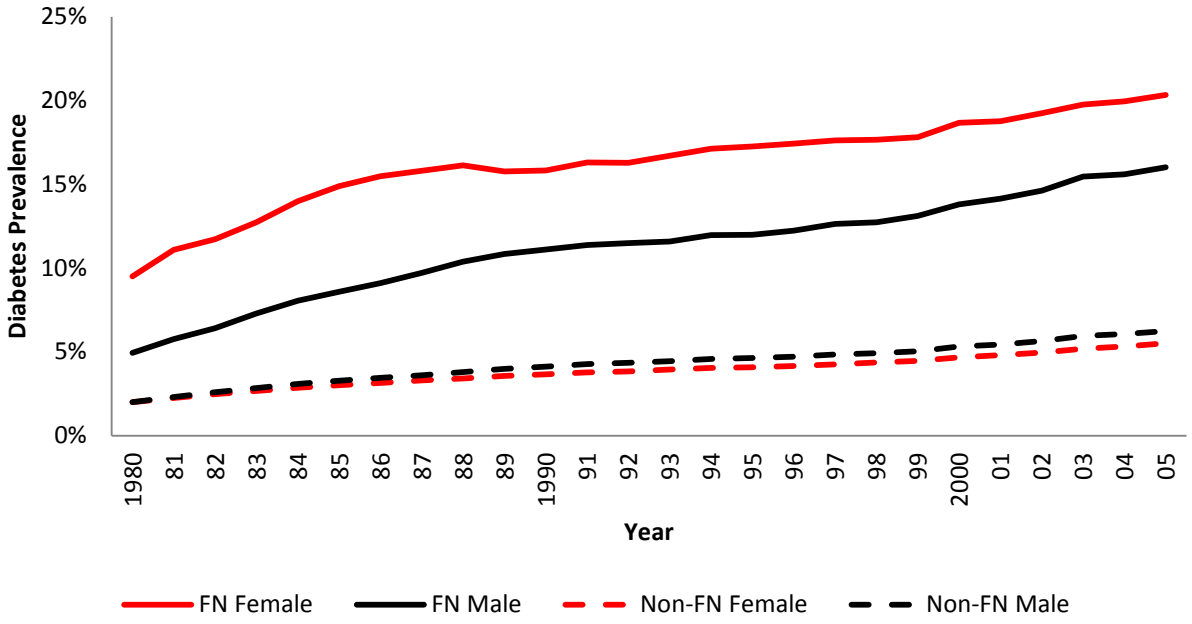
Prevalence of diabetes describes the number of cases (new and existing) in a given population. Literature shows up to 30% of Type 2 diabetes cases remain undiagnosed and therefore, the reported diabetes prevalence may be an underestimation.[135] The prevalence was calculated using the same administrative health data to determine the number of cases and by including all beneficiaries of Ministry of Health in the denominator.[136]

The study shows that the age-standardized prevalence rate of diabetes among FN adult females in Saskatchewan was more than four times that of the non-FN adult females over the 26-year period (Figure 6.2). The age-standardized prevalence rate of diabetes among FN adult males in Saskatchewan was two-to-three times that of the non-FN adult males over the same period.136

[134] Green C, Young TK, Blanchard JF, Griffith J. The Epidemiology of Diabetes in the Manitoba-Registered First Nation Population. Diabetes Care. 2003; 26(7): 1993-8.
[135] Young TK, Mustard CA. Undiagnosed diabetes: Does it matter? CMAJ. 2001; 164 (1): 24-28.

[136] Dyck R, Osgood N, Lin TH, Gao A, Stang MR. Epidemiology of diabetes mellitus among First Nations and non-First Nations adults. CMAJ 2010; 182 (3): 249-256.

Figure 6.2: Age-standardized* prevalence of diabetes, by gender in First Nations and non-First Nations adults (aged 20 or older) in Saskatchewan, 1980-2005



***Direct standardization based on 1991 Canadian census population**

Data Source: Dyck R, Osgood N, Lin TH, Gao A, Stang MR. Epidemiology of diabetes mellitus among First Nations and non-First Nations adults. CMAJ 2010; 182 (3): 249-256.

An alternative data source, the First Nations Regional Health Survey (RHS) conducted between 2008 and 2010, has estimates of (self-reported) diabetes prevalence for each province and nationally. The estimate of diabetes prevalence among FN at the national level shows trends similar to the above study, i.e. FN living on-reserve have more than three times the prevalence of diabetes compared to the overall Canadian population (20.7% vs. 6.2%).[137] The RHS estimate of diabetes prevalence for Saskatchewan is not available.

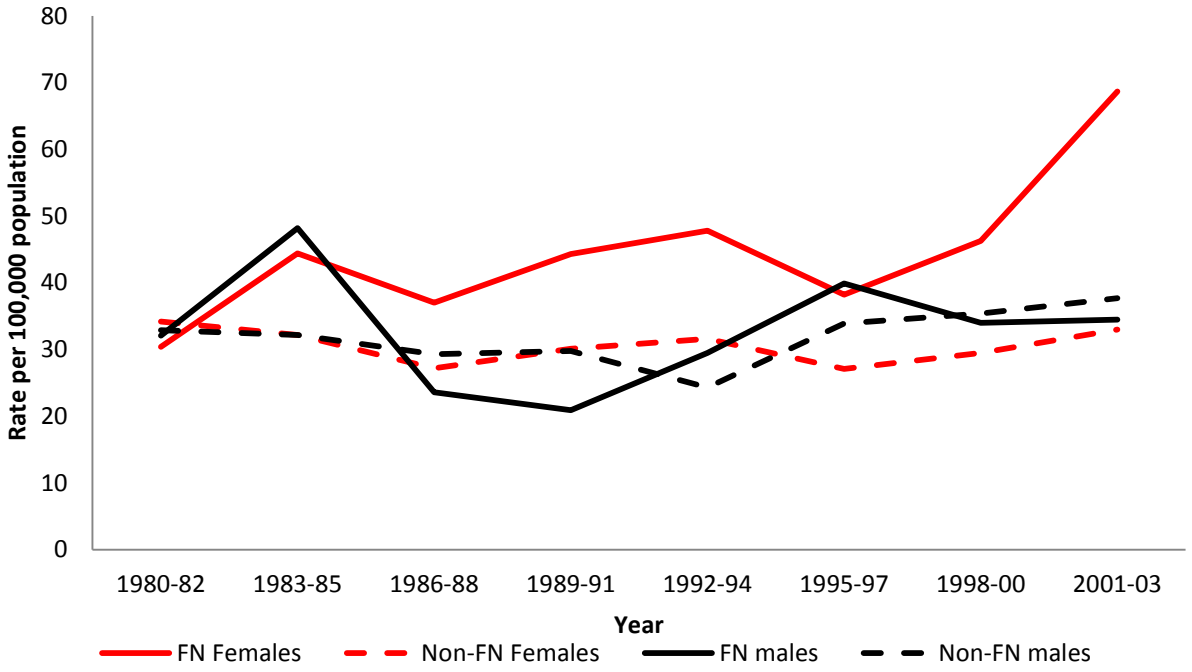
First Nations Information Governance Centre (FNIGC). First Nations Regional Health Survey (RHS) 2008/10: National report on adults, youth and children living in First Nations communities. Ottawa: FNIGC.

Children (19 Years or Under)

Estimated Childhood Incidence of Diabetes, 1980-2003

Historically, Type 1 diabetes has been viewed as the most prevalent form of childhood diabetes; however, with the increase of childhood obesity and changing lifestyles, Type 2 is emerging as a prominent disease, especially among FN children.[138]

Figure 6.3: Three-year average age-standardized* incidence of diabetes by gender, First Nations and non-First Nations children (aged 19 years and under) in Saskatchewan, 1980-2003



***Direct standardization based on 1991 Canadian census population**

Source: Dyck R, Osgood N, Gao A, Stang MR. The epidemiology of diabetes mellitus among First Nations and non-First Nations Children in Saskatchewan. CJD 2012; 36:19-24.

The available literature shows that prior to 2001, the three-year average age-standardized incidence rate in FN female children was statistically no different than that of non-FN female children (Figure 6.3). In other words, prior to 2001, diabetes rates between FN and non-FN female children were similar. Similarly, the three-year average age-standardized incidence rate in FN male children was statistically no different than that of non-FN male children from 1980 to 2003.[139]

[138] Dyck R, Osgood N, Gao A, Stang MR. The epidemiology of diabetes mellitus among First Nations and non-First Nations Children in Saskatchewan. CJD 2012; 36:19-24.
[139] Green C, Young TK, Blanchard JF, Griffith J. The Epidemiology of Diabetes in the Manitoba-Registered First Nation Population. Diabetes Care. 2003; 26(7): 1993-8.

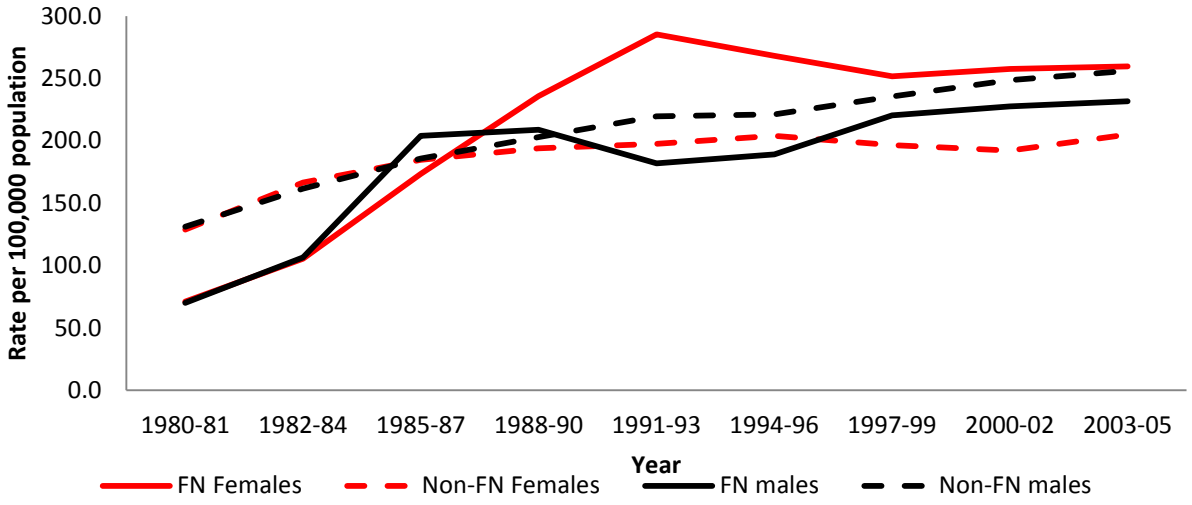
According to the same study above, between years 2001 and 2003, diabetes incidence rates among FN female children were double the rate of non-FN female children (68.7 vs. 33.0 cases per 100,000 population).[140] The reasons for the increase could not be ascertained based on the current literature.

Estimated Childhood Prevalence of Diabetes, 1980-2003

According to this study, the three-year average age-standardized prevalence rate in FN female children was similar to the rates of non-FN female children from 1980 to 2005 (Figure 6.4). Similarly, the three-year average age-standardized prevalence rate in FN male children was similar to the rates of non-FN male children from 1980 to 2005.140

Further, age-specific prevalence of diabetes among 15 to 19-year-old females saw the largest increase from 200 cases per 100,000 population in the 1980s to 600 cases per 100,000 population in the 2000s.[141]

Figure 6.4: Three year average age-standardized* prevalence of diabetes by gender, First Nations and non-First Nations children (aged 19 years and under) in Saskatchewan, 1980-2005



***Direct standardization based on 1991 Canadian census population**

Source: Dyck R, Osgood N, Gao A, Stang MR. The epidemiology of diabetes mellitus among First Nations and non-First Nations Children in Saskatchewan. CJD 2012; 36:19-24.

[140] Green C, Young TK, Blanchard JF, Griffith J. The Epidemiology of Diabetes in the Manitoba-Registered First Nation Population. Diabetes Care. 2003; 26(7): 1993-8.
[141] Dyck R, Osgood N, Gao A, Stang MR. The epidemiology of diabetes mellitus among First Nations and non-First Nations Children in Saskatchewan. CJD 2012; 36:19-24.

Anti-Diabetic Drugs

Given that most recent data regarding the epidemiology of diabetes in Saskatchewan for FN are nearly a decade old, anti-diabetic drug usage was another source of data used to approximate the prevalence of diabetes among FN in Saskatchewan.[142] Analyzing anti-diabetic drug usage to understand the prevalence of diabetes in the population has been documented in the literature as it provides a proxy to estimate the burden of disease when consistent diabetes data is lacking.[143, 144, 145]

Anti-diabetic drugs are medications used to treat diabetes. They are also referred to as 'hypoglycemic agents' or 'antihyperglycemic agents'. Anti-diabetic drugs lower blood glucose levels and are available in the forms of oral medication or injectable insulin. Treatment selection depends on the nature of the diabetes, age and situation of the person, as well as other factors. Anti-diabetic drugs are used when lifestyle interventions (diet and physical activity) fail to control blood glucose adequately in diabetes. [146]

This section provides an overview of the trends of anti-diabetic drug use among Saskatchewan FN using pharmaceutical utilization data. Anti-diabetic drugs are covered by Health Canada's NIHB program. Under the NIHB program, anti-diabetic drugs of the Saskatchewan registered FN population are covered, regardless of whether they live on-reserve or off-reserve.

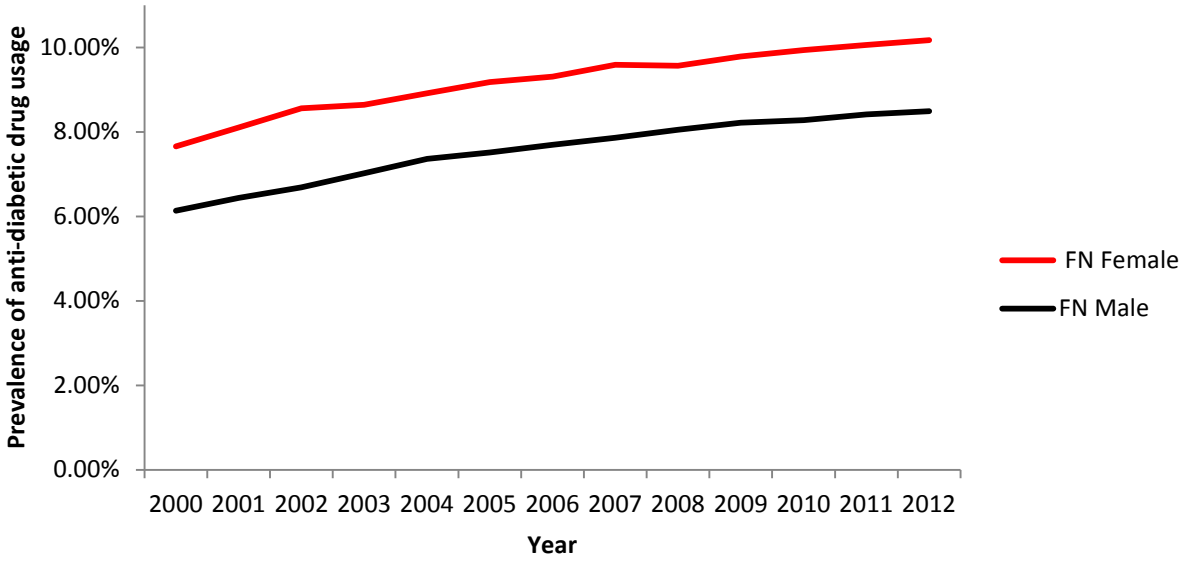
Burden of Anti-Diabetic Drug Usage, 2000-2012

The prevalence of anti-diabetic drug usage can be assessed by calculating the percentage of individuals on anti-diabetic drugs out of all FN eligible for medication coverage (which will be called *anti-diabetic drug usage prevalence*). The case definition was at least one prescription of anti-diabetic drug within the calendar year. The prevalence is for Saskatchewan's registered FN population who were provided with anti-diabetic medication in Saskatchewan. First Nations registered to bands outside of Saskatchewan are not included in either the denominator or numerator.

Gender-specific analysis of anti-diabetic drug usage prevalence shows interesting trends (Figure 6.5). The anti-diabetic drug usage prevalence among FN female adults (age 20 years or older) is significantly greater than FN male adults in Saskatchewan. The estimates of diabetes prevalence on Figure 6.5 and Figure 6.2 have similar trends where female adults have a higher diabetes rate than male adults.

[142] First Nations and Inuit Health: *Health Status of First Nations On-Reserve in Atlantic Canada 2012*. FNIHB Atlantic Region: 2013.
[143] Hsia Y, Neubert AC, Rani F, Viner RM, Hindmarsh PC, Wong ICK. *An increase in the prevalence of type 1 and 2 diabetes in children and adolescents: results from prescription data from a UK general practice database.* Br J Clin Pharmacol; 2009. 67(2): 242-249.
[144]Forrest RD. Diabetes mellitus in north Sweden: prevalence assessed from prescriptions for anti-diabetic agents. J Intern Med 1990; 228: 267–73.
[145] Stovring H, Andersen M, Beck-Nielsen H, Green A, Vach W. Rising prevalence of diabetes: evidence from a Danish pharmaco-epidemiological database. Lancet 2003; 362: 537–8.
[146] Diabetes.ca.uk (2015): *Diabetes and Anti-Diabetic Drugs*.

Figure 6.5: Anti-diabetic drug usage prevalence* among First Nation adults (age 20 years or older) in Saskatchewan by gender, 2000 to 2012



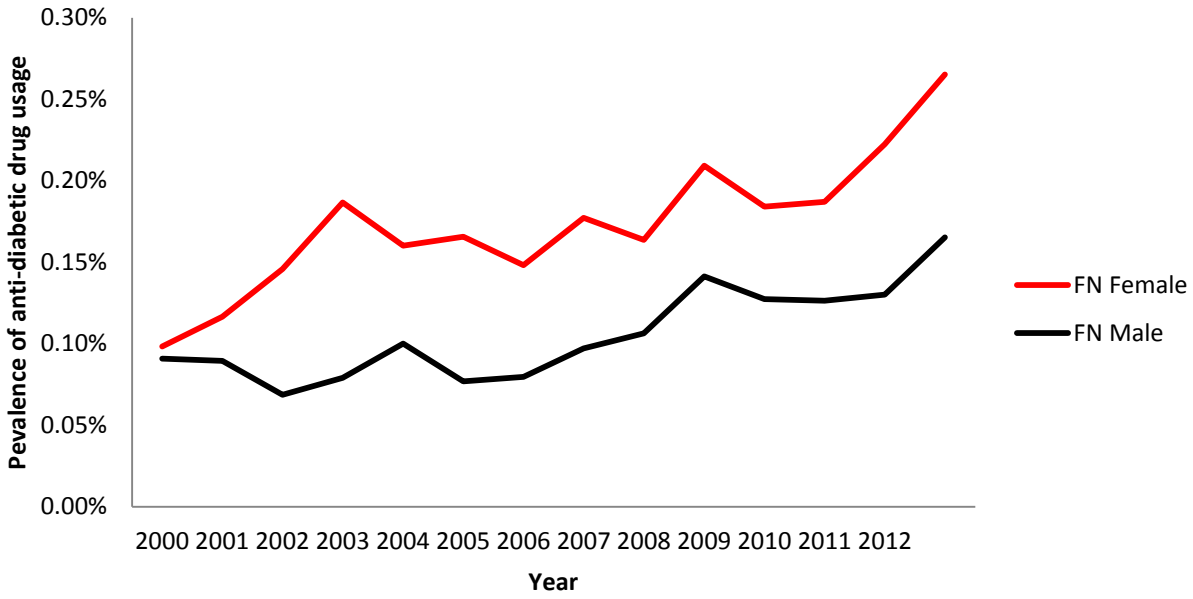
Source: NIHB data cube, Health Canada

*** The prevalence is for registered Saskatchewan band members. Band members registered to bands outside of Saskatchewan are not included in either the denominator or numerator.**

Among children (age 19 years and younger), the anti-diabetic drug usage prevalence in females remained consistently greater for the majority of the period between 2000 and 2012 (Figure 6.6). In year 2000 and 2001, the anti-diabetic drug usage prevalence among females and males was statistically no different. This trend is the same in the literature where the estimated prevalence of diabetes between males and female remained similar among First Nations children.[147] However, in the recent years between 2002 and 2012, female children are facing higher rates of anti-diabetic drug usage prevalence where the differences between females and males (anti-diabetic drug usage prevalence) either almost achieved or reached statistical significance (Figure 6.6).

[147] Dyck R, Osgood N, Lin TH, Gao A, Stang MR. Epidemiology of diabetes mellitus among First Nations and non-First Nations adults. CMAJ 2010; 182 (3): 249-256.

Figure 6.6: Anti-diabetic drug usage prevalence* among First Nation children (age 19 years and younger) in Saskatchewan by gender, 2000 to 2012



Source: NIHB data cube, Health Canada

*** The prevalence is for registered Saskatchewan band members and band members registered to bands outside of Saskatchewan are not included in either the denominator or numerator.**

Diabetes Methodology

Who is included in this chapter and data sources

1. **Saskatchewan registered First Nations population**
   - Registered to a Saskatchewan FN band ; living on and off reserve
   - Data Sources:
     - NIHB data cubes (de-identified data)
       - Anti-diabetic medication
     - Research studies – utilized administrative health data:
       - "Epidemiology of diabetes mellitus among First Nations and non-First Nations adults", 2010
         - Incidence and prevalence of diabetes in First Nation adults
       - "The epidemiology of diabetes mellitus among First Nations and non-First Nations children in Saskatchewan", 2012
         - Incidence and prevalence of diabetes in First Nation children

2. **Non-First Nation Saskatchewan population**
   - The 'Non-First Nations population' are people who are not in the Indian Registry. This includes approximately 5% Métis and <0.5% non-registered FN people
   - Data Sources:
     - Research Studies – utilized administrative health data:
       - "Epidemiology of diabetes mellitus among First Nations and non-First Nations adults", 2010
         - Incidence and prevalence of diabetes in non-First Nation adults
       - "The epidemiology of diabetes mellitus among First Nations and non-First Nations children in Saskatchewan", 2012
         - Incidence and prevalence of diabetes in non-First Nation children

Approach to Data Analysis

Data was analyzed using Microsoft Excel 2010.

The following formula is used to calculate the anti-diabetic drug usage prevalence using NIHB data:

$$\frac{Number\ of\ Saskatchewan\ region\ band\ members\ who\ had\ at\ least\ one\ anti-diabetic\ medication\ claim\ in\ a\ specific\ calendar\ year}{Total\ band\ population\ in\ the\ specified\ calendar\ year} \times 100\%$$

Data Limitations

- Type 1 and Type 2 diabetes cannot be distinguished for both adults and children.
- Data provided cannot distinguish First Nations individuals residing on-reserve from First Nations living off-reserve.
- Biological sampling would most accurately estimate the incidence and prevalence of diabetes; however, such data is not readily available and is not feasible in a large population. Therefore, the administrative data is the next best available data for estimating the epidemiology of diabetes in a given population.
- The lack of available recent data and literature on estimates of diabetes incidence in the First Nations population in Saskatchewan is a major gap.
- Drug usage data may be affected by an increase in compliance of patients filling drug prescriptions, changes in physician prescribing practices, improved access to primary care and many other reasons. Therefore, the interpretation of drug usage numbers should be done with caution.

Appendix

A. General Definitions

Name	Abbreviation	Definition/Relevance
Aboriginal Affairs and Northern Development Canada	AANDC	Supports Aboriginal people (First Nations, Inuit and Métis) and Northerners in their efforts to: •improve social well-being and economic prosperity; •develop healthier, more sustainable communities; and •participate more fully in Canada's political, social and economic development to the benefit of all Canadians.
Aboriginal		Aboriginal peoples of Canada are defined in the *Constitution Act*, *1982*, Section 35 (2) as including the Indian, Inuit and Métis peoples of Canada.[148]
Adequate grocery stores		A term related to food security. A grocery store is defined as 'adequate' if they sell items such as fresh protein; 1% or fat free milk; high fiber bread; 2 types of fresh fruit; and 3 types of fresh vegetables.
Adjusted Indian Register Data		Data provided by AANDC which provides the official record of the registered Indian population. Often used as a denominator, adjusted rates compensate for the late reporting of births and deaths.[149]
Age-specific mortality		The number of deaths per age group of a population during a specific time period.
Age-standard mortality		The weighted average of the age-specific mortality rates in the population
Anti-diabetic drugs		Medications used to treat diabetes; they are also referred to as 'hypoglycemic agents' or 'antihyperglycemic agents'. Anti-diabetic drugs lower blood glucose levels and are available in the forms of oral medication or injectable insulin.
Bedroom shortfalls		A lack of bedrooms indicates that a house in not suitable; a measure which indicates crowding.
Bloodborne pathogens	BBP	Disease causing organisms that are transmitted via blood.
Childhood Immunization Coverage Rates	CICR	Analyze the completeness of immunizations for children aged 1, 2 and 7. An individual is considered up-to-date (UTD) with an immunization if they have received the recommended doses of a vaccination by a certain age or within a certain age range as specified in the Saskatchewan Immunization Manual (SIM).
Community Well-Being Index	CWB	Developed by AANDC, the CWB measures the well-being of Canadian communities using socio-economic Statistics Canada Census indicators relating to housing, education, income and employment.

[148] Statistics Canada (2011): *Housing Reference Guide, National Household Survey*.
[149] Denominator guidelines for health surveillance in First Nations populations in Canada [electronic resource] / prepared by the Surveillance, Health Information Policy and Coordination Unit, First Nations and Inuit Health Branch, Health Canada. Ottawa : Health Canada, c2012

Name	Abbreviation	Definition/Relevance
Crude birth rate		The number of live births, in a given year, per 1,000 mid-year total population in the same year.
Diabetes		A metabolic disorder characterized by elevated blood glucose due to defective insulin secretion or action or both.
First Nations and Inuit Health Branch	FNIHB	A Health Canada branch which supports the delivery of public health and health promotion services on-reserve and in Inuit communities. It also provides drug, dental and ancillary health services to First Nations and Inuit people regardless of residence. The branch also provides primary care services on-reserve in remote and isolated areas where there are no provincial services readily available.
First Nations	FN	Individuals registered to a Saskatchewan First Nations band.
Food security		A state when an individual has physical, social and economic access to nutritious food for a healthy life.
General Fertility Rate	GFR	The number of live births in a calendar year per 1,000 female population aged 15-44 years.
Hepatitis C virus	HCV	A blood-borne pathogen that can be spread through exposure to blood or bodily fluids infected with HCV, or from a mother to a newborn child.
Herd immunity		When high immunization rates protect unvaccinated individuals in the community by reducing disease transmission.
Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome	HIV/AIDS	An infection of the immune system that results in a chronic illness and makes individuals more susceptible to other infections and cancers. Acquired Immunodeficiency Syndrome (AIDS) may develop once an individual is no longer able to fight the HIV infection.
Indian Register	IR	Compiled by AANDC; the official record of the Registered Indian population.
Infant mortality rates	IMR	The number of infant deaths in a population, less than one year of age, for every thousand live births.
Life expectancy		Number of years a person would be expected to live, starting from birth on the basis of the mortality statistics for a given observation period (typically a calendar year).
Limited grocery stores		A term related to food security. A grocery store is defined as 'limited' if they do not sell items such as fresh protein; 1% or fat free milk; high fiber bread; 2 types of fresh fruit; and 3 types of fresh vegetables.
Live birth		Babies born to mothers, which after delivery show evidence of life, regardless of pregnancy duration.
Lower access to grocery stores		Communities which have access to zero to two grocery stores within a 32km radius.
Major household repairs		According to the NHS, repairs are those associated with plumbing or electrical wiring, structural repairs to walls, floors or ceilings.
Maternal health		Refers to the health of women during pregnancy, childbirth and the postpartum period.
Minor household repairs		Repairs consisting of missing or loose floor tiles, bricks or shingles, defective steps, railing or siding.

Name	Abbreviation	Definition/Relevance
National Household Survey	NHS	A survey designed to provide information about people in Canada by their demographic, social and economic characteristics.
Non-Aboriginal Saskatchewan Population		According to the NHS, those who do not self-identify as Aboriginal.
Non-Insured Health Benefits	NIHB	A Health Canada program which provides coverage for First Nations (on- and off-reserve) for a limited range of these goods and services when they are not insured elsewhere.
Northern Inter-Tribal Health Authority	NITHA	A First Nations' partnership organization comprised of Meadow Lake Tribal Council, Lac La Ronge Indian Band, Prince Albert Grand Council and Peter Ballantyne Cree Nation. NITHA delivers nursing, public health, and primary care treatment services in 33 First Nation communities throughout northern Saskatchewan.
Overall Saskatchewan population		Total Saskatchewan population, including First Nations on- and off-reserve.
Participation rate		A term related to employment referring to the proportion of those in the labour force (employed plus unemployed) compared to the total population.
Perinatal		Referring to the period immediately before and after birth.
Prenatal		Referring to the period before birth.
Public Health Agency of Canada	PHAC	An organization which promotes and protects the health of Canadians through leadership, partnership, innovation and action in public health.
Regular household repairs		According to the NHS, repairs are associated with painting, furnace cleaning, etc.
Saskatchewan First Nations Living On-Reserve		Registered to a Saskatchewan First Nations band and residing on-reserve. Does not include non-registered First Nations or non-First Nations that may be living on-reserve.
Saskatchewan Immunization Manual	SIM	A document which provides evidence-based, standardized information related to immunization. The manual primarily assists public health personnel to deliver immunization programs. It is also an important resource for other health care providers, health care students, and post-secondary institutions. As a key provincial immunization resource, SIM supports consistent, quality immunization practices and services.
Saskatchewan registered First Nations population		Registered to a Saskatchewan First Nations band; living on- and off-reserve
Sexually Transmitted Infections	STI	Any infection or disease that can be passed from one person to another during sexual activity. Sexually-transmissible infections include chlamydia, herpes, gonorrhea, syphilis, genital herpes, scabies, pubic lice(crabs), hepatitis and HIV.
Social determinants of health		The circumstances in which people are born, grow up, live, work and age, and the systems put in place to deal with illness. These circumstances are in turn shaped by a wider set of forces: economics, social policies, and politics.
Stillbirths		Includes all fetal deaths with a birth weight ≥500 g and/or with a gestational age ≥20 weeks.

Name	Abbreviation	Definition/Relevance
Tuberculosis	TB	Is a preventable, contagious disease that can be treated and cured with medication. Mycobacterium tuberculosis is the bacterium that causes TB. Persons with active TB usually feel sick and may have symptoms such as coughing, fever, and weight loss.
Unadjusted Indian Register Data		Data provided by AANDC which provides the official record of the registered Indian population. Often used as a denominator, unadjusted rates do not compensate for the late reporting of births and deaths.
World Health Organization	WHO	Is the directing and coordinating authority for health within the United Nations system and is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries, and monitoring and assessing health trends.

B. Population Definitions

1. **Overall Canadian population**
   - Total Canadian population, including First Nations on-and off-reserve
2. **Canadian First Nations population**
   - Self-identified in the 2001 Census as being registered to a Canadian FN band; living on- and off-reserve
3. **Overall Saskatchewan population**
   - Total Saskatchewan population, including First Nations on- and off-reserve
4. **Saskatchewan non-Aboriginal population**
   - According to the National Household Survey, those who do not self-identify as Aboriginal
5. **Non-First Nation Saskatchewan population**
   - The 'Non-First Nations population' are people who are not in the Indian Registry. This includes approximately 5% Metis and <0.5% non-registered FN people.
6. **Saskatchewan registered First Nations population**
   - Registered to a Saskatchewan FN band; living on- and off-reserve
7. **Saskatchewan First Nations population living on-reserve**
   - Registered to a Saskatchewan FN band and residing on-reserve
   - Does not include non-registered First Nations or non-First Nations that may be living on-reserve.
8. **Saskatchewan First Nations population living off-reserve**
   - Self-identified as being registered to a Saskatchewan FN band but address indicates they are residing off-reserve
9. **Southern Saskatchewan First Nations Communities**
   - 25 communities in the southern part of the FNIHB-SK region