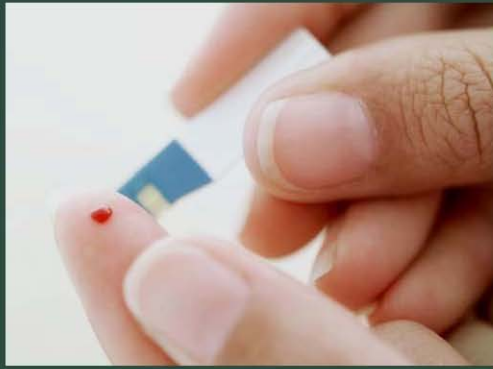


Diabetes in Saskatoon Health Region



A Report of the Medical Health Officer



August 2011

Acknowledgements

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What is a Medical Health Officer Report?

The Medical Health Officer reports are a series of publications that profile a health issue of particular importance in our health region. The purpose is to describe the issue; who is affected, over what particular time period, and where in Saskatoon Health Region. Working in consultation with front line staff and key partners, these reports highlight what is being done in our region to address these issues and also identify best practices from the literature for prevention, detection and management. Ultimately, recommendations are brought forward to the Region and its partners which are aimed at improving the health of residents of Saskatoon Health Region.

ⁱ This report is based in part on de-identified data provided by the Saskatchewan Ministry of Health. The interpretation and conclusions contained herein do not necessarily represent those of the Government of Saskatchewan or the Saskatchewan Ministry of Health.

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Letter from the Deputy Medical Health Officer

We are very pleased to present this Medical Health Officer report looking at diabetes in Saskatoon Health Region. The report aims to profile this important and growing health problem, identify what is currently being done in the region, make suggestions as to what could be done, based on published evidence and examples of good practice, and provide recommendations to improve upon this crisis in our community.

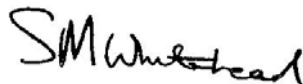
The picture we present is one of a large and growing health problem in our health region. People with diabetes are much more likely than people without the disease to suffer from ill health and a reduction in the quality of their life. They are also considerably more likely to require more health services. Of great concern is the fact that this disease disproportionately affects people living in poverty who are much more likely to develop the disease and once they have diabetes, more likely to suffer from complications. This has to be an important focus of our work as we strive to reduce health inequities.

The fact is, we know what needs to be done to reduce this health problem and we have known for a considerable time. Diabetes and its serious complications are largely preventable. It requires increased efforts to ensure people are active and eat well to avoid a growing epidemic of obesity which is directly related to the increasing prevalence of diabetes. We also need to identify people who have developed diabetes at an early stage so they can be adequately treated and their blood sugar levels controlled. If this can be achieved the onset of complications will be prevented or delayed. Finally, we need to ensure that people with diabetes are regularly checked for the onset of complications of the disease so that early treatment can be started to prevent the disease from worsening any further.

We know what to do, but inevitably doing it is not so easy or it would already have been done. Different segments of the population require different approaches to meet their specific needs and have an active role in both prevention and treatment to help them take control of their illness. As with many chronic diseases that require systematic care over a long period of time, this is truly a disease where a patient centered approach is essential.

Much is already being done in Saskatoon Health Region to prevent and manage the disease, but as this report clearly shows, there is still a long way to go. We hope that the report will be of interest and use to anyone who has a role to play in reducing this problem and that the compelling information and recommendations put forward will be considered and acted upon. Many individuals and organizations have been involved in gathering and interpreting data included in this report as well as helped to formulate recommendations for action; my thanks to them all.

But it doesn't end here; I extend an open invitation for feedback on this report, including what you think about the recommendations and how you or your organization may use, or are already using, this report in your own decision-making for program and service delivery. Challenges, along with good news stories are always welcome. Please either phone (306)655-4481 or email pho@saskatoonhealthregion.ca



Dr. Stephen Whitehead

Deputy Medical Health Officer,
Saskatoon Health Region

Highlights

What is diabetes?

- Diabetes is a chronic metabolic disorder characterized by persistently high levels of blood glucose affecting virtually every part of the body. Complications from diabetes can include cardiovascular disease (heart disease, strokes), high blood pressure, renal disease, retinopathy and amputations.
- Type 2 diabetes makes up about 90% of all diabetes cases. It occurs when there is impaired insulin production and/or insulin resistance in the bodyⁱⁱ; for the most part type 2 is considered preventable.
- Type 1 diabetes occurs when there is no insulin production by the body.

What do we know about diabetes in Saskatoon Health Region (SHR)?

Diabetes has increased in recent years and is projected to keep increasing

- In Canada, diabetes projections suggest an increase from 7.3% prevalence in 2010 to 9.9% in 2020. Saskatchewan has similar projections.
- About 5% of the SHR population (over 16,500 people) lived with diabetes in 2006/07, and this number continues to rise.
- In 2008, over 60 people died from diabetes, though this is an underestimateⁱⁱⁱ. The age standardized death rate from diabetes has increased in recent years and was about 15 for every 100,000 SHR residents.

Diabetes greatly affects an older population

- From age 60 onwards, there was a larger increase in incidence and prevalence of diabetes. Diabetes related death rates were highest in SHR's most elderly age groups.

Diabetes hits men harder

- Incidence and prevalence were higher for SHR males than females over age 40.
- Men were more likely to be hospitalized with complications and die from diabetes for all age groups.

The Registered Indian Status (RIS)^{iv} population bears a high diabetes burden

- Incidence and prevalence rates were 1.6 and 2.6 times higher in RIS populations than in the overall SHR population.
- Almost half of the RIS population over the age of 60 had diabetes.
- The RIS population had significantly higher rates for most diabetes related hospital complications compared to the non-RIS population (some up to four times higher).
- Death rates associated with diabetes were 4 times higher in the RIS population compared to the non-RIS population (68.5 compared to 17.3 per 100,000).

ⁱⁱ Insulin is a natural hormone that controls the level of glucose (a type of sugar) in the blood.

ⁱⁱⁱ Most diabetes related deaths are classified as cardiovascular deaths and diabetes would be likely listed as a secondary cause or co-morbidity.

^{iv} See Appendix A for definition of Registered Indian Status.

Residents of low income neighbourhoods^v in Saskatoon, bear a high diabetes burden

- Diabetes causes serious complications and these become more common as income decreases. For example, residents of low income neighbourhoods had end stage renal disease rates 6.4 times higher than affluent neighbourhood residents. Residents in Saskatoon of middle income neighbourhoods had rates 1.9 times higher than those in affluent neighbourhoods.

Diabetes rates look similar in rural and urban residents

- Incidence, prevalence and hospital complication rates were similar between urban and rural SHR residents, although diabetes death rates were significantly higher among rural SHR residents.

Standards of care measures show improvement is needed in certain areas

- The provincial Health Quality Council has reported on a number of diabetes standards of care indicators. Almost 24% of SHR residents with diabetes got three or more A1C tests done per year, slightly below provincial averages (25%) and far below the ideal standard (100%).
- For all diabetes standards of care indicators, SHR and the province are far below ideal standards and inequities exist between low and high income Saskatchewan residents.

What is currently being done in SHR?

- A provincial diabetes plan was implemented in 2004 with long-term outcomes to be achieved by 2012. In Saskatoon, interested stakeholders formed the Diabetes Self-Management Group and prepared the report, *Saskatoon Health Region: Regional Diabetes Plan*.
- The majority of SHR programs, offered through LiveWell Chronic Disease Management serve those already with diabetes, while many Saskatoon community based programs centre on primary prevention of diabetes.
- A gap exists in SHR related to delivering targeted programming to high risk individuals in primary prevention, screening, and self-management areas. Aim 4 Health is one key program in Chronic Disease Management that does focus on high risk groups.
- Most program areas use education and skill building through participation to influence physical activity and healthy eating, with the exception of programming in the Health Promotion department, Public Health Services, which focuses on environmental and social change.
- Though some programs (e.g. home care) are offered outside urban areas, many services are not evenly distributed in rural areas across SHR.

How can diabetes be controlled or prevented?

- Evidence shows that physical activity, healthy eating, weight loss and weight management are all critical to diabetes prevention, control, and reduced complication risks.
- Weight loss and weight management are also important factors to delay diabetes onset and subsequent complications.
- Evidence supports the effectiveness of pharmacological interventions in the control of diabetes for those with impaired glucose tolerance.

^v See Appendix A for definition of low income neighbourhoods.

- Screening should be offered every three years to individuals 40 years of age or older, with more frequent or earlier testing depending on a number of risk factors such as whether the person has a family history of diabetes, is associated with a high risk population or is overweight.
- Gaps exist in programming within SHR and these mostly centre on more targeted programming for high risk individuals in primary prevention, screening, and self-management areas. By filling in these gaps in services, diabetes can be better controlled and prevented.

What more can we do about diabetes starting right now?

Several recommendations are outlined in Chapter 5 with some shown here.

An overarching recommendation is for SHR to set measurable and manageable diabetes reduction targets for the incidence of diabetes, diabetes associated hospital complications and the gap between high risk and non-high risk populations.

To stop people from developing diabetes

- Encourage SHR initiatives and partnerships that affect the social determinants of health

Prevention and promotion are the first step to reducing costly diabetes related health care delivery. Community initiatives such as the Saskatoon Poverty Reduction Partnership and Health Promoting Schools are opportunities for SHR and partners to shape change at a local level.

To provide early screening and treatment

- Diabetes screening should be more targeted more to high risk populations

SHR, family physicians, community pharmacies and Aboriginal^{vi} based initiatives should take a targeted approach to improve screening service delivery for high risk populations and new immigrants as they often have a higher prevalence of diabetes.

To prevent diabetes complications

- Self-management interventions should be enhanced for those with diabetes

SHR, family physicians, community pharmacies and Aboriginal based initiatives should inform and encourage people with diabetes to undergo Haemoglobin A1C tests so that they know if their levels are within safe limits. Studies have shown important reductions in diabetes complications and diabetes related deaths if A1C levels are reduced by 1%.

^{vi} The term Aboriginal includes people who identify with at least one Aboriginal group such as North American Indian/First Nations, Métis or Inuit. While some of the data analysis in this report pertains to Registered Indian Status (a subset of First Nations groups), we feel that recommendations addressed to all Aboriginal groups is warranted. See Appendix A for more details.

Chapter 1 - An Introduction to Diabetes

Diabetes mellitus is a chronic metabolic disorder characterized by persistently high levels of blood glucose. Levels of high blood glucose occur because the body either cannot produce insulin or cannot properly use the insulin it produces¹. Insulin is needed to use glucose as an energy source. Diabetes is one of the most serious chronic diseases because it affects nearly every system in the body.

1.1 What is the human cost of diabetes?

International

- Worldwide, approximately 285 million people have diabetes. By 2025, that number is expected to increase to 380 million².

Canada

- Current estimates show 2.5 million people have diabetes, equal to 7.3% or 1 in 14 people with projections to 1 in 10 or 3.7 million people by 2020. This is a 48% increase in 10 years¹.
- Almost 60,000 more people each year are expected to develop diabetes³.

Saskatchewan

- In 2008/09, there were over 60,000 people with diabetes or 7.8% of the population with about 4,200 more people newly acquiring the disease that same year⁴. It is predicted that prevalence will increase to 9.9% by 2020⁵.
- Between 2001/02 and 2008/09, the prevalence of diabetes rose by 44% from 5.4%⁶ to 7.8%⁷.
- The prevalence rate was over three times higher in Aboriginal populations than non-Aboriginal. ⁶

1.2 What is the economic burden of diabetes?

The increasing magnitude of diabetes results in health system pressures at all levels and can cause severe socio-economic disruption to individuals, families and society. People with diabetes are three to five times more likely to visit a specialist and incur five times as many hospital days as people without diabetes⁸. Disabilities, resulting from related complications, increase pressure on health care services, result in lost days from work, possibly leading to unemployment and reduced life expectancy; all of which affects overall quality of life.

The economic burden of diabetes is estimated at \$12.2 billion per year in Canada; double the burden of 10 years ago¹. In Saskatchewan, the costs are projected to increase from \$419 million in 2010 to \$532 million in 2020⁵ – more than half of SHR's annual budget alone! This translates to a 27% increase. Medical costs are up to three times higher for people with diabetes compared to those without. The estimated annual expense for medication and supplies for a person with diabetes ranges from \$1,000 to \$15,000¹⁰.

The Cost of Obesity

Obesity is a key risk factor for diabetes. It is estimated that over \$120 million is spent on obesity-related illnesses in Saskatchewan every year; that is about 7.3% of total provincial direct health care costs⁹.

The Patient Cost Estimator tool from the Canadian Institute for Health Information puts the 2009 direct hospitalization costs per diabetes patient at \$4,200 in Saskatchewan and \$4,900 for Canada¹¹. These costs increase considerably to over \$13,000 in Saskatchewan for an unplanned dialysis¹¹. It is important to note that cost figures do not include people living in the community with undiagnosed diabetes and those with pre-diabetes. It is estimated that six million Canadians are living with pre-diabetes¹.

1.3 What are the types of diabetes?

The different types of diabetes are listed in Table 1. Further details can be found in Appendix A.

Table 1: Types of Diabetes

<p>Type 1</p> <ul style="list-style-type: none"> ▪ An autoimmune disease, characterized by no insulin production by the pancreas. Glucose then builds up in the blood instead of being used for energy¹². ▪ Accounts for approximately 10 percent of diabetes patients. ▪ Usually starts in childhood and young adulthood, onset by genetic and environmental factors in those predisposed. <p>Type 2</p> <ul style="list-style-type: none"> ▪ Caused by a combination of resistance to insulin followed by impaired insulin production¹³. ▪ Present in over 90% of diabetes patients. ▪ Affected by genetic and environmental factors. For example, obesity has a strong association with type 2 diabetes in genetically susceptible populations. ▪ Usually diagnosed in adults over 45 years. ▪ Over half of the Canadian population will be at risk by 2011³. <p><u>Other diabetes related conditions</u></p> <p>Pre-diabetes</p> <ul style="list-style-type: none"> ▪ Characterized by impaired fasting glucose and impaired glucose tolerance, conditions that put people at risk for developing diabetes and complications³. ▪ The annual rate of progression from pre-diabetes to type 2 diabetes is about 3 to 10 percent¹⁴ and can be prevented or delayed by reducing body weight by at least 5% to 10% and by increasing physical activity to at least 30 minutes per day¹⁵. <p>Gestational Diabetes</p> <ul style="list-style-type: none"> ▪ The onset or first recognition of glucose intolerance during pregnancy. ▪ Women are screened for gestational diabetes between 24-28 weeks' gestation, or in the first trimester if the woman has multiple risk factors¹⁶. ▪ In Saskatchewan, the prevalence of gestational diabetes varied from 3.5% in the non-Aboriginal population to 11.5% in the Aboriginal population¹⁷. <p>Other Types</p> <ul style="list-style-type: none"> ▪ Includes a wide variety of uncommon conditions, primarily specific genetically defined forms of diabetes or diabetes associated with other diseases or drug use³.
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1.4 How is diabetes diagnosed?

Diabetes

Fasting blood glucose continues to be the recommended screening test for diabetes. A person is diagnosed with diabetes if their:

- 1) fasting plasma glucose level is 7.0 mmol/L or greater, or
- 2) random plasma glucose level is 11.1 mmol/L or greater with symptoms of diabetes, or
- 3) 2-hour plasma glucose level is 11.1 mmol/L or greater in an oral glucose tolerance test¹⁸.

Pre-diabetes

A person is diagnosed with pre-diabetes if their impaired fasting glucose and impaired glucose tolerance with a fasting plasma glucose levels are between 6.1 and 6.9 mmol/L¹⁸.

A number of limitations to this lower limit have been identified³. It is important to note that pre-diabetes will not necessarily progress to diabetes. Risk factor modification and lifestyle interventions have been shown to be effective in preventing or delaying the onset³.

1.5 What are the complications from diabetes?

Diabetes causes structural and biochemical changes, including damage to nerves and blood vessels in almost all organs and tissues in the body, potentially resulting in a number of complications, outlined in Table 2. In addition to causing greater hardships for those with diabetes, these complications contribute to the economic costs outlined above in section 1.2.

Table 2: Diabetes Complications

<p>Cardiovascular disease and stroke</p> <p><u>What is it?</u></p> <p>CVD includes coronary heart disease, cerebrovascular disease and peripheral vascular disease. These can lead to heart attacks, angina, heart failure, stroke, and gangrene or ulceration of the feet and legs requiring amputation.</p> <p><u>What is the risk?</u></p> <p>About 80% of people with diabetes will die from heart disease or stroke¹⁹ and the risk is three to four times higher in people with diabetes than those without⁸. Risk of stroke in patients with diabetes is as high as 150% to 400%²⁰.</p>	<p>Hypertension</p> <p><u>What is it?</u></p> <p>Most people with diabetes will develop hypertension, otherwise known as high blood pressure; however, it is a treatable risk factor.</p> <p><u>What is the risk?</u></p> <p>Hypertension is a major risk factor for cardiovascular and microvascular (e.g. retinopathy, neuropathy, kidney) conditions.</p>
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Diabetes Complications continued...

<p>Hypo-and Hyper-glycemia</p> <p><u>What is it?</u></p> <p>Hypoglycemia is lower than normal blood sugar levels commonly caused by too much insulin or other glucose lowering medications. Hyperglycemia is higher than normal levels of blood sugar due to lack of effective insulin, which can lead to ketoacidosis (blood turns acidic). Both of these complications are acute or short term.</p> <p><u>What is the risk?</u></p> <p>Hospitalizations for these conditions tend to reflect the quality of diabetes care, and can be reduced through greater access to primary care, education, and medication adherence⁶.</p>	<p>Lower Limb Amputations</p> <p><u>What is it?</u></p> <p>Amputations are one of the most considerable co-morbidities of diabetes. People with neuropathy, nerve disorders resulting in numbness or pain/weakness in hands, arms, feet and legs, can get skin ulcers which lead to infection, gangrene, and eventually, amputation. Poor circulation due to diabetes is also a contributing factor.</p> <p><u>What is the risk?</u></p> <p>Approximately 20% of all diabetes related admissions in North America are as a result of amputations. The risk for people with diabetes is almost 19 times higher than in those without diabetes⁸.</p>
<p>Chronic Kidney disease (CKD)/End Stage Renal Disease (ESRD)</p> <p><u>What is it?</u></p> <p>CKD is responsible for kidney failure and is characterized by proteinuria (excess protein in the urine). ESRD is the most advanced stage of kidney disease and results in renal (kidney) failure. When the kidneys fail, dialysis may be needed.</p> <p><u>What is the risk?</u></p> <p>CKD is extremely common among people with diabetes, with 50% having this complication. In Canada, the number of people with diabetes and ESRD requiring dialysis rose by 30% between 1988 and 1997²¹.</p>	<p>Retinopathy</p> <p><u>What is it?</u></p> <p>Retinopathy is impairment or loss of vision. Diabetes is the most common cause of blindness in working age adults in the United States.</p> <p><u>What is the risk?</u></p> <p>Most people who have had diabetes for more than 20 years have some form of diabetic retinopathy²² and more than 80% of people with diabetes suffer from eye complications such as retinopathy, cataracts and glaucoma²³.</p>
<p>Erectile Dysfunction</p> <p><u>What is it?</u></p> <p>Erectile dysfunction (ED), or impotence, is a condition that affects a man's ability to get and sustain an erection, and affects up to 45% of men with diabetes.</p> <p><u>What is the risk?</u></p> <p>Increasing age, duration of diabetes, poor glycemic control, cigarette smoking and hypertension are among the chief risk factors for ED. It is also a marker for cardiovascular conditions.</p>	<p>Death</p> <p><u>What is the risk?</u></p> <p>Death rates are twice as high for people with diabetes than those without and diabetes shortens life expectancy by approximately 10 to 15 years⁵. For example, women diagnosed with diabetes between 20 and 39 years of age have a life expectancy 9 years less than those without diabetes⁸. About 41,500 deaths were recorded in Canada due to diabetes in 2005-2006.</p>

Source: Canadian Diabetes Association, 2008³ unless otherwise noted.

1.6 What are the risk factors for developing diabetes?

There are number of risk factors for developing diabetes, some of which are under the control of the individual and some which are not. Understanding risk factors can help to prevent diabetes by identifying people at risk who should be screened for diabetes. It can also minimize complications from diabetes and enhance personal knowledge of the disease.

Table 3: Risk Factors for Developing Diabetes

Age	<ul style="list-style-type: none"> Those 40 years of age or older are at greater risk for type 2 diabetes¹⁰. Age is one of the main risk factors for diabetes.
Member of a high risk population	<ul style="list-style-type: none"> Aboriginal men and women have rates two to eight times higher for diabetes than non-Aboriginal counterparts in Canada²⁴. Suggested contributors to higher Aboriginal diabetes rates have been genetics^{24,25}, and rapid socio-cultural changes among Aboriginal people in the past few decades²⁶. Almost 80% of new Canadians, including those of Hispanic, Asian, South Asian or African descent have higher risk for type 2 diabetes¹.
Family history of diabetes	<ul style="list-style-type: none"> Individuals with a family history of diabetes are more at risk of developing diabetes. This is especially true of first degree relatives of someone with type 2 diabetes.
History of gestational diabetes, or delivery of high birth weight babies	<ul style="list-style-type: none"> Females with a history of gestational diabetes or delivery of high birth weight babies (greater than or equal to 4 kg) have a higher risk of developing type 2 diabetes later in their life than women without gestational diabetes.
Impaired glucose tolerance (or history of)	<ul style="list-style-type: none"> One of the biggest predictors of diabetes. A fasting plasma glucose level of greater than 5.6mmol/L indicates a person at risk for diabetes.
Obesity (body mass index > 30 kg/m ²) and overweight (body mass index between 25-29.9 kg/m ²)	<ul style="list-style-type: none"> An estimated 80% to 90% of people with type 2 diabetes are overweight or obese. Excessive abdominal obesity is one of the strongest risk factors for diabetes.
Polycystic Ovary Syndrome	<ul style="list-style-type: none"> Multiple follicles accumulate in the ovaries without ovulation. This is associated with developing type 2 diabetes later in life.
Acanthosis Nigricans	<ul style="list-style-type: none"> A skin disorder characterized by the appearance of darkened patches of skin; associated with insulin resistance and development of type 2 diabetes.
Schizophrenia	<ul style="list-style-type: none"> A higher prevalence of type 2 diabetes exists among people with schizophrenia than the general population.

Source: Canadian Diabetes Association, 2008³ unless otherwise noted.

1.7 What are the pathways to prevention, control and management of diabetes?

There are various pathways along the continuum of diabetes care. Preventing people from developing diabetes is the first step. This is about addressing environments and risk factors to reduce the growing number of people affected by diabetes. The second step is to ensure early screening and treatment of diabetes for early detection to prevent any complications and improve quality of life. Lastly, for people with diabetes, ongoing regular annual check ups are needed to prevent the onset of diabetes related complications or, if complications are developing, to treat these early on. Throughout the continuum it is important to recognize that the health care sector alone cannot reduce the diabetes burden and requires intersectoral support.

1. Primary Prevention - To prevent people from developing diabetes

Primary prevention is aimed at modifying behavioural and environmental risk factors²⁷. Traditionally, modifiable risk factors were used to primarily explain individual lifestyle choices that put people at risk for, or resulted in, diabetes. This is one piece of a larger, more complex puzzle. It is also important to recognize the correlation between the social determinants of health (see Table 4) and high rates of chronic disease in the population, not only for people at risk of diabetes, but for those requiring screening and treatment, and at risk of diabetes related complications.

Table 4: The Social Determinants of Health

- | | |
|---|-----------------------------|
| ▪ Income and social status | ▪ Healthy Child Development |
| ▪ Education and literacy | ▪ Biology and Genetics |
| ▪ Employment & Working Conditions | ▪ Health Services |
| ▪ Social Environments | ▪ Gender |
| ▪ Physical Environments | ▪ Culture |
| ▪ Personal health practices & coping skills | ▪ Social Support Networks |

Source: Public Health Agency of Canada, 2010²⁸

When considering the diabetes evidence-base in Saskatoon Health Region, it is important to remain mindful of the social determinants of health, especially income. Previous research in Saskatoon Health Region found significant differences in health care utilization by neighbourhood income status for a variety of diseases, including diabetes²⁹.

While primary prevention of type 1 diabetes is not achievable at this time²⁷, it has been estimated that 90% of type 2 diabetes is related to modifiable factors such as obesity, sedentary lifestyles, and poor diet²⁴. Therefore, interventions to prevent people from developing diabetes include increased physical activity, healthy eating, education, employment, and changes to the physical environment²¹.

2. Secondary Prevention - To improve early screening and treatment

Secondary prevention involves early identification through screening to prevent or delay diabetes, as well as complications among those who already have diabetes^{27;30}. Screenings are generally available through family physicians, SHR chronic disease management programs, and community pharmacies. Early identification allows for treatment and encouragement of self-management practices to ensure positive health outcomes.

3. Tertiary Prevention - To prevent diabetes related complications

Tertiary prevention focuses on delaying or preventing complications and disabilities among people with diabetes³⁰. It is very similar to secondary prevention and there is overlap. Activities include team based medical management and self-management of diabetes, such as self monitoring of blood glucose, foot care, eye care and regular A1C tests. Daily injection of insulin is required for control of type 2 as well as type 1 diabetes. Evidence-based studies indicate that intensive treatment of type 1 diabetes through controlling blood glucose levels results in lowering the risk of cardiovascular cases by 42% and myocardial infarction, stroke or death from coronary vascular disease by 57%³¹.

What's the Bottom Line on Diabetes?

- Diabetes is a serious chronic disease because it affects nearly every system in the body.
- Diabetes costs the health care system thousands per patient and in Saskatchewan \$419 million in 2010.
- Type 2 diabetes, which makes up about 90% of all diabetes, can be prevented.
- Understanding the biologic, lifestyle, and broader socio-environmental risk factors for diabetes can lead to the prevention and better management of diabetes.

Chapter 2- A Profile of Diabetes in Saskatoon Health Region

In order to better understand how diabetes affects residents of Saskatoon Health Region (SHR), this chapter takes a closer look at different subpopulations, by age, gender, and income at regional, rural, urban and neighbourhood levels. Focus is given to persons of Registered Indian Status (RIS) who bear a higher diabetes burden than non-RIS individuals. In some cases, regional data was not available. For example, immigrant populations are not captured through administrative data sets, though it has been shown that countries in certain world regions of South Asia, Latin America, North Africa and the Middle East have a higher burden of diabetes than Canada^{2:32}.

2.1 How did we identify people with diabetes in Saskatoon Health Region?^{vii}

For the purposes of analysis, a standard definition was applied to describe a person with diabetes. A person was considered to have diabetes if they had:

- 1) two or more physician claims with a diabetes diagnosis of ICD-9 code 250 on different days within a period of two years or 730 days inclusive, or
- 2) one hospital discharge with a diabetes diagnosis coded 250.x in ICD-9 or E10.x, E11.x, E13.x, or E14.x in ICD-10 code, or
- 3) one or more outpatient prescriptions for insulin or oral hypoglycemic.

Diabetes records for girls and women aged 10 to 54 years of age, occurring 180 days prior to or 120 days after a gestational record, were dropped in order to exclude gestational diabetes from the dataset.

The SHR case definition is very similar to the one used by the Canadian Chronic Disease Surveillance System (CCDSS), formerly the National Diabetes Surveillance System, except for the prescription for insulin or oral hypoglycemic. The outpatient prescription was added to the case definition because it was thought that some people with diabetes might be missed using only the physician claims and hospital discharge criteria. However, because persons of RIS do not receive their prescription drug benefits through the provincial government, the diabetes definition among this subpopulation was restricted to the first two criteria only. The definition is included for all ages. All statistics presented as age standardized are adjusted to the 1991 Canadian population.^{viii} It should also be noted that there is no method to differentiate between type 1 and type 2 diabetes in the data.

^{vii} Saskatchewan is a partner in the Canadian Chronic Disease Surveillance System (CCDSS), and most data reported in the following sections (except death), came from the Saskatchewan Ministry of Health using CCDSS software.

^{viii} Note that the rates presented in the following section are different than that reported by the Health Quality Council on their Quality Insight website. This is likely due to differences in diabetic definition, and codes used for particular complications between these two data sources and that HQC reports rates for 20 years and over.

2.2 How many Saskatoon Health Region residents have diabetes?

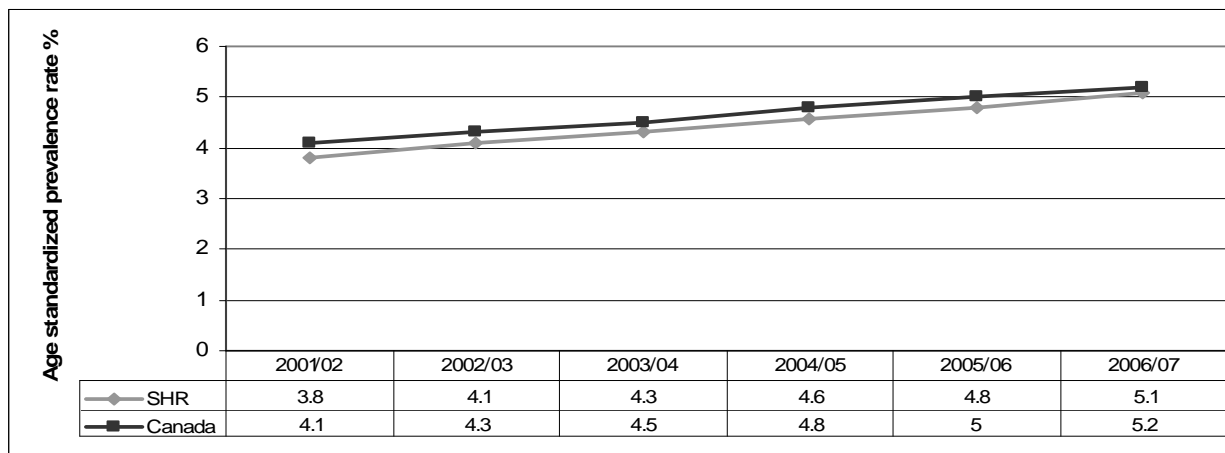
Regional Trend: Prevalence

Prevalence is the number of existing cases in a population. In SHR, there is an increasing trend of diabetes prevalence, reaching 5.1% in 2006/07, which translated to over 16,500 people. These are lower rates than those reported for Saskatchewan at 6.0% in 2006/07³³ and about the same trend as in Canada. SHR is following a similar increasing trend to the national prevalence (see Figure 1).

How many people have diabetes?

In 2006/07, over 16,500 people had diabetes in SHR. This number of people would overfill the Credit Union Centre at a capacity of roughly 15,000.

Figure 1: Diabetes prevalence rates, Saskatoon Health Region and Canada, 2001/02-2006/07

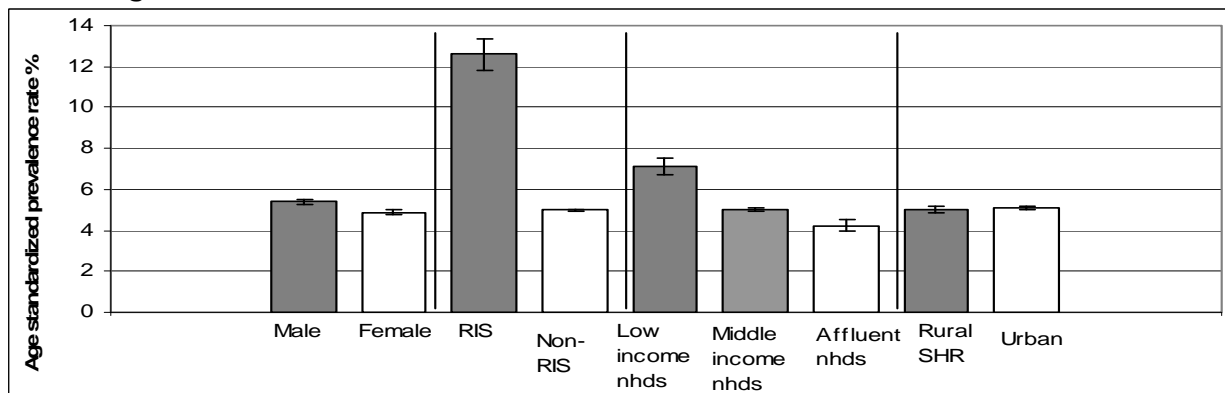


Source: Saskatchewan Ministry of Health. Canada values from National Diabetes Surveillance System, 2009⁸ report page 7.

A Closer Sub-Regional Look: Prevalence

The age standardized prevalence rate of diabetes in SHR was 5.1% in 2006-07. Comparisons between gender, RIS, neighbourhood and geography are shown below (Figure 2). More detailed information is found in Table B1, Appendix B.

Figure 2: Diabetes prevalence by subpopulation with 95% confidence intervals, Saskatoon Health Region, 2006-07



Source: Saskatchewan Ministry of Health.

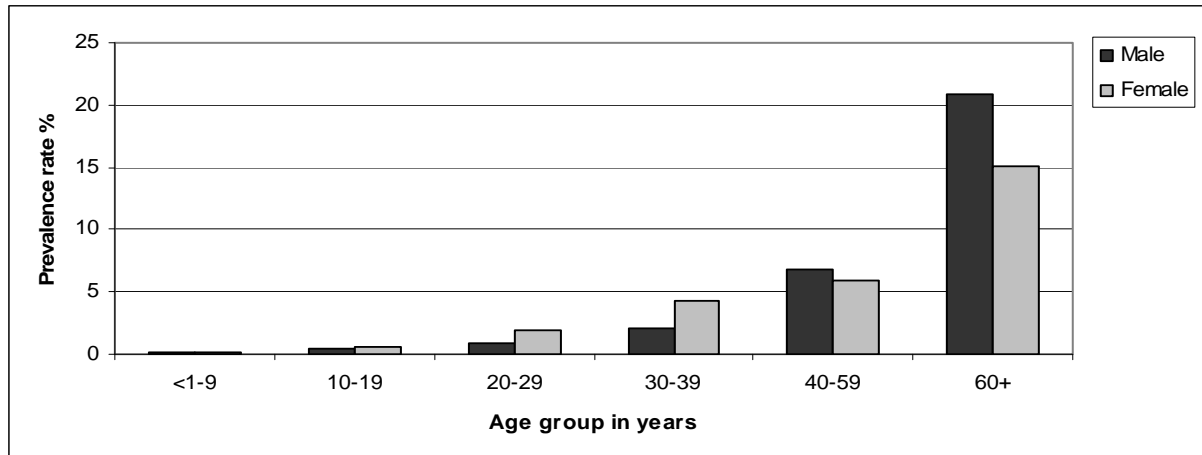
The RIS population had age standardized rates 2.6 times higher than the non-RIS population (12.6% versus 4.9%). This is slightly lower than rates found in the literature comparing similar populations; age adjusted prevalence for Aboriginal persons show a rate three to five times higher than the general population in Canada³⁴. In Saskatchewan, age adjusted prevalence rates for First Nations^{ix} females were 3.7 times higher than non-First Nations females and 2.6 times higher between First Nations males compared to non-First Nations males in 2005³⁵.

Residents of Saskatoon's low income neighbourhoods had much higher prevalence rates of diabetes (7.1%) compared to residents of middle income (5.0%) and affluent neighbourhoods (4.2%)^x. Similar findings have been shown in the literature³⁶. Men had higher prevalence rates than females, and rural and urban rates were similar.

Diabetes Prevalence: Gender Analysis

The prevalence rate of diabetes increases with age in both sexes (Figure 3). Women have higher prevalence rates than men until the age of 40 years, after which the trend reverses. This is similar to the trends found for Canada⁸.

Figure 3: Age specific prevalence of diabetes by age and sex, Saskatoon Health Region, 2006/07



Source: Saskatchewan Ministry of Health.

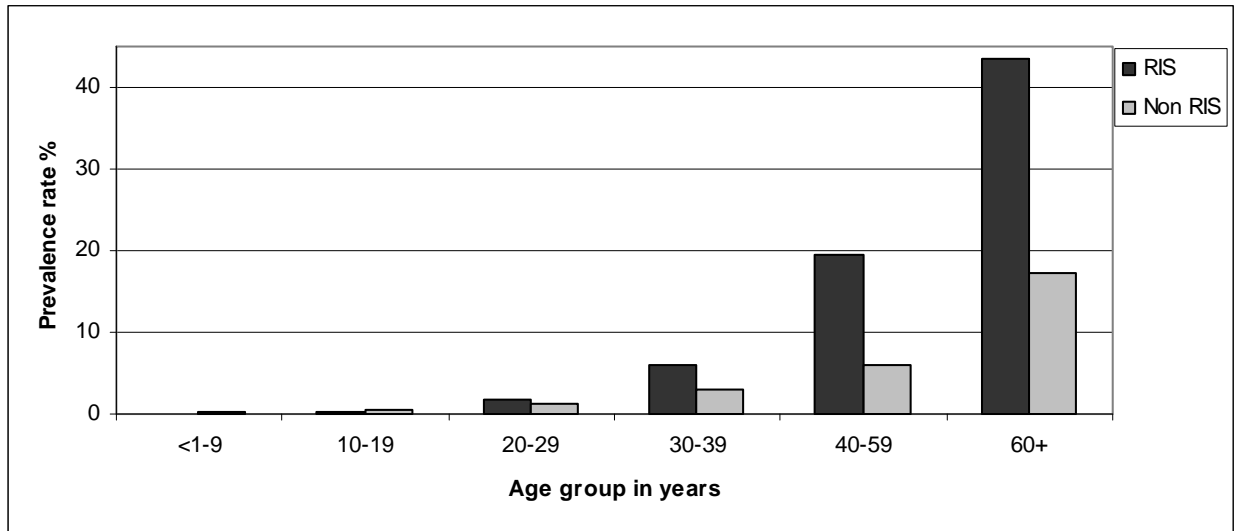
Diabetes Prevalence: RIS Analysis

The prevalence rate of diabetes is higher in the RIS population compared to the non-RIS population, with the highest rates in the 60+ age group (see Figure 4). Two in five (42%) RIS individuals over the age of 60 have diabetes. This is similar to findings in Saskatchewan³⁵.

^{ix} First Nations and non-First Nations referred to in Dyck et al., 2010³⁵ is the same definition as RIS and non-RIS respectively used throughout our report.

^x See Appendix A for list of neighbourhoods in Saskatoon.

Figure 4: Age specific prevalence of diabetes by Registered Indian Status, Saskatoon Health Region, 2006/07



Source: Saskatchewan Ministry of Health.

What's the Bottom Line on Diabetes Prevalence?

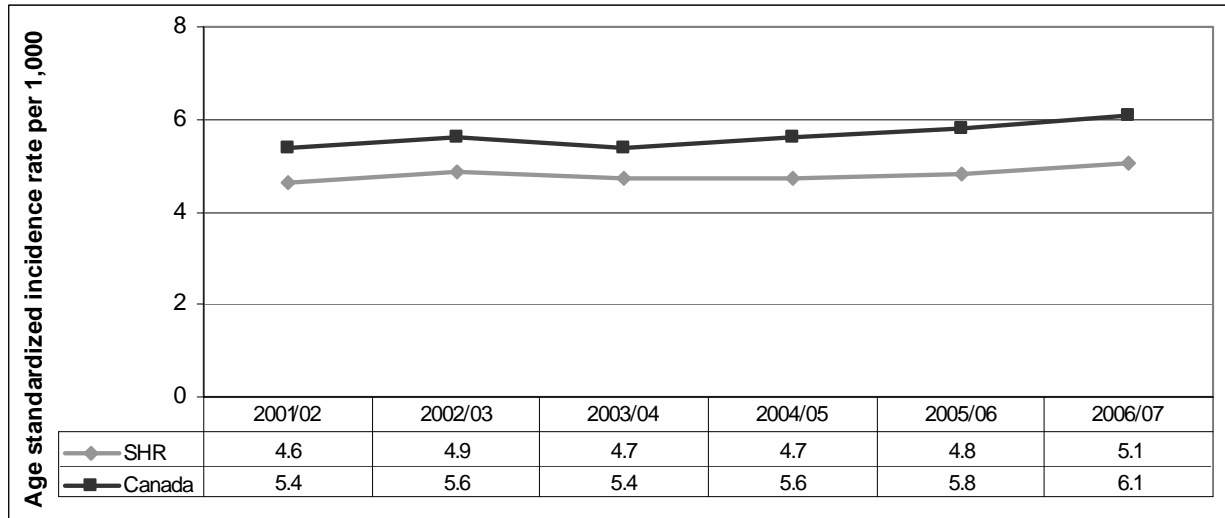
- Diabetes prevalence shows an increasing trend in SHR.
- There is significantly higher diabetes prevalence amongst residents of low income neighbourhoods, RIS populations, and males compared to other Saskatoon neighbourhood residents, non-RIS populations and females respectively.
- Males have higher prevalence rates after age 40.
- Prevalence rates increase with age; people 60 years and over have the highest prevalence rates. In RIS populations, almost half over the age of 60 have diabetes.

2.3 How many new cases of diabetes are there?

Regional Trend: Incidence

Incidence refers to the number of new cases of a disease in a certain time period. Overall, the incidence rate in SHR has been relatively constant between 2001/02 and 2006/07 fluctuating only slightly between 4.6 and 5.1 per 1,000 population. In 2006/07, this translated into over 1,600 new cases of diabetes. These values are lower than those reported for Saskatchewan in 2006/07 at 6.2 per 1,000³³ and in Canada at 6.1 per 1,000 population (Figure 5).

Figure 5: Diabetes incidence rates, Saskatoon Health Region and Canada, 2001/02-2006/07

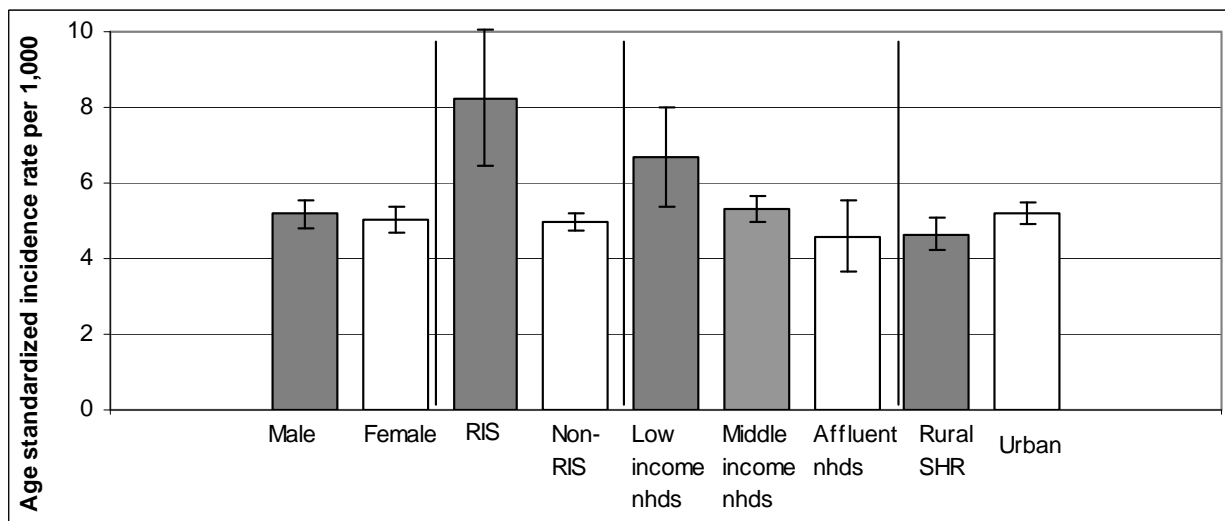


Source: Saskatchewan Ministry of Health. Canada values from National Diabetes Surveillance System, 2009⁸ report page 13.

A Closer Sub-Regional Look: Incidence

The age-standardized incidence rate of diabetes was 5.1 per 1,000 population in SHR in 2006-07 (see Table B2, Appendix B for more detailed information). The differences by subpopulation are similar to that of prevalence rates by subpopulation seen in Figure 6, where again, significant differences were observed for the RIS population. The RIS population had significantly higher age-standardized incidence rates compared to the non-RIS population (8.2 compared to 5.0 per 1,000). Residents of Saskatoon's low income neighbourhoods had higher incidence rates (6.7 per 1,000) than residents of middle income (5.3 per 1,000) and affluent neighbourhoods (4.6 per 1,000), though not statistically significant. Slight differences were seen between males and females and between urban and rural residents.

Figure 6: Incidence of diabetes by sub-population with 95% confidence intervals, Saskatoon Health Region, 2006-2007

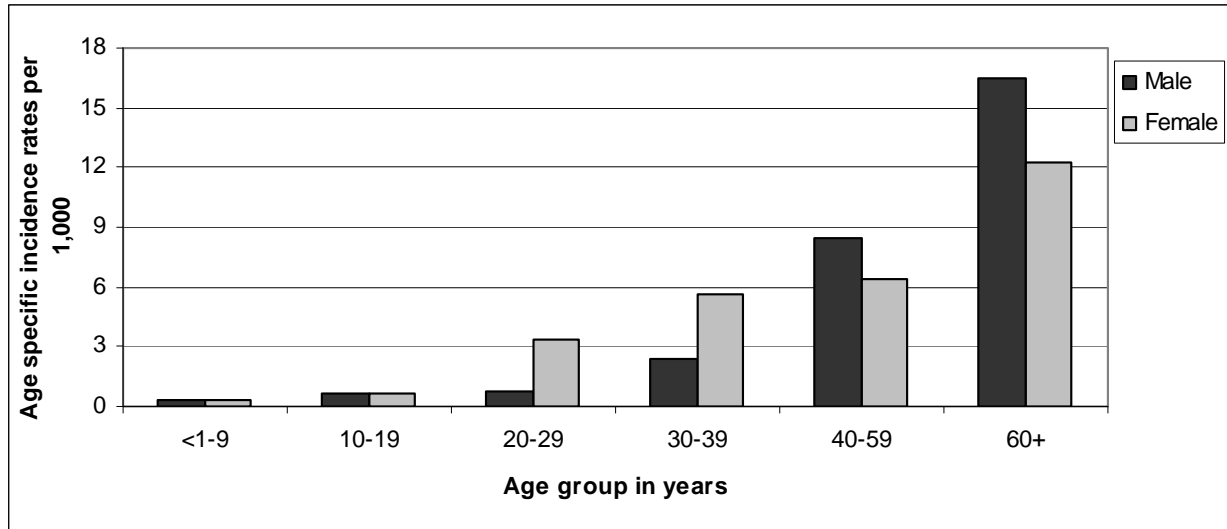


Source: Saskatchewan Ministry of Health.

Diabetes Incidence: Gender Analysis

Incidence rates also show an increase with age in both sexes, peaking for the 60+ age group (Figure 7). Women have higher incidence rates than men up to the age of 40 years and vice versa after that. This is consistent with literature from Saskatchewan showing that non-First Nations men have higher incidence rates than women starting at age 40³⁵.

Figure 7: Age specific diabetes incidence rate, by sex, Saskatoon Health Region, 2006/07

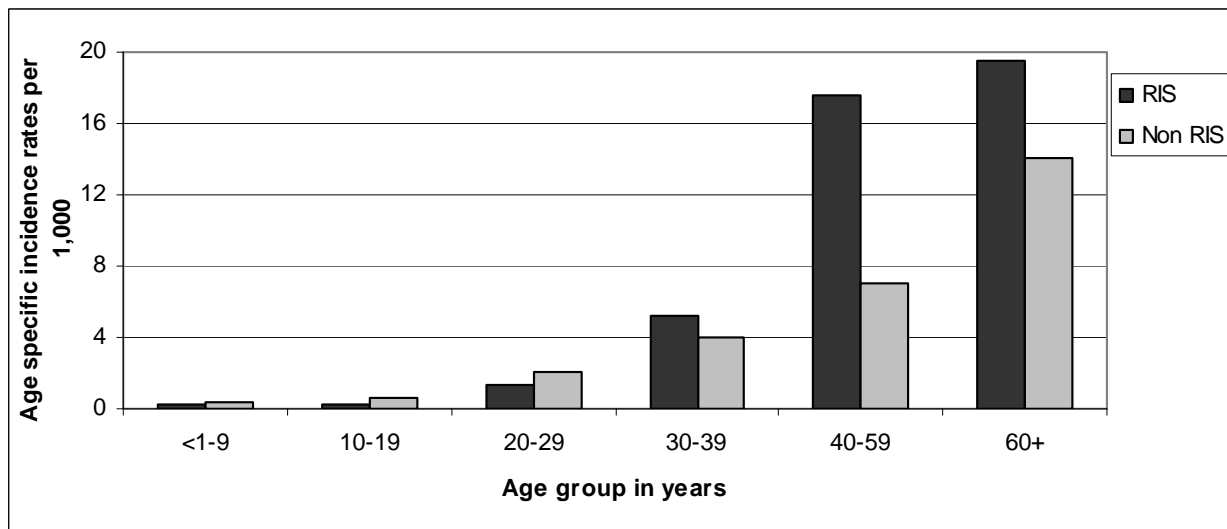


Source: Saskatchewan Ministry of Health.

Diabetes Incidence: RIS Analysis

Incidence rates in the RIS population look different than the non-RIS population after age 39. The RIS population had much higher incidence rates of diabetes (Figure 8) from age 40 onward. Even though the incidence rate is highest in the 60+ age group for RIS populations, the largest burden by number of cases occurs in the younger age group 40 to 59 years of age.

Figure 8: Age specific diabetes incidence rate, by Registered Indian Status, Saskatoon Health Region, 2006/07



Source: Saskatchewan Ministry of Health.

What's the Bottom Line on Diabetes Incidence?

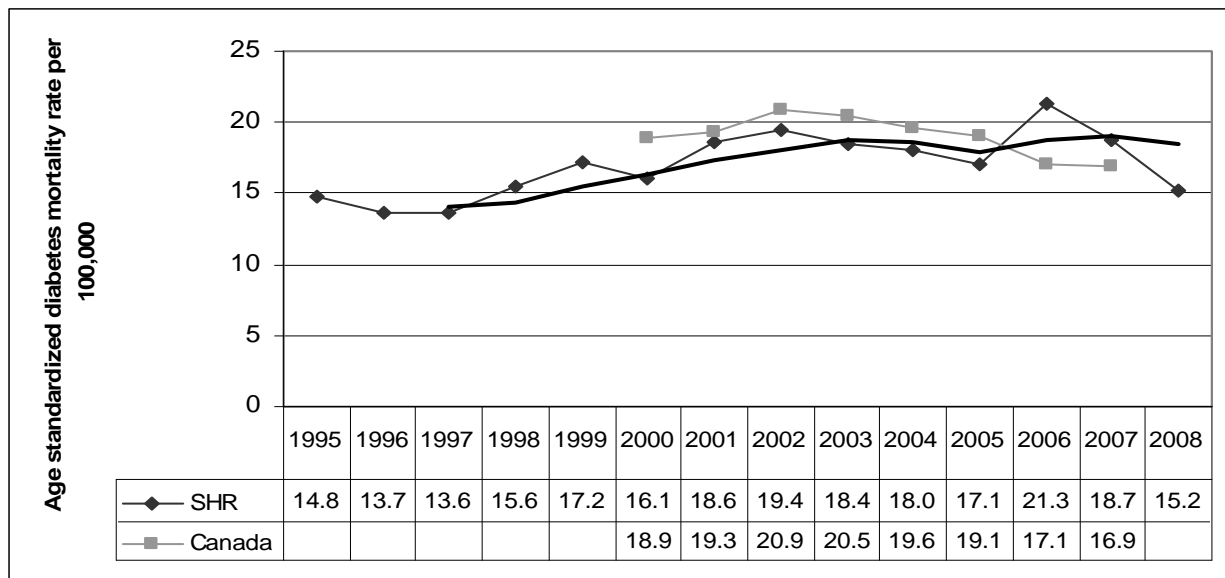
- There was a stable incidence trend between 2001/02 and 2006/07.
- Higher diabetes incidence rates are seen after the age of 60 years.
- RIS populations have significantly higher incidence rates compared to the non-RIS population.
- Incidence rates are higher among males after age 40.
- RIS populations have higher numbers of cases beginning at age 40.

2.4 How many people die from diabetes annually?

Regional Trend: Diabetes Deaths^{xi}

In 2008, over 60 people died with diabetes listed as the underlying cause of death. While the overall trend in age-standardized death rates in SHR has increased, the years 2007 and 2008 showed promising decreases (see Figure 9). Canadian age-standardized rates are only slightly higher during this time period (1995-2008). Male death rates have been consistently higher than female rates (data not shown).

Figure 9: Diabetes death rates, Saskatoon Health Region (with trend line) and Canada, 1995-2008



Source: Saskatchewan Ministry of Health. Canada from CANSIM table 102-0552.

As might be expected, diabetes death rates increase with age. Death rates were relatively small up to the age of 39 years with the highest rates for those in the 85+ year age range (data not shown).

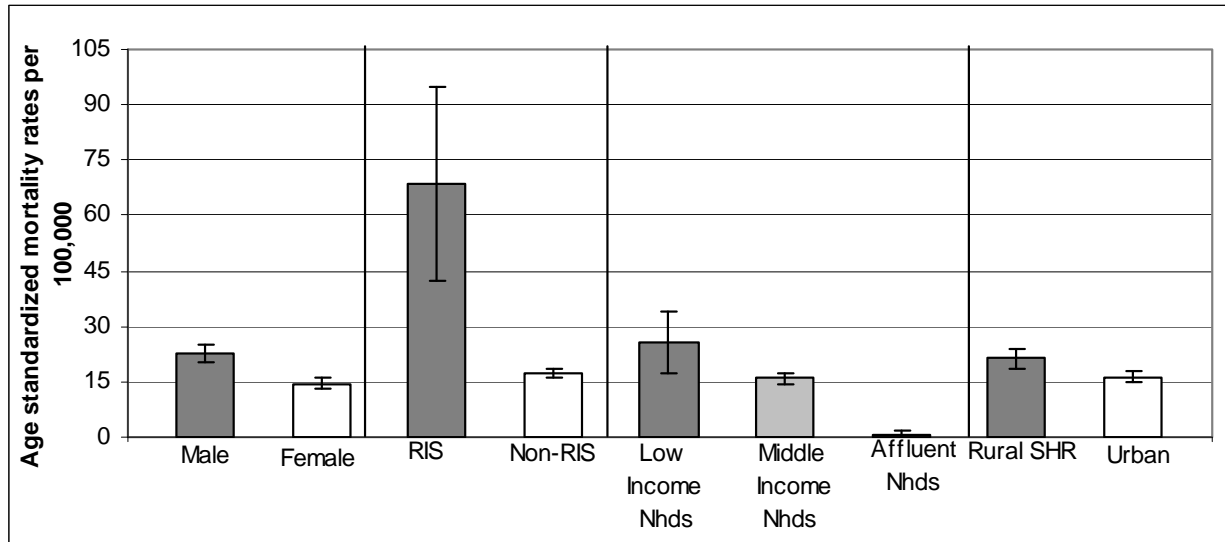
^{xi} Diabetes related death statistics reflect data from the Saskatchewan Ministry of Health. Death data are based on the underlying cause of death reported on the death registration. This can be problematic for accurately gauging the impact of diabetes as the majority of diabetes related deaths are attributed to cardiovascular causes (Booth et al, 2006). The diagnosis was in International Classification of Disease 9th edition (ICD-9) coding 250.0-259.9 between 1995-1999 or in ICD-10 coding E10.0-E14.9 from 2000 onwards.

A Closer Sub-Regional Look: Diabetes Deaths

Given that diabetes related deaths are quite low year to year, 10 years of data were combined for sub-regional analysis. Figure 10 shows that disparity exists between certain groups and that these differences are significant. The age-standardized death rate of diabetes in SHR was 18.0 per 100,000 between 1999 and 2008, with higher rates found for men (22.9 per 100,000) than women (14.4 per 100,000). Rural residents had significantly higher death rates (21.2 per 100,000) than urban residents (16.4 per 100,000) over this time period.

In addition, the RIS population had age standardized death rates four times higher than non-RIS populations (68.5 per 100,000 versus 17.3 per 100,000). This is consistent with rates found in the literature showing much higher age-standardized rates for RIS populations⁶. Residents of Saskatoon's low income neighbourhoods had higher age standardized rates (25.8 per 100,000) compared to middle income (15.9 per 100,000) and affluent neighbourhood residents (0.7 per 100,000). This finding is consistent with research that shows that people living on a low income are more likely to be affected by diabetes than those living in affluence³⁷.

Figure 10: Diabetes death rates by subpopulation with 95% confidence intervals, Saskatoon Health Region, 1999-2008 combined

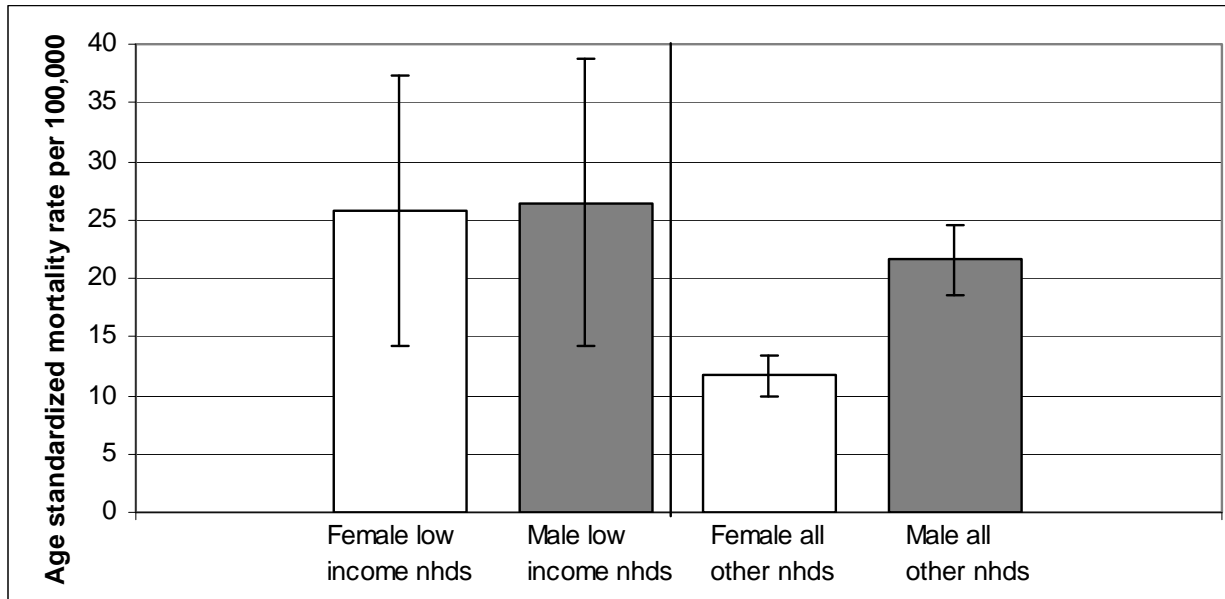


Source: Saskatchewan Ministry of Health.

Diabetes Deaths: Neighbourhood Analysis

Female low income neighbourhood residents had diabetes death rates almost as high as male low income neighbourhood residents. This is opposite for middle income and affluent neighbourhoods combined, where male death rates are significantly higher (Figure 11). Further examination is needed to understand why this occurred.

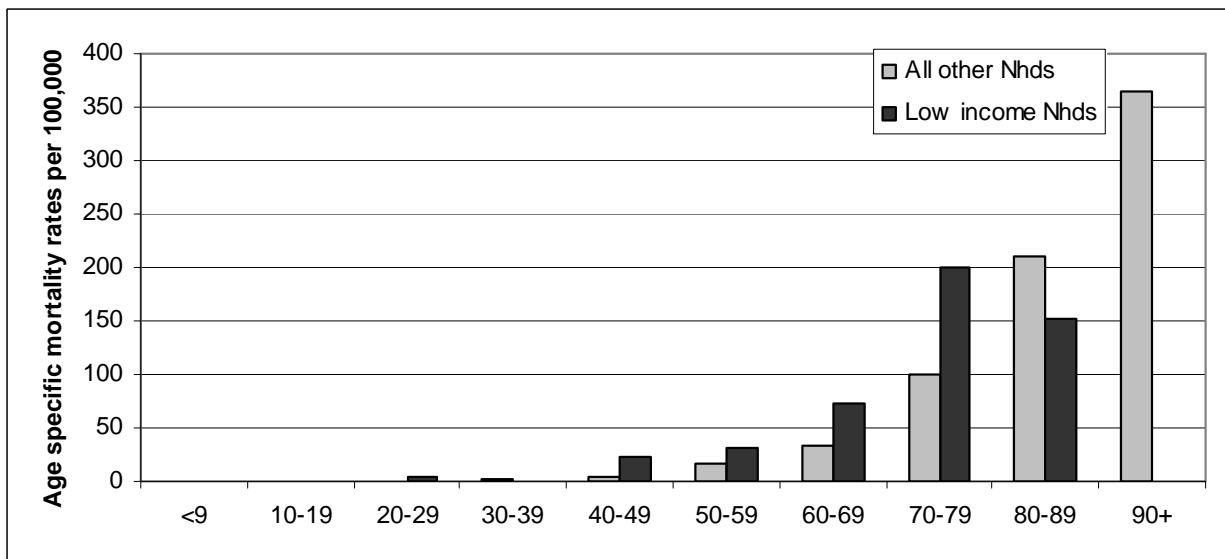
Figure 11: Diabetes death rates by sex and Saskatoon neighbourhood grouping, 1999-2008 combined



Source: Saskatchewan Ministry of Health.

In Saskatoon's low income neighbourhoods, diabetes death rates were higher than all other neighbourhood rates for every age group up until 80 years of age. After age 80, middle income and affluent neighbourhood rates were higher (see Figure 12). This suggests that diabetes affects those in Saskatoon's lower income neighbourhoods considerably more relative to the rest of the city's residents, especially in age groups under 80 years of age. It also suggests that people in more affluent areas are likely getting diagnosed earlier and managing their diabetes better.

Figure 12: Diabetes death rates, by age group, Saskatoon, 1999-2008 combined



Source: Saskatchewan Ministry of Health.

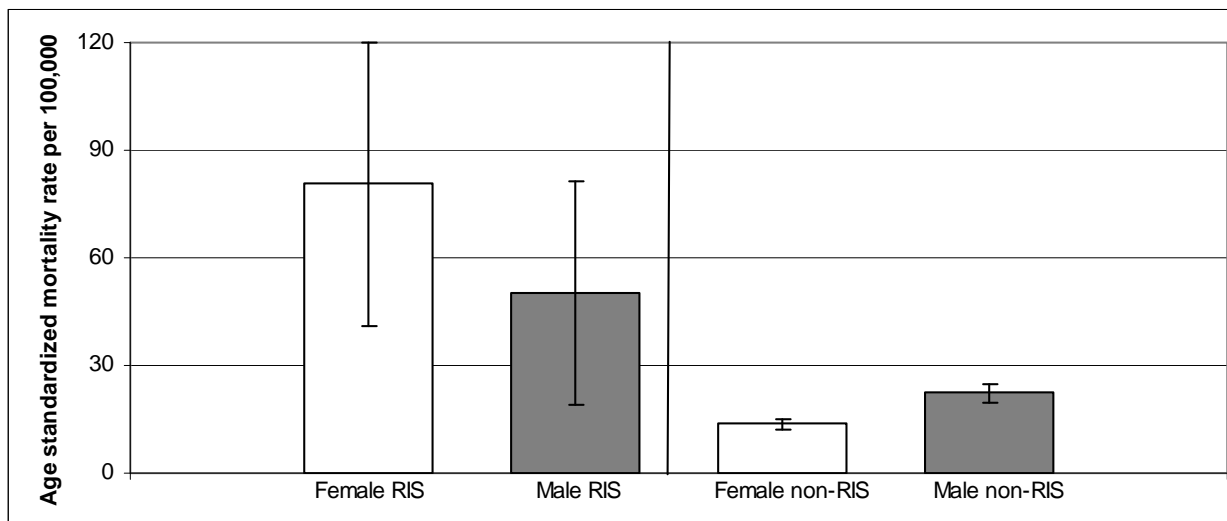
Diabetes Deaths: Urban and Rural Analysis

Diabetes death rates were higher for rural SHR residents in all age groups compared to those from Saskatoon, though these differences were not statistically significant (data not shown). The reason for these differences is not known, but how well people self-manage their diabetes in rural communities may be a factor. The highest death rates were seen in people aged 85 years and over. Men had higher age standardized death rates than women in both rural SHR and Saskatoon during the period 1999-2008 combined (data not shown).

Diabetes Deaths: RIS Analysis

Among the RIS population, age standardized diabetes death rates were higher in women than men (though not statistically significant). The reverse pattern was observed among non RIS populations (Figure 13). Crude diabetes death rates were small in both the RIS and non-RIS populations for those under age 50. Overall, death rates were higher in the RIS population compared to non-RIS populations in all age groups (data not shown).

Figure 13: Diabetes death rate by sex, Registered Indian Status, Saskatoon Health Region, 1999-2008 combined



Source: Saskatchewan Ministry of Health.

What's the Bottom Line on Deaths from Diabetes?

- Diabetes death rates have been increasing in SHR, but at generally lower rates than in Canada.
- Diabetes death rates are highest amongst the most elderly age groups.
- Diabetes death rates are significantly higher for RIS populations, low income residents, males and rural residents in SHR.
- Female death rates in RIS populations are higher than for males.

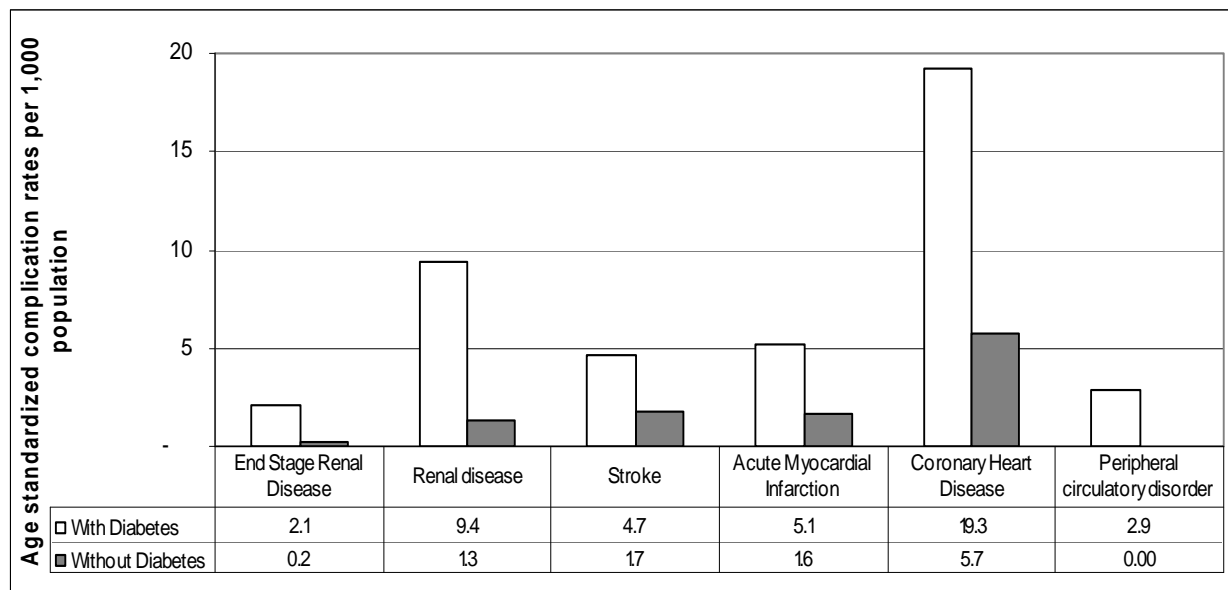
2.5 To what extent do people with diabetes develop complications?

Regional Trend: Complications Resulting in Hospitalization

As discussed in Chapter 1, there are a number of complications that may result from diabetes (see Appendix A for more details). The analysis below highlights the difference in hospitalization rates for certain complications between people with diabetes to those without. The data show that individuals with diabetes are more likely to be hospitalized (Figure 14).

Hypo- and hyper-glycemia hospitalization rates were much higher for people with diabetes, as was end stage renal disease and renal disease. People with diabetes had rates about three times higher than those without diabetes for acute myocardial infarctions (AMI), coronary heart disease and stroke. Finally, being hospitalized and death for any cause were about twice as high for people with diabetes compared to those without (Table B3, Appendix B)^{xii}.

Figure 14: Hospitalization rates for certain complications between people with diabetes and without, Saskatoon Health Region, 2006/07



Source: National Diabetes Surveillance System, 2006/07.

Though complication rates are much higher for people with diabetes, it appears that most rates have decreased over time except for peripheral circulatory disease and renal disease, which both show an increasing trend (data not shown). Complication rates previously reported by the Saskatchewan Health Quality Council show that SHR rates for AMI, stroke and hypo- and hyper-glycemia were close to the provincial averages⁷.

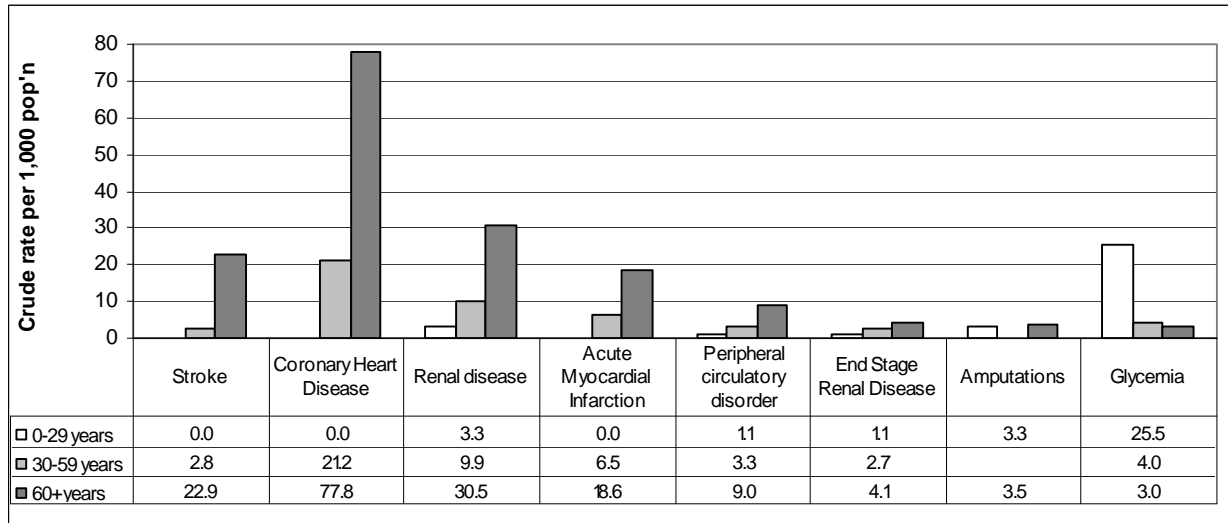
Regional Trend: Hospitalization for Complications by Age

Age was shown previously to be an important factor in diabetes incidence and prevalence (Figure 15 and Table B4 in Appendix B). Not surprisingly, the age groups above age 60 show the highest complication rates from diabetes, especially for stroke, coronary heart disease and renal disease.

The one exception was hypo- and hyper-glycemia, where 0 to 29 year olds had the highest complication rates. Upon further examination it was found that 0-9 year olds had the highest rates at 74 per 1,000 followed by the 10 to 19 year olds at 51.8 per 1,000 and then 20 to 29 year olds at 12.4 per 1,000. Although it is difficult to discern in the data, many of these complications are likely related to Type 1 diabetes. These high rates among youth have also been shown in Saskatchewan where 20 to 29 year olds had rates 12 times higher than the provincial average for all ages in 2008/09⁴.

^{xii} Note: amputations were not possible to age standardize because data for specific age groups were not available.

Figure 15: Hospitalization rates for certain complications by age for people with diabetes, Saskatoon Health Region, 2006/07

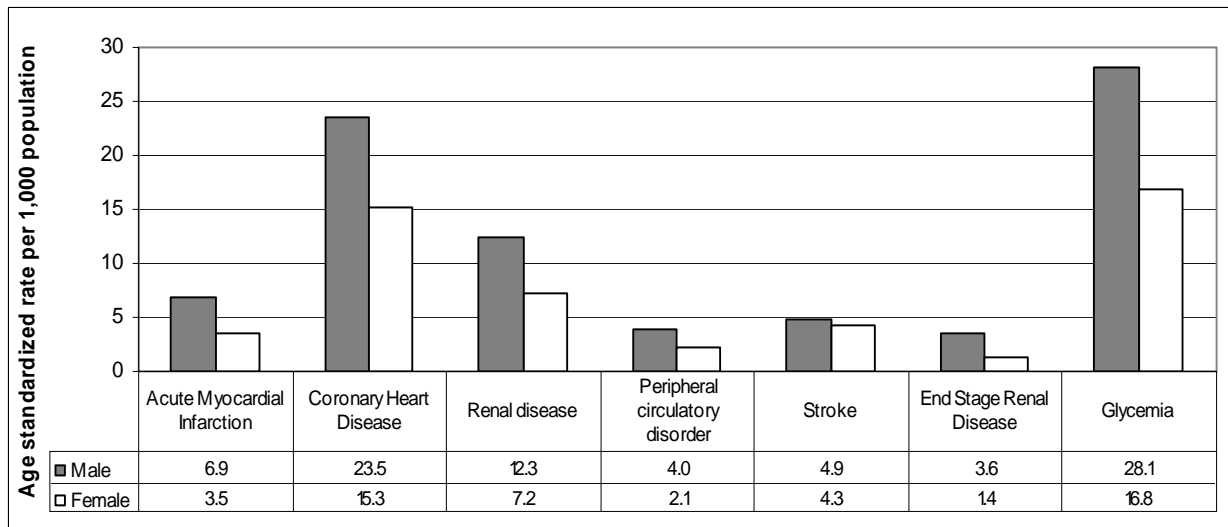


Source: National Diabetes Surveillance System, 2006/07. *Only two age groups given for amputations.

Regional Trend: Hospitalization for Complications by Sex

Similar to incidence and prevalence statistics presented earlier, men have higher complication rates from diabetes than women for all complications examined. Figure 16 shows that men had 2.6 times the end stage renal disease rate (3.6 divided by 1.4 per 1,000), and 1.9 times the acute myocardial infarction rates as females (Table B5, Appendix B). Men's reluctance towards self-care and the fact that they come into contact with the health care system too late has been well documented³⁸. The fact that men have higher complication rates from diabetes than women seems to verify this notion.

Figure 16: Hospitalization complication rates by sex for people with diabetes, Saskatoon Health Region, 2006/07



Source: National Diabetes Surveillance System, 2006/07.

A Closer Sub-Regional Look: Hospitalizations for Complications

We analysed hospitalizations from complications data comparing various subpopulations to determine if there were inequities present. Table 5 shows that for almost all diabetes related complications, residents living in low income neighbourhoods in Saskatoon had higher complication rates than for residents living in middle income and affluent neighbourhoods. There is a noticeable gradient where low income neighbourhood residents have the highest complication rates, followed by residents of middle income neighbourhoods, and finally affluent neighbourhoods. These results are consistent with Saskatchewan data showing individuals living in the poorest income quintile had higher complication rates (including for amputations) than those living in the richest income quintile⁴.

There was less clarity comparing urban and rural complication rates as they were more evenly distributed in terms of which group had the highest complication rates. Urban residents had higher hypo-hyper-glycemia and circulatory peripheral disorder complication rates, while rural residents had higher all cause hospitalization rates.

Examining the complication rates by RIS, shows that this population had higher complication rates in every category. Significantly higher rates were seen for end stage renal disease (ESRD), renal disease, circulatory peripheral disorders and all cause hospitalizations. Interestingly, acute AMI rates were slightly lower in RIS populations, though the reason for this is unclear.

Table 5: Age standardized hospitalization rates per 1,000 for people with diabetes, by subpopulation, Saskatoon Health Region, 2004/05-2006/07 combined

	Low income Nhds	Middle Income Nhds	Affluent Nhds	RIS	Non RIS	Urban	Rural
Acute Myocardial Infarction	7.6	5.1	3.1	4.8	5.1	5.3	4.7
Circulatory Peripheral Disorders	6.5	3.3	0.4	10.3	2.5	3.4	2.3
Coronary Heart Disease	24.6	18.2	13.7	23.1	18.4	18.5	19.5
End Stage Renal Disease	6.4	1.9	1.0	8.4	1.9	2.3	2.4
Hypo-Hyper-Glycemia	33.3*	29.0	13.9	16.9	24.3	26.6	15.2
Renal Disease	15.8	9.8	5.4	25.9	8.9	10.1	10.7
Stroke	6.4	4.5	2.9	5.3	4.2	4.5	3.6
Hospitalization any cause	280.0	229.8	181.3	283.7	225.5	226.7	242.0
Death any cause	15.9	11.7	7.1	12.7	12.1	11.8	13.1

For neighbourhood grouping, bold means statistically significant difference from affluent neighbourhood (reference group). For urban grouping, bold means statistically significant difference from rural (reference group). For RIS, bold means statistically significant difference from non-RIS (reference group). *Not significantly different than affluent neighbourhood rate due to small sample size. Amputation data not available by age groups.

What's the Bottom Line on Hospitalization for Diabetes Complications?

- In all the hospital complications examined, people with diabetes are hospitalized at higher rates.
- As is seen with incidence and prevalence, where diabetes complications are more common in older populations, the highest diabetes complication rates for stroke and death by any cause occur in those aged 60+ years.
- Men have consistently higher complication rates than women for all complications examined.
- People from Saskatoon's low and middle income neighbourhoods had significantly higher rates than those from the city's affluent neighbourhoods for most complications.
- RIS populations have significantly higher rates compared to the non-RIS population for many complications.

2.6 What could be contributing to diabetes in Saskatoon Health Region?

Regional Trend: Risk Factors

In the above sections, we saw a profile of diabetes in SHR that showed prevalence increasing, and substantial disparities in death and complications. Table 6 provides further insight into risk factors associated with diabetes where SHR and Canadian residents are compared.

Table 6: Risk factors associated with diabetes and complications, Saskatoon Health Region and Canada, 2001-2009^{xiii}

		2001	2003	2005	2007/08	2009/10
Overweight or obese (%)	SHR		52.5	55.1	53.1	53.6
	Canada		49.4	50.0	50.9	52.0
Physically active or moderate (%)	SHR	50.3	51.9	49.5	50.1	
	Canada	46.6	51.8	52.2	50.5	52.5
Eat vegetables and fruit 5+ times per day (%)	SHR	29.6	38.1	NA	41.1	
	Canada	37.6	41.4	43.6	43.8	45.6
Current smoker (%)	SHR	26.6	24	23.4	24.6	20.0
	Canada	25.9	23	21.8	21.7	20.4

Source: Canadian Community Health Survey, ages 12 and over. CANSIM table 105-0501 for years 2001-2005. CANSIM table 105-0502 for 2007/08 and 2009/10 combined.

Overall, SHR diabetes risk factors tend to be slightly worse than national averages, suggesting that diabetes could become an even bigger issue in SHR in the future if these factors are not addressed. More specifically, the table shows that:

- Since 2003, SHR residents are consistently more overweight or obese than other Canadians.
- Only about half the adult population is moderately or physically active in SHR, which is roughly similar to the rest of Canada.
- SHR residents had slightly lower percentages of people eating vegetables and fruit at least five or more times per day.
- Smoking rates for SHR residents have been higher than national averages until recently and national rates are dropping.

^{xiii} Note that the years 2001, 2003, and 2005 were based on two years worth of data. Starting in 2007, annual surveying was done. In order to compare to previous years, 2007 and 2008 years were combined as were 2009 and 2010. Canada results are more precise compared to SHR based on larger sample size.

A Closer Sub-Regional Look: Who is more at Risk?

SHR studies have shown that differences in some risk factors exist within certain SHR sub-populations. For example:

- Between 2001 and 2007, smoking rates were 44% among residents from low income neighbourhoods compared to 18.5% for the rest of Saskatoon³⁹.
- Between 2001 and 2005, only about 20% of rural SHR residents ate five or more servings of vegetables and fruit compared to 33% for urban residents⁴⁰.
- Between 2001 and 2005, only about 40% of rural SHR residents were moderately or physically active compared to almost 50% of urban residents⁴⁰.

2.7 How well are standards of diabetes care being met?

The previous sections detailed wide variations in diabetes related outcomes for prevalence, incidence, deaths and complications. How well people are managing (or not) their diabetes has some role to play in these outcomes. The Health Quality Council reports that there are certain standards of diabetes care that should take place for people with diabetes to ensure optimal outcomes⁴. Table 7 on page 29 shows how SHR residents compare to provincial counterparts on some of these indicators. It also demonstrates areas where improvements are required. For example, people with diabetes should be getting their A1C levels checked every three months, but currently, only 25% of people with diabetes in the province meet that target (and SHR is below provincial targets at 23.8%). In nearly all indicators, the province and SHR are far below ideal standards.

Inequities are apparent within most of these indicators as those living in the poorest income quintile in Saskatchewan had significantly worse results than those in the richest income quintile in three of the indicators shown in bold.

What's the Bottom Line on Standards of Diabetes Care Indicators?

- The Health Quality Council has reported on a number of standards of diabetes care indicators.
- In all indicators examined, SHR and provincial results fall below ideal standards and in some cases, they are far below; for example, residents of SHR are below provincial averages in the percentage of people getting three or more A1C tests done per year (23.8% vs. 25.0%) and in being dispensed a lipid lowering drug if LDL-C levels are equal to or above 2.5mmol/L (36.9% vs. 45.5%).
- Inequities exist as those in the lowest income quintile performed worse in three indicators compared to those in the highest income quintile.

Table 7: Standards of Diabetes Care Indicators, Saskatoon Health Region and Saskatchewan

Indicators (2008/2009)	What does this tell us?	SHR	Sask	Income quintile (province)		Ideal Standard
				Lowest	Highest	
Percentage of people with diabetes aged 20 years and over with three or more A1C tests per year.	The CDA 2008 guidelines recommend that A1C levels should be measured approximately every 3 months to ensure glycemic goals are being met or maintained.*	23.8%	25.0%	22.6%	26.7%	Ideally, all people with diabetes (100%) should have three or more A1C tests per year.
Percentage of people with diabetes aged 20 years and over with a most recent A1C level less than or equal to 7.0%.	The CDA 2008 guidelines recommend A1C level less than or equal to 7.0% as the optimal target for glycemic control.	54.0%	53.6%	51.5%	56.3%	Ideally, all people with diabetes (100%) should have A1C levels at or below 7% for optimal glycemic control.
Mean LDL cholesterol (LDL-C) level among persons with diabetes aged 20 years and over.	A drop in mean LDL-C could reflect important improvements for many persons with diabetes.	2.4	2.4	2.4	2.4	Optimal control is < 2.5 mmol/L.
Percentage of people with diabetes aged 20 years and over with LDL cholesterol (LDL-C) level greater than or equal to 2.5 mmol/L dispensed a lipid lowering drug.	Guidelines recommend the use of lipid lowering drugs (particularly, statins) for people with diabetes who have LDL-C above optimal levels to help protect them from cardiovascular disease.	36.9%	45.5%	45.3%	45.8%	All people with diabetes (100%) with LDL-C greater than or equal to 2.5 mmol/L would be dispensed a lipid lowering drug.
Percentage of people with diabetes aged 20 years and over with microalbuminuria.	A positive urine microalbumin screening test is an indicator of early kidney damage.	49.2%	64.7%	68.2%	63.2%	Ideally, no people with diabetes (0%) would have microalbuminuria.

Source: Quality Insight Indicators. 2010⁴. Available at: <http://www.hqc.sk.ca/hqcQInsight/FY200809/Diabetes/index.html>
 Performing A1C tests do not prevent complications unless lifestyle and pharmaceutical changes are made to bring A1C levels down. Bold font represents statistically significant differences between either SHR and Saskatchewan, or between lowest and highest income quintile levels.

Chapter 3 - What is being done to Prevent and Manage Diabetes in Saskatchewan and Saskatoon Health Region?

This chapter begins with an overview of ongoing provincial and regional plans to tackle diabetes. It then provides a summary from a scan of current programs, services and actions within SHR and the community to prevent, detect, and control diabetes. Taken together, this allows for an understanding of the current state of diabetes initiatives and interventions in SHR to beg the question in Chapter 4, what more can be done?

3.1 Diabetes in Saskatchewan: The Provincial Diabetes Plan

For more than a decade, the Provincial Government has made a continued effort to reduce diabetes in Saskatchewan. The initial call for action sounded in 2000 when the Province released a report entitled, *Diabetes 2000, Recommendations for a Strategy on Diabetes Prevention and Control in Saskatchewan*. This report was the catalyst for broader stakeholder consultation to inform the comprehensive *Provincial Diabetes Plan*⁴¹. At the same time, the government developed a Provincial Diabetes Advisory Body, which continues to meet annually and includes representation from the Federation of Saskatchewan Indian Nations, Métis Nation of Saskatchewan, Canadian Diabetes Association, Health Canada, provincial health districts and Saskatchewan Health. Membership includes diabetes educators, physicians, nurses, dietitians and an endocrinologist.

The *Provincial Diabetes Plan* includes goals, objectives, deliverables, intended outcomes and leads responsible for each area (e.g. Province, Regional Health Authority, or Shared). The four main components of the Plan are listed below, each tied to a number of objectives for achieving the goals and long-term outcomes of the Plan.

- 1) Primary prevention of type 2 diabetes
- 2) Optimum care for prevention of diabetes complications
- 3) Diabetes education for care providers
- 4) Diabetes surveillance

Saskatchewan Chronic Disease Management Collaborative: Diabetes and Coronary Artery Disease

This Collaborative was organized by the Health Quality Council to improve the care and health of people living with diabetes in Saskatchewan, and to improve access to timely physician services.

10,996 people with diabetes from this collaborative showed positive outcomes including better results for clinical measures, an increase in screening for complications, and new approaches developed based on strengthened multi-disciplinary teams⁴².

The Provincial Government continues to collect information from the Regional Health Authorities to monitor progress. Information is posted to their website, at <http://www.health.gov.sk.ca/diabetes-plan-progress>. Given that the long-term outcomes identified in the Plan are to be realized by 2012, summary information will be made available in the near future.

3.2 Diabetes in Saskatoon Health Region: The Regional Diabetes Plan

In 2002, Saskatchewan Health allocated funding to the Health Districts to begin the development of their individual Regional Plans, guided by the *Provincial Diabetes Plan*. In Saskatoon, interested stakeholders formed the Diabetes Self-Management Group and prepared the report, *Saskatoon Health Region: Regional Diabetes Plan*⁴³.

The main goal of the Regional Plan is to work towards a comprehensive, coordinated approach to diabetes care and prevention within SHR ensuring:

- Culturally appropriate programs and services
- Knowledgeable professionals and care providers
- Community and individual capacity for healthy living
- Self-management knowledge, skills and support for people with diabetes and their families
- An ongoing evaluation process

The Regional Diabetes Reference Group (formerly Diabetes Self-Management Group) monitors progress made on the Report's activities, identified in their logic model (Appendix C). In May 2010, the Group held a retreat to discuss the status of the Regional Plan and next steps. A follow-up survey with 37 diabetes stakeholders including primary care providers, program staff and community partners was conducted to solicit feedback on diabetes care moving forward. Most respondents felt there were gaps in resources and education for providers, as well as a lack of awareness of issues impacting the ability to provide diabetes care and offered the following solutions: increasing education, creating linkages between services by building on existing relationships and partnerships, and increasing efforts to address rural service delivery needs for diabetes care⁴⁴.

3.3 What is being done in Saskatoon Health Region to prevent and manage diabetes?

Diabetes Programs and Services in Saskatoon Health Region and the Community

Overview

A scan was conducted of programs and services offered in SHR for the prevention and control of diabetes. The table can be found in Appendix D. It includes any program, service or activity directed wholly or partially to the prevention, detection, control and treatment of diabetes within the geographic boundaries of SHR. Every attempt was made to include community based programs and services, though it is by no means an exhaustive list of all the important work that may be indirectly affecting diabetes rates in the region.

SHR Programs and Services

How does it all add up?

11 programs that focus on the primary prevention either through social determinants or individual strategies

5 screening services

13 programs focus on people with diabetes

Some programs fall into more than one category

Actions to prevent diabetes by improving our socio-environment

Population based primary prevention activities take place within the Health Promotion Department and Public Health Observatory of Public Health Services, as well as Primary Health Services. These activities are focused on whole populations and attempt to modify environments to bring about change through surveillance, research, community development, policy, population health interventions, education and evaluations.

Public Health Services and Primary Health Services are involved in several established community initiatives that deal with the social determinants of health; for example, the Saskatoon Poverty Reduction Partnership. This is a community-based partnership with an aim to develop, implement, monitor and evaluate an action plan for reducing poverty in Saskatoon through the participation of multiple partners and the greater community. SHR has informed the Partnership through the report, *Health Disparity in Saskatoon: Analysis to Intervention*⁴⁵. This report continues to be influential in raising awareness around policy options as they relate to the socio-economic environment and makes important links to evidence-based interventions that have been shown to improve health status and wellbeing. The Health Promotion department is also working on a social marketing campaign related to poverty awareness in the Region.

Actions to prevent diabetes from developing in individuals

Primary prevention services are also focused on preventing diabetes from occurring in individuals in the population. The *in Motion* program, for example, has primary prevention of diabetes as a main goal. Its mission is to have every resident of SHR incorporate physical activity into their daily lives. *In Motion* uses public awareness, education and motivation strategies, in combination with evaluation to carry out this goal. Results of population based surveys show that SHR residents have maintained their physical activity levels since 2002⁴⁶. Other examples include the Breastfeeding Friendly Initiative within the region, as well as the work of CHEP Good Food Inc. in partnership with SHR.

The SHR LiveWell Nutrition Education Session program is aimed at preventing diabetes through education. The program is open to anyone, and the goal is for participants to achieve a healthy body weight and learn about heart healthy eating. In addition, Fitness Food Fun and Aim 4 Health offer education, exercise and life skills for the prevention of diabetes.

Actions to improve early screening and treatment

SHR offers five early screening programs. The LiveWell Chronic Disease Management Upstream Diabetes Screening Project began as a pilot funded by Health Canada with a primary aim to identify those with pre-diabetes in the population. The LiveWell Chronic Disease Management Global Village Ethno Cultural Screening and Upstream Screening project have been provided to individuals from ethnic groups at risk for diabetes. Screening services are also provided through the LiveWell Diabetes program, gestational and diabetes in pregnancy clinics, and through the Aim 4 Health team programs. In the community, screening services are available from family physicians, in community pharmacies, and through several Aboriginal based initiatives.

Community Programs and Services

How does it all add up?

7 programs that focus on the primary prevention either through social determinants or individual strategies

6 screening services

5 programs focus on people with diabetes

Some programs fall into more than one category

Actions to prevent diabetes related complications

The majority of SHR activity that aims to prevent or delay complications and disabilities among people with diabetes is located within the Live Well Chronic Disease Management program. For example, the LiveWell Diabetes program offers self-management, education, and exercise for those with diabetes and pre-diabetes. Programs are available through a physician, healthcare provider or self referral. Individuals are offered the expertise of nurses, dietitians, exercise therapists and specialists amongst others.

Where are services located?

A map of diabetes programs and services within Saskatoon and rural areas of SHR are included in Appendix D. Although every attempt was made to include programs and services related to diabetes, in some cases it was not possible to map the services as they can exist in multiple locations (e.g. Home Care and *in Motion* events) or are "one-time" or annual events (e.g., Global Village Ethno-Cultural and Upstream Diabetes Screening programs).

What education programs are available for health care providers?

Diabetes education programs for providers are an important component of diabetes prevention and management. In Saskatchewan, the Saskatchewan Institute for Applied Science and Technology offers two programs: Diabetes Education for Health Care Providers and the Diabetes Education for Health Care Professionals. The Canadian Diabetes Educator Certification Board develops, administers, and regulates national certification for eligible diabetes educators in Canada.

3.4 Analysis of scan

There are some interesting findings as a result of this scan:

- 1) There are a number of programs that focus on social determinants of health and diabetes prevention in both SHR and the community. The majority focus on lifestyle modification through healthy eating and physical activity. There is also a need to consider the deeper root causes that do not support people's ability to make healthy choices. SHR Public Health Services and Primary Health Services are shifting to a broader population health paradigm in departmental planning and programming.
- 2) A fewer number of screening service programs are available, especially those that aim to identify diabetes in high risk groups. For example, the LiveWell Global Village Ethno-Cultural Screening is offered twice a year depending on demand and funding.
- 3) The majority of SHR programs, offered through the LiveWell Chronic Disease Management Program, are targeted to those who already have diabetes or are at risk of diabetes. As a result, much of the efforts are downstream towards diabetes management. The reverse trend is true for community-based programs and services where there is more activity around socio-environments and prevention.
- 4) Many SHR programs and services target all populations, although some specifically target high risk populations including ethnic and low socio-economic status individuals. The Diabetes Aim 4 Health program is a holistic, comprehensive and culturally appropriate diabetes program aimed at the prevention, detection, treatment and self-management of diabetes, focused on the needs of First Nation, Métis and Immigrant peoples. Services are provided in the community and they have a store front location at Confederation Mall in Saskatoon.

External to SHR, community activities also fill what may be perceived as potential gaps. For example, the Federation of Saskatchewan Indian Nations recently signed on to an Aboriginal Diabetes Initiative that involves diabetes screening, and the Saskatoon Community Clinic works in partnership with SHR to offer programming aimed at prevention and detection.

5) In terms of geography, there are fewer SHR programs and services offered in rural areas compared to Saskatoon which may or may not have potential implications for service delivery.

6) Self-management education, exercise and medical management using clinic based services are the most utilized approach for diabetes prevention and care, as evidenced by tertiary prevention level services focused on self-management education and group sessions. Education is considered an individual focused change strategy.

3.5 Previous Saskatoon Health Region reports and recommendations

The growing rates of chronic disease in SHR, particularly diabetes, have not gone unnoticed in recently released SHR reports. *Food Access in Saskatoon Community Report* (2010) highlighted that a lack of access to healthy food has been linked with health problems such as type 2 diabetes as it relates to obesity. Three other reports, *Health Status Report: A Report of the Chief Medical Health Officer* (2008), *Aboriginal Health Strategy 2010-2015* and *Strengthening Rural Communities: Rural Health Strategy 2010* make specific recommendations in the area of diabetes and chronic disease prevention and health promotion that may have an impact on the goal of decreasing rates in the region. The *SHR 2010-2011 Strategic Directions, Goals and Objectives* include moving on some of those recommendations (Appendix E).

What's the Bottom Line on Diabetes Prevention and Management?

- A Provincial Diabetes Plan was implemented in 2004 with long-term outcomes to be achieved by 2012.
- The Saskatoon Regional Diabetes Reference Group continues to on towards activities laid out in the *Saskatoon Health Region: Regional Diabetes Plan*.
- SHR surveyed diabetes key stakeholders in 2010 and found that most respondents wanted increasing education, creating linkages between services, especially by building on existing relationships and partnerships, and increasing efforts to address the rural service delivery.
- The majority of SHR programs, offered through LiveWell Chronic Disease Management (CDM) are targeted to those who already have diabetes or are at risk of diabetes. Much of the efforts are towards diabetes management.
- Aim 4 Health is one of the CDM program areas that focus on high risk groups.
- Physical activity and healthy eating are prominent in many SHR program areas. Most program areas use education and exercise programming to affect physical activity and healthy eating, with the exception of programming in the Health Promotion department, the Public Health Observatory and Primary Health Services which focus on socio-environmental change.
- Though some programs are offered in rural SHR, it is likely that these programs are not evenly distributed across rural areas.
- External to SHR, community based programs and services show more activity around socio-environments and prevention than diabetes management.
- Three recently released Saskatoon Health Region reports provide recommendations to improve the rates of chronic disease and in some cases specifically mention diabetes in the Region.

Chapter 4 – What can be done to Prevent and Control Diabetes? A Look at the Evidence

This chapter provides an overview of the types of interventions across the continuum of diabetes prevention and care. It is an opportunity to compare the programs and services in SHR from the previous chapter with interventions showing best or promising practices on a broader scale. This gap analysis will be used to inform the recommendations in Chapter 5.

4.1 To prevent diabetes from developing

Evidence

Physical Activity and healthy eating are frequently combined when speaking of lifestyle changes needed to prevent or control diabetes⁴⁷. Most literature supports losing weight and increasing physical activity as cornerstones of primary prevention³. In one well cited study, people with impaired glucose tolerance were able to reduce their risk of type 2 diabetes by 58% by exercising moderately for 150 minutes per week and by losing 5% to 7% of their body weight⁴⁸.

Cochrane reviews report that physical activity and healthy eating produce favourable results compared to control groups⁴⁹, can reduce the incidence of type 2 diabetes by up to 37%⁵⁰, and be effective in changing lifestyle behaviours and weight control in children and adolescents⁵¹. Another Cochrane review found that only dietary advice interventions resulted in a 33% reduction in the risk of diabetes⁵².

Interventions

It is important to understand the types of interventions that might help to achieve weight loss, physical activity and healthy eating goals to help prevent type 2 diabetes. The Canadian Diabetes Association³ describes three key approaches to preventing diabetes in a population, including programs that:

- 1) target high risk individuals (e.g. persons with impaired glucose tolerance, or obesity);
- 2) target high risk subpopulations (e.g. ethnicity); and
- 3) are for the general population and promote physical activity and healthy eating habits both in adults and children.

Annapolis Valley Health Promoting Schools

Eight schools in Nova Scotia participated in a program to address physical inactivity and unhealthy eating, two main risk factors for diabetes. Changes in the schools included more opportunities for physical activity and healthier choices in vending machines and cafeterias. The evaluation found that students in intervention schools had lower rates of overweight and obesity, had healthier diets and reported more physical activity than students from schools without nutrition programs⁵³.

SHR is currently undertaking a Health Promoting Schools Program. Nineteen schools have expressed interest and Public Health Services, Saskatoon Health Region is able to support them all. This program will be evaluated.

Gap between Evidence and Interventions

Within SHR, the majority of prevention and promotion programs target the entire population for physical activity (e.g. *in Motion*). There may be more of a need for additional targeted programming for high risk individuals. Some of this is already happening in schools in low income neighbourhoods (e.g. health promoting schools as well as through the broader scope of the Saskatoon Partnership for Poverty Reduction).

One potential area to strengthen is around the coordination and collaboration of Public Health Services and Primary Health Services in their primary prevention efforts. SHR could also foster stronger links to community diabetes initiatives, particularly with Aboriginal organizations, in order to meet the needs of more at risk populations.

4.2 To improve early screening and treatment

Evidence

The Canadian Diabetes Association³ recommends screening every three years in individuals 40 years of age or older with more frequent or earlier testing if the individual had one of a list of risk factors; including:

- First-degree relative with type 2 diabetes
- Member of high risk population (e.g. people of Aboriginal, Hispanic, Asian, South Asian or African descent)
- History of Impaired Glucose Tolerance or Impaired Fasting Glucose
- Presence of complications associated with diabetes
- Vascular disease (coronary, cerebrovascular or peripheral)
- History of gestational diabetes mellitus
- History of delivery of a macrosomic infant
- Hypertension
- Dyslipidemia
- Overweight
- Abdominal obesity
- Polycystic ovary syndrome
- Acanthosis nigricans
- Schizophrenia

Interventions

While mass screening may not be resource-wise given the low prevalence of diabetes in the general population, there is benefit to targeting high risk populations³ - provided that the screening system is relevant to that population.

Gap between Evidence and Interventions

Given the prevalence of diabetes in low income neighbourhoods and among RIS populations in SHR, additional screening opportunities may be warranted. One additional step may be to assess the availability and access of those services by at risk populations, a known barrier to service use. At the same time, awareness of diabetes must be raised, in order for people to consider being screened, especially those people currently living with pre-diabetes and diabetes that go undiagnosed until complications arise. Therefore, opportunities for screening to either catch people with pre-diabetes, or to ensure people begin the treatment they need, is critical.

4.3 To prevent diabetes related complications

Evidence

The Canadian Diabetes Association³ proposes that good outcomes for people living with diabetes depend on:

- 1) Daily commitment to self-management;
- 2) Support by their proactive interdisciplinary team; and
- 3) A system that links these two together

Support by a multi-disciplinary team is evidenced within the Live Well Chronic Disease Management (CDM) program as dietitians, exercise and physical therapists, medical specialists, nurse clinicians, and support staff are involved in supporting self-management for people with diabetes. The role of the Live Well CDM program is to link individual self-management with a team that can support it. Different diabetes management strategies are outlined in Table 8 below.

Table 8: Diabetes Management Strategies

<p>Self-Management Education</p>	<ul style="list-style-type: none"> ▪ Self-management education is a foundational element of diabetes care and includes the “ongoing process of facilitating the knowledge, skill and ability necessary for diabetes self-care”⁵⁴. The objectives of self-management education are to support informed decision making, behaviours, and problem solving to improve clinical outcomes, health status and quality of life⁵⁴. ▪ Research evidence shows that self-management education of type 2 diabetes can be effective, at least in the short term, and that behavioural and psychosocial strategies demonstrate improved outcomes. It has also shown that culturally and age appropriate interventions and group education programs can be effective,⁵⁵ and that behavioural goal-setting is effective for improving self-management behaviours⁵⁴. ▪ More research is needed to confirm the effectiveness of self-management on a long-term basis, including effectiveness with glucose control, complications, and quality of life⁵⁶. Further, a systematic review found that outcomes improved at six months post intervention, but not at 12 months⁵⁵.
<p>Glycemic Control</p>	<ul style="list-style-type: none"> ▪ Glycemic control is fundamental to the management of diabetes³. One of the main indicators for glycemic control is the A1C (glycated haemoglobin) value. For most patients with diabetes, an A1C value of <7.0% is recommended, with each 1.0% drop in A1C values registering a 37% drop in microvascular complications and 14% lower rate of myocardial infarction³. It is recommended that A1C values should be monitored every three months³.
<p>Physical Activity, Nutrition and Obesity</p>	<ul style="list-style-type: none"> ▪ While physical activity and healthy eating are noted as key to primary prevention, they are also very important to consider once someone has diabetes. Physical activity is associated with improved glycemic control by considerably decreasing A1C levels and plasma triglycerides levels and increasing insulin response⁵⁷. ▪ Large studies have demonstrated that 15 to 20 year overall death rates drops 39% to 70% for those engaged in regular physical activity and/or moderate to high cardiovascular fitness³.

Diabetes Management Strategies continued....

Physical Activity, Nutrition and Obesity	<ul style="list-style-type: none"> ▪ It has been shown that nutrition can improve glycemic control by reducing A1C values by 1% to 2%³. ▪ The same lifestyle interventions related to healthy eating and physical activity are shown to be very effective in controlling and reducing weight³. In addition to healthy eating and physical activity, pharmacotherapy agents to treat obesity could be considered as these can improve weight loss³. Finally, bariatric surgery^{xiv} could be considered in those who are extremely obese (a body mass index greater than or equal to 40 kg/m²) and who have multiple health issues³.
Pharmacological interventions for type 2 diabetes	<ul style="list-style-type: none"> ▪ While lifestyle changes are a preferred option in the treatment of diabetes, anti-hyperglycemic pharmaceuticals are recommended if glycemic control targets are not met within two to three months³. In those with elevated A1C levels (>9.0%), pharmacological interventions along with lifestyle treatment options should be implemented. In those with normal A1C values (<7.0%), it has been shown that A1C levels drop by approximately 0.5%-1.5% with one drug³. ▪ Use of ACE inhibitors or Angiotensin receptor blockers (ARB's) has been found to be very beneficial in reducing poor cardiovascular outcomes²⁰. Similarly lipid lowering agents like statins are very effective in primary and secondary prevention of coronary vascular diseases. ▪ The Canadian Diabetes Association reported that pharmaceuticals are effective for those with impaired glucose tolerance³. Gillies et al.⁴⁹, reported the effects of interventions, including pharmacological in their meta-analysis, and found that oral diabetes and anti-obesity drugs along with a herbal remedy produced favourable results compared to controls in 12 randomized trials.
Psychological Aspects	<ul style="list-style-type: none"> ▪ Diabetes can take its toll mentally as well as physically. For those with diabetes, mental health disorders such as depression and anxiety can be a reality when diabetes is not well managed³. Depression and anxiety disorders affect approximately 14% of those with type 1 diabetes compared to about 3 to 4% in the general population. Preventive psychological interventions should be weaved into diabetes self-management education. Medications may be needed depending on the mental health severity. ▪ Individual empowerment is also an important psychological component. Supporting individuals with diabetes so that they can master a sense of control and informed decision-making over their diabetes care can lead to better coping skills and healthy behaviours.
Complementary and alternative medicine	<ul style="list-style-type: none"> ▪ Complementary and alternative medicine includes herbal medications and dietary supplements such as minerals, vitamins and micronutrients. It has been estimated that up to 30% of people with diabetes use some form of complementary and alternative medicine³. There is conflicting evidence as to the effectiveness of a number of complementary and alternative medicines and none are recommended by the Canadian Diabetes Association.

^{xiv} Bariatric surgery is surgery on the stomach and/or intestines to help a person with obesity lose weight.

Interventions

The Canadian Diabetes Association cites the use of Diabetes Self-Management Education (SME) as an effective tool for increased knowledge, skills and resulting health behaviour change. It has been found that SME is most effective when education and health care services are delivered together^{56;58}. Given that diabetes lasts a lifetime, ongoing education is an integral component of diabetes self-management education⁵⁹.

Gap between Evidence and Interventions

In SHR, self-management education is provided through the Live Well Chronic Disease Management (CDM) program and Home Care. The three major points within self-management education are an individualized plan of action for patients, peer led support classes that are offered through the LiveWell with Chronic Conditions Program, CDM, and the enhancement of self-management skills⁶⁰. While many of the CDM programs are offered to all diabetes patients, the more effort may be needed to identify programming for at risk populations. It should be noted that the Home Care department plays a role in diabetes management through promotion of self-management education to their clients.

What's the Bottom Line on Diabetes Control and Prevention?

- Evidence shows that factors such as physical activity, healthy eating, weight loss and weight management are key components in all levels of diabetes prevention, control and reduced complication risk.
- Weight loss and weight management are also important factors to delaying diabetes onset and subsequent complications.
- The Canadian Diabetes Association³ (2008) recommends screening every three years in individuals 40 years of age or older with more frequent or earlier testing if the individual had one of a list of risk factors.
- Evidence supports the effectiveness of pharmacological interventions in the control of diabetes for those with impaired glucose tolerance.
- The Canadian Diabetes Association³ (2008) proposes that good outcomes for people living with diabetes depend on: daily commitment to self-management; support by their proactive interdisciplinary team; and a system that links these two together.
- Gaps exist in programming within SHR; these mostly centre on more targeted programming for high risk individuals in primary prevention, screening, and self-management areas.

Chapter 5 – Recommendations

Diabetes prevalence in SHR has been increasing over time and future projections show this trend will only escalate. It is necessary to develop comprehensive strategies that address diabetes and chronic diseases, as these are important to overall population health status. While targeting risk factors that increase the likelihood of developing diabetes is important, the social determinants of health must also be integrated into any strategy to be effective at the population level and to have a long-term impact.

The environmental scan in Chapter 3 demonstrates that SHR is undertaking diabetes prevention at all levels of care on the continuum. However, there are areas where SHR and community partners can do better. Below are general and targeted recommendations, developed in consultation with SHR and stakeholders, which can help reduce the burden of diabetes in our community.

GENERAL RECOMMENDATIONS

1) Set measurable targets and maintain routine surveillance

SHR should set manageable targets for specific diabetes indicators. These could include a target for reducing incidence (new cases) and hospitalization complication rates from diabetes. For example, incidence targets could be set for no more than 5 new cases per 1,000 in future years given the SHR 2006/07 rate of 5.1 per 1,000.

Particular targets should also be set for high risk populations found in this report, including RIS populations, residents of low income neighbourhoods, older adults, and males. For example, targets could be set to close the gap between hospitalization complications for low income neighbourhood residents and those from middle income neighbourhoods, as well as RIS populations and non-RIS populations. All without raising overall rates for any group.

SHR should maintain annual diabetes and chronic disease surveillance data and provide plain language analysis to track inequities, evaluate intervention effectiveness and inform SHR decision-making. This would help determine whether targets were attained or not.

2) Support the implementation of diabetes and chronic disease related recommendations contained within three recently released Saskatoon Health Region reports (Appendix E)

From the *Aboriginal Health Strategy*:

- Priority should be given to the development and implementation of the Aboriginal Diabetes Strategy.

From the *Rural Health Strategy*:

- That the Region explore options to expand upon its chronic disease management model to ensure that appropriate and effective supports for patients and providers in rural areas are in place.

From the *Health Status Report: A Report of the Chief Medical Health Officer (2008)*:

- SHR and its partners should continue to advocate for environments that support active communities and target improved outcomes for rural communities, children and youth.

3) Strengthen collaboration and capacity

The environmental scan shows that there are various SHR departments and community partners involved in diabetes prevention, control and treatment. It remains imperative to work together to streamline efforts and reduce gaps in the provision of services.

i. The Regional Diabetes Reference Group, consisting of a cross-section of SHR and community representatives, exemplifies multi-disciplinary teamwork and this approach should be sustained. SHR should continue to identify and connect with partners in the region, province and nationally who are doing similar diabetes work and exemplifying promising and best practices. For example, one possibility is to strengthen ties with community pharmacies that provide diabetic care through prescriptions, medical devices, and education.

ii. SHR should continue to identify diabetes training and continuing education opportunities for front line provider staff. Continuing education programs for physicians and nurse practitioners in the management of diabetes, particularly medications, should be explored. In addition, allowing nurses and dietitians who are Certified Diabetes Educators to adjust insulin doses should be examined.

iii. SHR should continue to send representatives to local, provincial and national diabetes and chronic disease discussions, and to provide in-kind support for intersectoral strategy development and implementation.

4) Apply a health care equity lens

Along the continuum of diabetes care, SHR should continue to work towards providing additional prevention, screening and treatment programs, particularly for the four high risk groups identified in this report, RIS persons, residents of low income neighbourhoods, older adults and males, along with immigrant populations as many new immigrants come from countries with higher rates of diabetes than Canada. A closer review of availability and accessibility of SHR diabetes programs and services should be considered to determine whether we are meeting the needs of those most at risk.

To Stop People from Developing Diabetes

5) Encourage and continue to support SHR initiatives and partnerships that affect the social determinants of health

Diabetes prevention and promotion is the first step to reduce costs associated with diabetes related health care delivery. Yet, most of SHR services are downstream efforts focused on individuals with diabetes. Chronic diseases, in general, are preventable through healthy behavior change; however, SHR should continue to consider the deeper root causes of why individuals may not be able to make such changes. For example, income, employment, housing, social support networks, and personal coping skills all interplay. Community initiatives such as the Saskatoon Poverty Reduction Partnership and Health Promoting Schools are opportunities for SHR to work with partners to affect change at a local level.

6) Continue support for physical activity and nutrition

Continued support for the work of the *in Motion* team and those working on food security in the Region is needed, especially if the work can be targeted to those at high risk of diabetes. Breastfeeding promotion is also important as it has the potential to reduce obesity and stop diabetes from developing in children. These initiatives have the potential to reduce diabetes long term in our communities.

To Provide Early Screening and Treatment

7) Continue to target diabetes screening towards high risk populations

SHR, family physicians, community pharmacies and Aboriginal based initiatives should continue to take a targeted approach to improve screening service delivery for high risk populations and new immigrants because they often have a higher prevalence of diabetes.

To Prevent Diabetes Complications

8) Enhance self-management for those with diabetes

- i. People with diabetes should ideally have four appointments each year with their primary care provider dedicated solely to diabetes care. Topics of discussion would centre on blood pressure, feet examination, medications reviewed etc. The Canadian Diabetes Association has a checklist at <http://www.diabetes.ca/documents/about-diabetes/patientToolcontentFINAL.pdf> which helps patients know what to expect and how to prepare for these important visits.
- ii. SHR, family physicians, community pharmacies and Aboriginal based initiatives should inform and encourage people with diabetes to undergo Haemoglobin A1C tests so that they know if their levels are within safe limits. Studies have shown substantial reduction in diabetes complications and diabetes related deaths if A1C levels are reduced by 1%. Regular follow up with a team of diabetes professionals in SHR demonstrated a 1.5% reduction in A1C levels over a 6 month period⁶⁰. This short term follow up should be encouraged as a way of promoting self-management.
- iii. Community based classes on diabetes self-management including managing blood glucose and following prescription drugs should be enhanced with the best possible evidence to empower those with diabetes. This pertains to all diabetes programs and clinic based services and in 15 physician practices where diabetes nurse clinicians work.
- iv. Diabetes can affect very young populations as evidenced by the high hypo- and hyper-glycemia hospitalization complication rates. Further analysis is required to inform appropriate intervention strategies to address the needs of this sub-population.

Conclusion

This report demonstrates how diabetes spans a continuum from the socio-environment to the treatment of diabetes related complications. SHR programs and services alone are only a small fraction of the greater community. Tackling the effects of diabetes will continue to take many partners and community based practitioners. It is hoped that this report has shed light on diabetes in our community - high risk populations, SHR programs and services offered, broader interventions, and how SHR and partners may move forward to reduce the impact of diabetes. This report offers recommendations for action, whether it is for planning and priority setting, program development or evaluation, or connecting with a new organization. Whether these recommendations lead to improvements in diabetes outcomes will only be known over time. Given the magnitude of this disease, there is no time to lose.

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Appendix A

Definitions

Type 1 diabetes

The human body gets energy by making glucose (sugar) from foods. To use this sugar, the body needs insulin which is a hormone that helps the body control the level of sugar in the blood. Type 1 diabetes is an autoimmune disease characterized by no production of insulin by pancreatic cells in the body. Sugar then builds up in the blood instead of being used for energy (CDA, 2009b). Up to 10 percent of diabetes patients suffer from type 1 diabetes and it usually starts in children and young adulthood (Health Council of Canada, 2007). Genetic and environmental factors precipitate the occurrences of type 1 diabetes in predisposed children and youth.

Type 2 diabetes

Type 2 diabetes occurs when there is impaired insulin production in the pancreas or when there is insulin resistance, which is a condition where fat, muscle, and liver cells do not use insulin properly (National Diabetes Information Clearinghouse, 2009). Over 90 percent of diabetes patients have type 2 diabetes in Canada (Somerville, 2009). An interaction between the genetic and environmental factors has been observed in type 2 diabetes. For instance, obesity has a strong association with type 2 diabetes in genetically susceptible populations. Statistics show that almost 60% of adults (Tjepkema, 2005) and one quarter of Canadian children (Shields, 2005) were overweight or obese during 2005 based on measured height and weight. Therefore, the potential for a large burden of disease from diabetes is very real.

Type 2 diabetes is usually diagnosed in adults over 45 years and over half of the Canadian population will be at risk of type 2 diabetes by 2011 (CDA, 2008).

To be considered a person with diabetes, a fasting plasma glucose level of greater than, or equal to, 7mmol per litre is widely used (CDA, 2008).

Gestational diabetes

Gestational diabetes is a temporary condition that occurs during child bearing age especially during pregnancy and is characterized by hyperglycemia (high blood sugar levels). Gestational diabetes tends to convert to type 2 diabetes later in life of both mother and child (Reece et al, 2009). The prevalence of gestational diabetes varies from 3.7% in non-Aboriginal women to between 8 and 18 percent in Aboriginal women (CDA, 2009c).

Pre-diabetes

A condition characterized by higher levels of blood glucose, but not to the extent of diagnosed diabetes. People with pre-diabetes have impaired fasting glucose of 6.1-6.9 mmol/L and have a tendency to develop type 2 diabetes (NDIC, 2009; CDA, 2008). Not all people who are deemed to have pre-diabetes will progress to diabetes, as the annual rate of progression from pre-diabetes to type 2 diabetes is about 3 to 10 percent (Unwin et al., 2002). This progression can be prevented or at least delayed by reducing body weight by at least 5 to 10 percent and by increasing physical activity to at least 30 minutes per day (ADA, 2004).

Low Income Neighbourhoods

Low income neighbourhoods were determined by using 2001 census information and the percentage of families living under the Low Income Cut Off (LICO). Having 30% or more families living under LICO and being a contiguous area in the west side of Saskatoon designated the following neighbourhoods as low income: Westmount, Meadowgreen, Confederation Suburban Centre, Pleasant Hill, Riversdale, King George.

Affluent Neighbourhood

Based on 2001 census information, these neighbourhoods had some of the lowest percentages of families living below LICO in Saskatoon and were in a contiguous area. The affluent neighbourhoods include: Briarwood, East College Park, Arbor Creek, Erindale, Lakeridge.

Middle Income Neighbourhood

Are equal to all other residential neighbourhoods in Saskatoon (excluding low income and affluent neighbourhoods).

Incidence

The number of new cases of a disease in a certain time period.

Prevalence

The number of existing cases in the population.

Registered Indian Status (RIS) and Aboriginal populations

Hospitalization analysis

Registered Indian Status is the only ethnic identifier available within Saskatchewan Ministry of Health's registry system. A person of Registered Indian Status means that the person is registered under Section 6 of The Indian Act and who has been assigned a ten digit number in the Indian Registry (Saskatchewan Ministry of Health, 2008) and has voluntarily declared this information to the Ministry of Health.

Registered Indian Status is an underestimate of the total Aboriginal population because it excludes those that have Aboriginal ancestry but are not registered through *The Indian Act* or who have chosen not to disclose this information. It also does not include people of Métis or Inuit heritage. In total, about 53% of the Aboriginal population in SHR was of Registered Indian Status based on the 2006 census.

Death analysis

Registered Indian Status was included on the vital statistics death file compiled by the Saskatchewan Ministry of Health. This information comes from the death registration and is an optional field.

Statistical Significance and 'Significance'

Where differences between two areas are compared in this report, the word significant is used only if it is a statistically significant difference. If the differences are not statistically significant, other language is used (e.g. considerable, substantial etc.) or else it is explicitly stated (e.g. no statistically significant differences found between the two groups). Confidence intervals at the 95% level were used to test statistical significance, whereby if there were overlapping confidence intervals, the differences could be said to be not statistically significant.

Main Data Sources and Limitations

The methodology used in chapter 2 of this report includes descriptive and bivariate analysis only.

The hospital complication data in chapter 2 was compiled by the Saskatchewan Ministry of Health using CCDSS software. The Saskatchewan Ministry of Health also compiled the vital statistics death data but this extraction was done separately from the diabetes hospitalization information and the two datasets were not linked.

All statistics that are presented as age standardized are adjusted to the 1991 Canadian population.

Note: the rates presented in the following section are different than that reported by the Health Quality Council on their Quality Insight website (HQC, 2010). The difference are likely due to differences in diabetic definition and in the codes used for particular complications between these two data sources and that HQC reports rates for 20 years and over. There is no ability to differentiate between type 1 and type 2 diabetes in this data.

Note: the latest year available is 2006/07 and therefore an underestimate of the diabetes outcomes happening currently.

Hospital Complications

Hospital complications were defined as follows:

Complication	Codes or description
Death	Death from any cause occurring in measurement year
Hospitalization	Inpatient hospital discharge or day surgery discharge from any cause in measurement year
Acute Myocardial Infarction	Hospitalized or day surgery with a discharge diagnosis ICD-9 code 410.x or ICD-10 codes I21.x, I22.x. Date of discharge within measurement year
Coronary Heart Disease	Hospitalized or day surgery with a discharge diagnosis ICD-9: '410','411','412','413','414', ICD-10: 'I20','I21','I22','I23','I24','I25' Date of discharge within measurement year.
Stroke	Hospitalized or day surgery with a discharge diagnosis ICD-9: '430','431','432','433','434','435','436','437','438', ICD-10:'I60','I61','I62','I63','I64','I65','I66','I67','I68','I69' Date of discharge within measurement year.
Minor or major lower extremity amputations	<p>Procedure (CCP) codes: Hospitalization assigned to a procedure code Toe 96.11, Foot 96.12, Ankle 96.13, Below knee 96.14, 9619. or</p> <p>Intervention (CCI) codes: Toe 1.WL.93.^, 1.WM.93.^, Foot 1.WE.93.^, 1.WJ.93.^, Ankle 1.WA.93.^, Below knee 1.VQ.93.^, Above knee 1.VC.93.^, 1.VG.93.^</p> <p>Exclude CCP and CCI codes if any diagnosis is an ICD-9 code 170.x, 171.x, 213.x, 740.x-759.x, 800.x-900.x, 901.x-904.x, 940.x-950.x, or ICD-10 codes C40.x, C41.x, C461, C47.x, C49.x, C80x, C962, D16.x, E830, G901, H473, L590, M431, M432, M898.x, N079, N818, P293, P960, Q00.x-Q99.x, R294, S00.x-S99.x, T00.x-T99.x. Date of discharge within measurement year.</p>

Hospital Complications continued...

End stage renal disease	Hospitalized or day surgery with a discharge diagnosis ICD-9 585-586 or ICD-10 N18-N19 Procedures (CCP): '5195', '6698', '6759', or intervention (CCI) '1PZ21', '1PC85' ESRD index date falling within measurement year.
Glycemia	Hypo or hyperglycemia. Hospitalized or day surgery with a discharge diagnosis ICD-9: 250.1, 250.2, 250.3, 251.0, 251.2 or ICD-10: E10.1, E11.0, E11.1, E13.0, E13.1, E14.0, E14.1, E15, E16.0, E16.1, E16.2. Date of discharge within measurement year.
Renal disease	Hospitalized or day surgery with a discharge diagnosis ICD-9: 585x, 586x ICD-10: N18, N19
Peripheral circulatory disorders	Hospitalized or day surgery with a discharge diagnosis ICD-9: 250.6, or ICD-10: E10.50, E10.51, E11.50, E11.51, E13.50, E13.51, E14.50, E14.51. Date of discharge within measurement year

Note: The Canadian Classification of Health Interventions (CCI) is the national standard for classifying health care procedures and is a companion to ICD-10 coding. CCI replaces the Canadian Classification of Diagnostic, Therapeutic and Surgical Procedures (CCP) which was a companion to ICD-9 coding.

Appendix B

Table B1: Diabetes prevalence by major subgroups, Saskatoon Health Region, 2006-07

	Number of prevalent cases	Denominator	Crude prevalence rate %	Age standardized prevalence rate %
SHR	16,528	297,172	5.6	5.1
Male	8,305	146,753	5.7	5.4
Female	8,223	150,419	5.5	4.9
RIS	1,024	18,166	5.6	12.6
Non-RIS	15,504	279,006	5.6	4.9
Low income Nhds	1,071	16,450	6.5	7.1
Middle Income Nhds	9,551	172,092	5.5	5.0
Affluent Nhds	821	22,484	3.7	4.2
Rural SHR	4,675	78,500	6.0	5.0
Urban	11,853	218,672	5.4	5.1

Source: Saskatchewan Ministry of Health.

Table B2: Diabetes incidence by major subgroups, Saskatoon Health Region, 2006-2007

	Number of incident cases	Denominator	Crude incidence rate per 1,000	Age standardized incidence rate per 1,000
SHR	1,632	297,172	5.5	5.1
Male	810	146,753	5.5	5.2
Female	821	150,419	5.5	5.0
RIS	81	18,166	4.5	8.2
Non-RIS	1,551	279,006	5.6	5.0
Low income Nhds	100	16,450	6.1	6.7
Middle Income Nhds	986	172,092	5.7	5.3
Affluent Nhds	93	22,484	4.1	4.6
Rural SHR	423	78,500	5.4	4.7
Urban	1,209	218,672	5.5	5.2

Source: Saskatchewan Ministry of Health.

Table B3: Hospital complication age standardized rates between people with diabetes and without, Saskatoon Health Region, 2006/07

Complication	With diabetes		Without diabetes	
	Numerator	Age stand rate per 1000	Numerator	Age stand rate per 1000
Hypo- Hyper-Glycemia	76	22.0	12	0.04
End Stage Renal Disease	56	2.1	53	0.2
Renal disease	356	9.4	360	1.3
Coronary Heart Disease	877	19.30	1,609	5.7
Stroke	237	4.7	476	1.7
Acute Myocardial Infarction	219	5.1	461	1.6
Death any cause	581	12.3	1,674	6.0
Hospitalization any cause	4,624	224.1	34,351	123.7
Peripheral circulatory disorder	108	2.9	0	0

Source: Saskatchewan Ministry of Health.

Table B4: Complications by age for people with diabetes, Saskatoon Health Region, 2006/07

Complication	0-29 years			30-59 years			60+ years			Rate ratio 60+ to 0-60
	Numer	Denom'r	%	Numer	Denom'r	%	Numer	Denom'r	%	
Stroke	a	a	0	17	5,997	0.28	221	9,630	2.3	9.3
Death any cause	a	a	0.11	52	5,997	0.87	528	9,630	5.48	7.1
Coronary Heart Disease	a	a	0	127	5,997	2.12	749	9,630	7.78	4.2
Renal disease	a	a	0.33	60	5,997	0.99	294	9,630	3.05	3.4
Acute Myocardial Infarction	a	a	0	39	5,997	0.65	180	9,630	1.86	3.3
Peripheral circulatory disorder	a	a	0.11	20	5,997	0.33	87	9,630	0.90	3.0
Hospitalization any cause	163	901	18.1	1,173	5,997	19.55	3,288	9,630	34.1	1.8
End Stage Renal Disease	a	a	0.11	16	5,997	0.27	39	9,630	0.41	1.7
Amputations*	23	6,898	0.33	See footnote below			34	9630	0.35	1.1
Hypo- Hyper-Glycemia	23	901	2.55	24	5,997	0.4	29	9,630	0.30	0.4

a: Cells suppressed because of low values in each cell.

*Amputations only given for <60 and 60+. Source: Saskatchewan Ministry of Health.

Table B5: Complications by sex for people with diabetes, Saskatoon Health Region, 2006/07

Complication	Male			Female			Rate ratio male/female
	Numerator	Denominator	%	Numerator	Denominator	%	
Amputations	39	8,305	0.47	18	8,223	0.22	2.1
Acute MI	140	8,305	1.68	79	8,223	0.96	1.8
Coronary Heart Disease	524	8,305	6.3	353	8,223	4.29	1.5
Renal disease	216	8,305	2.60	140	8,223	1.71	1.5
Peripheral circulatory disorder	65	8,305	0.79	43	8,223	0.52	1.5
Death any cause	340	8,305	4.09	242	8,223	2.94	1.4
Stroke	136	8,305	1.63	102	8,223	1.24	1.3
ESRD	32	8,305	0.39	24	8,223	0.29	1.3
Hypo- Hyper-Glycemia	40	8,305	0.48	36	8,223	0.44	1.1
Hospitalization any cause	2338	8,305	28.15	2,286	8,223	27.80	1.0

Source: Saskatchewan Ministry of Health

Appendix C

Saskatoon Health Region: Regional Diabetes Plan – Logic Model

<p>GOAL: To work towards a provincial comprehensive, coordinated approach to diabetes prevention, education, care and treatment ensuring:</p> <ul style="list-style-type: none"> ▪ Culturally appropriate programs and services ▪ Knowledgeable professionals and care providers ▪ Community and individual capacity for healthy living ▪ Self-management knowledge, skills and support for people with diabetes and their families ▪ An ongoing evaluation process 			
<p>CLIENT(S)/TARGET GROUPS [using a population health approach recognizing sub-population needs] <u>primary prevention:</u> First Nations/Métis (both on and off reserve); children (particularly those already overweight, obese), school-based educators; people/families already identified 'at high risk' (IFG, IGT), policy-makers <u>secondary/tertiary:</u> people with diabetes and their families (some sub-pop w low service – off reserve First Nations, Métis, some seniors, care providers (particularly physicians)</p>			
<p>Over-arching outcomes</p> <ul style="list-style-type: none"> - decrease incidence of diabetes - decrease incidence and prevalence of diabetes complications - improve quality of life for people living with diabetes 	<p>ULTIMATE/LONG TERM OUTCOMES 2012</p> <ul style="list-style-type: none"> ↑ Access to services + resources that promote self-management for those 'at high risk' + people w diabetes ▪ All people w diabetes receive care to promote self-mgt + decrease diabetes complications ▪ Care providers have knowledge, skills + systems to provide an integrated approach to diabetes care ↑ Community awareness + actions that build capacity for healthy living 	<p>INTERMEDIATE OUTCOMES 2005</p> <ul style="list-style-type: none"> ↑ Information that is current and consistent for people with diabetes/families ↑ Care provider knowledge ↑ In alignment of care with Clinical Practice Guidelines ↑ In team based services 	<p>PROGRAM COMPONENTS</p> <p>COMMUNITY RESOURCES + HEALTHY POLICIES</p> <ul style="list-style-type: none"> ▪ Directory of services/resources ▪ Cultural awareness education <p>SELF-MANAGEMENT SUPPORT</p> <ul style="list-style-type: none"> ▪ Needs assessment w primary care services/Aboriginal groups ▪ Integration community pharmacists in education ▪ Education options for IGT/IFG <p>DELIVERY SYSTEM DESIGN</p> <ul style="list-style-type: none"> ▪ Physician education + support ▪ Education for care providers <p>DECISION SUPPORT</p> <p>CLINICAL INFORMATION SYSTEMS</p> <ul style="list-style-type: none"> ▪ Common database registry + basic statistics

Appendix D

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Environmental scan of diabetes programs and services, Saskatoon Health Region																	
Name of Service or Program	Type of Prevention											Population served			Geographic Area		
	Primary			Secondary	Tertiary						All	At risk		People with diabetes	Saskatoon	Rural SHR	
	Physical Activity	Healthy Eating	Environment	Screening	Pharmacology	Self-mgmt education	Glycemic control	Physical Activity	Healthy Eating	Obesity/weight loss		Psychology	Pre-diabetes or other medical				Ethnicity or low SES
SHR Public Health Observ			x									x				x	x
SHR HPD <i>in Motion</i>	X	x										x				x	X
SHR HPD Food security		x	x									x				X	X
SHR HPD Breastfeeding Friendly Initiative		x	x									x				x	X
SHR HPD Health Promoting Schools		x	x									x				x	X
SHR Primary Health – Community Development	X	X	X									X				X	X
SHR Primary Health – Food for Thought	X	X	X									X				X	
SHR Primary Health – Healthy Mother Healthy Baby	X	x	X									X				X	
SHR Primary Health - KidsFirst	X	X	X									X				X	

Environmental scan of diabetes programs and services, Saskatoon Health Region continued...

SHR CDM - LiveWell Diabetes program				X	x	x	X	X	x	x	x	x	x	x	X	x	X
SHR CDM - Global Village Ethno-Cultural Screening				X		x	X	x	x	x	x		x	x	X	x	
SHR CDM - Upstream Diabetes Screening Project				X		X	x	X	X	x	x	x	x	x		x	X
SHR CDM - Building Resistance program					x	x	X	X	x	x	x	x	x	x	X	x	
SHR CDM - First Step program					x	x	X	X	x		x	x	x	x	X	x	X
SHR CDM - LiveWell with Chronic Conditions					x	x	X	X	x	x	x	x	x	x	X	X	X
SHR CDM - Aim 4 Health & partner programs*	x	x	x	X	x	x	X	X	x	x	x	x	x	x	X	X	X
SHR LiveWell Nutrition Education Sessions		x				x	X	x	x	x		x			X	x	X
SHR LiveWell Discovering Diabetes					x	x	x	x	x	x	x	x		x	X	x	X
SHR LiveWell gestational and diabetes in pregnancy clinic				X	x	x	x		x			x		x	X	x	X
SHR Home Care					X	x	x	X	x	X				X	X	x	X
Saskatoon Community Clinic - Diabetes Education						x			x						X	x	
Saskatoon Community Clinic - Pre-Diabetes Class						x			x				x			x	
Saskatoon Community Clinic - Aboriginal Diabetes Outreach						x		x	x				x	x	X	x	
SHR Health Bus						x								x		x	
Saskatoon West Winds PHC-Diabetes Educ Program					x	x	x	x	x	x			x		X	x	

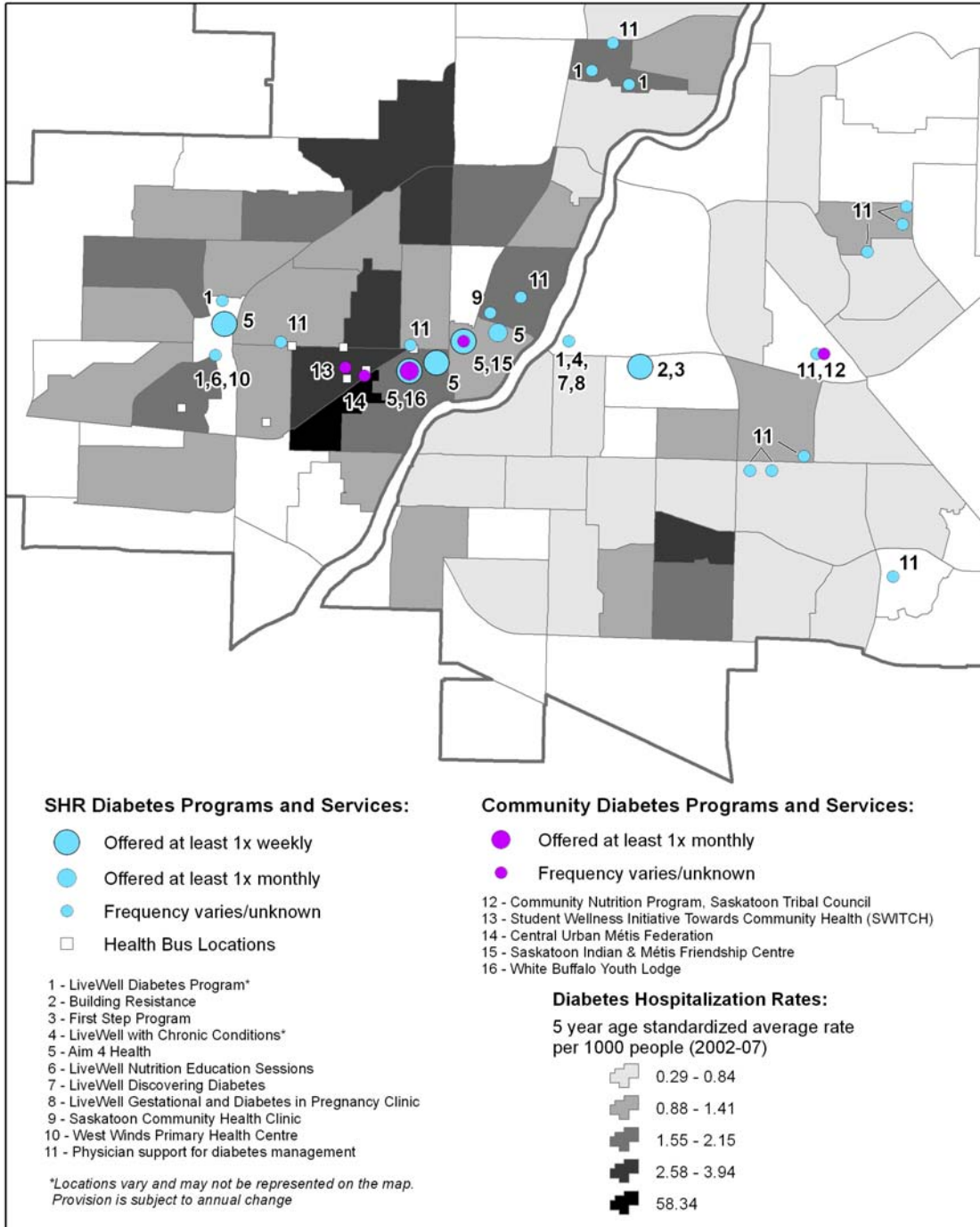
Environmental scan of diabetes programs and services, Community and Other																	
Name of Service or Program	Type of Prevention										Population served			Geographic Area			
	Primary			Secondary	Tertiary						All	At risk		People with diabetes	Saskatoon	Rural SHR	
	Physical Activity	Healthy Eating	Environment	Screening	Pharmacology	Self-mgmt educat'n	Glycemic control	Physical Activity	Healthy Eating	Obesity/weight loss		Psychology	Pre-diabetes or other medical				Ethnicity or low SES
CHEP - Good Food Box, Collective Kitchen, others ***		X	X									x		X		x	X
Saskatoon Tribal Council - Community Nutrition Program				X		X	x	x	x				x	x	x		X
Student Wellness Initiative Toward Community Health (SWITCH**)						X								x		x	
Physician Services	x	X		X	x	X	x	x	x	x	x	x	x	x	x	x	X
Canadian Diabetes Association	X	X		X		X	x	x	x				x	x	x	x	
Pharmacists				X**		X	x	x									
Central Urban Métis Federation***	X	X	X											X		X	
Saskatoon Indian and Métis Friendship Centre ***	X	X	X											X		X	
White Buffalo Youth Lodge - Fitness Food Fun ***	X	X	x	x	x	X	x	x	x	x	x		x	x	x	x	
Federation of Saskatchewan Indian Nations – Aboriginal Diabetes Initiative ***	X	X	X	X									X	X	X	X	X

* Includes individual counselling and education, Confederation Mall Adult Exercise program, Nēwo Steps at Saskatoon Indian and Métis Friendship Centre, Fitness, Food & Fun, and Food Experience.

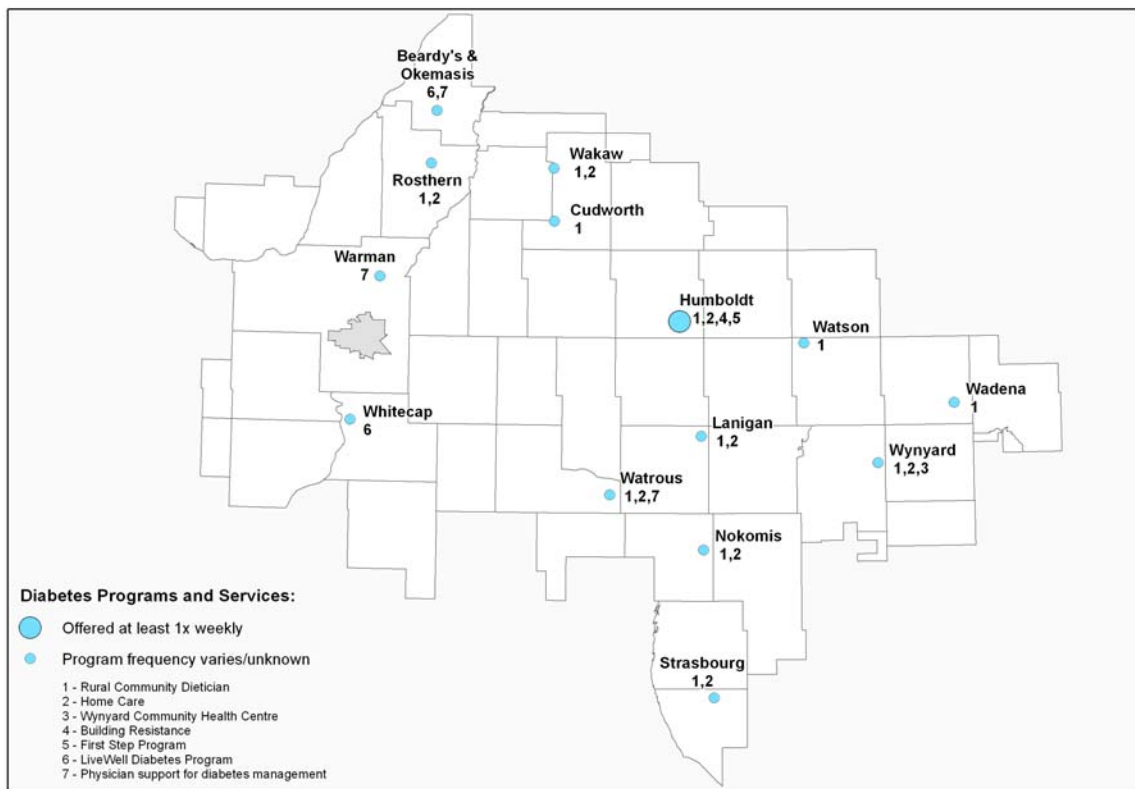
** Some community pharmacists are trained in diabetes screening, and although diabetes screening clinics are held, they are not regularly scheduled.

*** Working in partnership with SHR

Environmental Scan for Programs and Services Directed at Prevention or Control of Diabetes in Saskatoon



**Environmental Scan for Programs and Services
Directed at Prevention or Control of Diabetes in Rural SHR**



Note: Some programs and services do not appear on these maps because it would have made the maps much harder to read.

1) Home Care does not appear on either of these maps but their contribution to diabetes prevention and control is widespread through many of our communities. They visit dozens of individual client homes daily.

2) The LiveWell Discovering Diabetes program (#7 on the city map) offers classes in the following locations: Saskatoon Field House, Cosmo Civic Center, WestWinds Primary Health Center, Saskatoon Co - op 8th St, Superstore 8th St, Safeway Confederation mall, Harry Bailey Aquatic Center, Shaw Center, Lakewood Civic Center, Safeway at Lawson Heights, Lawson Heights Civic Center, Superstore Confederation.

3) The LiveWell with Chronic Conditions program (#4 on the city map) offers classes in the following locations: Fieldhouse, Luther Towers, McClure United Church, 1st Ave. Community Clinic, West Side Community Clinic.

Appendix E

Saskatoon Health Region (SHR) Report Recommendations

The *Health Status Report: A Report of the Chief Medical Health Officer* (2008) provides an evidence base on population health status in the region to inform 24 proposed recommendations to improve overall health and well-being. Several of these recommendations are applicable to decreasing rates of chronic disease, including diabetes, in our Region. While activities listed are by no means all encompassing or representative of the larger work of the community, they do provide general insight into what is currently being done.

1) Planning and budgeting for tertiary services should be based on a continuum of services. For example, for renal dialysis services for diabetics SHR should build in a 10% premium for health promotion and chronic disease prevention and management. Activity in this area has been limited, although supported by SHR in principle. Some new SHR initiatives have included prevention and promotion components in their proposals or guidelines some initiated by SHR (e.g. renal program) and some initiated by the Ministry of Health (e.g. surgical initiatives for oral surgery including some initiatives around fluoride varnish programs).

2) SHR should do its part to reduce inequities in health care. Some progress is being made in this area. Accreditation Canada recently noted that "the continuation of the Health Care Equity Audit has provided evidence to inform many activities" within SHR (Accreditation Canada December 16, 2010). SHR has made health equity audits a priority in Strategic Planning 2011-2012. The goal is to finalize the framework in the pilot areas of Chronic Disease Management (diabetes), immunization and suicide attempt. Public Health Services continues to champion the use of Health Equity Audits across SHR departments.

3) The Region and its partners should advocate for improved food security in both rural SHR and Saskatoon's core neighbourhoods. Some activity is occurring not only within SHR initiatives, but in partnership with the many groups committed to food security in the region. SHR recently released two reports; *Food Access in Saskatoon Community Report* (June 2010) and *Cost of Healthy Eating* (April 2010) to draw attention to this important issue. SHR also continues to support the work of the Saskatoon Food Coalition including the development of the Food Charter, creating community gardens, distributing good food boxes, developing vacant lot renewals and coordinating a local foods bus tour with key regional decision-makers.

4) SHR and its partners should continue to advocate for environments that support active communities and target improved outcomes for rural communities, children and youth. SHR has seen some progress on activities in this area. In 2009/2010 *in Motion* expanded to six more schools as well as facilitated School Travel Planning to six schools. SHR is supporting the development of an Active Transportation Strategy in collaboration with the community. The Student Health Survey 2011 is also currently underway, and one component is to measure rates of physical activity to support and inform the development of interventions based on need. SHR's Building Health Equity Program is instrumental in enhancing physical activity programs and increasing classroom based activity in core neighbourhoods. SHR also supports the Annual Commuter Challenge to engage workplaces in May.

5) The Region should implement positive mental health promotion programming according to Canadian best practice to increase the percentage of residents who report good holistic health status (physical, mental, emotional, and spiritual). Activity in this area has been limited. Positive mental health, viewed in the Canadian Best Practice Report, includes 5 components: ability to enjoy life; dealing with life's challenges; emotional well-being; spiritual well-being; and social connections with respect to culture, equity, justice and personal dignity (Canadian Institute for Health Information, 2009). Applying positive mental health programming along the diabetes care continuum is critical.

6) SHR and its partner should implement a health promoting schools approach.

Significant activity has been accomplished in this area. SHR continues to support the Health Promoting Schools Approach. This approach started off as two pilot schools , both high school and elementary, and is now looking to build readiness and partnerships with 20+schools to integrate the health promoting schools approach across the Region. This year, 19 schools expressed interest in the health promoting schools approach and Public Health Services, Saskatoon Health Region, was able to support them all.

The *Strengthening Rural Communities: Rural Health Strategy* (2010) highlights major health issues facing rural communities in SHR. Some of the main themes discussed include diabetes, obesity and physical activity. Three recommendations are specific to chronic disease:

- 1) That the Region increase effective health promotion activities in rural communities.
- 2) That the Region strengthens linkages and services to rural First Nations communities through the implementation of the Region's Aboriginal Health Strategy.
- 3) That the Region explores options to expand upon its chronic disease management model to ensure that appropriate and effective supports for patients and providers in rural areas are in place.

SHR Strategic Directions, Goals and Objectives 2011-2012 include: implement the first steps of rural health strategy to support and partner with all communities ready to engage in joint health service planning, including but not limited to: Watson, Wakaw/Cudworth, Nokomis, Lanigan and Watrous.

The *Aboriginal Health Strategy 2010-2015* (2010) goes a few steps further than the two previous reports. While it identifies important and relevant issues to Aboriginal well-being, such as physical inactivity, proper nutrition, food security and culturally appropriate programs and services, it also provides a diabetes related recommendation.

#5 Create a specific *Aboriginal Diabetes Strategy*.

SHR Strategic Directions, Goals and Objectives 2011-2012 include: begin implementation of the *Aboriginal Health Strategy*.

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