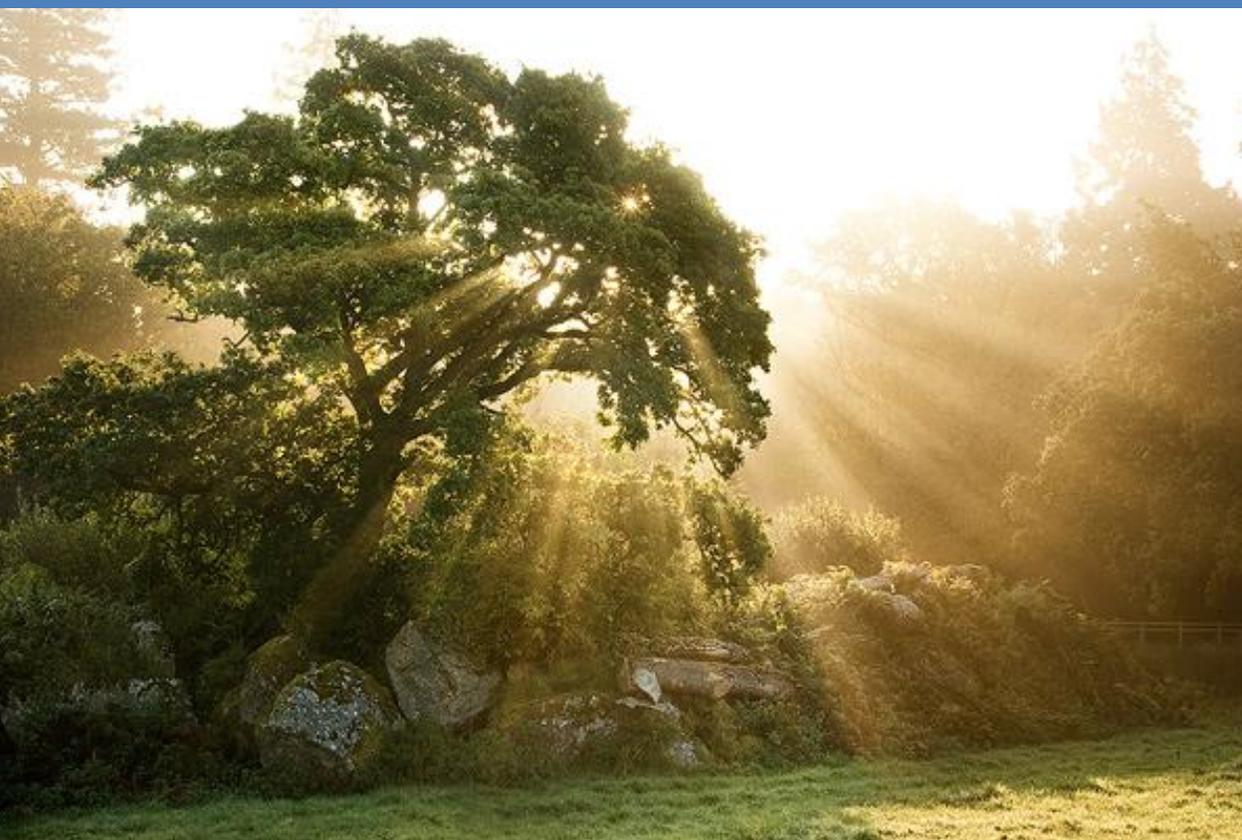


Diabetes, Mental Health & Aboriginal People Literature Review



Irene Goodwin, Health Policy Analyst
Native Women's Association of Canada
3/31/2011

CONTENTS

Executive Summary	3
Purpose of Literature review:	4
Methodology:	4
Introduction	4
Background	5
Theme A: Aboriginal People	7
Fastest Growing Population:	9
Gender:	13
Theme B: Diabetes.....	14
Gender:	16
Theme C: Mental Health.....	18
Gender	19
Diabetes, Mental Health & Aboriginal People.....	21
In Conclusion	33
Recommendations.....	35
Bibliography and Resources	37

EXECUTIVE SUMMARY

This literature review was initiated by the Native Women's Association of Canada's Health Department in order to further understand linkages between diabetes and mental health and its impacts upon Aboriginal people. Where possible, this included Aboriginal women. As this literature review will show linkages between diabetes and mental health have been established in numerous studies, however more research is required to clearly articulate the relationship between these two health conditions co-occurring among Aboriginal peoples. With no consensus statements and occasional conflicts as to what condition influences the other condition, academia recognizes that there lies a greater need for further research with controlled parameters to enable cross-referencing from data available. It was noted by several researchers that work within this field must take into account the ever changing socio-economic human environment in which Aboriginal people live. Findings within this work also reveal that even more research is required linking diabetes and mental health within the Aboriginal population, in particular, its effects and impacts on Aboriginal women. While NWAC is ideally positioned to provide a cultural and gendered perspective on this issue, there is limited research specific to Aboriginal women with these two co-occurring ailments to process a more detailed response to the needs of Aboriginal women with diabetes and a co-occurring mental health issue. Research priorities in Aboriginal health are best determined by Aboriginal communities and the people being researched. Studies indicate where Aboriginal communities are uniquely engaged, outcomes are more reliable.

Recommendations based on this literature review focus on the following three points:

1. Little research is available on diabetes and mental health issues co-occurring within the Aboriginal population, even less is available when specifically applied to Aboriginal women.
2. Little research is available on the lives of Aboriginal people prior to contact, in particular information relating to tradition, culture, gender roles, medicinal practices, ways of being (healthy living).
3. There is a need to add to existing research data within the diabetes and mental health fields and how they co-occur in various population groups, geographies, and socio-economic conditions.

PURPOSE OF LITERATURE REVIEW:

The purpose of this literature review is to determine the connection between diabetes, mental health and Aboriginal¹ people, with a focus where possible on Aboriginal women. NWAC has recognized increasingly in its work that health outcomes for Aboriginal people are distinctly connected to the social determinants of health as well as historical and current trauma. In addition, anecdotal evidence suggests that some health conditions co-occur with others and may impact upon treatments thus exasperating long-term outcomes. Diabetes and mental health illness are conditions which Aboriginal people suffer, and it is known that these conditions do co-occur. Research within this area appears to not be readily available, thus prompting this piece of work. It is expected that through a review of available literature that recommendations could lead to long-term solutions.

METHODOLOGY:

The paper examines the linkages between mental health, diabetes and Aboriginal people, and in particular Aboriginal women. The method used to conduct this literature review included online searches, MEDLINE, and google scholar (includes medical journals).

Key words utilized include:

- Aboriginal people and diabetes
- Aboriginal women and diabetes
- Diabetes and mental health
- Diabetes and depression
- Aboriginal people, diabetes, and mental health
- Aboriginal women, diabetes and mental health
- Type 2 diabetes and mental health

There were many Canadian studies found on each area individually, fewer that linked two areas, and even less to none that linked together mental health, diabetes, and Aboriginal people. As little literature on gender, mental health and diabetes among Aboriginal people in Canada exists, studies covering Aboriginal people in general were reviewed in conjunction with one or two of the aforementioned variables.

INTRODUCTION

Over the last five to six decades there has been an increase of diabetes mellitus among the Aboriginal population in Canada, where historically this chronic disease was virtually unknown. Statistically diabetes mellitus has increased dramatically across all nationalities in Canada as well as in other countries during this time period.

¹ Aboriginal in this document refers to First Nation, Metis and Inuit persons as identified in section 35 of the Canadian constitution. Wordings, such as Native and Indigenous are used interchangeable with Aboriginal.

The lives of Aboriginal people have changed drastically from pre-contact times to today. Prior to contact, Aboriginal cultures lived in balance with their environment and spirituality formed the foundation of the social structure that kept both the individual and community in a healthy state of well-being. Traditionally, the world was viewed as a system of interconnected relationships where everyone and everything had a purpose. Maintaining these relationships in balance was necessary in order to guarantee the survival of the people. This worldview not only dictated that human beings respected the natural world, but each other as well.

Changes resulting from colonialism and assimilation policies have impacted social structures, economics, and living dynamics thus disrupting the natural balance, leaving the Aboriginal peoples vulnerable to illness and chronic disease that were in the past unheard of. Diabetes and mental health has emerged within this population group at epidemic proportions. One in four Aboriginal persons living on reserve has type 2 diabetes compared to one in ten in the general population. The prevalence of type 2 diabetes among the Métis is 5% and 1-3% among the Inuit. Depression among Aboriginal people is two times higher compared to non-Aboriginal people in Canada.

While there are several non-Aboriginal studies and research pieces that examine the connection between diabetes and mental health, little material exists that examine these connections as it applies to the Aboriginal population in Canada, and even less when narrowed to Aboriginal women. While relevant research materials exist across these variables individually, it is evident that more research is required. It also important to recognize that progress is being made by Aboriginal communities in contributing to these fields of research.

Findings on health issues among Aboriginal communities state that the most important health issue for Aboriginal communities is family violence, with diabetes and substance use ranked second and mental health ranked third. Health issues for Aboriginal women rank in order of priority are violence, mental health and diabetes. Five themes emerged from Aboriginal women on their health and wellness (Dion-Stout 2001) "Aboriginal women's health status; violence and sexual abuse; substance abuse and maternal health; health seeking behavior; and access to services. Many Aboriginal women reside in rural and urban areas; poverty is a fact in their life. These women regarded physical problems as related to physical fitness, mobility issues, and diabetes. Over a third admitted to emotional problems such as depression, anxiety and stress/worries. Loneliness, interpersonal difficulties related to hormonal imbalance and FAS effects constitute other concerns. Addictions are identified as adversely affecting health, 26% indicated addiction to drugs, alcohol and substances like nicotine and cocaine. Sixty-nine percent of the women reported smoking that has negative effects on health. Intellectual concerns were forgetfulness, poor concentration, lack of energy and lack of motivation. Low education was a factor for 11% of the women (Bent 2004, 37).

BACKGROUND

The Native Women's Association of Canada (NWAC) was incorporated in 1974 and possesses a comprehensive understanding of the unique challenges facing Aboriginal women and girls in Canada. NWAC is the only National Aboriginal Organization (NAO) solely responsible for representing the interests of one of the most marginalized sectors of the Canadian population. The NWAC is founded on the collective goal to enhance, promote, and foster the social, economic, cultural and political well-being of First Nations and Métis women within First Nation and Canadian societies. NWAC passionately pursues every opportunity to raise awareness of the unique circumstances

and realities facing Aboriginal women. Education and awareness have become key priorities for the entire organization. This examination on the connections between mental health, diabetes, and the Aboriginal population with a focus on Aboriginal women will contribute to the knowledge base required to truly understand the significant impacts of colonization as it relates to illness and chronic disease.

Health is defined by the World Health Organization as a *“state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”*. NWAC’s wholistic approach to health and well being underpins the priorities of the Health Department and is in keeping with the WHO definition.

When compared to Canadian women, Aboriginal women do not share the same level of good health. In 1999-2000, life expectancy for First Nations women was 76.6 years and for Inuit women in Nunavut 70.2 years, compared with 81.8 years for Canadian women in general. Aboriginal women have higher incidences of diabetes, tobacco addiction, and HIV/AIDS. They are also more likely to seek services to treat drug and alcohol abuse than are other Canadian women. Related are problems concerning fetal alcohol syndrome (FAS) and its effects (FAE), and family dysfunction and violence. Aboriginal women also have a suicide rate up to eight times that of other Canadian women, depending upon age. The sub-Canadian standard of health of Aboriginal women cannot be disassociated from other factors, including poverty and unemployment, family violence, poor housing and living conditions and the cost of quality food in remote communities.

THEME A: ABORIGINAL PEOPLE

Discussion on the Aboriginal people in Canada cannot be properly articulated without first exploring the evolutionary dynamics involved pre-contact to present day. The following summarizes in brief distinct and key changes that have impacted upon the Aboriginal people in the geographic region now recognized as Canada. Of fundamental importance is the terminology identifying the Indigenous population, referred to in Canadian legislation as “Aboriginal” people.

First Nations people, Métis and Inuit are three distinct peoples with unique histories, languages, cultural practices and spiritual beliefs, traditions and ways of being. These distinctions

Pre-Contact/First Contact

Many records indicate that common and prolonged contact with Europeans began in the 17th and 18th centuries; however historical records indicate interactions occurring as far back at 1000AD. First contact, otherwise indicative of first point of interaction between indigenous people within the America’s and European populations is not well defined. Many historians point to the travels of Christopher Columbus as the point of first contact, but research during that period concludes that first contact may have occurred many years prior².

Conservative estimates of pre-contact population in North America range between 5 to 10 million Indigenous people, and between 200,000 to 2 million in the late 15th century. Over the successive centuries the Indigenous population saw a dramatic decline (40 to 80% of the total population) due to outbreaks of European infectious diseases such as small pox, measles and influenza.

Prior to contact, life for the Indigenous populations included inter-tribe trade, consumption of wildlife and plant food items obtained from the land, and spiritual connectedness. Tools at that time were primitive in nature (stone, bone and wood) but well designed to accomplish specific tasks associated with the lifestyle and region.

It has been widely accepted that a well-developed system of trade existed, which served not only to distribute food and other products across regions and vast landscapes, but also to reduce warring and feuds between various tribes. These trade patterns and alliances prevented war and promoted relationships and marriages thereby leading to more harmonious living and a reduced chance of inter-breeding between families.

Prior to colonization the Aboriginal population in North America consumed foods that were natural to their environment and the land. While diet diversity occurred throughout the lands and territories, it can be universally said that the traditional diet was comprised of wild meat, fishes, and vegetation products such as roots, berries, and nuts. The Aboriginal peoples took from the land only that what was needed and no more.

It has been widely stated that prior to contact, the Aboriginal population were strong and healthy, with diverse and complex societies.

² Gonzalo Fernandez de Oviedo y Valdes records first contact accounts in “General y natural historia de las Indias” (1526). This work includes early accounts of contact in the 19th century between the Neothuk and Norseman, as well as that of Bjarni Herjolfsson in 985 or 986 CE.

Post-Contact

After contact, many changes occurred as a result of introductions to new tools and instruments (such as kettles, axe, and guns), religion, and disease. Included within this system of changes, were new ways and methods of livelihood such as the fur trade industry. One result of these changes between tribal groups was the increase in warfare, mostly based on access to hunting, trapping and trading grounds. It would be pertinent to include within this pivotal period of change, the introduction of European goods which included *“tobacco, liquor, powder and shot (in later years), biscuit, peas, beans, flour, assorted clothing, etc”*³.

Significant in the introduction of new goods upon the lifestyle of the Aboriginal population, was that of liquor and the fur trade. Liquor resulted in an increase in death rate and a disintegration of social order within communities and families. The fur trade resulted in inter-tribal feuds (ie. Hurons vs. Iroquois) and the decline of spiritual connections to the land. This spiritual connection to the land was fragmented as the Aboriginal population began to take more than was needed from the land of fur-bearing animals, in particular, the beaver that in many areas were in massive decline due to over-kills.

During these early periods, European Christian views were largely promoted. One especially damaging to the Aboriginal peoples of the America's was the belief that all un-Christianized peoples of the world were savages. This European perception resulted in the First peoples of this land to be treated as savages, and it was their mission therefore to turn these peoples into Christian believing and worshiping people. This resulted in an onslaught of Aboriginal spiritual beliefs in an attempt to instill Christian beliefs and values.

Perhaps the most devastating result of contact between the Indigenous people of the America's and European explorer's and settlers was that of the introduction of disease (ie. small pox, measles, influenza, whooping cough, tuberculosis and scarlet fever)⁴ which raged across the lands decimating Indigenous populations. As Martin (1993) noted *“disease did more than decimate the First Nations population; it effectively prepared the way for subsequent phases of European contact by breaking First Nations morale and ... by cracking their spiritual edifice”*. Of all disease, small pox was a reoccurring pandemic and had the most profound impact upon the Aboriginal people. The Aboriginal people had no previous exposure and as a result had little to no resistance to European disease.

During this time, patriarchy (male dominated power structures) was imposed upon Aboriginal communities, resulting in a breakdown of existing family and social structures and relationships (Voyageur 2005). Colonialism and oppression contributed the change in values that negatively impacted Aboriginal people's health. These same structures continue to negatively impact upon present day Aboriginal peoples, as seen in poorer health outcomes, mental health, parenting skills, substance use and family violence.

The arrival of the Europeans in the entity now known as Canada brought with it a change of food availability, combined with legislation that restricted movement and confinement to “Indian reserves” thus impacting hunting and gathering activities resulting in forced starvation and a change in diet and dietary habits. This relocation of Aboriginal people off their lands during the early 19th century “fueled Canadian and American economic growth”⁵ by providing resources for industry and farming – the most fertile lands were given to white settlers. Many of these settlements or Indian reserves still exist today with the status (registered) Indians subject to the Indian Act effectively making them “wards of the state”. Food availability resulted in a drastic change in Aboriginal people's diet, with increases in “saturated fats, sugars and starches, refined salts, alcohol, and caffeine”⁶. These dietary

³ Martin, C. *“The European Impact on Culture of A North Eastern Algonquin Tribe: An Ecological Interpretation”*. 1993.

⁴ Acheson (1995). A persistent spirit: Towards understanding Aboriginal health in British Columbia.

⁵ Frideres (1998). Aboriginal peoples in Canada.

⁶ Hopkinson, et al 1995.

changes were a result of changing circumstances within the Aboriginal peoples primarily linked to habitat; forced relocation to reserves.

Loss of knowledge, especially as it refers to plants, animals and healing arts occurred⁷, this was further reinforced by the creation of reserves and later, residential schools.

Present Day

Colonialism continues in present day Canada through policies, laws, and systems associated with controlling people or geographic areas, resulting in cultural and population loss (Acheson, S. 1995). According to Smye (2004) *“European worldviews, including their medical systems, have achieved social, economic and political dominance over Aboriginal people through enactment of its policies. This piece of legislation, passed in 1876, delved into every facet of Native life: education; health services; welfare; taxes; livelihood, including hunting and fishing rights; the consumption of alcohol; citizenship, including the right to vote; “Indian” identity, status, non-status, treaty or non-treaty; organizational/ruling structures; spiritual practices; “even the right to loiter in a poolroom””* (Moran 1988).

Today, 4% of the Canadian population identifies as Aboriginal; there are some 630 First Nation communities (or reserves) that exist in a neo-colonial environment⁸. Many First Nation communities continue to be governed by the Indian Act first introduced in 1876. The 2006 census counted 1,172,790 people in Canada who reported Aboriginal identity⁹, with the following breakdown: 698,025 North American Indian (First Nations), 389,780 Métis, and 50,480 Inuit. Nearly two-thirds of the Aboriginal population is First Nation across all regions except Nunavut. First Nations people, both status and non-status that live on and off reserve make up the largest Aboriginal identity group. Just under one-third identify as Métis of which the majority resides in Alberta, Saskatchewan and Manitoba. Almost 5% of the Aboriginal population in Canada identify as Inuit, most living in the North. According to the 2006 census, 73.7% of all Aboriginal people do not live on a reserve; 72% live in urban areas and the majority of non-Status Indians (74%) and Métis (69%) reside in urban areas, while the Inuit (63%) live primarily in rural centres many of which are located in the North. Overall, half or 54% of the total Aboriginal population live in urban areas (up from 47% in 1996). Just under half (48%) of all registered Indians (First Nations) live on reserve.

Fastest Growing Population:

In a ten year period (1996 Census to 2006 Census) the Canadian Aboriginal population group grew six times more or 45% faster than the non-Aboriginal population (8% growth rate). The Aboriginal population growth rate is up from 3.3% in 2001 and 2.8% in 1996 and is expected to continue (*Aboriginal Population, Household and Family Projections, INAC, 2007*). Of all Aboriginal groups, the Metis had the highest growth rate, nearly doubling between 1996 and 2006. In this same period of time, the First Nation population grew by 29% while the Inuit population grew by 26%. Population projections indicate that the Canadian Aboriginal population will have increased from 1.1 million in 2006 to 1.4 million in 2017. The medium-growth scenario indicates that the Aboriginal share of the total

⁷ Ibid.

⁸ Colonial practices, often referred to as “neo-colonialist” exist today and continue to contribute to inequities in Aboriginal society. An example of a neo-colonialist policy is the Indian Act, originally drafted in 1876 that continues to determine the rights, choices, and opportunities for status Indians in Canada.

⁹ Canada, Statistics Canada Census, “Aboriginal identity” refers to North American Indian, Metis, or Inuit.

Canadian population is projected to increase to 4.1% by 2017, up from 3.4% in 2001¹⁰. It is expected that that Inuit population would grow the fastest, followed by the North American Indian, then the Metis.

These growth projections may be attributed to some degree to an Aboriginal population age profile that is younger in comparison to the general Canadian population. However, indications point to an increase in the overall age of the Aboriginal population: the median age was 24.7 years in 2001 and is projected to increase to 27.8 years by 2017¹¹. The median age of the non-Aboriginal Canadian population is projected to increase from 37.1 years to 41.3 years during the same time period¹². Aboriginal children under 15 years of age accounted for 32.9% of the total Aboriginal population in 2001, and are projected to decrease to 28.6% by 2017¹³. This decrease in the 15 years and under range for the Aboriginal population marks an increase in the number of Aboriginal people¹⁴ expected to enter the labour market; projected to increase by 41.9% between 2001 and 2017¹⁵. In addition, population projections for this same time period also indicate that the numbers of Aboriginal people over 65 years will more than double from 4% to 6.5% of the total Aboriginal population¹⁶.

Aboriginal Health, self-reported:

According to the 2006 Aboriginal People's Survey, 53% of First Nation people living off reserve and 58% of Métis adults reported being in "excellent to very good health". In contrast, 62% of the total Canadian population over 15 years of age indicated being in "excellent to very good health"¹⁷. When measuring gender differences among the total Aboriginal population off reserve, 58% of Aboriginal men and 54% of Aboriginal women reported being in "excellent to very good health"; 49% of Aboriginal men and 57% of Aboriginal women were diagnosed by a health professional as having one or more chronic health conditions¹⁸. The RHS 2002-2003 reports that among First Nation adults living on reserve, 42.6% of First Nation men and 37.1% of First Nation women self-reported being in "very good" or "excellent" health.

Health Status and Poverty:

In 1996 the Royal Commission on Aboriginal Peoples (RCAP) reported that many factors (both historical and contemporary) contribute to the current health issues faced by Aboriginal people. It is well documented that First Nation people suffer from certain physical diseases at rates higher than other Canadians, as reflected in rates related to tuberculosis, cancer, diabetes and hepatitis. Some of these diseases such as tuberculosis are directly related to the conditions upon which a person lives (poor housing, over-crowding, bad heating and cooling). Rates of tuberculosis vary on location but are reported to be 8 to 10 times higher in the First Nation population than the

¹⁰ Statistics Canada. Projections of the Aboriginal population, Canada, provinces and territories. 2001 to 2017.

¹¹ Ibid.

¹² Ibid.

¹³ Ibid.

¹⁴ Age group: 20 to 29 years

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Source: Canadian Community Health Survey

¹⁸ Aboriginal Peoples Survey 2006

non-Aboriginal population. Diabetes is closely linked to poverty¹⁹ as it impacts food security; diabetes is a prevalent disease related to diet. The dietary change from traditional to more conventional foods heavy in sugar, starch and oily foods has been argued by many researchers as being fundamental to the increase in diabetes among First Nations and other Aboriginal population groups. Cost factors included, in more remote areas, it is cheaper to purchase unhealthy food than to purchase fresh fruits and vegetables, in some communities the price of a single apple can be as high as \$3.00.

RCAP made a number of health status and poverty linkages; the following are just some of the observations:

- 50% of on and off reserve Aboriginal children live in poverty;
- Children of poor mothers are more likely to have low birth weight, chronic health problems, die of injuries, have mental disorders, and drop out of school;
- People living in poverty have poorer nutrition;
- People in poverty are more likely to work in high risk jobs (i.e.: a greater risk of physical injury);
- People in poverty have less health knowledge due to lower levels of education

The RCAP report goes on to state that poverty lies at the heart of many of the health issues that plague Aboriginal people in Canada. Data supporting high poverty rates are closely linked to social assistance/welfare rates, of which in 1990, 28.6% of Aboriginal people claimed compared to non-Aboriginal people; for First Nation people living on reserve, welfare rates increased to 45%²⁰. According to the RHS (2002-2003) 59.9% of First Nation adults living on reserve reported a personal income under \$20,000 per year; only 4.9% reported a personal income of \$50,000 or more per year; 56.6% earned income from employment sources and 71% reported receiving income from government sources²¹.

Unemployment and Poverty:

A poverty linkage to the unemployment rate is an easy one to establish comparing Aboriginal and non-Aboriginal populations. In 2006 the unemployment rate for the total Aboriginal population was 14.8% compared to 6.6% for the non-Aboriginal population. Statistically, if the Aboriginal population were full participants in the Canadian economy there would be a 1.2% boost to the gross domestic product (GDP). Unfortunately the average income of Aboriginal people is 62% the average income of non-Aboriginal people in Canada; in 2006 the median income of Aboriginal people was 65% of the median income of non-Aboriginal people in Canada.

Education and Employment

The RHS 2002-2003 Adult Survey found that almost half of First Nation adults participating in the survey have graduated from high school, and that half of those persons went on to obtain a diploma in university, college, technical or vocational school, with only a small minority attaining a bachelor's or master's degree or doctorate. Approximately half of First Nation adults participating in the survey reported being married or in a common-law

¹⁹ Statistics Canada's Low Income Cut-Off (LICO) is most often used to measure poverty. This is unofficially referred to as "the poverty line." The LICO defines an income threshold below which a family is likely to spend significantly more of its income on food, shelter and clothing than the average family. A family with an income below the cut-off is considered to have low income.

²⁰ RCAP 1996

²¹ Regional Health Survey, 2002-2003

relationship. Age differentials indicate that younger adults were more likely to report common-law relationships and being single, versus older adults reporting being married or previously married. Employment rates for both on and off reserve First Nation adults were found to be relatively the same, with half of all First Nation adults working for pay and most being employed full time. Gender differences were noted where more First Nation women worked part time compared to First Nation men. Educational levels influenced the number of First Nation people who worked for pay, in that the higher the educational level, the higher the percentage of those working for pay. Employment rates for First Nation adults were found to lag behind the non-Aboriginal Canadian population by about 8%. Comparing RHS and Census data found that there “is little difference between First Nation and non-First Nation identity groups in labour force participation rates, especially at higher levels of attainment.”

Geographic Distribution of Canada’s Aboriginal Population

The number of Aboriginal people living in urban centres has increased, while the number of Aboriginal people (First Nation) living on Indian reserves and settlements have declined, and the overall proportion of the Aboriginal population living in rural non-reserve areas declined slightly. The following graph indicates these changes as per Statistics Canada 1996 and 2001 census counts, where the Aboriginal population living in urban centres rose from 47% to 49%, with the on-reserve and settlements declining from 33% to 31%, and the rural non-reserve declining from 20.4% to 19.5%.

Statistics indicate that Aboriginal people living in urban areas were more than twice as likely to live in poverty compared to non-Aboriginal people. It has been determined that approximately 55% of urban Aboriginal residents live in poverty²², and depending on which urban city this percentile can rise as high as 66%. In Winnipeg for example; one in ten people are Aboriginal. This movement towards a more urban environment further impacts upon what are customary and traditional food choices and activities, as noted in a 2008 paper²³ that concluded that “(participants) described changes related to access and use of fresh meat, hunting and gathering activities, presence of fast food, cultural value of sharing, cooking facilities, convenience of groceries, availability of produce and dairy products. There were some differences between the experiences of those in our study and the available literature in terms of diversity experience among Aboriginal peoples, perceived positive aspects of dietary and lifestyle changes and cultural aspects of food use such as sharing.”

Diabetes linked to poverty:

Causes for diabetes have consistently been linked to lack of physical activity, obesity, and family history. However, recent research²⁴ points to poverty as a significant factor, and can in fact double or triple the likelihood of developing this chronic disease; these individuals are more likely to suffer complications as a result of diabetes. This analysis found that the prevalence of diabetes in the lowest income group is 4.14 times higher than the highest income group, and that the prevalence rates decrease as income goes up²⁵.

²² Canadian Council on Social Development. 2003

²³ Brown, Isaak, Lengyel, Hanning, Friel (2008). “Moving to the city from the reserve: Perceived changes in food choices.

²⁴ Diabetes prevalence and income: Results of the Canadian Community Health Survey (2010)

²⁵ Ibid.

GENDER:

Historical records were created by European males and often only contained information from their perspective on early life resulting in what might be deemed a fabrication of Indigenous reality, in particular where Aboriginal women are concerned. This said there is some historical record of Aboriginal women as it applies to their role in the fur trade and intermarriage with European traders. An accurate reflection on the lives of Aboriginal women pre and post contact is difficult to attain, but is recorded in small part through documenting oral histories of the women themselves. One such transcribed oral record was taken by anthropologist Anna Flannerty of a Cree woman named Ellen Smallboy during the mid-nineteenth century.

It has been suggested that this absence of Aboriginal women in the archeological and anthropological history is the result of the tools and materials that they used. Aboriginal women were the primary gatherers within hunting and gathering societies; the tools they employed were often made of leather, plant fibers and hemp. These materials do not preserve well over time and have resulted in undue focus on hunting practices that utilize stone and bone materials (Aboriginal men's hunting tools). Another factor is the collection of oral histories were mostly based on male to male communications, resulting in Aboriginal women being excluded from the information exchange where they were often overlooked or misrepresented. This lack of gender balanced recording of history continues to pose a challenge to historians who face a gap in literature into political and economical inputs by Aboriginal women and women in general.

However, widely accepted oral histories inform that Aboriginal women were highly valued and held leadership roles²⁶. This is not a surprise given that many Aboriginal societies were matriarchal in structure. In more modern times with the advent of paternalistic Government policies, the role of Aboriginal women have become minimized and in some cases entirely omitted in current political mechanisms. In fact, it was not until 1951 that amendments to the Indian Act gave Native women the right to vote in band elections and hold positions on band council; three years later, Elsie Knott made history by becoming the first woman in Canada to be elected chief of a First Nation²⁷. Aboriginal people were granted the right to vote in federal elections in 1960.

Regardless of gender, there are striking inequities in Aboriginal health outcomes including life expectancies for both men and women 5 to 10 years lower than the general population²⁸. These inequities reflect the results of years of colonization, the Indian Act and historical trauma (residential school²⁹), combined with the negative outcomes relating to the social determinants of health. This legacy has impacted the Aboriginal person and community across the spectrum from lost languages, traditions, destroyed self-esteem and poor parenting skills.

²⁶ Van Kirk, S (1988). *Women in between: Indian women in fur trade society in western Canada*.

²⁷ Elsie Knott, was born Elsie Marie Taylor in 1922; she became Chief of Curve Lake First Nation in 1954 serving until 1960, she served a second term as Chief of Curve Lake First Nation from 1970 to 1976. In her later years, she served as an Elder for the Union of Ontario Indians. Her work on behalf of the people took her across the country where she met with other leaders (native and non-native), and dined with prime ministers and even the Queen of England. Elsie Knott died of congestive heart failure on December 3, 1995 at the age of 73.

²⁸ Indian and Northern Affairs Canada [website] Ottawa, ON Indian and Northern Affairs Canada 2009 Available from: www.aic-inac.gc.ca/index-eng.asp Accessed 2009 Feb 27.

²⁹ The residential school system was established in 1892 to "civilize" Aboriginal people. This civilization process included removal of children from their homes into boarding schools that were funded by the federal government and operated by the Churches. In these schools Aboriginal children were forbidden to speak their own language, many were emotionally, physically, and sexually abused. The last residential school closed in 1996. In the Summer of 2008, the Canadian government offered an apology.

Later in life, these former residential school children grew into adults, many of whom turned to alcohol and drugs to deal with the mental pain they were suffering resulting in fragmented communities and multigenerational trauma. It then is no surprise that the prevalence of violence in Aboriginal communities has increased; violence among Aboriginal women and communities, in addition there are well-over 500 missing or murdered Aboriginal girls and women in Canada.

The role of poverty in terms of its effect on health, and diabetes to be specific cannot be understated. The glaring differences across the gender platform for Aboriginal men and women are significant, whereas the prevalence of diabetes in Aboriginal men who fell into the lowest income bracket was doubled, for Aboriginal women in the same income bracket it had tripled³⁰.

Today, Aboriginal women represent just over 51% of the total Aboriginal population in Canada. Poverty rates for Aboriginal women in Canada are double that when compared to non-Aboriginal Canadian women³¹, with one in four First Nation children living in poverty compared to one in six non-Aboriginal children³².

THEME B: DIABETES

“One in every 11 Canadian Adults now suffer from diabetes”³³

According to the Canadian Diabetes Association (CDA) there are more than 9 million Canadians who are living with diabetes or prediabetes. This figure includes the many undiagnosed individuals with diabetes.

There are several types of diabetes, with three main ones:

- Type 1 Diabetes: usually diagnosed in children and adolescents, occurs when the pancreas is unable to produce insulin. Insulin is a hormone that controls the amount of glucose in the blood. Approximately 10% of people with diabetes have type 1 diabetes.³⁴
- Type 2 Diabetes: occurs when the pancreas does not produce enough insulin or when the body does not effectively use the insulin that is produced. Type 2 diabetes usually develops in adulthood, although increasing numbers of children in high-risk populations are being diagnosed. Approximately 90% of people with diabetes have type 2 diabetes.³⁵

³⁰ Diabetes prevalence and income: Results of the Canadian Community Health Survey (2010)

³¹ Townson, M. 2005. Poverty issues for Canadian Women

³² 2006 Report card on child and family poverty in Canada.

³³ Conference Board of Canada, How Canada Performs, A Report Card on Canada, June 2007.

³⁴ CDA website: <http://www.diabetes.ca/diabetes-and-you/what/facts/> Accessed February 10, 2011.

³⁵ Ibid.

- Gestational Diabetes: is a temporary condition that occurs during pregnancy. It affects approximately 2 to 4 per cent of all pregnancies (in the non-Aboriginal population) and involves an increased risk of developing diabetes for both mother and child.³⁶

Prediabetes is a condition wherein a person's blood glucose levels are higher than normal, but not yet high enough to be diagnosed as type 2 diabetes.³⁷

Diabetes is a lifelong chronic disease that has no cure. If not managed properly or left untreated, diabetes can cause a number of complications which in themselves can be lethal to the person. These complications include heart disease, kidney disease, eye disease, and nerve damage. Approximately 40% of people with diabetes will develop long term complications³⁸. For this reason it is recommended that people most at-risk³⁹ should be tested for diabetes earlier and more often and should be aware of diabetes signs and symptoms⁴⁰. Many people may have diabetes yet exhibit no symptoms or signs, in fact it is estimated that as many as one-third of people with diabetes are undiagnosed⁴¹.

Diabetes can have a significant impact upon the person and result in early death; people with type 2 diabetes may have a life expectancy shortened by 5 to 10 years compared to people without diabetes⁴². Every year, approximately 41,500 Canadians die from diabetes; 80% of people living with diabetes will die as a result of heart disease or stroke⁴³. The CDA estimates that diabetes and complications arising from diabetes cost the Canadian healthcare system approximately \$13.2 billion every year⁴⁴. This is expected to rise to \$16.9 billion a year by 2020⁴⁵.

In Canada approximately 9 million⁴⁶ people are affected by diabetes; 10% have type 1 diabetes and 90% have type 2 diabetes. Diabetes currently affects nearly 285 million people worldwide, and the IDF⁴⁷ figures predict that this will increase to over 330 million by 2025, and to 438 million by 2030⁴⁸. It is estimated that 7 million people will develop diabetes each year⁴⁹.

³⁶ Ibid.

³⁷ Ibid.

³⁸ Diabetes Facts & Figures. PHAC website: accessed January 17, 2011. <http://www.phac-aspc.gc.ca/cd-mc/diabetes-diabete/index-eng.php>

³⁹ Diabetes risk factors: 40 years and older, being a member of a high risk group (Aboriginal, Hispanic, Asian, South Asian or African descent), and being overweight. In addition to these, diabetes risk increases if you have a direct relative with diabetes, have health complications that are associated with diabetes, have given birth to a baby that weighed more than 9 pounds, have gestational diabetes, impaired glucose tolerance or impaired fasting glucose, high blood pressure, high cholesterol or other fats in the blood, and have been diagnosed with polycystic ovary syndrome, acanthosis nigricans (darkened patches of skin) or schizophrenia.

⁴⁰ Diabetes symptoms: unusual thirst, frequent urination, weight change (gain or loss), extreme fatigue or lack of energy, blurred vision, frequent or recurring infections, cuts and bruises that are slow to heal, tingling or numbness in the hands or feet, and trouble getting or maintaining an erection.

⁴¹ Young, TK and Mustard, CA. Undiagnosed diabetes: does it matter? CMAJ 2001.

⁴² Prevalence and Cost of Diabetes. CDA website accessed January 17, 2011. <http://www.diabetes.ca/diabetes-and-you/what/prevalence/>

⁴³ Ibid.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ This number includes those individuals who are undiagnosed but have diabetes

⁴⁷ IDF: International Diabetes Federation

⁴⁸ CDA website. Accessed February 3, 2011. <http://www.diabetes.ca/diabetes-and-you/what/prevalence/>

⁴⁹ Ibid.

Diabetes is a disease not linked to one area of the globe, indications point to increases in diabetes where Nations have modernized and adopted westernized diets and food products. In addition, obesity rates in adults and children have increased, with this increase most noticeable in indigenous populations. This observation is one that is internationally recognized, as noted by the IDF in 2004 with the statement *“Until recently, type 2 diabetes has been viewed as a disease of older adults. With increasing rates of obesity, it is clear that the age of disease onset is falling in all ethnic groups and that type 2 diabetes is occurring in childhood.”* ... *“...the underlying problem of childhood obesity is, unfortunately, well documented”*⁵⁰. This particular report further recognizes that *“a consequence of urbanization is the parallel emergence of CVD, obesity, and type 2 diabetes, which until recently was mainly a problem of the developed world.”*⁵¹

The Aboriginal peoples of Canada have been significantly impacted by this chronic disease; in fact, Aboriginal peoples are 3-8 times more likely to have diabetes as compared to non-Aboriginal Canadians, and that complications arising from diabetes are much more common. In a recent Health Outcomes Report⁵² (2007) the following observation was stated: *“Inequalities in health outcomes in Canada are evident in diabetes.”* (p29); *“Canadians are much more likely to have diabetes if they have low income or belong to an Aboriginal community or certain ethnic groups. Screening programs can identify people at high risk for diabetes and connect them with information, services and health care to prevent or delay the onset of disease. But those programs and services must be in place.”* (p5)

GENDER:

“After extensive review of literature and our own studies it is evident that there are clinical differences between diabetic men and women. The compliance varies between men and women to a great extent. These gender differences in clinical presentation and compliance in diabetics has greater implications in management strategies and planning for health care delivery in the community.”

Gender difference in diabetes mellitus by KM Prasanna Kumar (1996).

A study undertaken by Kelly and Booth (2004)⁵³ found that diabetes in Canada appears to be more common among men than women, in contrast, among Aboriginal Canadians, two-thirds of affected individuals are women. This study makes several key observations related to gender and diabetes: Although obesity is more prevalent among men than women (35% vs, 27%), the diabetes risk associated with obesity is greater for women. Socio-economic status is inversely related to diabetes prevalence but the income-related disparities are greater among women; polycystic ovarian syndrome affects 5-7% of reproductive aged women and doubles their diabetes risk. Women with gestational diabetes frequently develop diabetes over the next 10 years. This study recommends that studies of at risk ethnic/racial groups and women with gestational diabetes are needed; age and culturally sensitive programs need to be developed and evaluated; studies of low-income diabetes women are required before determining potential interventions; lifestyle programs and workplaces are needed to promote well-being and combat obesity/inactivity; lobbying the food industry for needed changes. This study also notes that high

⁵⁰ Type 2 Diabetes in the Young: The Evolving Epidemic, The International Diabetes Federation Consensus Workshop Consensus Statement 2004

⁵¹ Idib.

⁵² A Health Outcomes Report: Why Health Care Renewal Matters: Lessons From Diabetes. Health Council of Canada, March 2007.

⁵³ Diabetes in Canadian Women. Kelly, C. Booth, GL. 2004.

depression rates among diabetic women influence self-care ability and health care expenditures; and that health professionals need further training in the use of effective counseling skills that will assist people with diabetes to make and maintain difficult behavioral changes.

The characteristics of men and women with diabetes differ enough that researchers recommend that diabetes prevention, care and education need to be targeted to men and women differently⁵⁴. The report by Gucciardi, et al states that *“primary care providers should encourage men to attend diabetes self-management education sessions and emphasize the benefits of self-care. Primary care providers should promote regular diabetes screening and primary prevention to women, particularly women with a family history of diabetes or a high body mass index; emphasize the importance of weight management for those with and without diabetes; and screen diabetic women for depressive symptoms.”*

Understanding how diabetes impacts on gender is critical in diabetes prevention methods. As indicated in the following quote, diabetes is being diagnosed more and more among younger adults, women in particular placing them at greater risk of complications arising from diabetes and early mortality. *“The greatest proportional rise is in individuals below the age of forty years ... An important consequence of the increased earlier prevalence of type 2 diabetes, is that it affects women during their reproductive lifetime ... Another important consequence of type 2 diabetes occurring at a younger age is the earlier onset of diabetic complications. Type 2 diabetes is associated with premature cardiovascular disease. The morbidity and mortality from CVD associated with T2D is 2-3 times greater in women than men.”*⁵⁵

Statistics support that women are at greater risk of pre-mature death as a result of diabetes than their male counterparts. A study undertaken in the United States found that while progress in reducing mortality among individuals with diabetes has occurred; this progress has been limited to men⁵⁶, and that *“diabetes continues to greatly increase the risk for mortality, particularly among women.”*⁵⁷

These findings are of particular interest to the Aboriginal people of Canada, especially First Nation women who represent two-thirds of First Nation people with diabetes⁵⁸. When compared to non-Aboriginal Canadians, Aboriginal women have over 5 times the rate of diabetes compared to women in the general population, and Aboriginal men have over 3 times the rate of diabetes compared to men in the general population⁵⁹. Aboriginal women experience higher rates of diabetes (13%) than Aboriginal men (8%), and up to 18% are diagnosed with gestational diabetes increasing the likelihood that mother and child will experience diabetes at some stage in their life. Aboriginal babies are increasingly being diagnosed with diabetes as are Aboriginal children as young as five years of age.

Diabetes is taking a very heavy toll on Aboriginal women in Canada. The rate of type 2 diabetes is almost twice that found among Aboriginal men. Diabetes rates increase as Aboriginal women age. The burden of illness is borne by Aboriginal women as caregivers who themselves live with serious complications affecting the heart, limbs, eyes

⁵⁴ Characteristics of men and women with diabetes by Gucciardi, Wang, DeMelo, Amaral and Steward.

⁵⁵ EU Conference on Prevention of Type 2 Diabetes, Female Gender and Diabetes. Dornhorst 2006

⁵⁶ Mortality trends in men and women with diabetes, 1971-2000. Gregg, Gu, Cheng, Narayan and Cowie.

⁵⁷ Ibid.

⁵⁸ Diabetes Among Aboriginal People in Canada: The Evidence 2001.

⁵⁹ Ibid.

and kidney. Aboriginal females are susceptible to type 2 diabetes as young as 5-8 years of age. These facts pose grave implications for the development of type 2 diabetes and its attendant complications in future generations at an earlier age.

Gestational diabetes is unique, and as implied, only affects women. Gestational diabetes occurs in 2 – 4% of women during pregnancy and usually disappears after the birth of the baby⁶⁰. It occurs in 14% -18% of pregnancies in Aboriginal women that results in a predisposition for both mother and fetus to develop type 2 diabetes in later life. Gestational diabetes normally disappears after birth; however, these women have a 17% to 63% chance of developing type 2 diabetes within 5 to 16 years⁶¹. The statistics for First Nation women are staggering, a full three-quarter of First Nation women with gestational diabetes will develop type 2 diabetes within four years of giving birth – this is approximately 4 times higher compared to other women in general⁶². Up to 40% of women with gestational diabetes may develop type 2 diabetes as they get older⁶³.

THEME C: MENTAL HEALTH

A 2006 document prepared for the Government of Canada titled “The Human Face of Mental Health and Mental Illness in Canada” (2006) provides the following perspective on mental health and mental illness:

- **mental health** - the capacity of each and all of us to feel, think, and act in ways that enhance our ability to enjoy life and deal with the challenges that we face. It is a positive sense of emotional and spiritual well-being that respects the importance of culture, equity, social justice, interconnections and personal dignity. Everyone benefits from positive mental health. The determinants of mental health go well beyond individual attitudes, beliefs and behaviours: the family, the community, the school and workplace environments all contribute to mental health. Thus, one could say that every single individual and organization has a role to play in promoting the mental health of Canadians.
- **mental illness** – a biological condition of the brain that causes alterations in thinking, mood or behaviour (or some combination thereof) associated with significant distress and impaired functioning. Mental illness affects approximately 20% of Canadians during their lifetime. Most mental illness can be treated, and placing treatment within a recovery model encourages individuals to go beyond symptom reduction to improved quality of life. Supportive community, education and workplace environments facilitate recovery. People with mental illness who have positive mental health are better able to cope with the symptoms of mental illness.

Defining mental health presents unique challenges due to differences in culture; as noted by the World Health Organization “*what would be mentally healthy (or acceptable behavior) in one culture may present as something too eccentric in another.*” More commonly, mental health can be defined as a state or condition on which an

⁶⁰ CDA website, accessed January 12, 2011. <http://www.diabetes.ca/diabetes-and-you/what/facts/>

⁶¹ Modifiable risk factors for developing diabetes among women with previous gestational diabetes, preventing chronic disease. January 2007.

⁶² Alberta Diabetes Atlas. 2007

⁶³ Diabetes in Canada, Second Edition

individual feels a sense of wellbeing; mental wellness itself can be defined as the lack of mental problems or disorders. In this, is the notion that mental health can itself be defined as mental wellness? Defining mental illness has over time become more structuralized, where mental illness is defined as *“states of distress that result from complex interactions between person and environment over the course of decades of individual development”* (Spaulding, Sullivan, Polland. 2003).

It is often said that mental illness touches all people and impacts relationships, education, productivity, and overall quality of life – approximately 20% of individuals will experience a mental illness at some point in their lives, and 80% of people will have been affected by mental illness through family members, friends, or colleagues⁶⁴. Mental illness can affect people from all walks of life, regardless of age, income and educational levels, and culture; the onset of most mental illnesses occurs during adolescence and young adulthood.

Mental illness poses a significant risk factor for the development of chronic diseases such as lung cancer, stroke, breast cancer, obstructive pulmonary disease, health disease and diabetes. Mental illness co-occurring with chronic disease means *“that prevention services, health screening and regular access to primary health care should be of high priority”*⁶⁵. Mental health issues and diagnosis from a health care professional can pose some challenges, as health care professionals are often focused on the cause of a patient's visit. A recent study found that the risk of non-detection of mental health problems in the primary health care field can increase depending on the *“Patient's race, gender, and coexisting medical conditions affected physician awareness of mental health problems.”*⁶⁶ Mental illness and type 2 diabetes are and can be co-occurring with research supporting an increased risk of type 2 diabetes in people with a history of depression⁶⁷. The CDA has listed schizophrenia as a risk factor for diabetes⁶⁸, with several studies finding that the prevalence of diabetes in people with schizophrenia is 3 to 4 times higher compared to the general population⁶⁹. Recent findings indicate a growing connection between diabetes and mental health, with one research document stating that *“the prevalence of mental health conditions have increased in the diabetes population in the past decade and are much more prevalent than in the non-diabetes population”*, and that *“affective and anxiety disorders are most common in younger adults with diabetes”*, and further that *“psychotic disorders, due to either organic or non-organic causes, are more common in diabetes across all age groups”*⁷⁰.

GENDER

It has been found that among the non-Aboriginal population, young adults and women are more likely to suffer from major depression (Hammen 1997), and that depression is common among women in the Aboriginal population (Thommasen, et al. 2005, Wardman and Khan 2004). Given that available statistical data points to a

⁶⁴ Health Canada. A Report on mental illness in Canada. 2002

⁶⁵ Bazelon Centre for Mental Health Law. 2004.

⁶⁶ Borowsky, Rubenstein, Meredith, Camp, Jackson-Triche, and Wells. 2000. Who is at risk of nondetection of mental health problems in primary care?

⁶⁷ Depressive symptoms and the risk of type 2 diabetes in Canada. Diabetes Care 2004.

⁶⁸ Canadian clinical practice guidelines for the prevention and management of diabetes in Canada. Canadian Journal of Diabetes 2003.

⁶⁹ Prevalence and correlates of diabetes in national schizophrenia samples. Schizophr Bull 2000.

⁷⁰ Alberta Diabetes Surveillance System. Alberta Diabetes Atlas 2007. Chapter 8.

younger Aboriginal population and early onset of diabetes within this group, the relationship between age, depression, and diabetes should be carefully considered. With research pointing to the fact that women are twice as likely as men to experience or be diagnosed with depression⁷¹, and that they are also more likely to be prescribed addictive anti-depressant and anti-anxiety medicines⁷² that can potentially have serious side effects greater attention should be paid to the gender aspect of mental illness and treatment. Often the lives of women in general include an over-lapping of issues that include mental health concerns, violence, substance use, poverty, and homelessness – these same issues are compounded for Aboriginal women who face additional burdens that include sexism, racism, and classism⁷³.

Aboriginal women in Canada face numerous stressors in their lives that impact upon their personal well-being and overall health, many of which are a result of life changing circumstances Aboriginal people have faced since first contact. A recent study identified key factors influencing Aboriginal women's mental health⁷⁴:

- childhood sexual abuse
- child protection services
- racism/discrimination
- colonization-residential schools

These factors may contribute to the high levels of suicide among Aboriginal women, estimated to be three times higher⁷⁵ than non-Aboriginal women. Although whether or not high suicide rates are related to depression is not the focus of this paper, it should be mentioned that some co-relation between the two is suspected. On-reserve; results from the FNRHS indicates that 30% of all respondents had symptoms that suggested a major depressive episode in the year preceding data collection; 31% of all respondents had suicidal thoughts, and 16% of respondents having attempted suicide at least once during their lifetime. Aboriginal women on-reserve reported higher rates of attempted suicide (18.5%) than their male counterparts (13.1%)⁷⁶. Off-reserve; 13.2% of the Aboriginal population reported symptoms suggestive of a major depressive episode in the year prior to the Census (2001 Census); this rate is 1.8 times higher than the non-Aboriginal population. Unfortunately the Census data does not break down gender differences.

Penckofer et al (2007) undertook a psychological impact study that examines women's day-to-day experiences of living with diabetes. This study involved four focus groups (2 white, 2 african-american), noting more similarities than differences by race. Themes generated directly from the focus group data are (1) struggling with the changing health situation; (2) encountering challenges in relationships with self, family, and others; (3) worrying about the present and future; (4) bearing multiple responsibilities for self and others; and (5) choosing to take a break. The women also expressed feelings of depression, anxiety, and anger, which were primarily related to having diabetes as well as managing the multiple responsibilities of being a caregiver. This study concluded that women with type 2 diabetes experience feelings of depression, anxiety, and anger, which affect their health and overall quality of life, and further recommended that "health care providers should assess the psychological health of women with type

⁷¹ CWHN 2007

⁷² Ibid.

⁷³ Urban Aboriginal Women and Mental Health. 2010

⁷⁴ Prairie Women's Health Centre of Excellence (2010): Aboriginal Women's Mental Health: Through Their Own Eyes, In Their Own Words. KISKAYITAMAWIN MIYO-MAMITONECIKAN (Plains Cree word meaning "knowing mind *fullness*")

⁷⁵ Health Canada (2003) The Health of Aboriginal Women, and; Morrow, M (2003).

⁷⁶ First Nations Regional Health Survey 2002-2003. Preliminary Adult Report.

2 diabetes when developing plans of care. By understanding and addressing the emotional health of women with type 2 diabetes, the relationships between the patient, family, and health care provider may improve, allowing for more successful diabetes management.”

DIABETES, MENTAL HEALTH & ABORIGINAL PEOPLE

“By 2030, chronic conditions will cause 75% of all deaths globally”⁷⁷

Mental health co-occurring with diabetes is not uncommon. In the Aboriginal population in Canada these two conditions present challenges that are unique to this group (Reading 2011) and to groups who are otherwise marginalized and living with poverty. Diabetes is perhaps one of the most complex chronic diseases for any individual to live with; the diagnosis, treatment and prevention of complications requires a disciplined management structure which in itself offers no guarantee towards good health. As noted by Gonder-Frederisk, et al (2002), *“There is no cure, diagnosis can occur at any stage of life, and, after diagnosis, daily treatment is required for the remainder of the lifespan, which may or may not successfully prevent the development of long-term complications, such as cardiovascular and kidney disease. The management regimen can be enormously complex and relies almost solely on the intensive, daily efforts of patient and their families.”*

Studies that examine the relationships between mental health and diabetes among Aboriginal people in Canada is severely limited. One study, undertaken by H.V. Thommasen, et al. (2005) utilized a participatory fashion that followed recommendations outlined in a recently published policy statement⁷⁸ on working with Aboriginal people. This study was accomplished through a mailed health-related survey and a population based retrospective chart review. The study group consisted of those individuals aged 17 years and older living in the Bella Coola Valley⁷⁹, British Columbia who had an existing medical relationship (chart) with the Bella Coola Medical Clinic from September 2001. These individuals were asked to complete a HRQOL⁸⁰ survey between August and December 2001. The main outcome measured demographics (age, sex, and ethnicity) with the HRQOL measured via the MOS

⁷⁷ WHO: World Health Statistics 2008

⁷⁸ *A Guide for Health Professionals Working with Aboriginal Peoples*. Journal of the Society of Obstetricians and Gynecologists of Canada 2001.

⁷⁹ The Bella Coola Valley is an isolated rural community located in the central coast region of British Columbia, with a population of 2285 people (Census 2001), of which 46% are estimated to be people of Aboriginal descent.

⁸⁰ HRQOL: Health-Related Quality of Life. Over 50 years ago the World Health Organization (WHO) defined health in its charter constitution as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. This landmark definition broke the myopic view that health is simply the absence of pathology. The modern concept of HRQOL is directly related to the WHO definition in that HRQOL is thought to encompass three fundamental domains: 1) biological functioning, 2) psychological functioning, and 3) social functioning. The balance measure of HTQOL captures all these domains and summarizes them in a single metric.

36-item short form health survey and the US Centre for Disease Control health days' items⁸¹. The results indicated that more diabetic people completed the survey than non-diabetic people (n = 72 [57%] vs. n = 675 [37%]) and that *the mean score for Aboriginal people were lower/poorer than the mean scores for non-Aboriginal people in all quality of life questions*. In general, *mean scores for diabetic people were lower than the mean scores for non-diabetic people in all quality of life questions*. Most significant in this study are the findings that indicate that Aboriginal people with diabetes reported the worst scores on almost all quality of life questions. This study concluded by stating that *"rural diabetics experience significant impairment in their health-related quality of life"*, and that among rural diabetics, Aboriginal people *"report the worst HRQOL scores"*.

Depressive symptoms and diabetes may have some connection to the geographic conditions where one resides. One interesting study⁸² was conducted by Bell et al (2005) that examined depressive symptoms among older adults living in two rural North Carolina communities who are at risk of developing diabetes. This methodology of this study included an examination of the ELDER83 diabetes study (n=696, ≥years of age) of African-American, Native American and white men and women living in rural communities. The study results indicate that *"older rural adults with diabetes are at high risk for depressive symptoms"*, regardless of ethnic grouping, and that *"certain demographic and health characteristics are important factors in this association"*. This study recommends that greater attention should be paid to diagnosing and treatments by medical professionals who provide health care to these populations.

K Wilson and T. Kue Young (2007) prepared an overview⁸⁴ of 96 papers with the objective of examining if Aboriginal health research that is being conducted in the field of social sciences reflects the population and geographic diversity of the Aboriginal population in Canada. These papers were collected from the Web of Science Social Science Citation Index, the Arts and Humanities Citation Index and the Scholars Portal for the time period between 1995-2005. Search terms reflected the common variations used to identify Aboriginal people in Canada with citations not health specific eliminated. Each paper was coded according to 7 broad categories (Aboriginal identity, group, geography, age, health status, health determinants, health services, and methods). Only 6 papers examined traditional approaches to healing and/or access to traditional healers/medicines. The results of this analysis found that there is a distinct under-representation of Metis and urban Aboriginal peoples, and that the majority of papers focused on health status and non-medical determinants of health, with a particular focus on chronic conditions and life-style behaviors. This overview concluded that *"further research is required to address gaps in the current body of literature"*.

Clearly additional research is required that examines and determines how geographical location and Aboriginal identity impact upon individuals who have co-occurring conditions of diabetes and mental illness. Findings strongly suggest correlations towards greater health care challenges across all segments of the population, including an increase in medical care expenditures.

⁸¹ CDC HRQOL "Healthy Days Measure": the standard 4-item set of Healthy Days core questions has been in: the state-based Behavioral Risk Factor Surveillance System (BRFSS) since 1993; the National Health and Nutrition Examination Survey (NHANES) since 2000; the Medicare Health Outcome Survey (HOS) since 2003. Reference: http://www.cdc.gov/hrqol/hrqol14_measure.htm

⁸² Prevalence and Correlates of Depressive Symptoms Among Rural Older African Americans, Native Americans, and Whites with Diabetes. RA Bell, SL Smith, TA Arcury, BM Snively, JM Stafford, and SA Quant. 2005.

⁸³ ELDER: Evaluating Long-term Diabetes Self-management Among Elder Rural Adults.

⁸⁴ An Overview of Aboriginal Health Research in the Social Sciences: Current Trends and Future Directions. K Wilson, TK Young. 2007.

Diabetes and Mental Health

A study conducted by Egede (2002)⁸⁵ compared 825 adults with diabetes and 20,688 adults without diabetes examined three distinct factors: first, comparisons using the 1996 Medical Expenditure Panel Survey (MEPS); second, comparing depressed and nondepressed individuals with diabetes; and third, examining expenditure estimates that noted differences in age, sex, race/ethnicity, health insurance, and comorbidity with analysis of covariance. The consumer price index was used to adjust expenditures for inflation, SAS and SUDAAN software was used for statistical analysis. The results of this study found that *individuals with diabetes were twice as likely (comparable sample from the general US population) to have been diagnoses with depression. Younger adults (< 65 years), women, and unmarried individuals with diabetes were more likely to have depressions. Patients with diabetes and depression had higher ambulatory care use and filled more prescriptions than their counterparts without depression. Finally, among individuals with diabetes, total health care expenditures for individuals with depression was 4.5 times higher than that for individuals without depression.* This study concluded that *the odds of depression are higher in individuals with diabetes than in those without diabetes; depression in individuals with diabetes is associated with increased health care use and expenditures, even after adjusting for differences in ages, sex, race/ethnicity, health insurance, and comorbidity.*

Most examinations of mental health and diabetes focus on the role of depression in effecting health outcomes. It has been noted that depression is common among patients with chronic medical illness such as diabetes. Depression has been implicated in many studies as having an adverse impact on primary care patients relative to diabetes, diabetes self-care, adherence to medication regimes, functioning and health care costs. A prospective population-based study⁸⁶ conducted by Eaton et al (1996) sought to determine whether depression is associated with an increased risk for onset of diabetes and concluded that major depressive disorder signals increased risk for onset of type II diabetes.

A study by Ciechanowski et al. (2000) found that *“depressive symptom severity is associated with poorer diet and medication regimen adherence, functional impairment, and higher health care costs in primary care diabetic patients.”*⁸⁷ This study involved 367 patients with both type 1 and type 2 diabetes from two health maintenance organization primary care clinics with data collection aimed at demographics, depressive symptoms, diabetes knowledge, functioning, and diabetes self-care. This study recommended that further studies testing the effectiveness and cost-effectiveness of enhanced models of care of diabetic patients with depression are needed.

A review of cross-sectional and cohort studies by Moire (2010) concluded that depression appears to exacerbate the progression of type 2 diabetes. Evidence within this study supports the hypothesis that depression in persons with diabetes increases the risk of diabetes-related burden, including suboptimal glycemic control, complications, functionality, mortality, and health care utilization. This study recommended that screening for depression among patients with diabetes should be increased in primary care. Similarly, a cohort study on depression and diabetes complications concluded that among people with type 2 diabetes, major depression is associated with an increased risk of clinically significant micro-vascular and macro-vascular complications over the ensuing 5 years,

⁸⁵ Comorbid depression is associated with increased health care use and expenditures in individuals with diabetes. Egede, Le. Zheng, D. Simpson K. 2002

⁸⁶ Depression and risk for onset of type II diabetes. A prospective population-based study. WW Eaton, H Armenian, J Gallo, L Pratt, and DE Ford. 1996

⁸⁷ Impact of Depressive Symptoms on Adherence, Function and Costs by Ciechanowski, Katon and Russo

even after adjusting for diabetes severity and self-care activities⁸⁸. This study points to the need for further research aimed at clarifying the underlying mechanisms for this association and to test interventions aimed at reducing the risk of diabetes complications among patients with co-morbid depression. In another study conducted by the German National Health Interview and Examination Survey found that diabetes was associated with an increased likelihood of anxiety disorders, recommending that “the association between mental disorders, diabetes, and glycemic control should be evaluated carefully in terms of potentially confounding socio-demographic variables, sample characteristics, and definitions of the disorders.”⁸⁹

Quality of Care:

Anecdotal evidence suggests that the presence of a mental illness in persons with diabetes results in poorer self-care and adherence to diabetes management regimes, with some suggesting that medical treatment of diabetes in those with mental illness may not be at par with those persons with diabetes alone.

Goldberg, et al (2007) undertook a study that examined the quality of diabetes care among adults with serious mental illness. This cross sectional analysis of medical chart data from 300 patients with type 2 diabetes (201 with serious mental illness and 99 without serious mental illness) examined indicators of quality of care established by the Diabetes Quality Improvement Project. Services assessed included glycosylated hemoglobin examination, eye and foot examinations, blood pressure check, and urine and lipid profiles. Self-reported data attained from the two study groups was used to compare receipt of provider-delivered diabetes education and cues regarding self-management of diabetes. The results of this study found evidence of *lower quality of diabetes care in persons with serious mental illness* in terms of fewer recommended services and less diabetes education compared to those without serious mental illness. It concluded that although *participants with serious mental illness received some services that are indicated in the quality of care standards for diabetes they were less likely to receive the full complement of recommended services and care support*. This study suggests that more effort may be required to provide optimal diabetes care to these vulnerable patients.

While depression has been highlighted in the above studies as being in some or many ways detrimental in patients with diabetes, another study conducted by Gonzalez (YEAR) suggests that even low levels of depressive symptoms are associated with non-adherence to important aspects of diabetes self-care⁹⁰. Similarly, Schram et al (2009) examined depression and quality of life in patients with diabetes found that “diabetic patients with depressive symptoms also had a severely lower diabetes specific quality of life”, recommending that increased awareness and monitoring for depression is needed within different diabetes care settings. This study recommends that interventions that focus on alleviating depressive symptoms could result in significant improvements in diabetes self-care.

Diabetes and Depression

⁸⁸ Depression and Advanced Complications of Diabetes, a prospective cohort study by Lin, Rutter, Katon, Heckbert, Ciechanowski, Oliver, Ludman, Young, Williams, McCulloch, and Von Korff

⁸⁹ On the Association Between Diabetes and Mental Disorders in a Community Sample: Results from the German National Health Interview and Examination Survey. By Kruse, Schmitz, and Thefeld 2003

⁹⁰ Depression, Self-Care and Medication Adherence in Type 2 Diabetes, Relationships across the full range of symptom severity by Gonzalez, Safren, Cagliero, Wexler, Delahanty, Wittenberg, Blais, Meigs, and Grant.

While the above studies focus on co-occurring diabetes and mental health, speculation exists on whether or not a diabetes diagnosis increases the risk of depression. Research in the causal relationship between these two conditions continue to remain unclear, some researchers have proposed that depression is a result of and precursor to diabetes, and other researchers have stated that depression preceded and predisposes a person to diabetes via the psychological effects of depression that contribute to negative health behaviors.

A study conducted by Brown, et al (2006) makes a definitive statement that type 2 diabetes does not increase the risk of depression once co-morbid diseases and the burden of diabetes were accounted for. In contrast, a study undertaken by Egede, Zheng, and Simpson⁹¹ that compared 825 adults with diabetes and 20,688 adults without diabetes “found that individuals with diabetes were twice as likely as a comparable sample from the general US population to have diagnosed depression” and that “younger adults, women and unmarried adults with diabetes were more likely to have depression”. This particular study concluded that “the odds of depression are higher in individuals with diabetes than in those without diabetes”. Challenges exist in making positive determinations regarding cause and effect, in another study that sought to determine whether depression is associated with an increased risk for onset of diabetes, conducted by Eaton, et al.⁹² concluded that “major depressive disorder signals increased risk for onset of type II diabetes”. Limitations within this particular study revolved around the difficulty in determining temporal order between these two chronic conditions, as a result “it is possible that the treatment for depression led to an early diagnosis of diabetes” within this sample grouping.

Diabetes and Aboriginal People

Expert opinion suggests that diabetes mellitus continues to be an ever increasing health problem in Canada’s Aboriginal population with projections indicating the onset of an epidemic. Aboriginal people are three to five times higher than the general population. The average age of diagnosis of diabetes in First Nation youth is 11 years old⁹³.

Diabetes, as seen through the eyes of an Aboriginal person is seen as an outcome, a symptom, an effect, and a result of the loss of culture and traditional practices, access to lands and territories, wholistic health perspectives and belief systems. The long term effects of diabetes are detrimental in terms of quality of life, cost to the health care system and negatively impact the individual, family, community and society as a whole. The health of Aboriginal people is not only sub-standard but is intricately related to poverty and unemployment, family violence, poor housing and living conditions, and the cost of quality food in remote communities.

Today it is widely recognized that type 2 diabetes is at epidemic levels and has become a serious health problem among the Aboriginal population in Canada. During the 1930’s and 1940’s diabetes was literally unheard of within Aboriginal populations. A study examining diabetes within the Saskatchewan population (Dyck, Osgood, Lin, Gao, Stang 2010) found that in 1937 diabetes was not detected in the First Nation people who underwent a tuberculosis survey. By 1990, almost 10% of the First Nation population in Saskatchewan had diabetes, this rose to 20% by 2006 while the general population remained at 6%. Regarding diabetes incidence and prevalence, First Nations women had the highest diabetes rates whereas non-First Nation women had the lowest, the variable between the two being four times higher among First Nation women than non-First Nation women. In comparison, First Nation men were 2.5 times higher than non-First Nation men. In 2005, the prevalence of diabetes remained more than 25% higher among First Nations women than among First Nation men. Relative to the study period (1980-2005) the

⁹¹ Comorbid depression is associated with increased health care use and expenditures in individuals with diabetes. Egede, Zheng, Simpson.

⁹² Depression and risk of onset of type II diabetes. A prespective population-based study. Eaton, Armenian, Gallo, Pratt, Ford.

⁹³ First Nations Regional Longitudinal Health Survey 2002/03. The People’s Report.

prevalence rate doubled in First Nation women and tripled in First Nation men, the rates in the non-First Nation population were similar.

In 1992, the death rate from diabetes among Aboriginal women on reserve was five times higher than the national average (Young, Reading, Elias, O'Neil 2000). According to the 1997 First Nations and Inuit Health Research Survey (FNIRHS), 8% of Aboriginal men and 13% of Aboriginal women reported having diabetes type 2. Alarming, diabetes is found in Aboriginal children as young as 5-8 years (Dean 1998). In one study performed in Island Lake Manitoba, 3.6% of girls aged 10-19, were diagnosed with diabetes. It must also be pointed out that the rate of diabetes is not evenly distributed among Aboriginal people in Canada. Among the Oji-Cree of Quebec, 25% of all adults and 80% of women 50-64 years had type 2 diabetes; in some areas of Canada the rate has almost doubled from the 1980-1990 as in Sioux Lookout Ontario and Saskatchewan (Young et al. 2002). The prevalence of heart disease and hypertension among First Nation adults with diabetes is four times higher than First Nation adults without diabetes⁹⁴. Across all age groups, diabetes is higher in the First Nation population than that of the Canadian population. Diabetes is a chronic disease rooted in multiple causes. Theories as to the cause of diabetes range from genetic markers, plasma insulin levels, and Gestational Diabetes Mellitus (GDM). Cross-sectional surveys link diabetes with hyperlipidemia, and obesity with the thrifty gene theory. Diet and lack of physical activity are highly implicated as well (Young et al. 2000). One particular research piece⁹⁵ published by the Canadian Journal of Diabetes in 2006 provided some insight into the perceptions of two generations of Aboriginal women in relation to diabetes and gestational diabetes, of note is the following statement *"Diabetes was discussed in 20 of 34 interviews, with a focus on causation theories and ways to prevent diabetes. Both groups linked sugar and processed foods with diabetes. More grandmothers talked about decreasing activity patterns and increasing maternal size, while more mothers emphasized the role of stress in causing diabetes during pregnancy. Both groups discussed prevention measures, such as an increased consumption of wild meat and fresh foods."*

Quality of care concerns regarding diabetes management and treatment among Aboriginal people is an area that requires additional research. Anecdotal evidence suggests a poorer level of care for this group; however numerous programs funded by federal and provincial programs such as the ADI have recently focused efforts specifically towards Aboriginal communities (primarily First Nation communities/reserves). Many of these efforts work towards ensuring Aboriginal control within the design and delivery of diabetes programming on reserve. Even so, challenges continue to exist as noted in a 2009 (Oster) study conducted with the on-reserve First Nation population in Alberta (43 First Nation communities) that examined the state of diabetes care among a total of 743 self-referred First Nation individuals with known diabetes. This study concluded that *"diabetes care is suboptimal in Alberta First Nation communities"* and went on to recommend that rural doctors caring for First Nation patients on reserve need to be more involved in strategies to improve diabetes care. As indicated in this study, the *"results justify the need for community-based screening for diabetes control and complications in First Nation communities"*.

Genetic Factors:

Diabetes poses a unique challenge to researchers attempting to examine genetic factors⁹⁶, as diabetes does not seem to be inherited in a simple pattern. Factors relating to lifestyle and environmental issues must be accounted

⁹⁴ Ibid.

⁹⁵ Perceptions of 2 Generations of Aboriginal Women on Causes of Diabetes During Pregnancy. Tait-Neufeld, Marchessault

⁹⁶ The genetic landscape of diabetes. Dean, McEntyre. 2004

for within research parameters, and these have often been difficult to isolate within target groups. That said, there have been several studies that focus on genetic factors that examine potential markers in Aboriginal populations with diabetes, however these have been small in scope and may not be broadly applied to the Aboriginal people in Canada. Further research is required that involves a larger sample of Aboriginal people across Canada to determine the role that genetic factors has upon the health of Aboriginal populations. An example of this type of research found that genetic markers are believed to be unique to Oji-cree and have been identified such as the variant of a gene encoding the hepatic nuclear factor –1alpha S319 has been found in 20% of diabetics in Sandy Lake Ontario.

Thrifty gene theory:

A recent genetic theory suggests some humans have adaptations that may not be well suited to our current environment. This adaptation in the Aboriginal population is popularly known as the “thrifty gene theory”⁹⁷, coined in 1962 by American geneticist Dr. James Neel. This theory sought to explain why some people gain weight and develop type 2 diabetes easily. According to Neel’s theory, Indigenous peoples possess genes that helped them survive feast-to-famine living. Traditionally, Aboriginal people lived a hunter-gatherer lifestyle and occasionally faced food scarcity. This theory suggests that “thrifty genes” gave these people an evolutionary advantage by allowing them to store greater reserves of energy which allowed them to better tolerate bouts of famine. This was key to their survival, that is, until the typical Western lifestyle was adopted. With less physical activity, a high fat diet, and access to a constant supply of calories, their bodies continued to store calories in preparation for a famine that didn’t arrive resulting in obesity and type 2 diabetes. Geneticists studying Neel’s theory have discovered certain genes and mutations (like mt16189, PSARL in chromosome 3q27, Pro12Ala in PPAR_2, and leptin- STAT3) that affect insulin levels and store glucose. Normally the body uses the hormone insulin to control the level of glucose (sugar) in the blood, but in diabetes mellitus, this process is altered. Further research is required to examine gene and gene mutations and goes beyond the scope of this literature review.

Poverty, stress due to racism, and poor nutrition (especially during pregnancy) also results in children being born predisposed to diabetes. Most experts agree that genetics alone does not determine the risk factor of obesity; but research does suggest that “thrifty genes” predispose people to hold on to food (sugars), making them more likely to develop type 2 diabetes (Pyhtila, 2007).

More recently, some researchers have moved to dismiss the “thrifty gene” theory. Kalhan, et al (2009) clearly dispels the thrifty gene theory and states *“although it remains a useful stimulus for research, the thrifty gene hypothesis remains a theoretical construct that so far lacks any concrete examples.”*⁹⁸ In sound scientific testing, Southan, et al (2009) used an array of tests to search for the “thrifty gene” and made the following statement in the results section of their study⁹⁹: *“We found no evidence for significant differences for the derived/ancestral allele test. None of the studied loci showed strong evidence... There are no consistent patterns of selection that*

⁹⁷ Thrifty gene theory: the theory is that *homo sapiens* evolved through times of famine; in order to survive, therefore, we developed a “thrifty” gene to help us store up excess calories as fat during times of abundance, so that we could burn that fat for fuel during the next famine. The thrifty gene theory allows pro-caloric balance hypothesis researchers to explain why only some people get fat and not all people.

⁹⁸ Kalhan, SC. Prentice, AM. Yajnic, CS. *Emerging Societies – Coexistence of Childhood Malnutrition and Obesity: Obesity in Emerging Nations: Evolutionary Origins and the impact of a Rapid Nutrition Transition.*

⁹⁹ Southan, L. Soranzo, N. Montgomery, SB. Frayling, TM. McCarthy, MI. Barroso, I. Zeggini, E. *Is the thrifty genotype hypothesis supported by evidence based on confirmed type 2 diabetes and obesity susceptibility variants? 2009.*

provide conclusive confirmation of the thrifty gene hypothesis." A study released by Australian and American researcher's dismissed the thrifty gene theory, and suggested that the high rate of chronic disease is rooted in social disadvantage rather than genetic predisposition; this particular study reviewed over 40 studies in an attempt to test the thrifty gene theory and found no specific gene to this effect. A number of "candidate" genes were identified but problems in replication (studies do not fully account for known social and environmental determinants¹⁰⁰ for diabetes). Many of the studies reviewed did not measure these factors sufficiently or considered them in their analysis, resulting in findings that are difficult if not impossible to replicate in a different group. This study recommended that studies are needed that sufficiently account for both the genetic and the environmental causes of diabetes, however cautioned specifically on studies aimed at Indigenous populations in search of a thrifty gene stating that the social determinants of diabetes and its effects on population groups be the intended focus. Yin Paradies states that *"race is primarily a social idea and there's no genetic basis to race in the strong sense of the word; clearly there are genes that determine skin color, etc"*. He goes on to state that it is more useful to understand the genes that determine diabetes amongst everyone and from there on determine if those genes have a particular impact on certain groups within the overall population.

Dr. James Neel in 1989 rejected his initial research findings and published a review of his earlier research based on his original "thrifty genotype" hypothesis and stated the following: *"the data on which that (rather soft) hypothesis was based has now largely collapsed."* In his research review, Dr. Neel researched the frequency of diabetes and obesity in a number of populations to test the original thrifty gene hypothesis. His new research findings casted doubt on his initial research, the hypothesis assumed that if a propensity to develop diabetes were an evolutionary adaption then diabetes would have been a disease of long standing in those populations currently experiencing a high frequency of diabetes. Neel's new research found no evidence of diabetes among these population groups in the early part of this century, and when testing younger members for glucose intolerance, he found none. Neel surmised that modern, very high levels of obesity and diabetes among formerly native populations were a relatively recent phenomenon most likely caused by changes in diet; the Inuit for example experienced a rise in obesity and diabetes in conjunction with a reduction of the proportion of fat and protein in their diets. Neel concluded that the dietary causes of obesity and diabetes lay in carbohydrate consumption and more specifically the use of highly refined carbohydrates. It is anticipated that further research within this area will be undertaken to eliminate opposing voices and more clearly establish whether this theory remains viable in the twenty-first century.

Statistics indicate that Aboriginal people in Canada face many socio-economic challenges, resulting in higher levels of poverty and less access to healthy foods than the general population, so it is difficult to separate genetic factors from environmental ones (Poudrier, 2004). This alone precipitates the need for additional research that focuses on how socio-economic stressors impact upon the health status of Aboriginal people.

Gary Taubes, author of *"Good Calories, Bad Calories"*¹⁰¹ dismisses the notion of the thrifty gene theory with the following key points:

- Obesity seems to confer a serious evolutionary disadvantage, so why would we "evolve in" a mechanism that would make us obese?

¹⁰⁰ It is well known that diabetes is caused by poor diet, sedentary lifestyles, lack of exercise, and factors such as low birth weight, stress, and so forth.

¹⁰¹ Good Calories, Bad Calories. Pages 242-251. Gary Taubes.

- evidence suggests that diabetes is a relatively new disease; this suggests that the hypothesis is wrong, since diabetes and obesity closely correlate;
- the hypothesis rests on the assumption that we evolved through many periods of famine. Ample anthropological evidence contradicts this assumption. Our hunter gatherer ancestors most likely lived in an equilibrium with their environment;
- In general, when species encounter an overabundant food supply, they multiply – they don't get fat and sick; one of the main studies often used to defend the hypothesis, a study on Israeli sand rats, could easily be interpreted as providing evidence against the hypothesis and in support of the ideas that carbohydrates make us fat;
- Offer animals like lions and monkeys unlimited calories of meat and protein, and they will eat to satiation and not gain weight. Conversely, provide these animals an abundance of carbohydrate calories, and they will get fat and sick. Again, carbohydrates seem to be the problem, not some strange and as of yet unidentified genetic storage mechanism.

Challenges to any long-held theory often results in observations that may support new and emerging theories. The “thrifty phenotype” hypothesis¹⁰² is one that is a direct result of challenges posed to the thrifty gene theory. It is theorized that the development of insulin resistance is directly related to the body “predicting” a life of starvation for the developing fetus¹⁰³.

Food Preservatives and Additives:

In response to Young, et al's (YEAR) research on *Diabetes in Canada's First Nations*, Dr. William D. Panton (ret.) challenged current perceptions that genetics are a factor in the diabetes epidemic, noting Chase (1937) who indicated that not all Indian people were thin and in fact some were over-weight. He further referenced a textbook on the pathology of diabetes published in 1938 wherein retinopathy and nephropathy are rarely mentioned. Yet today, these two complications are among the most devastating. Dr. Panton adds that “*if the triad of elevated blood sugar, overeating and lack of exercise contributes to diabetes and its microvascular complications then why was such a cause-and-effect relationship not apparent prior to World War II?*”. He hypothesizes that “*blame should not be on eating and exercise habits, but on the quality of the “white man's food”* and suggest that modern/westernized food may have nutritional deficiencies or toxic additives and could in fact be contributing to the increased frequency of diabetes and its complications. Research into this angle of cause and effect goes beyond the scope of this paper, however given documented increases in toxicity and pollutants found within the human biology over the last forty to fifty years diabetes researchers should undertake an examination of the parallel relationship between “home cooked foods” of yesteryear and the increase of convenience and fast-foods currently consumed today in relation to diabetes prevalence rates. While this literature review did not specifically focus on this area, it was noted that many research papers exist that point to preservatives and additives within the “western” food system and potential linkages to a possible cause to diabetes and complications arising from diabetes. This area of study should be further investigated by diabetes researchers, if indeed true, findings could lead to substantial changes to the food systems and methods of food preservation and reviews of additives that are common today.

¹⁰² The “thrifty phenotype” hypothesis theorizes that instead of the “thrifty factors” arising from genetic factors, that instead it is a direct result of the environment within the womb during development.

¹⁰³ Watva, Yajnik (2007). Evolutionary origins of insulin resistance: a behavioural switch hypothesis.

Obesity:

“Obesity is a disease of metabolic regulation. If you’re going to treat obesity, you have to understand the root cause in the failure of metabolic regulation” Dave Dixon

The “caloric balance hypothesis”¹⁰⁴ points to the obesity epidemic as being caused by an epidemic of sloth and gluttony. Obesity researchers invoke the “thrifty gene theory” to rationalize why people become overweight and become diabetic. In essence, the logic applied tells us that the modern environment presents access to a super abundance of calories, and that human beings who evolved to live in times of famine cannot adapt to the super abundance of calories, resulting in over consumption of food simply because the food is available to us.

Obesity is a public health concern worldwide that begs immediate intervention. Health Canada has found that the *“The prevalence of obesity among women is highest among the low and lower-income groups...the prevalence of obesity is highest among Aboriginal women...”* (Women’s Health Surveillance Report, 2003). Among Aboriginal population, the rate of obesity for women is twice that of men. Characteristically, in the Aboriginal population, excess weight is located around the middle giving an “apple shape” to the body. One study found that Aboriginal people have a greater amount of abdominal obesity, eat more calories, and engage in less physical activity than the more economically advantaged Canadians of European descent (Anand et al., 2002).

Lack of physical activity and obesity play important roles in the development of cancer and many chronic diseases that affect women. This places a substantial burden on the quality of their life and on the health care system. With this in mind, the Aboriginal Circle of Life Services at the Native Canadian Centre of Toronto developed the program for Aboriginal women, “Weigh In Weigh Out” to address two modifiable behaviors, healthy eating and physical activity. The framework utilized was the Stages of Change, also known as the Trans-theoretical model. The Canadian Centre of Activity and Aging (CCAA) Physical Activity Guidelines were followed to give participants a portable gym so to speak, a home exercise program. Other important components such as a wellness approach, time for relationship building, social/peer support and cultural sensitivity were integrated into the program. Follow-up at 6 months indicated women were participating in some kind of physical activity and cutting down on fats and carbohydrates. This program was sponsored by the Canadian Cancer Society-Ontario Division (unpublished report).

Cross-sectional surveys argue the association between diabetes, hyperlipidemia, and obesity. As noted, obesity in Aboriginal people is central or abdominal and is higher for the development of diabetes. Dietary patterns among Northern Ontario and Manitoba First Nations indicate that diabetics eat more protein than non-diabetics but differ in terms of protective effect of fibre. In Sandy Lake, junk foods, fatty ways of food preparation, the introduction of the Western diet and limited access to traditional foods (15%) all contribute to diabetes risk factors (Young et al. 2000). In addition, according to the Aboriginal People’s Survey (1991) only 54 % of adults include physical activity in their leisure time, the lack of physical activity contributes to obesity resulting in an increased risk of diabetes.

The quality of food consumed by an individual has an impact upon the health of that individual. In areas in which food, in particular fresh fruits and vegetables are not readily available or where cost factors such as transportation

¹⁰⁴ The caloric balance hypothesis rests on the assumption that controlling calories (by eating less and exercising more) will lead to weight loss. This theory is the foundation of many diet plans.

have hyper-inflated consumer costs, food security becomes an issue. As observed in one study¹⁰⁵ *“low-income, nutritionally stressed families relying on federal food programs may be at increased risk of obesity and diet-related chronic conditions due to long-term use of foods that are high in fat and calories and low in fiber.”*

Challenges in Policy:

Challenges experienced by First Nation adults with diabetes point to concerns regarding NIHB¹⁰⁶ (27% compared to 18.7% of First Nation adults without diabetes) who stated having difficulty in accessing medication, other medical supplies and hearing aids¹⁰⁷. Comparative differences in First Nation adults with diabetes and those without diabetes are reflected in reports around the lack of and/or denial of approval for services under NIHB resulting in limited access to health care (21.2% compared to 15.2%). Reasons cited for not attending a diabetes clinic or diabetes education session include cost (6.2%), insufficient information available (4.7%), and culturally inappropriate or inadequate services (3.3%)¹⁰⁸. Regardless of these identified challenges, the majority of First Nation adults with diabetes are being treated, with most taking pills (68%) and monitoring their diet (65.5%). Other treatments include exercise (52.9%), insulin (16.7%), traditional medicines (12.9%), and traditional healer or traditional ceremony (6.0%)¹⁰⁹. NIHB policy must be streamlined to ensure the best possible point of care for Aboriginal people needing it, in addition, increasingly more and more Aboriginal people, First Nation people in particular are ineligible to access NIHB due to status provisions within the Indian Act that excludes non-status Indians. Addressing diabetes in the Aboriginal population is of great importance. Type 2 diabetes is at pandemic proportions among the Aboriginal people in Canada impacting upon their health and ultimately their longevity as a distinct Indigenous populace of the area known as Canada. Initiatives such as the ADI should work with the relevant government bodies both nationally and regionally to alleviate stressors that may impact upon those Aboriginal people most needing access to services; efforts to streamline services and reduce challenges should be priority areas.

Gestational diabetes:

Gestational diabetes is a condition where diabetes is identified during pregnancy; up to 18% of pregnant Aboriginal women will have this condition, early research indicates that this rate will continue to increase. GM predisposes women and their children to diabetes in the future. Surely if the same level of prevalence were identified within the non-Aboriginal populations this would trigger alarm bells worldwide.

The longer term effects of this condition pose a greater challenge to the future health care solutions of the Aboriginal population as diabetes rates among the young continue to climb: *“T2D is increasingly being observed among children and youth, including the Native population of Canada. Only one study has investigated prenatal and early infancy risk factors for the disease.”*¹¹⁰ This study concluded that *“breastfeeding reduces the risk of T2D*

¹⁰⁵ Patterns of Commodity Food Use Among American Indians by Chino, Haff, and Dodge-Francis

¹⁰⁶ NIHB: Non-insured health benefits: Provinces and Territories are responsible for delivering health care services guided by provisions within the Canada Health Act. Some health-related goods and services are not insured within existing systems, the NIHB was developed to support First Nations and Inuit people and provides coverage for a limited range of goods and services not insured elsewhere. Source: www.hc-sc.gc.ca.

¹⁰⁷ First Nations Regional Longitudinal Health Survey 2002/03. The People's Report.

¹⁰⁸ Ibid.

¹⁰⁹ Ibid.

¹¹⁰ Type 2 Diabetes in Children, prenatal and early infancy risk factors among native Canadians by Young, Martens, Taback, Sellers, Dean, Cheang, and Flett (2002)

among Native Canadian children and should be promoted as a potential intervention to control the disease". An additional focal point for researchers within this field would be identifying factors that could reduce this condition and/or prevent the predisposition of diabetes in the future for both mother and child. Good nutrition and healthy weight gains during pregnancy are promoted broadly by medical professionals; however issues related to food security and socio-economic barriers need to be addressed by researchers within this field.

Mental health and Aboriginal populations:

Aboriginal people in Canada traditionally lived a harmonious existence that balanced spiritual, emotional, mental and physical aspects of life, promoting connectedness that did not separate "health" from mental health and other ideas of well-being¹¹¹. This existence has been altered through colonial practices and legislation designed to transform the Indian into a White man. These historical stresses, marginalization, and cultural suppression has impacted upon the traditional structures that supported "bimazadiwin", or the good-life. These stressors have led to social problems that have impaired mental health in the Aboriginal population leading to an increase in violence, family dysfunction, abuse of alcohol or drugs, and physical or sexual abuse. The outcomes are witnessed by rates of depression among on-reserve First Nation people at twice the level¹¹² in comparison to the general Canadian public, as well as high levels of violence, suicide and addictions. The off-reserve First Nation group also had higher rates of depression, 13.2% had experienced a major depressive episode in the past year, and this is 1.8 times higher than the non-Aboriginal population. The legacy of colonization has had a substantial impact on the Aboriginal people of Canada. In fact, there are striking parallels in the mental health problems of Indigenous peoples around the world suggesting that, while biological, social, cultural and political factors vary, there are common processes at work (Hunter, 1993; Kunitz, 1994; Spencer, 2000).

A number of epidemiological studies have documented high levels of mental health problems in many Aboriginal communities (Kirmayer, 1994a; Kirmayer et al. 1993; RCAP, 1995; Waldram et al., 1995). While efforts have been undertaken to record these effects several researchers have focussed on the regeneration and enculturation aspects of restoring mental health among Aboriginal people. Cultural continuity has been identified as fundamental in restoring balance and building healthier Aboriginal communities.

In a study conducted by Chandler and Lalonde (1998) that examined suicide rates in 196 First Nation communities found that "cultural continuity"¹¹³ resulted in lower incidents of suicide among its membership. Clearly, there is a direct correlation between lack of community control and high suicide rates. To further support this, Kirmayer et al (2000) concluded¹¹⁴, *"a cultural perspective can contribute to rethinking appropriate forms of mental health services and health promotion that respond to the dilemmas created by this complex history and social context."*

Researchers have pointed to the need to address historical trauma's that still to this day continue to impact upon the health status and socio-economic well being of Aboriginal people, often leaving in its wake stressors that contribute to a poorer mental health status. Certainly, what impacts one generation will have a cause and effect response in the following generations, work undertaken by organizations such as the Aboriginal Healing Foundation identify intergenerational stressors¹¹⁵ as significant. This has been supported by others, in fact research on older Aboriginal peoples have found that *"acculturation stress resulting from forced acculturation and*

¹¹¹ Adelson N. Being alive well: health and the politics of Cree well-being. Toronto: University of Toronto Press; 2000.

¹¹² First Nations and Inuit Regional Health Surveys, 1997

¹¹³ These authors examined 6 indicators of what they termed "cultural continuity," but which might more accurately be called local control: community control of police and fire, education, and health, existence of local facilities for cultural activities, self-government, and involvement in land claims.

¹¹⁴ In a report presents the proceedings of a conference on "The Mental Health of Indigenous Peoples" organized by the Aboriginal Mental Health Team of the Culture & Mental Health Unit, Sir Mortimer B. Davis—Jewish General Hospital in Montreal May 29-31, 2000.

¹¹⁵ Historic Trauma and Aboriginal Healing. Aboriginal Healing Foundation Research Series. 2004.

attempted forced assimilation is hypothesized to be a causative factor in development of depression in older American Indians.” (Kunitz & Levy, 1986); Leighton 1971; and LaFromboise 1988)

IN CONCLUSION

“Aboriginal concepts of health and healing start from the position that all elements of life and living are inter-dependent. By extension, well-being flows from the balance and harmony among all elements of personal and collective life” (Murdock in Wilson, 2004, p.1)

This paper identifies that significant gaps in literature exists where diabetes and mental health co-occur among Aboriginal people. When specific to Aboriginal women this gap in literature becomes more obvious. While data does exist individually, and to a lesser degree, in combinations thereof, concrete data linking all three variables indicate a discernable need for more research. In addition, research materials are more readily available for the on reserve Aboriginal (First Nation) population, there are gaps present for the off-reserve Aboriginal population. The gap in information for the urban Aboriginal population is significant enough to threaten any effective strategy for addressing diabetes and its effects. Addressing this “urban” gap is especially important given that the majority of Aboriginal people live in urban areas and statistics indicate this number is growing; additionally, the majority of Aboriginal urbanites are Aboriginal women with families. Other gaps in literature apply to linkages between diabetes and mental health among the Aboriginal homeless population, street trade workers and incarcerated Aboriginal women. Geography, environmental factors, and socio-economic conditions should be included where possible in research projects. This information provides for a starting point for researchers seeking to identify how these co-occurring conditions impact upon the Aboriginal population base and would provide valuable data that could be used in the design and development of programs and services for Aboriginal people. As indicated in this paper research involving Aboriginal populations must include cultural continuity, be ethically sound and include the population group at every stage of the research process. The need to address health disparities that are directly and indirectly related to the socio-economic, cultural and political inequities is of fundamental importance to bring about any measure of good health, well-being, and equitable standing for Aboriginal people in Canada. Without this application the end result *“is a disproportionate burden of ill health and social suffering upon the Aboriginal populations of Canada.”* (Adelson, N. 2005). A recent Health Council of Canada report *“Rekindling Reform: Health Care Renewal in Canada 2003-2008”* highlighted ongoing gaps in services that result from the complex structure of health care funding and delivery for Aboriginal people. Referenced in this report is that due to poor integration of services, Aboriginal people receive a lower level of care in comparison to that received by the general population. Examples include the Non-Insured Health Benefits (NIHB) Plan where newer diabetes medications, devices or supplies are not always made available, in addition, Metis and Non-status First Nation people do not have access to NIHB. In many cases, jurisdiction is cited as an issue as Aboriginal people must navigate three, sometimes four, systems of government (First Nations, local, Provincial, and Federal) to attain adequate health care services. This structure often gates Aboriginal women from equitably accessing the services

they need, in fact many do not access health services because of a gap in culturally appropriate services in urban areas, systemic barriers, lack of transportation and child care^{116, 117}. There is *“evidence that health behavior, and access to and use of health services are socially and culturally determined”*¹¹⁸. As a result it should be understood that equal access to health care does not ensure greater treatment outcomes for Aboriginal people because of cultural differences, poor communication between physician and patient, and system barriers. According to many studies, change in the attitudes toward Aboriginal people is needed in order to guarantee that acceptable, timely, responsive and quality health services are available to them if we are going to change attitudes towards diabetes and its complications. New approaches such as that by The Stanford Geriatric Education Centre on American Indians recommended that health education should utilize a “health promotion” approach rather than a disease model, and be carefully evaluated for cultural relevance, as noted by Neligh in 1990. In addition, *“partnerships, confidentiality, privacy, data storage, Aboriginal, consent, ownership and control, and, analysis and interpretation”*¹¹⁹ should be important variables.

Regardless of process, the social determinants of health need to be considered whenever research, programs or services involve Aboriginal people. Aboriginal women, in particular have unique needs, and are the most vulnerable. They are heads of families, primary breadwinners and responsible for providing care for the family. This triple role results in stress. Their health is sub-standard and connected to poverty and unemployment, family violence and poor housing and living conditions, cost of quality food in remote communities and a lack of clean water. Regardless of these challenges, Aboriginal women remain strong forces within family and community, their voices continue to inspire. As noted in many research pieces, and succinctly stated by M. Dion Stout¹²⁰ *“...recognition must also be given to Aboriginal women’s strength and resilience, which has allowed them to move forward and succeed, despite the countervailing forces of racism, prejudice and colonialist legacy...”*.

¹¹⁶ Ontario Aboriginal Diabetes Strategy. 2006

¹¹⁷ Health Practitioners’ Perspectives On The Barriers To Diagnosis And Treatment Of Diabetes In Aboriginal People On Vancouver Island. By McKee, Clarke, Kmetc, and Reading. *“This study identified disparities related to access to transportation, educational materials, traditional care and medicine, and diagnostic services.”* These findings support literature identifying barriers from the perspective of Aboriginal patients and researchers.

¹¹⁸ Daniel 2002; Green 2003; Tonelli et al. 2004

¹¹⁹ Issues Relating to Diabetes Surveillance in the Aboriginal Community, by the Aboriginal Diabetes Working Group 2003

¹²⁰ *Aboriginal Women’s Health Research Synthesis Project*, by, Kipling, M Dion-Stout and Stout (2001)

RECOMMENDATIONS

“...enculturation plays an important role in the healing process. The promotion of Aboriginal cultural identity is a key factor to establish reconnection to cultural values and traditions, promote cultural pride, and strengthen self-esteem/respect.” - Coping with stress among Aboriginal women and men with diabetes in Winnipeg, Canada. Iwasaki, Bartlett, O’Neil. 2004.

The NWAC’s collective goal is to enhance, promote, and foster the social, economic, cultural and political well-being of First Nations and Metis women within First Nation, Metis and Canadian societies. NWAC’s mandate is to achieve equality for all Aboriginal women in Canada. The following identifies key findings and recommendations which was derived on research conducted during the development of this literature review and in the context of culturally relevancy and gender inclusivity.

1. Little research is available on diabetes and mental health issues co-occurring within the Aboriginal population, even less is available when specifically applied to Aboriginal women:
 - Research funds need to be strategically aligned to focus specifically on linkages between diabetes and mental health issues co-occurring in Aboriginal people (both on and off reserve) and include distinctions in age parameters (babies and children, youth, adults, and seniors), gender, and cultural factors.
 - Research in this field must respect and adhere to methodologies that ensure Aboriginal people are included in the design, development, and implementation of research activities and given control over how the research problem was conceptualized and investigated.
 - Additional research is required to determine why Aboriginal people experience a lower quality of life as compared to non-Aboriginal people in Canada. This piece should focus on how this impacts upon those individuals with co-occurring diabetes and mental illness and include variables that factor in differences in age, gender, geography, and socio-economic conditions.
 - Research is required that examines the quality of care in Aboriginal people who suffer both diabetes and mental health conditions concurrently, and identifies differences in age, gender, geography, and socio-economic conditions, as well as how existing legislation and policy may act to promote or inhibit health outcomes.
 - Research is required on diabetes, gestational diabetes and population projections of Aboriginal people in an effort to better identify long-term health outcomes and complications, requirements and solutions.
 - Research is required where diabetes co-occurs with mental illness in distinct Aboriginal groups, such as the homeless, street-workers, incarcerated, and children and youth in the child welfare system.

2. Little research is available on the lives of Aboriginal people prior to contact, in particular information relating to tradition, culture, gender roles, medicinal practices, ways of being (healthy living):
 - Research is required that identifies how tradition, culture, gender roles, medicinal practices, and ways of being can be applied to modern lifestyles and changing social structures. Research in this area should seek to explore historical trauma, methods of de-colonization and include practical approaches and interventions toward resolving current issues and challenges that impact upon the health and well-being of Aboriginal people.

- Research is required that examines how dual conditions such as diabetes and mental health can be treated over and above modern methodologies. In particular answering and identifying traditional, cultural, and medicinal methods and plants used to treat these conditions.
 - Research is required to identify best methods to recapture lost knowledge and skills in an effort to restore cultural values and traditions to better support long-term health outcomes.
3. There is a need to add to existing research data within the diabetes and mental health fields and how they co-occur in various population groups, geographies, and socio-economic conditions.
- More research is required on gender within both fields, as well how they co-occur in various population groups, geographies, and socio-economic conditions.
 - Additional research is required that examines the relationship between age, diabetes, and depression. This should be further explored within the Aboriginal population and include an in-depth look at gender differences.
 - Additional research is required on genetic factors as it relates to both conditions individually and when they co-occur within an Aboriginal person. Current theories should be investigated and new and evolving research undertaken to assist within these medical fields.
 - Research is required that examines health policy in Canada and how it applies to Aboriginal people to determine the level of health care services that Aboriginal people regardless of Indian status receive compared to non-Aboriginal people. This research should identify limitations and exclusions, jurisdictional issues, map out solutions to challenges identified by Aboriginal people and medical professionals.

BIBLIOGRAPHY AND RESOURCES

Penckofer, Ferrans, Velsor-Friedrich, Savoy. *The psychological impact of living with diabetes: women's day-to-day experiences*.

Martin, C. "The European Impact on Culture of A North Eastern Algonquin Tribe: An Ecological Interpretation". 1993.

Acheson. *A persistent spirit: Towards understanding Aboriginal health in British Columbia*. 1993. 1995

Frideres. *Aboriginal peoples in Canada*. 1998

Hopkinson (1995)

Bent 2004 (37).

M. Dion Stout, Kipling, and Stout. *Aboriginal Women's Health Research Synthesis Project*. 2001

Martin, C. "The European Impact on Culture of A North Eastern Algonquin Tribe: An Ecological Interpretation". 1993.

Smye. 2004

Moran. 1988

INAC. *Aboriginal Population, Household and Family Projections*. 2007

Statistics Canada. *Projections of the Aboriginal population, Canada, provinces and territories 2001 to 2017*.

Diabetes prevalence and income. Canadian Community Health Survey. 2010

Aboriginal Peoples Survey 2006

Regional Health Survey 2002-03

RCAP 1996

McKee, Clarke, Kmetc, and Reading. *Health Practitioners' Perspectives On The Barriers To Diagnosis And Treatment Of Diabetes In Aboriginal People On Vancouver Island*.

Brown, Isaak, Lengyel, Hanning, Friel. *Moving to the city from the reserve: Perceived changes in food choices*. 2008

Government of Canada. "The Human Face of Mental Health and Mental Illness in Canada" 2006

Canadian Council on Social Development. 2003

Van Kirk, S. *Women in between: Indian women in fur trade society in western Canada*. 1988.

Indian and Northern Affairs Canada [website] Ottawa, ON Indian and Northern Affairs Canada 2009 Available from: www.ainc-inac.gc.ca/index-eng.asp Accessed 2009 Feb 27.

Diabetes prevalence and income: Results of the Canadian Community Health Survey (2010)

Townson, M. Poverty issues for Canadian Women. 2005

2006 Report card on child and family poverty in Canada.

Conference Board of Canada, How Canada Performs, A Report Card on Canada, June 2007.

CDA website: <http://www.diabetes.ca/diabetes-and-you/what/facts/> Accessed February 10, 2011.

Diabetes Facts & Figures. PHAC website: accessed January 17, 2011. <http://www.phac-aspc.gc.ca/cd-mc/diabetes-diabete/index-eng.php>

Young, TK and Mustard, CA. Undiagnosed diabetes: does it matter? CMAJ 2001.

Prevalence and Cost of Diabetes. CDA website accessed January 17, 2011. <http://www.diabetes.ca/diabetes-and-you/what/prevalence/>

IDF: International Diabetes Federation

CDA website. Accessed February 3, 2011. <http://www.diabetes.ca/diabetes-and-you/what/prevalence/>

Type 2 Diabetes in the Young: *The Evolving Epidemic, The International Diabetes Federation Consensus Workshop Consensus Statement 2004*

A Health Outcomes Report: Why Health Care Renewal Matters: Lessons From Diabetes. Health Council of Canada, March 2007.

Kelly, C. Booth, GL. *Diabetes in Canadian Women*. 2004

Gucciardi, Wang, DeMelo, Amaral and Steward. *Characteristics of men and women with diabetes*.

Dornhorst. EU Conference on Prevention of Type 2 Diabetes, Female Gender and Diabetes. 2006

Gregg, Gu, Cheng, Narayan and Cowie. *Mortality trends in men and women with diabetes, 1971-2000..*

Diabetes Among Aboriginal People in Canada: The Evidence 2001.

CDA website, accessed January 12, 2011. <http://www.diabetes.ca/diabetes-and-you/what/facts/>
Modifiable risk factors for developing diabetes among women with previous gestational diabetes, preventing chronic disease.
January 2007.

Alberta Diabetes Atlas. 2007

Diabetes in Canada, Second Edition

Health Canada. *A Report on mental illness in Canada*. 2002

Bazelon Centre for Mental Health Law. 2004.

Borowsky, Rubenstein, Meredith, Camp, Jackson-Triche, and Wells. *Who is at risk of nondetection of mental health problems in primary care?* 2000.

Depressive symptoms and the risk of type 2 diabetes in Canada. Diabetes Care 2004.

Canadian clinical practice guidelines for the prevention and management of diabetes in Canada. Canadian Journal of Diabetes 2003.

Schizophr Bull. *Prevalence and correlates of diabetes in national schizophrenia samples.* 2000.

Alberta Diabetes Surveillance System. Alberta Diabetes Atlas 2007. Chapter 8.

CWHN 2007

Urban Aboriginal Women and Mental Health. 2010

Prairie Women's Health Centre of Excellence (2010): *Aboriginal Women's Mental Health: Through Their Own Eyes, In Their Own Words.* KISKAYITAMAWIN MIYO-MAMITONECIKAN (Plains Cree word meaning "knowing mind fullness")

Health Canada (2003) The Health of Aboriginal Women. Morrow, M (2003).

First Nations Regional Health Survey 2002-2003. Preliminary Adult Report.

WHO: World Health Statistics 2008

A Guide for Health Professionals Working with Aboriginal Peoples. Journal of the Society of Obstetricians and Gynecologists of Canada 2001.

RA Bell, SL Smith, TA Arcury, BM Snively, JM Stafford, and SA Quant. *Prevalence and Correlates of Depressive Symptoms Among Rural Older African Americans, Native Americans, and Whites with Diabetes.* 2005.

K Wilson, TK Young. *An Overview of Aboriginal Health Research in the Social Sciences: Current Trends and Future Directions.* 2007.

Egede, Le. Zheng, D. Simpson K. *Comorbid depression is associated with increased health care use and expenditures in individuals with diabetes.* 2002

WW Eaton, H Armenian, J Gallo, L Pratt, and DE Ford. *Depression and risk for onset of type II diabetes. A prospective population-based study.* 1996

Ciechanowski, Katon and Russo. *Impact of Depressive Symptoms on Adherence, Function and Costs*

Lin, Rutter, Katon, Heckbert, Ciechanowski, Oliver, Ludman, Young, Williams, McCulloch, and Von Korff . *Depression and Advanced Complications of Diabetes, a prospective cohort study*

Kruse, Schmitz, and Thefeld. *On the Association Between Diabetes and Mental Disorders in a Community Sample: Results from the German National Health Interview and Examination Survey.* 2003

Gonzalez, Safren, Cagliero, Wexler, Delahanty, Wittenberg, Blais, Meigs, and Grant. *Depression, Self-Care and Medication Adherence in Type 2 Diabetes, Relationships across the full range of symptom severity.*

Egede, Zheng, Simpson. *Comorbid depression is associated with increased health care use and expenditures in individuals with diabetes.*

Eaton, Armenian, Gallo, Pratt, Ford. *Depression and risk of onset of type II diabetes. A prespective population-based study.*

First Nations Regional Longitudinal Health Survey 2002/03. The People's Report.

Tait-Neufeld, Marchessault. *Perceptions of 2 Generations of Aboriginal Women on Causes of Diabetes During Pregnancy.* 2006

Dean, McEntyre. *The genetic landscape of diabetes.* 2004

Kalhan, SC. Prentice, AM. Yajnic, CS. *Emerging Societies – Coexistence of Childhood Malnutrition and Obesity: Obesity in Emerging Nations: Evolutionary Origins and the impact of a Rapid Nutrition Transition.*

Southan, L. Soranzo, N. Montgomery, SB. Frayling, TM. McCarthy, MI. Barroso, I. Zeggini, E. *Is the thrifty genotype hypothesis supported by evidence based on confirmed type 2 diabetes and obesity susceptibility variants?* 2009.

Gary Taubes. *Good Calories, Bad Calories.* Pages 242-251.

Watva, Yajnik. *Evolutionary origins of insulin resistance: a behavioural switch hypothesis.* 2007

Chino, Haff, and Dodge-Francis. *Patterns of Commodity Food Use Among American Indians*

Adelson N. *Being alive well: health and the politics of Cree well-being.* Toronto: University of Toronto Press; 2000.

"*The Mental Health of Indigenous Peoples*" organized by the Aboriginal Mental Health Team of the Culture & Mental Health Unit, Sir Mortimer B. Davis—Jewish General Hospital in Montreal May 29-31, 2000.

Aboriginal Healing Foundation Research Series. *Historic Trauma and Aboriginal Healing.* 2004.

Ontario Aboriginal Diabetes Strategy. 2006

McKee, Clarke, Kmetic, and Reading. *Health Practitioners' Perspectives On The Barriers To Diagnosis And Treatment Of Diabetes In Aboriginal People On Vancouver Island.*

Daniel 2002; Green 2003; Tonelli et al. 2004

Issues Relating to Diabetes Surveillance in the Aboriginal Community, by the Aboriginal Diabetes Working Group 2003