

A photograph of a traditional salmon smoking rack. Several large salmon are hanging vertically from a wooden frame. The fish are being smoked over a fire, as evidenced by the glowing embers and smoke in the background. The fish have a silvery skin and some are showing a reddish-orange hue from the smoking process.

THE PREVALENCE OF TYPE 2 DIABETES AMONG FIRST NATIONS AND CONSIDERATIONS FOR PREVENTION

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CHILD, YOUTH & FAMILY HEALTH

© 2019 National Collaborating Centre for Aboriginal Health (NCCAH). This publication was funded by the NCCAH and made possible through a financial contribution from the Public Health Agency of Canada. The views expressed herein do not necessarily represent the views of the Public Health Agency of Canada.

Acknowledgements

The NCCAH uses an external blind review process for documents that are research based, involve literature reviews or knowledge synthesis, or undertake an assessment of knowledge gaps. We would like to acknowledge our reviewers for their generous contributions of time and expertise to this manuscript.

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Une version française est également publiée sur le site ccnsa.ca, sous le titre : *La prévalence du diabète de type 2 chez les Premières Nations et une réflexion sur la prévention.*

Citation: Halseth, R. (2019). *The prevalence of Type 2 diabetes among First Nations and considerations for prevention*. Prince George, BC: National Collaborating Centre for Aboriginal Health.

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ISBN (Print): 978-1-77368-205-1
ISBN (Online): 978-1-77368-206-8

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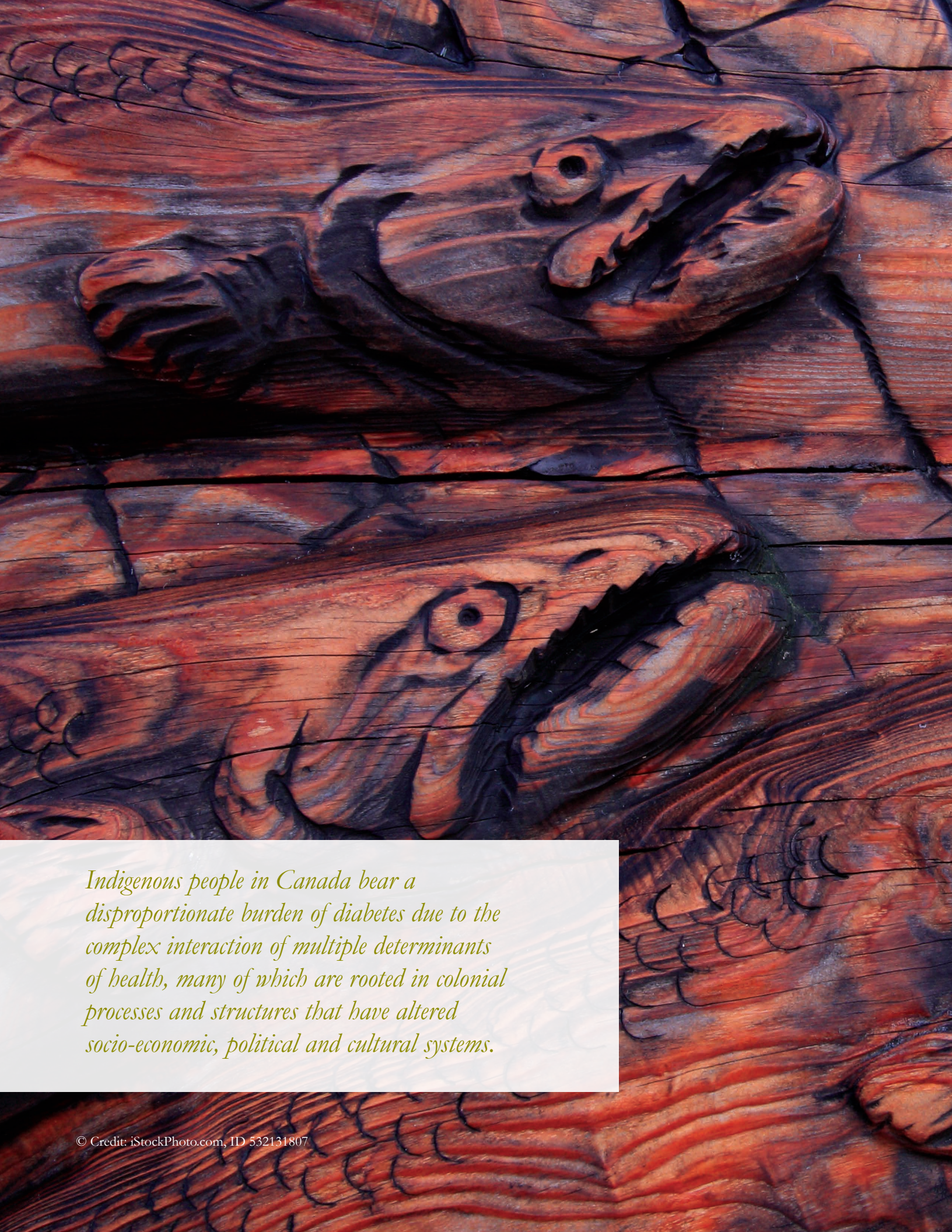


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Indigenous people in Canada bear a disproportionate burden of diabetes due to the complex interaction of multiple determinants of health, many of which are rooted in colonial processes and structures that have altered socio-economic, political and cultural systems.

1.0 INTRODUCTION



Diabetes mellitus (DM), more commonly referred to as diabetes, is one of the most common chronic diseases in Canada and a major cause of morbidity and mortality. The disease has been expanding rapidly since 2006, and is expected to continue increasing at a rapid rate for at least the next decade (Canadian Diabetes Association [CDA], 2016). Diabetes is expected to place an increasing burden on Canada's healthcare system, with costs to the system expected to increase from \$3.4 billion in 2016 to \$5 billion by 2026 (CDA, 2016). The prevalence of diabetes varies across age, geographic location, racial groups, and by socio-economic and health status. Indigenous people¹ in Canada bear a disproportionate burden of diabetes due to the complex interaction of multiple determinants of health, many of which are rooted in colonial processes and structures that have altered socio-economic, political and cultural systems. These determinants have resulted in health inequities, socio-economic disparities and associated lifestyle risk factors that contribute to the development of Type 2 diabetes (T2DM) and make it challenging to cope with the disease (Ghosh, 2012).

In recognition of the seriousness of diabetes as a public health concern, intensive efforts have been made at multiple levels to develop appropriate and effective diabetes policies, healthcare practices, and prevention and management programs. The Government of Canada, for example, has implemented both a pan-Canadian diabetes strategy to address the disease within the general Canadian population as well as a targeted Aboriginal Diabetes Strategy, resulting in funding for numerous prevention and management activities. Despite these efforts, interventions for Indigenous populations have shown limited effectiveness to date (Harris, Tompkins, & Te Hiwi, 2017; Office of the Auditor General of Canada, 2013). There is currently a paucity of evidence on the effectiveness of interventions to prevent or treat diabetes and a lack of surveillance data, as well as numerous barriers to diabetes care, that continue to impede effective prevention, management and control of diabetes among Indigenous populations (Guariguata et al., 2014; Harris et al., 2017; McNamara, Sanson-Fisher, D'Este, & Eades, 2011).

However, diabetes does not affect all Indigenous peoples equally, as First Nations populations carry a considerably larger burden of the disease compared to Inuit and Métis populations. As such, this paper aims to provide an overview of diabetes among First Nations. Specifically, it discusses what is known about the prevalence of and trends in diabetes among First Nations,² the factors that increase their risk of developing the disease, the barriers and facilitators of diabetes prevention interventions in First Nations communities, and the features of interventions that have shown some success. The paper draws on a review of peer and non-peer reviewed literature published up to October 2018. This literature was identified through a search of Google, Google Scholar, PubMed and Medline, using the search terms "diabetes + Aboriginal/First Nation/Indigenous + Canada."

¹ The term 'Indigenous people(s)' refers to the original inhabitants of Canada and their descendants, including First Nations, Inuit and Métis peoples as defined in Section 35 of the Canadian Constitution of 1982. When not referring to all Indigenous peoples collectively, the specific terms "First Nations", "Inuit", and "Métis" will be used.

² First Nations is defined throughout this paper as inclusive of all First Nations regardless of whether they do or do not have Indian Status or whether they live on or off reserve.



2.0 PREVALENCE OF AND TRENDS IN DIABETES AMONG FIRST NATIONS



Diabetes results from the body's insufficient production or use of insulin to absorb sugar and can present in three forms: Type 1, Type 2 and gestational diabetes (Office of the Auditor General of Canada, 2013). Both Type 2 and gestational diabetes (which can develop during pregnancy) are considered largely preventable through the adoption of healthier lifestyles, though genetic factors can also play a role. Type 2 is the most common form of diabetes, constituting 90-95% of cases (Public Health Agency of Canada [PHAC], 2011). For this reason, the focus of this paper is primarily on the development of Type 2 diabetes (T2DM) among the First Nations population; however, it is important to note that the literature relating to diabetes in this population does not necessarily distinguish between the various types of diabetes.

First Nations are considered among the most at-risk populations for developing diabetes and related complications in Canada (Crowshoe et al., 2018; Ghosh & Gomes, 2011; First Nations Information Governance Centre [FNIGC], 2012, 2018; Gionet & Roshanafshare, 2013). In some First Nations communities, T2DM is considered to be epidemic (Harris, Bhattacharyya, Dyck, Naqshbandi Hayward, & Toth, 2013). Among First Nations adults living on reserve, the age-standardized prevalence of diabetes derived from the third phase of the Regional Health Survey was 19.2%, a rate that is slightly lower than the previous two phases (First Nations Information Governance Centre [FNIGC], 2018). In comparison to non-Indigenous adults, the prevalence of Type 1 and Type 2 diabetes combined is nearly three

times greater for First Nations adults living on reserve and in northern communities, and two times greater for First Nations adults living off reserve³ (PHAC, 2018). However, data derived from a number of local and regional studies across Canada show substantial variation of diabetes prevalence across First Nations communities and regions, even among communities in close proximity with the same cultural background. These studies suggest that, in general, rates of diabetes may be lower among First Nations living in British Columbia and Alberta (Johnson, Martin, & Sarin, 2002; Oster, Grier, Lightning, Mayan, & Toth, 2014a; Oster, Johnson, Balko, Svenson, & Toth, 2012; Oster et al., 2011) compared to those living in Manitoba, Ontario and Quebec (Chateau-Degat et al., 2009; Dannenbaum, Kuzmina, Lejeune,

³ The prevalence of diabetes among Métis adults was 1.5 times that of non-Indigenous adults, while Inuit rates were slightly lower than non-Indigenous adults.

Torrie, & Gangbe, 2008; Imbeault et al., 2011; Johnson-Down et al., 2015; Kahnawahere Horn et al., 2007; Ley et al., 2008, 2009, 2010, 2012; Martens, Martin, O’Neil, & Mackinnon, 2007; Philibert, Schwartz, & Mergler, 2009; Riediger, Lix, Lukianchuk, & Bruce, 2014).

Trends highlighted in existing studies indicate that:

- The rate of diabetes is increasing more rapidly among First Nations than the general population (Dyck, Osgood, Lin, Gao, & Stang, 2010a, 2012; Oster et al., 2012; Sellers, Wicklow, & Dean, 2012; Wahi, Zorzi, Macnab, & Panagiotopoulos, 2009; Zorzi, Wahi, Macnab, & Panagiotopoulos, 2009).
- Though diabetes generally tends to be more prevalent among individuals 50 years and older, the onset of diabetes is earlier among First Nations (Chowdhury Turin et al., 2016; Crowshoe et al., 2018; Maar, Gzik, & Larose, 2010; Pelletier et al., 2012; Zheng, Ley, & Hu, 2018).
- The prevalence of diabetes among First Nations children and youth has also been increasing rapidly (Dyck et al., 2012; Harris et al., 2013; Sellers et al., 2012).

- First Nations women are disproportionately impacted by diabetes compared to both First Nations men and non-Indigenous women (FNIGC, 2018; Harris et al., 2013); this difference is related, at least in part, to the high rates of gestational diabetes mellitus (GDM) among First Nations women (Dyck, Klomp, Tan, Turnell, & Boctor, 2002; Oster, King, Morrish, Mayan, & Toth, 2014b; Oster, Mayan & Toth, 2014c; Porter, Skinner, & Ellis, 2012; Saad, Wilson, & Donovan, 2015; Shen et al., 2016).
- First Nations individuals are more likely to develop complications⁴ related to diabetes than non-Indigenous people (Dyck, Jiang, & Osgood, 2014; Dyck, Osgood, Lin, Gao, & Stang, 2010b; Mansuri & Hanley, 2017; Sellers et al., 2016a), be hospitalized for diabetes-related conditions (Booth, Hux, Fang, & Chan, 2005; Campbell et al., 2012; Jin, Martin, & Sarin, 2002a), and subsequently die from these complications (Deved et al., 2013; Jiang, Osgood, Lim, Stang, & Dyck, 2014; Jin, Martin, & Sarin, 2002b). This suggests that diabetes management and care may be sub-optimal for First Nations.

- Adverse health outcomes are generally greater among rural/remote First Nations,⁵ which is likely associated with reduced access to care (Booth et al., 2005; Crowshoe et al., 2018; Martens et al., 2007).
- The types of diabetes-related complications experienced by First Nations men and women are different, with women at higher risk of cardiovascular disease complications and men at higher risk of kidney problems, hypertension, limb complications and retinopathy (Oster, Virani, Strong, Shade, & Toth, 2009; Rudnisky, Wong, Virani, & Tennant, 2012; Zacharias, Young, Riediger, Roulette, & Bruce, 2012).

Over the period 1980-2005, the rate of diabetes grew by 10.8% for First Nations women and 4.2% for First Nations men (Dyck et al., 2010b). With this rapidly increasing rate, it is expected that a significant majority of this population will develop diabetes at some stage in their life (Chowdhury Turin et al., 2016), taking a significant toll on their quality of life.

Numerous gaps continue to exist in the surveillance data related to diabetes and related complications among First Nations. There is currently no national surveillance

⁴ Complications related to diabetes can include cardiovascular disease, hypertension, lower limb amputation, retinopathy, neuropathy and nephropathy.

⁵ As shown by Maar et al. (2010), some exceptions do exist.

system for the collection of data related to diabetes for First Nations, and health administrative data, which are often used for diabetes surveillance in the general Canadian population, often do not contain Indigenous identifiers (Naqshbandi Hayward et al., 2012a; PHAC, 2011). As a result, most of the data is derived from studies among adult First Nations populations in

selected communities or regions at a single point in time, resulting in a paucity of data that allows for a comprehensive understanding of this health issue over time or meaningful comparisons to be made across geography, age, Indigenous groups or sex. Contributing further to this data challenge is the lack of systematic reviews and meta-analyses related to diabetes and

related complications among First Nations. Issues related to limitations of surveillance data must be addressed to improve diabetes care and guide diabetes prevention and management initiatives in First Nations communities.





Colonization, with its impacts on Indigenous cultures and identities, can be understood as the broadest and most fundamental determinant of Indigenous peoples' health, one that remains an "active and ongoing force" in the lives of Indigenous peoples

(de Leeuw, Lindsay, & Greenwood, 2015, p. xxii).

3.0 DETERMINANTS OF T2DM AND DIABETES-RELATED COMPLICATIONS AMONG FIRST NATIONS



The factors that contribute to high rates of T2DM among First Nations are complex and can be situated within both biomedical and Indigenous frameworks. The biomedical perspective is based on the assumptions that all illnesses have a single underlying cause, that the removal of that cause will result in a return to health, and that health is simply the absence of disease (Wade & Halligan, 2004). In the case of diabetes, this approach focuses primarily on physical risk factors such as older age, family history, high blood pressure, history of heart disease or stroke, obesity, genetic susceptibility, depression, poor diet and physical inactivity (National Institute of Diabetes and Digestive and Kidney Diseases, 2016; Steyn et al. 2004). Within this perspective, the high rates of T2DM among First Nations may potentially be explained by the high rates of obesity found among First Nations compared to the general population, the high rates of GDM among First Nations

women with associated high birth weight rates across generations, as well as inadequate physical activity and diet (Dyck et al., 2010b; Harris et al., 2013; Millar & Dean, 2012). While this perspective contributes to a general understanding of why First Nations are at greater risk of developing T2DM, it overlooks the underlying root causes of the social stressors and lifestyle risk factors that influence an individual's perceptions, actions and experiences with diabetes (Barton, 2008a; Wade & Halligan, 2004).

The Indigenous perspective is based on a holistic understanding of health. This perception of health encompasses physical, mental, emotional and spiritual dimensions within the context of inter-relationships between individuals, families, communities, nations, the land and local ecosystems, the Creator, as well as past, present and future kin relations (Howell, Auger, Gomes, Brown, & Young

Leon, 2016; Smylie, Olding, & Ziegler, 2014). From this perspective, diabetes is seen as being intimately connected to historic and contemporary colonization processes, including loss of traditional lifestyles and spirituality, displacement, marginalized land bases, sociocultural disruption, assimilation, systemic disadvantage, socio-economic marginalization, loss of control over one's lifeway, loss of overall community wellness, power imbalances, stress, racism, discrimination, and intergenerational trauma (FNIGC, 2018; Iwasaki, Bartlett, & O'Neil, 2005, 2011; Manitowabi & Maar, 2013). Colonization, with its impacts on Indigenous cultures and identities, can be understood as the broadest and most fundamental determinant of Indigenous peoples' health, one that remains an "active and ongoing force" in the lives of Indigenous peoples (de Leeuw, Lindsay, & Greenwood, 2015, p. xxii).



Colonization processes have resulted in disturbingly high rates of poverty, food insecurity, unemployment, and low educational attainment, contributing to the disproportionate burden of ill health Indigenous peoples' experience (Greenwood, de Leeuw, & Lindsay, 2018). These intersecting determinants of health manifest differently among First Nations individuals and communities, across the lifespan and multiple generations, to influence both the risk and protective factors associated with health status (Reading & Wien, 2009). They directly influence access to and options for healthy foods and formal physical activity opportunities in First Nations communities, as well as health literacy, which plays a crucial role in the ability of individuals to manage chronic disease (van der Heide et al., 2018). Colonization processes set in motion a rapid transition from a physically

active lifestyle revolving around hunting, fishing and other food gathering activities and reliance on a nutritionally dense diet of traditional foods, to a more sedentary lifestyle and reliance on less nutritious manufactured foods containing large amounts of simple sugars and saturated fats (Haman et al., 2010). This transition has contributed to higher rates of obesity, hypertension, metabolic syndrome, and impaired fasting glucose and/or increased insulin resistance among First Nations people, key risk factors in the development of T2DM (Chateau-Degat et al., 2009; Daniel & Cargo, 2003; Daniel, Marion, Sheps, Hertzman, & Gamble, 1999a; Kaler et al., 2006; Lazzinnaro, Plourde, Johnson-Down, Dewailly, & Egeland, 2012; Wahi et al., 2009; Young, Dean, Flett, & Wood-Steiman, 2000; Zorzi et al., 2009). For many First Nations, the loss of language and culture, coupled with

intergenerational trauma, has also led to loss of self-esteem, identity, and self-worth, as well as mental health issues and substance abuse (Maar, Manitowabi, Gzik, McGregor, & Corbiere, 2011; Martens et al., 2007; McGregor, Gzik, Manitowabi, Maar, & Corbiere, 2011). These impacts can affect one's ability to practice healthy behaviours that can reduce the risk of developing T2DM, as well as one's ability to self-manage the disease after onset, resulting in an increased risk of poorer health outcomes from the disease (Manitowabi, & Maar, 2013).

Geography and various barriers to care also contribute to the high prevalence of diabetes and diabetes-related complications among First Nations. Many First Nations individuals live in isolated and remote communities where options for healthy living may be limited by a lack of: availability,

variety and affordability of healthy foods; physical infrastructure for sports and recreational activities; and local capacity to organize sports and recreational programs (Skinner, Hanning, & Tsuji, 2006; Stout, 2018). These barriers are exacerbated by socio-economic disadvantage (Beaumier, & Ford, 2010; Lambden, Receveur, Marshall, & Kuhnlein, 2006). Rural and remote communities often lack access to a full range of health services and health information, which can affect knowledge about diabetes and the quality of diabetes care (Ho et al., 2008a; Oster et al., 2009). In isolated communities, the lack of nursing capacity and electronic health records can also lead to a “reactive, disorganized approach to diabetes care for many First Nations people” (Eurich, et al., 2017, p. 1). While there is a limited body of research on the quality of diabetes care for First Nations (McNamara et al., 2011), the current literature suggests that despite the availability of clinical practice guidelines and progress in providing culturally appropriate programs and integrated diabetes care in some First Nations communities (see for example Booth et al., 2005; Maar et al., 2010), many First Nations diabetes patients may not be receiving ideal standards of clinical care (Harris et al., 2011; Naqshbandi Hayward et al., 2012b; Si, Bailie, Wang, & Weeramanthri, 2010). Gaps in diabetes management and care services include limited access to community-based screening for diabetes and related


complications, specialized health professionals, medicines to manage diabetes and complications, as well as culturally appropriate health services and health information.

First Nations individuals living in urban centres may face a different set of barriers in accessing health services. These health services may overlook the linguistic, cultural, economic and legal diversities that exist within and between Indigenous peoples, or offer services that adopt pan-Indigenous strategies that only partially meet their needs (Ghosh, 2012). First Nations individuals living in urban centres may experience difficulties in accessing non-insured health benefits,⁶ which may pose a significant challenge to slowing the progression of diabetes or effectively managing it (Ghosh & Spitzer, 2014). In the context of poverty, this barrier may restrict access to diabetes medications or limit healthy food choices, forcing individuals to choose one of these options over the other (Drewnowski & Darmon, 2005; Jetter & Cassady, 2006). First Nations individuals living in urban centres may face additional health care challenges, such as experiencing racism or discrimination in health care encounters, lacking access to timely and ongoing culturally sensitive diabetes care and education, or needing to go to multiple locations to receive care, resulting in missed appointments and frustration with care delivery (Goodman et al., 2017; Levin & Herbert, 2004; Ontario

Federation of Indigenous Friendship Centres, 2017; Sherifali, Shea, & Brooks, 2012). Negative encounters with the health care system, lack of culturally safe health services, and lack of culturally relevant health information can affect First Nations peoples engagement with the health care system, the quality of diabetes care, the capacity for self-care and changing health behaviours, the acquisition of health knowledge, and adherence to treatment protocols (Crowshoe et al., 2017, 2018; Maar et al., 2011; Tait Neufeld, 2011, 2014).

Finally, gestational diabetes mellitus is thought to be an important driver of the diabetes epidemic among First Nations as it increases the risk of T2DM among offspring (Mendelson et al., 2011; Oster et al., 2014b; Sellers et al., 2016b). The intergenerational effects of diabetes is thought to be related to an impaired ‘acute insulin response’ among children who were exposed to diabetes in pregnancy (Bogardus & Tataranni, 2002; Gautier et al., 2001; Osgood, Dyck, & Grassman, 2011), as well as to possible epigenetic modifications of genes induced by the in utero environment, resulting in fetal programming that predisposes infants to the development of obesity and T2DM later in life (Battista, Hivert, Duval, & Baillargeon, 2011). However, the relationship between GDM and intergenerational diabetes is not yet well understood.

⁶ Non-insured health benefits (NIHB) are available for First Nations individuals who are registered whether they reside on or off reserve; however, sometimes in urban centres, First Nations patients may encounter challenges in accessing benefits as doctors and pharmacists may not be aware that NIHB coverage is available for First Nations people who are not residing on reserve (Aboriginal Sexual Health.ca, 2010). Additionally, non-Status First Nations (those who identify as First Nations but are not registered as Status First Nations) are not entitled to these benefits.



There is a need to re-examine all policies that affect the multiple factors that heighten the vulnerability of First Nations peoples and communities to poor health and affect their ability to choose healthier life options.

4.0 CONSIDERATIONS IN THE DESIGN OF EFFECTIVE DIABETES PREVENTION INTERVENTIONS IN FIRST NATIONS COMMUNITIES



Given the prevalence of T2DM among First Nations people and its impacts on First Nations individuals, families and communities, effective diabetes prevention interventions are needed to break the intergenerational cycle of the disease and promote better health outcomes. While many First Nations communities have implemented health promotion interventions to address diabetes, their impacts have been limited by several deep underlying barriers. There is a need to re-examine all policies that affect the multiple factors that heighten the vulnerability of First Nations peoples and communities to poor health and affect their ability to choose healthier life options. This includes addressing the underlying social and physical challenges to healthy eating and physical activity in First Nations communities, including socio-economic marginalization, limited opportunities for physical

activity, geographic constraints to affordable and healthy foods, mental health and substance abuse, lack of community capacity to organize and run diabetes prevention programs and activities, as well as inequitable and unsustainable funding for prevention programs. It also requires efforts to change the perception held by many First Nations that diabetes is an inevitable disease (Bisset, Cargo, Delormier, Macaulay & Potvin, 2004; Oster et al., 2014c) and empowering individuals to make healthy life choices and take control over the determinants that impact their health (Brooks, Darroch, & Giles, 2013; Bruce, 2016; Macaulay et al., 2003; Skinner et al., 2006). Multi-sectoral public policies are required to address the complex interaction of factors that are contributing to the startling inequities in health that exist between First Nations people and the general Canadian population (Brooks et al., 2013).

In the absence of broad policy changes to address these factors, diabetes prevention interventions will continue to have limited impact (Brooks et al., 2013; Kakekagumick et al., 2013; Mead, Gittelsohn, Roache, Corriveau, & Sharma, 2012). For First Nations individuals who are overwhelmed by multiple stresses, diabetes may be one of many health concerns they face and not necessarily given highest priority. As such, an integrated approach is also needed to collectively address all health concerns and risks in a community rather than focusing on diabetes in isolation (Maar et al., 2010; Toth, 2012). Additionally, given that the various factors that increase the risk of T2DM among First Nations differ across the life course and operate at multiple levels, diabetes prevention interventions must likewise be targeted at individuals across all life stages, as well as at entire communities.

The effectiveness of diabetes prevention interventions in First Nations communities is also dependent on how appropriate they are for the targeted population. As such, interventions that focus solely on obesity as the underlying cause of diabetes and on lifestyle changes as the solution to addressing the disease may not be effective in First Nations communities. Interventions must be culturally appropriate and tailored to meet the specific needs of communities. This includes incorporating First Nations' perspectives on health and healing and the root causes of diabetes (Barton, 2008a; Giles et al., 2007), as well as drawing on the strengths and resilience of First Nations peoples, including the strengths of families, communities and cultures to support First Nations people in adopting healthy behaviours (Barton, 2008a). Such strengths are important for reducing the stresses that can enhance disease susceptibility, buffering the impacts of illness on individuals, and providing supportive environments for maintaining healthy behaviours (Berkman & Glass, 2000; Gaudreau & Michaud, 2012). By integrating First Nations knowledge, values and perspectives into diabetes prevention interventions, including the incorporation of broad support networks of families and communities, promotion of traditional diets and participation in cultural activities, and adoption of holistic healing approaches, diabetes prevention interventions can be

made more relevant, understandable, and acceptable to First Nations (Barton, 2008b; Gaudreau & Michaud, 2012; Ministry of Health & Long Term Care, n.d., Johnston Research Inc., 2015; Ofori & Unachukwu, 2015; Pilon, 2015). Interventions must also be tailored to incorporate the differing tools and resources available to prevent and manage diabetes within specific First Nations communities.

To ensure diabetes interventions are culturally appropriate, First Nations people and communities must be involved in all aspects of the research, planning and delivery of interventions as they have valuable knowledge about local conditions, assets and resources that should be used in the design and implementation of interventions (Maple-Brown et al., 2012; Tobe, Maar, Roy, & Warburton, 2015). Decolonizing methodologies can help restore self-determination for First Nations individuals and communities to turn around the negative collective experience of trauma to resilience (Howard, 2014). As local capacity to organize and implement effective interventions may be limited in some First Nations communities, interventions must also build on local strengths and assets, which requires fostering relationships between all members of the community, researchers and other stakeholders,⁷ including federal and provincial governments and agencies (Barton, 2008b; Macaulay et al., 2003; Macridis et al., 2016).

Overcoming a prevailing lack of trust and confidence that many First Nations have in representatives of a colonial government (Leung, 2016) will be central to the development of cooperation and effective partnerships.

The effectiveness of diabetes prevention interventions is also dependent on the quality of health information and education programs. This is related to not only the content of the messages being conveyed, but also the ease and accessibility of the information, the ways in which the information is conveyed, and the relevancy of the information for the targeted population. Health information and education programs require information about the risk factors for diabetes, such as obesity, smoking, inactivity, stress, and unhealthy eating in order to address any harmful misconceptions about the disease (Maar et al., 2011; McGregor et al., 2011). They also require information about diabetes prevention and management strategies, and the supports and resources available locally to support healthy behaviours. This health information must be reflective of the local cultural context and be tailored to meet the needs of individuals and communities, including linguistic and cultural differences, varying levels of health literacy, and differences in preferred modes of learning (Chetty, 2013; Cloutier et al., 2014; Gaudreau & Michaud, 2012; Kreuter & McClure, 2004; Sampson,

⁷ Stakeholders are any people or organizations who may be interested in health promotion interventions or have a stake in it. This might include local and social health organizations, recreational clubs, program management and staff, clients, community members, funding organizations, advocacy groups, elected officials, among others.



To ensure diabetes interventions are culturally appropriate, First Nations people and communities must be involved in all aspects of the research, planning and delivery of interventions as they have valuable knowledge about local conditions, assets and resources that should be used in the design and implementation of interventions

(Maple-Brown et al., 2012; Tobe, Maar, Roy, & Warburton, 2015).

2007). For example, the use of oral traditions and storytelling can be valuable tools in communicating health promotion information in First Nation communities (Barton, 2008a; Kakekagumick et al., 2013). As well, health information must also be accurate, come from a trusted source, and be clear and uncomplicated to facilitate knowledge acquisition and enhance understanding and acceptance of that knowledge (Cloutier et al., 2014; Freeman, 2017; McGregor et al., 2011). A variety of methods have been utilized to facilitate the uptake of health information and changes in health behaviours in First Nations and other Indigenous settings, including use of local

health professionals and educators (Eskicioglu et al., 2014; Foulds, Bredin, & Warburton, 2011; Gibson et al., 2015; McGregor et al., 2011; Naqshbandi Hayward et al., 2016; Viswanathan et al., 2010), home visitations (Harvey-Berino & Rourke, 2003; Levin Martin, Williams, Huerth, & Robinson, 2015), and peer educators (Eskicioglu et al., 2014; Harvey-Berino & Rourke, 2003).

Finally, diabetes prevention interventions must be sustainable in order to be effective. Adequate and secure funding and resources are needed over a long period to ensure dedicated full time staff can be employed to implement

programs (Ho, Gittelsohn, & Rimal, 2008b); local staff can be trained on nutrition and diabetes to build capacity; coordination can be improved between health workers and program staff (Rosencrans et al., 2008); and sufficient institutional support can be garnered to make the environmental changes needed to ensure all key community stakeholders support the success of interventions through their actions (Ho et al., 2008b). Further, funding and resources must be sufficient for management to support staff in their roles and mitigate staff turnover, which has been identified as a key challenge for several Indigenous diabetes prevention interventions.⁸

⁸ For example, in the Healthy Foods North program, staff turnover affected the ability of local stores to stock healthy foods (Mead et al., 2012). Likewise, the BRAID-Kids project, a university-community school-based diabetes prevention intervention involving the University of Alberta and Driftpile First Nation in Alberta, suffered from gaps in community health human resources to support the work of the local intervention team, which limited the program's effectiveness (Toth, 2012).





5.0 HEALTH PROMOTION AND DIABETES PREVENTION INTERVENTIONS IN FIRST NATIONS COMMUNITIES



A number of diabetes health promotion and prevention interventions have been implemented in First Nations communities, yet there remains a paucity of research on their effectiveness. This may be due to difficulties in measuring the outcomes of these interventions in terms of diabetes prevention and control due to a variety of factors, including a lack of local infrastructure, expertise, or resources; inadequate surveillance systems; the difficulty of determining whether the outcome measured is the result of the intervention; and the fact that impacts from such interventions may not be evident in the short-term (Leung, 2016; Rice et al., 2016). Nevertheless, some of these initiatives have shown some encouraging and positive results in First Nations communities.

One example that has shown positive benefits is the federal government's Aboriginal Diabetes Initiative, which was launched in 1999 as one component of its Canadian Diabetes Strategy. This initiative adopts a community-based, collaborative, multi-faceted and multi-sectoral approach to improving the health status of First Nations and Inuit individuals, families and communities. The initiative funds local health promotion and diabetes prevention projects, including projects that: raise awareness of diabetes, risk factors and complications; support healthy living activities; increase early detection and screening for diabetes and related complications; and increase capacity to prevent and manage diabetes (Indigenous and Northern Affairs Canada, 2016). This funding has supported a wide range of community-based and culturally-sensitive disease prevention and health promotion activities in hundreds of First Nations and Inuit communities; enhanced diabetes screening and treatment through the launching of mobile screening initiatives in four provinces (Alberta, BC, Manitoba, and Quebec); contributed to the building of local capacity through the training of hundreds of community diabetes prevention workers; supported active diabetes research; and enhanced disease surveillance (Leung, 2016). Initially implemented as a five-year strategy, the predominantly positive results of the initiative have led to additional phases and ongoing funding.

Several diabetes health promotion and prevention interventions have had considerable impact in specific First Nations communities. This includes the Kahnawake Schools Diabetes Prevention [KSDP] Project; the Aboriginal Youth Mentorship Program in Garden Hills First Nation, Anishnawabe Health's Biim-Maa-Sii-Win program in Toronto, the Hearts in Training program in BC, the Sandy Lake Health and Diabetes Project (SLHDP), and the Zhiiwapenewin Akino'maagewin: Teaching to Prevent Diabetes program implemented in northern Ontario. While these interventions have not been linked directly to better diabetes outcomes, they have resulted in some improvements in the risk factors for diabetes

by improving health knowledge and behaviours, with some also contributing to improvements, at least over the short term, in reducing obesity (Macaulay et al., 2003; Rice et al., 2016; Saksvig et al., 2005). In addition, drawing from evaluation results on the KSDP project, Macaulay and colleagues (2003) noted that success can also be measured in terms of the program's sustainability, individual indicators of empowerment, skills development, self-efficacy, participation and program reach, as well as community capacity building and collective empowerment to tackle other health issues. Features that have been considered as vital to the success of these interventions in First Nations communities have included:

- strong community support and perceptions of community ownership (Cargo et al., 2003; Daniel et al., 1999b; Eskicioglu et al., 2014; Foulds et al., 2011; Ho, Gittelsohn, Harris, & Ford, 2006; Macaulay et al., 2003; Potvin, Cargo, McComber, Delormier, & Macaulay, 2003; Naqshbandi Hayward et al., 2016);
- a philosophy of empowering people and communities to take control over their own health and health determinants (Macaulay et al., 2003);
- strong partnerships and shared decision-making between First Nations and non-First Nations stakeholders (Cargo et al., 2003;





Ho et al., 2006; Kakekagumick et al., 2013; Macaulay et al., 2003; Potvin et al., 2003);

- alignment with community needs and priorities (Kakekagumick et al., 2013);
- culturally safe and supportive services (Gibson et al., 2015);
- addressing barriers to care such as assistance with transportation and accommodation (Gibson et al., 2015);
- drawing on local human resources to lead initiatives and facilitate interventions to develop trust and ensure local traditional values are incorporated (Eskicioglu et al., 2014; Foulds et al., 2011; Gibson et al., 2015; Naqsbandi Hayward et al., 2016; Rice et al., 2016);
- utilizing a complex, multilayered and multi-strategy approach within multiple settings, multiple organizations and partners (schools, stores,

and the community) to reach the entire community (Ho et al., 2006; Macaulay et al., 2003; Rosencrans et al., 2008); and

- sustaining the intervention over a long period of time (Kakekagumick et al., 2013), which requires sufficient funding (Gibson et al., 2015) and an adequate and stable staff (Gibson et al., 2015; Ho et al., 2008b; Shubair, & Tobin, 2010).

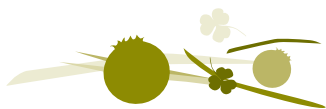
Other interventions have taken a systems-level approach to improve the health of Indigenous peoples. An example of this type of intervention is the Healthy Weights Connection, a collaborative multi-sectoral intervention implemented in London, Ontario in 2010. The intervention originally began with a narrow mandate to prevent chronic disease like diabetes by reducing obesity risk among urban First Nations and Métis children and their families. However, in 2011 its

goals were broadened to improving the ability of local public health systems to serve these children and families through coordination not only with local organizations that provide healthy weights programs, but also with organizations that provide programs and services that address other determinants of obesity including food security and food literacy. While health outcomes have not yet been evaluated, the intervention is expected to result in better knowledge about the needs of local Indigenous families and cultural awareness among health practitioners, as well as improved attitudes towards collaboration and working together (Wilk & Cooke, 2015).



6.0 CONCLUSION

Preventing diabetes from developing is a crucial first step in breaking the intergenerational cycle of the disease in First Nations communities. Effective and sustained health promotion and diabetes prevention interventions must be implemented that address the full range of factors that contribute to the development of T2DM in First Nations communities and inhibit the ability of individuals to take control over their own health. This requires multi-sectoral, multi-faceted, community-based approaches targeted at health promotion and diabetes prevention at both individual and collective levels. Such approaches can better build on community strengths; develop community capacity and collective empowerment; align with community priorities and needs; increase community 'buy-in' and support for the intervention; ensure interventions are grounded in the specific social, cultural and health contexts of the community; and reach the widest segment of the community's population. Interventions must also be supported with sufficient funding to sustain the intervention over a long period of time. Above all, multi-sectoral policies are needed to address the structural factors that are contributing to health inequities for First Nations individuals and communities. This includes addressing the socio-economic, political, geographic, cultural and built environment barriers to health and well-being in First Nations communities, as well as enabling the community to build their capacity for healthier living through self-determination. Without these broad policy changes, the impact of diabetes prevention interventions will continue to be limited in First Nations communities.





7.0 RESOURCES

Diabetes resources, toolkits, and strategies for the prevention and management of diabetes in First Nations individuals and communities

Diabetes Canada. (2018). Diabetes in the Aboriginal community, videos and print resources in Inuktitut, Ojibwe, Inuinnaqtun, Plains Cree, English and French, diabetes.ca/diabetes-and-you/healthy-living-resources/multicultural-resources/diabetes-in-the-aboriginal-community

Healthy Weights Connection. (2013). Resources and fact sheets for organizations working to improve the health of First Nations and Métis children and families, healthyweightsconnection.ca/resources

Native Women's Association of Canada. (2012). Diabetes self-management toolkit for Aboriginal women. nwac.ca/wp-content/uploads/2015/05/2012-NWAC-Diabetes-Toolkit.pdf

National Aboriginal Diabetes Association. (2016) NADA Diabetes Resource Directory, 2016, nada.ca/wp-content/uploads/2016/pdfs/NADA%20Resources/Diabetes-Resource-Directory-2016.pdf

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