

Indigenous Traditional Foods and Culturally Appropriate Care: Exploring Community
Experiences and Developing a Tool to Assess Healthcare Provider Knowledge

By

Sina Sarviha

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Department of Food and Human Nutritional Sciences

University of Manitoba

Winnipeg, Manitoba, Canada

R3L 0T3

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Abstract

The prevalence of gestational diabetes mellitus (GDM) is three times higher among Indigenous women than non-Indigenous women in Canada. While culturally appropriate programs exist to promote healthy pregnancies, they are often designed for rural contexts where traditional foods and activities are more readily accessible. Considering the steady migration of Indigenous populations to urban centers, it is vital to assess the availability and clinical support regarding traditional foods within urban healthcare systems. This necessitates an evaluation of the care provided by healthcare professionals to ensure it meets the unique needs of urban Indigenous women. To explore the experiences of urban Indigenous women with prenatal programs and healthcare, a multi-method and Community-Based Participatory Research (CBPR) approach was utilized. The research team conducted focus groups and in-depth interviews and analyzed the data using Classical Grounded Theory, revealing six themes from the focus groups and two additional themes from the interviews. These themes highlighted the vital importance of traditional foods during pregnancy, the challenges of accessing them in urban settings, and a significant inability among healthcare providers to offer culturally appropriate care or recommendations. This finding pointed to a critical lack of foundational knowledge on the topic, which led to the initiation of a second study to develop a valid and reliable Indigenous Traditional Foods Knowledge Questionnaire. Guided by an advisory board of Indigenous knowledge keepers from across Canada, a modified eight-step psychometric approach was used to develop the survey instrument. The advisory board established the definitions for traditional foods and related knowledge, and the research team developed questionnaire items using academic and grey literature, including Indigenous traditional food guides, Indigenous organizations websites, and organizational reports

and books. Five registered dietitians evaluated the first draft for content validity, and ten healthcare practitioners assessed its face validity. While the psychometric evaluation of the questionnaire remains to be completed, this solution-focused project will provide a reliable instrument to identify specific knowledge gaps and improve healthcare professionals' knowledge of traditional foods.

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Dedications

I dedicate this thesis to my family: to my mom, for her unconditional love; to my dad, for his unwavering support; and to my brother, whom I have missed the most. I also dedicate it to my close friends, who have supported me throughout this journey.

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Abbreviations

C-HEI 2007	Canadian Healthy Eating Index 2007
CAPC	Community Action Program for Children
CAPCHP	Community Action for Prenatal and Children Program
CBPR	Community-Based Participatory Research
CHIPER	Committee for Harmonized Health Impact, Privacy, and Ethics Review
CPNP	Canada Prenatal Nutrition Program
CPNP-FNIC	Canada Prenatal Nutrition Program - First Nations and Inuit component
CTT	Classical Test Theory
CVI	Content Validity Index
EFA	Exploratory Factor Analysis
FG	Focus Group
GDM	Gestational Diabetes Mellitus
GED	General Educational Development
HEFI -2019	Healthy Eating Food Index-2019
ICDEP	Integrated Competencies for Dietetic Education and Practice
IDI	In-depth Interviews
ITFKQ	Indigenous Traditional Foods Knowledge Questionnaire
JARS-Qual Standards	Journal Article Reporting Standards for Qualitative Research
KMO	Kaiser–Meyer–Olkin
LMICs	Low- and Middle-Income Countries
MC	Multiple Choice
NCDs	Noncommunicable Chronic Diseases
PCA	Principal Component Analysis
PHAC	Public Health Agency Canada
PI	Principle Investigator
RD	Registered Dietitian
REDCap	Research Electronic Data Capture
SWOT	Strengths, Weaknesses, Opportunities, Threat
T2DM	Type 2 Diabetes Mellitus
WHO	World Health Organization

Chapter I: Introduction

Indigenous peoples in Canada have long faced discrimination and suboptimal care within the healthcare system (Schultz et al., 2021). This history has eroded trust, and the system continues to fall short of providing culturally appropriate care, which is a shortcoming reflected in the fact that students often graduate from postsecondary health professional degree programs feeling unprepared to deliver it (Knoblock-Hahn et al., 2010; Hack et al., 2015; McArthur et al., 2011). These shortcomings are especially consequential for health conditions that disproportionately affect Indigenous peoples, among them gestational diabetes mellitus.

Gestational diabetes mellitus (GDM) is a form of glucose intolerance that first appears during pregnancy. Its prevalence has been rising steadily, increasing in Canada from 4.1% of cases in 2005 to 10.4% in 2019, and in Manitoba from 1.3% in 1981 to 8.6% in 2019 (Nelson et al., 2024). The burden is considerably higher among Indigenous women, with reported rates ranging from 8% to 18% (First Nations Centre, 2009). This disparity warrants attention, as GDM can lead to a range of complications for both mother and child and is associated with an increased risk of developing type 2 diabetes later in life (Diaz-Santana et al., 2022; Stewart and Malhotra, 2015).

Culturally competent care has the potential to improve patient satisfaction, trust, and health outcomes (Castro and Ruiz, 2009; Ohana and Mash, 2015; Paez et al., 2009; Tajou et al., 2015). Cultural competency is defined as the integration of knowledge, policies, behaviors, and attitudes within a system to support effective cross-cultural practice (Hickson, 2022). For Indigenous peoples, however, trust in the healthcare system has been damaged by the legacies of colonization, nutrition experiments, and Indian hospitals (Schultz et al., 2021). This is compounded by gaps in training, as students in fields such as dietetics often report feeling unprepared upon graduation to

provide culturally appropriate care (Knoblock-Hahn et al., 2010; Hack et al., 2015; McArthur et al., 2011). Although Canadian dietetic programs have begun incorporating cultural safety training, this work remains uneven and constrained by systemic barriers (Dias et al., 2026). One aspect of culturally competent care is the ability of healthcare providers to offer guidance and suggestions regarding Indigenous traditional foods. For dietitians specifically, this is an explicit competency within the Integrated Competencies for Dietetic Education and Practice (Eisenbraun, 2020), though the relevance of traditional foods knowledge extends to other providers involved in nutrition-related care.

The urgency of addressing this issue has grown alongside Canada's rising Indigenous population, which reached 1.8 million people in 2021, 5% of the country's total population, and 18.1% within Manitoba. The urban Indigenous population in particular grew by 12.5% between 2016 and 2021 (Canada's Indigenous Population - Statistics Canada, n.d.). This growth, combined with increasing urbanization, introduces new challenges to the accessibility and consumption of Indigenous traditional foods (Graham et al., 2023; Skinner et al., 2016) and to the care provided in relation to them.

Indigenous traditional foods are defined as edible resources consumed by Indigenous peoples prior to European contact (Where To Buy Indigenous Traditional Food in Winnipeg, n.d.). These foods offer numerous benefits: they are rich in a variety of nutrients, hold deep cultural value, contribute to social benefits such as improved food security, and support better health outcomes (Kuhnlein et al., 2001; Miltenburg et al., 2022; Skinner et al., 2016). They have also been shown to help prevent and manage chronic diseases such as diabetes (Sarkar et al., 2020). However, access to these foods faces many challenges, such as climate change, transportation barriers, equipment costs, and governmental policies (Batal et al., 2021).

Despite the clear importance of traditional foods, healthcare providers may not be equipped with the knowledge needed to support Indigenous patients in safely consuming these foods as part of a healthy and nutritious diet across different life stages and disease states. This observation emerged directly from the first project of this thesis, a study exploring the experiences of urban Indigenous women enrolled in the Canada Prenatal Nutrition Program (CPNP) with the care they received. As discussed in Chapter IV, participants indicated that care relating to Indigenous traditional foods was often missing or inadequate, raising the question of whether healthcare providers themselves possess the knowledge required to offer such care.

Currently, this question cannot be answered because no valid and reliable tool currently exists to assess healthcare providers' knowledge of Indigenous traditional foods in Canada. A search of the literature conducted with the assistance of a research librarian identified no such instrument. Without a validated tool, it is not possible to determine whether providers are equipped to deliver culturally appropriate care in this area, or to identify where education and training efforts should be directed. These findings motivated the second project of this thesis, which focused on the development of a valid and reliable Indigenous Traditional Foods Knowledge Questionnaire (ITFKQ).

Together, these two projects form a single line of inquiry. The first explores the experiences and perspectives of urban Indigenous women receiving care, while the second responds to a gap that emerged from those experiences by developing a tool to assess provider knowledge. In doing so, this thesis aims to contribute toward more culturally appropriate care for Indigenous peoples in Canada — care that has the potential to improve patient satisfaction, strengthen trust in the healthcare system, and, over the longer term, support better health outcomes for Indigenous

patients, including those affected by GDM (Castro and Ruiz, 2009; Nikitara et al., 2025; Ohana and Mash, 2015; Paez et al., 2009; Tajeu et al., 2015; Thom and Tirado, 2006).

Chapter II: Literature Review

While considerable research has examined culturally appropriate approaches to the prevention and management of type 2 diabetes, comparatively less attention has been devoted to gestational diabetes mellitus (GDM). GDM is defined as glucose intolerance resulting in hyperglycemia that first presents during pregnancy (Mussa et al., 2021). The prevalence of GDM has increased substantially in Canada over recent decades, rising from 41.2 cases per 1,000 deliveries in 2005 to 104.3 cases per 1,000 deliveries in 2019 (Nelson et al., 2024). In Manitoba specifically, prevalence increased from 1.3% to 8.6% between 1981 and 2019 (Nelson et al., 2024). Of particular concern, Indigenous women in Canada experience approximately threefold higher rates of GDM compared to non-Indigenous women (First Nations Centre, 2009), representing a significant and growing public health challenge that demands more comprehensive and culturally responsive approaches to prevention and management. GDM poses meaningful risks to the health of both mother and child. For mothers, it is associated with a higher likelihood of hypertension, preeclampsia, and complications during operative delivery, as well as a greater risk of developing type 2 diabetes in the years following pregnancy (Diaz-Santana et al., 2022). The effects on the child can begin at birth, where GDM has been linked to macrosomia, birth trauma, hypoglycemia, hyperbilirubinemia, hypocalcemia, erythremia, and difficulties with feeding (Al Ghadeer et al., 2024; Stewart and Malhotra, 2015). These risks do not necessarily resolve in infancy. Children born to mothers with GDM are also more prone to longer-term metabolic and cardiovascular problems, including obesity, greater adiposity, hypertension, insulin resistance, and type 2 diabetes (Bianco and Josefson, 2019). The adverse outcomes associated with GDM tend to weigh more heavily on Indigenous populations. Macrosomia, preterm delivery, and neonatal mortality all occur

at disproportionately higher rates among Indigenous individuals than among any other racial or ethnic group in Canada (Rodrigues et al., 2000; Sheppard et al., 2017). The burden also extends across pregnancies and over time. Nearly half of Indigenous individuals diagnosed with GDM in one pregnancy go on to be diagnosed again in subsequent pregnancies (Aljohani et al., 2008; Harris et al., 1997), and as many as 70% of those diagnosed during their first pregnancy will later develop type 2 diabetes, compared with roughly 40% of their non-Indigenous counterparts (Berger H et al., 2002). Indigenous individuals with GDM are also more likely to experience high blood pressure during pregnancy (Dyck et al., 2002).

The impact of GDM and diabetes extends beyond the health of individual patients. Diabetes also places a substantial financial burden on the healthcare system. One study projected approximately 2,156,000 new cases between 2011/12 and 2021/22, representing an estimated additional cost of \$15.3 billion over that ten-year period (Bilandzic and Rosella, 2017). A study conducted in Manitoba found that individuals with diabetes-related complications were roughly half as likely to participate in the labor force, placing a strain on both the workforce and the provincial economy (Kraut et al., 2001).

Given this growing burden, attention has increasingly turned to how care is delivered, and in particular to the role that culturally competent care may play in improving outcomes. Culturally competent care has the potential to improve health outcomes, enhance patient satisfaction, and strengthen trust in the healthcare system (Castro and Ruiz, 2009; Tajeu et al., 2015; Paez et al., 2009; Ohana and Mash, 2015; Thom and Tirado, 2006). It is defined as the integration of knowledge, behaviors, policies, and attitudes within a system to support effective cross-cultural practice (Hickson, 2022). Trust, engagement, and access to healthcare among Indigenous peoples have remained low, shaped by the historical and ongoing impacts of colonization, residential

schools, and Indian hospitals. Experiences of experimental treatments and suboptimal care have, over time, deeply eroded Indigenous peoples' trust in the healthcare system (Schultz et al., 2021).

A systematic review examining cultural competency training in diabetes care found that, in some cases, providing such training to care providers led to improved patient outcomes. One study included in that review reported that a pharmacist-led training program was associated with a reduction in provider unpreparedness, which in turn corresponded to a decrease in HbA1c — from 6.9 to 6.7 among controlled patients overall, and from 8.0 to 7.65 among those whose diabetes was poorly controlled (Nikitara et al., 2025).

In recognition of the essential need for culturally competent care, many healthcare professions in Canada, including dietetics and nutrition, now require education and training in cultural safety, particularly as it relates to Indigenous values and foods. The Integrated Competencies for Dietetic Education and Practice (ICDEP) specify that registered dietitians (RDs) must demonstrate an awareness of the role that Indigenous traditional and country foods play in dietary practices, an understanding of how these foods are accessed and prepared, familiarity with Indigenous values and ways of knowing related to health and wellness, and an awareness of the ongoing impact of colonization, residential schools, intergenerational trauma, and systemic racism on Indigenous peoples in Canada (Eisenbraun, 2020). The ICDEP further stipulates that RDs must practice in a way that promotes cultural safety, enabling them to help all Canadians access culturally safe and appropriate food and nutrition advice, care, and support (Eisenbraun, 2020). Offering guidance on Indigenous traditional foods, as mandated by the ICDEP (2020), is a fundamental part of providing culturally competent care to Indigenous peoples in Canada. Such care has been shown to improve patient satisfaction and strengthen trust in the healthcare system (Govere and Govere, 2016; Brunett and Shingles, 2018).

Despite these requirements, gaps remain. Cultural competency training within dietetics education in Canada is still limited, and students often graduate feeling unprepared to provide culturally appropriate care to clients from diverse backgrounds (Knoblock-Hahn et al., 2010; Hack et al., 2015; McArthur et al., 2011).

The Public Health Agency of Canada (PHAC) has developed a number of nutrition programs for vulnerable populations across Canada. One of these is the Canada Prenatal Nutrition Program (CPNP), which, as of 2026, has been merged with the Community Action Program for Children (CAPC) to form the Community Action for Prenatal and Children Program (CAPCHP). The CPNP includes gestational diabetes prevention education, reflecting the long-recognized health risks associated with the condition. However, a review of the most recent program evaluation by the PHAC reveals a similar gap. Although the agency reports high overall participant satisfaction with the cultural respect shown by the program, key informants in the evaluation specifically noted that CPNP resources need to be more “culturally and linguistically appropriate”, and pointed to the unique challenges facing projects serving Indigenous participants (PHAC, 2021). The program's current public materials reflect this concern. The listed CPNP components, which include nutrition counselling, food coupons, food preparation training, and breastfeeding support, make no reference to traditional or country foods, nor do they describe any resources tailored specifically to urban Indigenous participants (PHAC, 2021).

This potential gap in culturally appropriate care relating to Indigenous traditional foods becomes especially pressing in light of Canada's growing Indigenous population, and in particular the rapid growth of Indigenous communities in urban areas, which makes addressing the issue all the more urgent.

As of 2021, the Indigenous population in Canada had reached 1.8 million people, accounting for 5.0% of the total population, up from 4.9% in 2016 (Canada's Indigenous Population - Statistics Canada, n.d.). Between 2016 and 2021, the Indigenous population grew by 9.4%, nearly double the growth rate of the non-Indigenous population (5.3%) over the same period. Looking ahead, population projections for First Nations, Métis, and Inuit peoples suggest that the Indigenous population could reach between 2.5 and 3.2 million within the next two decades (Canada's Indigenous Population - Statistics Canada, n.d.). According to Statistics Canada, Indigenous people were more likely to be living in urban areas in 2021 than in 2016, with the urban Indigenous population growing by 12.5% over that five-year period. By 2021, more than 44% of Indigenous people in Canada were living in large urban centers (Canada's Indigenous Population - Statistics Canada, n.d.). Manitoba was home to 237,190 Indigenous people in 2021, representing 18.1% of the province's total population. The majority of this population, 60%, lived outside of rural areas, with 41.6% residing in medium or large population centers (Canada's Indigenous Population - Statistics Canada, n.d.).

Indigenous people in urban areas encounter numerous barriers to accessing the healthcare they need. These include difficulties communicating with health professionals, challenges with medications, being dismissed by healthcare staff, long wait times, mistrust and avoidance of the healthcare system, racial discrimination, poverty, and transportation issues (Graham et al., 2023).

Indigenous people living in urban areas of Canada also face a heightened risk of food insecurity. Research has documented a dietary shift that often accompanies relocation to the city, a move away from what some have described as "good food" toward a "city food" diet, characterized by greater consumption of fast food, fruits, and vegetables, and a decline in traditional foods (Skinner et al., 2016). The increase in fast food consumption has been attributed in part to the faster pace of

urban life, where time to cook is limited and fast food is more readily available (Skinner et al., 2016). Yet for many urban Indigenous people, accessing traditional foods is not straightforward (Skinner et al., 2016). A number of barriers have been identified, including the distance from reserves and a sense of disconnection from family who remain outside the city, the loss of skills needed to harvest and prepare traditional foods, and the monetary culture of urban life, which can also erode traditional food-sharing practices (Skinner et al., 2016).

Indigenous traditional foods occupy an important place in this picture. They can help alleviate the impact of food insecurity while also supporting more culturally appropriate care for Indigenous patients.

Indigenous traditional foods are generally defined as those consumed by Indigenous peoples in Canada prior to European contact (Where To Buy Indigenous Traditional Food in Winnipeg, n.d.). Their significance, however, extends well beyond nutrition, reaching into the cultural, spiritual, and relational dimensions of Indigenous life. Importantly, it is not only the foods themselves that hold meaning, but also the practices, knowledge, and relationships involved in how they are harvested, prepared, and shared (Miltenburg et al., 2022).

From a nutritional standpoint, traditional foods offer considerable benefits. A research and education intervention conducted with the Nuxalk Nation in British Columbia found that increasing the consumption of traditional foods led to measurable improvements in vitamin A, iron, and folic acid status, underscoring the nutritional richness of these food systems and their potential to support public health (Kuhnlein et al., 2001). More broadly, traditional food systems have been recognized as valuable resources for nutrition interventions among Indigenous peoples globally, with evidence suggesting that approaches grounded in local and traditional foods are among the most effective for improving health outcomes in Indigenous communities (Kuhnlein et al., 2006).

The benefits of traditional foods to dietary quality are also well documented. First Nations individuals who incorporate traditional foods into their diets score higher on both the Healthy Eating Food Index-2019 (HEFI-2019) and the Canadian Healthy Eating Index 2007 (C-HEI 2007) than those who do not, underscoring the central role these food systems play in supporting overall diet quality (Sebai et al., 2024). Research among Syilx Okanagan adults in British Columbia similarly found that those who consumed traditional foods had significantly higher intakes of protein, omega-3 fatty acids, and dietary fiber, along with superior levels of micronutrients including magnesium, manganese, phosphorus, potassium, zinc, and vitamins B, D, and E (Blanchet et al., 2020).

Traditional foods have also been associated with the prevention and management of chronic disease. Traditional plant-based foods are rich in bioactive compounds that contribute to the prevention of noncommunicable chronic diseases, while also supporting cultural heritage and ecological sustainability (Sarkar et al., 2020). In a study conducted with a First Nations community in Ontario, a traditional foods dietary pattern was not associated with an increased risk of type 2 diabetes, in contrast to a processed foods pattern, suggesting that traditional foods may offer protective benefits against the very conditions that disproportionately affect Indigenous populations (Reeds et al., 2016).

The significance of traditional foods, however, cannot be captured by nutrition alone. A substantial body of research underscores that traditional foods are foundational to holistic health, contributing to physical, mental, emotional, and spiritual well-being (Kuhnlein and Chotiboriboon, 2022). This holistic understanding of food and health reflects ways of knowing that differ from a purely biomedical view of nutrition, and it is central to why traditional foods matter so deeply within Indigenous communities.

These multiple dimensions of value make access to traditional foods a pressing concern. The availability of traditional foods is a critical determinant shaping all dimensions of food security among Indigenous peoples in Canada. Research suggests that the primary driver behind declining consumption of specific traditional items is their limited or inconsistent availability within communities, and for Indigenous people living in cities, access to traditional foods in urban areas is an added concern (Shafiee et al., 2022). This is compounded by the fact that a strong preference for traditional foods persists among Indigenous adults in Canada, yet that preference is frequently met with significant obstacles. First Nations participants have identified a complex range of barriers, spanning broad structural forces such as climate change, industrial development, and government regulation, as well as household-level constraints including lack of time, the absence of an active hunter in the family, and insufficient resources for the equipment and transportation that harvesting requires (Batal et al., 2021). In Canada more broadly, traditional foods remain central to the diets of many First Nations communities, though food security challenges persist as a result of environmental change, limited access to harvesting resources, and reduced time available for harvesting activities (Schuster et al., 2011). These challenges are not unique to Canada; traditional diets have been shown to play a crucial role in maintaining food security while also preserving cultural heritage and environmental sustainability among Indigenous populations globally (Sidiq et al., 2022).

Taken together, these dimensions explain why access to traditional foods is understood not simply as a matter of nutrition but as a critical component of food security for First Nations — more specifically, as cultural food security — reflecting both its nutritional contribution and its deeper cultural and relational meaning (Sidiq et al., 2022; Schuster et al., 2011).

Despite the clear nutritional, cultural, and relational importance of traditional foods, healthcare providers may not be equipped with the knowledge needed to support Indigenous patients in this area. As noted earlier, dietetics training in Canada often leaves providers feeling unprepared to deliver culturally appropriate care, and preliminary work suggests that knowledge of Indigenous traditional foods specifically may be lacking. If providers are to offer meaningful, culturally safe guidance on traditional foods, they must first possess a foundational understanding of these foods themselves. This raises an important question: how can such knowledge be measured?

Survey research is a widely used method for efficiently gathering information from large populations, though it is subject to several sources of bias, including sampling and measurement error (Ponto, 2015). The development of a validated and reliable instrument that clearly defines both the population and the construct of interest is an important strategy for mitigating these biases (Ponto, 2015). Researchers face the challenge of designing an instrument that accurately captures the construct it is intended to measure.

A construct is a theoretical concept, grounded in empirical observation, that cannot be measured directly — examples include motivation, anxiety, and knowledge. Because constructs are not directly observable, they must be measured indirectly through the development of indicators or items, which allow researchers to move from the theoretical to the empirical and, once defined, can be scaled collectively to represent the underlying construct (Axelson and Brinberg, 1992). Nutrition knowledge, for instance, has been defined as a construct representing individuals' cognitive processes related to information about food and nutrition (Axelson and Brinberg, 1992). In contrast, researchers have not previously defined the construct of Indigenous traditional foods knowledge within a psychometric framework.

Within the nutrition field, questionnaires have been developed to assess knowledge across a range of topics. One widely used instrument was developed by Parmenter and Wardle (1999) to measure the nutrition knowledge of adults in the United Kingdom, accompanied by a companion paper detailing key design considerations including item generation, the use of pilot studies and item analysis, and assessments of validity and reliability (Parmenter and Wardle, 2000; Parmenter and Wardle, 1999). Building on this foundation, Trakman et al. (2017) expanded these guidelines to incorporate factor analysis and Item Response Theory, specifically Rasch analysis, and proposed an eight-step methodology to guide the development of nutrition knowledge questionnaires (Trakman et al., 2017).

To date, however, no validated instrument exists to assess knowledge of Indigenous traditional foods. Given that the ICDEP mandates that registered dietitians demonstrate knowledge of Indigenous traditional foods as a component of culturally safe practice, the absence of such a tool represents a meaningful gap. Without a means of assessing this knowledge, it is not possible to determine whether healthcare providers are equipped to deliver the culturally appropriate care that policy requires, nor to identify where education and training efforts should be directed.

Research Questions

This thesis explores two interconnected questions that together form a single line of inquiry. The first centers on the perspectives of community members, particularly those enrolled in the CPNP in urban areas, and seeks to understand their experiences with the care they have received — whether they would value culturally appropriate care, how they experienced care relating to Indigenous traditional foods, and what gaps they perceived. It was through this first project that the second took shape. In hearing that care relating to traditional foods was often missing or inadequate, a further question emerged: are healthcare providers equipped with the knowledge

needed to provide such care? The second project therefore turns to healthcare providers and students in the field, assessing their knowledge of Indigenous traditional foods. This assessment goes beyond the nutritional and health dimensions of these foods to take a more holistic approach, examining whether providers are aware of the cultural significance, accessibility, and teachings surrounding traditional foods, as well as the complex histories surrounding them. Such knowledge is foundational to delivering culturally appropriate care, which in turn has the potential to improve patient satisfaction, trust, and health outcomes, and over the longer term may contribute to better management of conditions such as GDM among Indigenous patients.

The thesis is organized as follows. Chapter III describes the methods used to explore the experiences of urban Indigenous women within the healthcare system, with particular attention to Indigenous traditional foods. Chapter IV presents the findings of this exploration among women participating in the CPNP, drawing on a multi-methods, community-based participatory approach. Chapter V outlines the methodology for developing a valid and reliable Indigenous Traditional Foods Knowledge Questionnaire, which extends existing questionnaire development frameworks by incorporating a step centred on Indigenous governance and grounding the process in community needs and knowledge. Chapter VI reports on the work completed to date on the questionnaire, detailing how each step of the process was carried out and the current stage of development. Finally, Chapter VII discusses the contributions of this work and the knowledge it adds to the field, serving as the concluding chapter.

Chapter III: A Community-Based Participatory Approach to Developing a Culturally Appropriate Gestational Diabetes Intervention for Urban Indigenous peoples in Manitoba: a study protocol

Abstract

Background: Gestational diabetes mellitus (GDM) disproportionately affects Indigenous populations in Canada, occurring at rates more than three times the national average. While culturally appropriate prenatal programs exist, they are predominantly designed for rural and reserve-based communities, leaving urban Indigenous individuals underserved.

Aim: This project employed a mixed methods design and Community-Based Participatory Research (CBPR) approach to conduct formative work leading to the development of a culturally appropriate GDM intervention emphasizing traditional country foods and lifestyle activities available and accessible to urban Indigenous individuals at risk for GDM.

Method: The study used three complementary qualitative methods: focus group interviews, in-depth interviews (IDIs), and stakeholder workshops. Six focus groups (up to six participants each), twelve IDIs, and six stakeholder workshops (up to 20 participants each) were conducted across Winnipeg and Brandon, Manitoba, with urban Indigenous Canada Prenatal Nutrition Program participants and Indigenous health stakeholders. Data was analyzed using constant comparative analysis with Atlas.ti software.

Summary: This protocol described formative work to inform the development of a culturally appropriate GDM risk reduction intervention for urban Indigenous peoples in Manitoba. The study

identified barriers and facilitators to GDM prevention, explore the role of traditional foods and Indigenous lifestyle practices in prenatal health, and established community partnerships to guide intervention development. Findings were disseminated to participants and stakeholders in keeping with CBPR principles, with the goal of reducing the disproportionate burden of GDM and its long-term health consequences among this population.

Introduction

Diabetes Canada defines diabetes mellitus as a heterogeneous metabolic disorder characterized by hyperglycemia resulting from impaired insulin secretion, insulin action, or both. It is primarily classified into two major types: type 1 and type 2 diabetes mellitus. However, certain forms of diabetes do not fit neatly within this classification. One such condition is gestational diabetes mellitus (GDM), which is defined as glucose intolerance with onset or first recognition during pregnancy. Prevalence of GDM is increasing around the world due to increasing obesity rates, maternal age, and ethnic diversity (Mussa et al., 2021). In Canada, GDM is the most frequent endocrinopathy of pregnancy (Aljohani et al., 2008; Behboudi-Gandevani et al., 2019). In a 2024 study, Nelson et al. showed that over the 15-year period from 2005 to 2019 in Canada, there was a 162.7% relative increase in the rate of GDM (excluding British Columbia), or 153% when British Columbia was included. They also reported that the largest relative increase in the rate of GDM during this period was found among the youngest age group, those aged 15–19 years, with a 260% increase including British Columbia, and 291% excluding British Columbia (Nelson et al., 2024). Complications of GDM include maternal high blood pressure, preeclampsia, morbidity from operative delivery, and increased risk of maternal development of T2D post-partum (Diaz-Santana et al., 2022). In the offspring, GDM can increase risk for fetal macrosomia, birth trauma,

hypoglycemia, hyperbilirubinemia, hypocalcemia, erythremia, and poor feeding (Stewart and Malhotra, 2015; Al Ghadeer et al., 2024).

Rates of GDM among Canadian Indigenous populations are even higher and are rising more rapidly (Rodrigues et al., 2000; Berger H et al., 2002). Prevalence of GDM among Indigenous individuals in Canada has been reported to be over three times the national rate, ranging from 8% to 18% (First Nations Centre, 2009). A 2011 report from the Public Health Agency of Canada indicated that the prevalence of GDM was significantly higher among Indigenous populations, with rates approximately 8 times higher among Inuit and more than 4 times higher among Métis populations compared to non-Indigenous populations ((Diabetes in Canada Facts and Figures from a Public Health Perspective, 2011). Prior studies have consistently identified several factors associated with an increased risk of GDM among Indigenous populations in Canada. These include advanced maternal age, higher pre-pregnancy body weight, a prior history of GDM, adverse outcomes in previous pregnancies, and a family history of diabetes (Zhang and Ning, 2011; McIntyre et al., 2019). However, some evidence suggests that these factors may exert a greater impact within Indigenous populations compared to non-Indigenous groups (Dyck et al., 2002; Oster et al., 2014). Social and structural determinants of health have been linked to this higher level of GDM among Indigenous people (Reading and Wien, 2009). Research has also shown that Indigenous ancestry, specifically First Nations, is considered to be an independent risk factor for GDM (Dyck et al., 2002; Oster et al., 2014). Additionally, nearly 50% of Indigenous individuals diagnosed with GDM in one pregnancy are diagnosed in subsequent pregnancies (Aljohani et al., 2008; Harris et al., 1997). Furthermore, similar trends are observed in other Indigenous communities around the world. A retrospective cohort study examining Indigenous and non-Indigenous women in Australia demonstrated that Indigenous women faced a greater than fourfold

increased risk of developing type 2 diabetes within eight years following a GDM diagnosis, compared to their non-Indigenous counterparts (Chamberlain et al., 2016). Indigenous individuals with GDM are also more likely to have high blood pressure during pregnancy (Dyck et al., 2002). As of 2021, Indigenous peoples represented approximately 5% of the total Canadian population, reflecting a modest increase from 4.9% in 2016. Over the same period, the Indigenous population grew at nearly twice the rate of the non-Indigenous population, with a growth rate of 9.4% between 2016 and 2021 compared to 5.3% among non-Indigenous populations. It is also worth mentioning that during this period the Indigenous populations within urban areas have risen by 12.5%. In this census it also mentioned that the Indigenous population is younger than non-Indigenous population with the average age of 33.6 in 2021 with 41.2% of Indigenous people were under the age of 25, compared to 27.3% of the non-Indigenous population (Canada's Indigenous Population - Statistics Canada, n.d.). This represents a significant portion of the Indigenous population that is of childbearing age and potentially at risk for GDM. In Manitoba, 18.1% of the population is Indigenous, 43% of whom reside in the urban areas (Canada's Indigenous Population - Statistics Canada, n.d.). Together, these statistics demonstrate the large potential impact that prevention of GDM in urban Indigenous individuals in Manitoba could have on overall population health. Given the high proportion of Indigenous individuals of childbearing age, the increased risk for GDM in this population, and the potential for increased health risks in both the parent and the offspring, it is of critical importance to address this issue and minimize the potential for significant disease burden that could result in both the present and future generations of a population already severely impacted by health disparities.

The health risks associated with GDM have long been recognized and there are existing programs that include GDM prevention education as a part of their services. It has been proven that

nutritional interventions both before and during pregnancy may decrease the frequency of GDM (Mierzyński et al., 2021). The Canada Prenatal Nutrition Program (CPNP), administered by the Public Health Agency of Canada, has historically focused on providing targeted nutritional interventions for vulnerable populations. As of April 2026, CPNP has been integrated with the Community Action Program for Children (CAPC) to form a unified initiative known as the Community Action for Prenatal and Child Health Program (CAPCHP). Through these combined efforts, approximately 495 projects are funded annually, serving over 230,000 pregnant people, young children (aged 0–6 years), and their parents or caregivers across Canada (Community Action for Prenatal and Child Health Program - Canada.Ca, n.d.).

The most recent publicly available data from the Public Health Agency of Canada indicate that, as of 2008, six projects in Manitoba were funded through the Canada Prenatal Nutrition Program (CPNP), while 16 projects were supported through the Community Action Program for Children (CAPC). More recent program-level data specific to Manitoba are not publicly available. These figures also predate the 2026 integration of CPNP and CAPC into a unified national program (Healthy Pregnancy for First Nations and Inuit, n.d.). Three of those six are located in urban areas as defined according to Statistics Canada (Archived – From Urban Areas to Population Centres, n.d.): Winnipeg, Brandon, and Steinbach. Project activities are flexible at each site, and may include nutrition counseling, prenatal vitamins, food and food coupons, food preparation training, counseling in prenatal health and lifestyle, breastfeeding education and support, education and support on infant care and child development, and referrals to other agencies. The CPNP strives to deliver culturally sensitive prenatal support for Indigenous individuals or recent immigrants, as evidence shows that materials that are culturally adapted and tailored to a specific population are more successful for health and nutrition interventions, particularly among Indigenous populations

(Vincze et al., 2021). The Indigenous Services Canada provides publicly available resources on healthy pregnancy, nutrition, and physical activity. However, these materials are not specifically tailored to Indigenous populations in the context of traditional foods and culturally grounded practices (Canada Prenatal Nutrition Program (CPNP) - Canada.Ca, n.d.). Prior to this merger, a distinct stream of the Canada Prenatal Nutrition Program (CPNP)—the First Nations and Inuit component (CPNP-FNIC)—was implemented within First Nations and Inuit communities. This component produced a guidebook to support the design and delivery of CPNP initiatives in these settings, emphasizing the importance of traditional (country) foods for health and offering culturally relevant guidance and recommendations (The CPNP Guidebook : A CPNP Worker's Guide to Running a Great Community Program). At present, it remains unclear how these resources and approaches have been adapted or integrated following the program merger. However, resources provided by the Indigenous Services Canada, along with previously developed guideline documents, may have limited applicability for Indigenous individuals living in urban settings, where access to traditional foods and opportunities to engage in traditional activities can be limited. The lack of culturally appropriate GDM prevention programming that specifically addresses the challenges faced by urban Indigenous individuals represents a significant scientific and public resource gap that urgently needs to be addressed.

Despite efforts such as the existing federal prenatal programs such as CAPCHP, the disparities of increased GDM and associated negative health outcomes among Indigenous individuals persist, suggesting the need to move towards methodological approaches that enable communities to co-create research that responds to their own health concerns and ambitions (CIHR, 2007). This approach, referred to as Community-Based Participatory Research (CBPR), requires that community partnership be foundational throughout project planning, implementation, data

collection, analysis, and dissemination (Stephens et al., 2006). Employing a CBPR approach to engage with CPNP, Indigenous individuals at risk for GDM, and stakeholders committed to Indigenous health and wellness in Manitoba may be the key to successful GDM intervention development. The present study addressed this gap through a CBPR approach, conducting the formative work necessary to inform the development, implementation, and evaluation of a culturally appropriate GDM risk reduction intervention for urban-dwelling Indigenous peoples. Grounded in Indigenous knowledge systems, the proposed intervention prioritized traditional country foods and lifestyle practices that are accessible within urban environments, offering a culturally responsive and community-driven solution to the disproportionate burden of GDM among this population.

Method

Study design

This study employed a CBPR approach to conduct extensive formative work that characterizes the community of urban Indigenous CPNP participants within Manitoba, identifies optimal strategies for community engagement, and described community attributes relevant to GDM risk and prevention. A CBPR approach ensures knowledge integration and translation for the mutual benefit of all partners, making it particularly well-suited to research conducted in partnership with Indigenous communities. Three complementary qualitative methods — focus group interviews, in-depth interviews (IDIs), and stakeholder workshops — were employed to accomplish these objectives. Focus groups are selected for their capacity to surface shared community experiences, cultural values, and collective perspectives on GDM and prenatal health within a group setting. IDIs complemented this by enabling deeper, individualized exploration of participant thoughts, behaviors, and experiences that may not emerge in a group context, providing richer contextual

detail to support a more complete understanding of the topic. Both focus groups and IDIs are dynamic by design, allowing participants to share and communicate their knowledge in an environment built to adapt to their comfort levels — an especially important consideration when engaging Indigenous participants on topics intersecting culture, identity, and health. Stakeholder workshops were conducted with individuals operating within the Indigenous health sphere in each community, including healthcare providers, business owners, Elders, and other relevant community members. Workshops were oriented toward collaborative knowledge generation, with discussion focused on considerations for future resource development and opportunities to expand partnerships for ongoing community collaboration. Workshop outputs takes various forms, including mind maps, SWOT analyses, drivers and gaps analyses, and flowcharts, reflecting the participatory and iterative nature of the CBPR process.

Setting and context

This study was conducted within the context of the Community Action for Prenatal and Child Health Program (CAPCHP) in Manitoba, focusing specifically on urban Indigenous participants enrolled at CPNP sites. For the purposes of this study, "urban" was defined according to Statistics Canada criteria based on population size and density, as established in the 1971 Census: an urban area is defined as having a population of at least 1,000 and a population density of 400 or more persons per square kilometre (Archived – From Urban Areas to Population Centres, n.d.). Based on this definition, three urban centres in Manitoba with CPNP sites were initially identified: Winnipeg, Brandon, and Steinbach. However, Steinbach was excluded from the study due to insufficient enrollment of Indigenous participants at that site to support meaningful data collection. Including both Winnipeg and Brandon ensures that the perspectives of Indigenous participants

across urban centres of varying size and context are represented, supporting the development of a tool that is broadly applicable to urban Indigenous CPNP participants across Manitoba.

Participants recruitment and eligibility criteria

Focus group interviews participants

Convenience sampling was used to recruit participants for all focus groups. Inclusion criteria includes: self-identifying as Indigenous (First Nations, Métis, Inuit, or any combination thereof), currently participating in the CPNP initiatives within their respective community, currently living in the respective community and have lived there for at least six months prior, and English speaking. Recruitment flyers were posted at CPNP sites and sent home with current CPNP participants. Participants were also recruited in person and via phone or email for the focus groups. Interested individuals were emailed a link to view the project description, read and sign a consent form, and complete a brief demographic survey. Participants were compensated with a meal provided during the focus group and one \$75 Amazon gift card upon completion.

In-depth interviews participants

Individuals identified from focus group participants were invited to participate in an in-depth interview, with the aim of four IDIs per each community. Individuals were recruited in person and via phone or email for the IDIs. Interested individuals will be emailed a link to view the project description and read and sign a consent form. IDIs will be conducted only among individuals identified from focus group participants, no further demographic survey will be required. All IDI participants will receive one \$100 Amazon gift card upon completion of the interview.

Stakeholders' workshops

Convenience and purposive sampling were used to recruit up to 20 participants for each workshop. Inclusion criteria include: individuals whose work relates to Indigenous health and wellness within

the respective community (this could include healthcare providers, business owners, Elders, and others) and English speaking. Participation in the focus groups or IDIs were preclude anyone from also participating in the workshops. Recruitment flyers were posted at relevant community sites (i.e., health centers) and on social media sites. Research staff also attended Indigenous health and wellness community meetings and events to advertise the workshop and seek participants. Participants were also recruited in person and via phone or email for the workshops. Interested individuals were emailed a link to view the project description, read and sign a consent form, and completed a brief demographic survey. The first 20 individuals in each community to sign the consent form and complete the survey were contacted to participate in each workshop. Participants were compensated with a meal provided during the workshop and one \$50 Amazon gift card upon completion.

Data Collection

Each of the three methods were implemented as follows. Six focus groups of up to six participants each were conducted, with each session lasting approximately 60 minutes. Focus groups were co-moderated by two moderators employing grounded theory techniques, with a dedicated note-taker present at each session to record observations and notes. Each focus group was open with a review of the project overview and consent form, allowing participants adequate time to raise questions, followed by the establishment of group guidelines by the moderators. Moderators then utilized three to five predetermined questions and/or prompts to guide discussion. Topics invited participants to reflect on the issue of GDM within their community, the support received through existing prenatal programs, barriers and facilitators to accessing culturally appropriate nutrition and healthcare, the role of traditional country foods and lifestyle activities in health and wellbeing, Indigenous knowledge frameworks relevant to health within their cultures, and preferred means of

learning and communication, among other areas. Complementing the focus groups, twelve individual IDIs were also conducted, each lasting approximately 60 minutes. IDIs were open-ended and discovery-oriented in nature, allowing for deeper exploration of participants' individual perspectives and experiences. Each focus group and IDI were audio-recorded and transcribed for analysis, with transcriptions supplemented by recorded notes and observations. Additionally, six stakeholder workshops of up to 20 participants each were conducted, with each session lasting approximately 60 minutes. Workshops were co-moderated by two moderators and a dedicated note-taker. Moderators utilized predetermined questions and prompts to facilitate interactive brainstorming sessions aimed at identifying key considerations for the development of a culturally appropriate GDM prevention program for urban-dwelling Indigenous CPNP participants. Each workshop were similarly audio-recorded and transcribed for analysis, with transcriptions supplemented by recorded moderator notes and observations. An overview of the data collection process is provided in Figure3. 1.

Figure 3.1: Data Collection Process

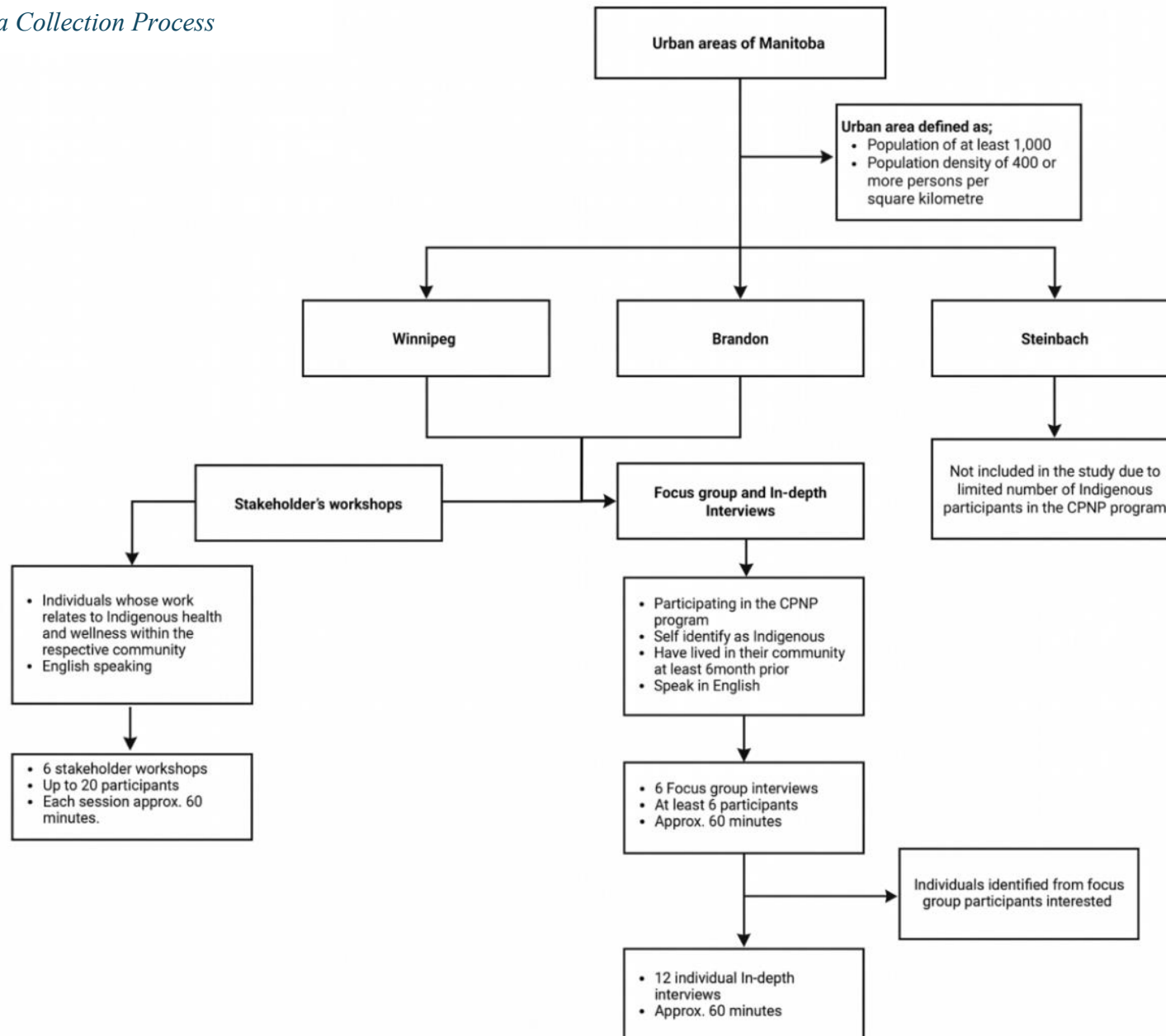


Figure 3. 1: Data Collection Process

Data analysis

All focus group interviews, in-depth interviews, and stakeholder workshops will be transcribed using Otter.ai transcription software, with transcriptions subsequently verified against original audio recordings and notes to ensure accuracy. Data will be managed and analyzed using Atlas.ti (version 23; ATLAS.ti Scientific Software Development GmbH, Berlin, Germany) qualitative data analysis software. Constant comparative analysis was employed as the primary analytic approach, as this method has demonstrated particular utility in studies involving multiple focus groups by enabling systematic identification of patterns and themes across data sources. This approach proceeds through three sequential stages: open coding, in which data are segmented into discrete units and descriptive codes are assigned to each; axial coding, in which codes are grouped into broader categories based on their relationships and shared properties; and selective coding, in which overarching themes that capture the essence of each category are developed and refined. Together, these stages allow for a rigorous and iterative process of meaning-making that is well aligned with the exploratory and community-centered aims of this study (Onwuegbuzie et al., 2009).

Dissemination and Knowledge Translation

Upon completion of data collection and analysis, the research team returned to each community to meet with community partners and stakeholders to disseminate study findings. Consistent with CBPR principles, this step is critical to ensuring that community voices have been authentically heard, meaningfully incorporated, and appropriately reflected in the results (LaVeaux and Christopher, 2009). Findings were disseminated through in-person or virtual meetings, providing an opportunity for collaborative discussion of results and facilitating dialogue around continued data management and ownership, manuscript preparation and co-authorship, and identification of next steps for program development.

Rigor and Trustworthiness

Several strategies were employed to ensure the rigor and trustworthiness of the study findings. Credibility were supported through triangulation of data across three complementary methods — focus group interviews, IDIs, and stakeholder workshops — as well as through member checking, whereby preliminary findings were returned to stakeholders for review and verification during dissemination meetings. Three team members independently coded a subset of the data in Atlas.ti, with discrepancies resolved through discussion and consensus, to enhance dependability and confirm the consistency of the analytic process. Reflexivity was maintained throughout data collection and analysis, with the research team documenting and critically examining their positionality in relation to the communities involved.

Summary

It is anticipated that the formative work will lay the foundations for development and pilot testing of a GDM intervention program for urban Indigenous CPNP participants in Manitoba. It is expected that knowledge gained from this project will inform intervention program format, content, length, and focus. Importantly, it will identify Indigenous knowledge frameworks to be utilized and barriers and facilitators to be addressed. It will also establish connections with stakeholders and potential partners, including the CPNP, which aligns with recommendations for the CPNP to partner with research teams to improve services. Subsequent development of the intervention program has the potential to improve the personal health of urban-dwelling Indigenous individuals experiencing pregnancy by reducing risk factors for GDM and even reducing overall incidence of GDM. This would lead to improvements for both maternal and fetal health, with the potential for improved health benefits across the lifespan for pregnant individuals postpartum as well as their offspring.

Bridge to Chapter IV

The protocol described in this chapter provided the methodological framework for the qualitative and community-based participatory work conducted with urban Indigenous peoples in Manitoba. The study was subsequently implemented to explore participants' experiences with gestational diabetes, Indigenous traditional foods and activities, and culturally appropriate care. Chapter IV presents the implementation and findings of Project Radiant, including participant characteristics, qualitative themes, and implications for culturally appropriate GDM care and support.

Chapter IV: Project Radiant

Abstract

This qualitative study examines the experiences of urban Indigenous women in Manitoba, Canada, receiving care through the Canada Prenatal Nutrition Program (CPNP), focused on the integration of traditional foods and activities and how it relates to gestational diabetes mellitus (GDM). Given that Indigenous women in Canada experience approximately three times higher rates of GDM compared to non-Indigenous women, this research addresses an urgent public health concern. Utilizing a Community-Based Participatory Research (CBPR) approach and a modified grounded theory design, 23 participants from Winnipeg and Brandon were initially surveyed; 21 were recruited for focus groups and in-depth interviews to share their lived experiences. The study highlighted the vital role of traditional foods, activities and teachings in sustaining cultural identity and spiritual well-being, especially during pregnancy. However, significant challenges were identified, including economic and physical barriers to accessibility, such as financial constraints, transportation challenges, and loss of connection to community, that restrict traditional resources in urban settings. Furthermore, accessibility to appropriate prenatal care was limited by systemic gaps, including a lack of provider confidence regarding Indigenous cultural needs and low community awareness of existing prenatal support options. The findings suggest prioritizing knowledge and awareness of Indigenous traditional foods, activities and cultural practices among healthcare providers. This study provides crucial insights for policy and community-based interventions, such as targeted provider training, Elder involvement, and Indigenous-centered program promotion, aimed at improving access and supporting culturally safe maternal healthcare.

Introduction

The World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.” (Constitution of the World Health Organization, n.d.). Although this definition has remained unchanged since 1948, it has been critiqued for excluding spiritual health (Chirico, 2016), which is considered an important dimension of well-being in many cultures. For many First Nations, Inuit, and Métis families in Canada, pregnancy is understood not only as a biological event but also as a significant spiritual and cultural journey (Hayward and Cidro, 2021). Consequently, culturally appropriate prenatal care extends beyond addressing clinical needs to incorporating spiritual values, traditional practices, and Indigenous ways of knowing into individualized care plans, often through a focus on traditional foods and activities (Maloney et al., 2024). This holistic approach is particularly important in the context of gestational diabetes mellitus (GDM), which disproportionately affects Indigenous populations in Canada and contributes to significant maternal and infant health risks (Elamurugan et al., 2022).

Gestational diabetes mellitus (GDM), a condition characterized by elevated blood glucose levels during pregnancy (Kunarathnam V et al., 2025), carries substantial long-term health risks for both mother and child, yet its prevention and postpartum follow-up have remained underprioritized in many healthcare settings (Elomrani et al., 2025). However, the prevalence of GDM has increased substantially in Canada over recent decades, rising from 41.2 cases per 1,000 deliveries in 2005 to 104.3 cases per 1,000 deliveries in 2019 (Nelson et al., 2024). In Manitoba specifically, GDM prevalence increased from 1.3% to 8.6% between 1981 and 2019 (Brunton et al., 2025). This upward trend underscores the urgent need for more comprehensive and culturally responsive approaches to GDM prevention and management. Notably, Indigenous women in Canada

experience approximately threefold higher rates of GDM compared to non-Indigenous women, representing a significant and growing public health concern (First Nations Centre, 2009).

While many risk factors for GDM are considered to be nonmodifiable – such as history of GDM, family history of type 2 diabetes, and advanced maternal age – dietary intake also plays a significant role (First Nations Centre, 2009). Dietary quality influences the body's ability to manage blood sugar and process insulin, and diets high in refined grains, processed foods, and dietary saturated fats have been shown to increase risk (Schoenaker et al., 2016). These dietary patterns also contribute to nutrient deficiencies and poor overall diet quality. A 2008 dietary assessment of Indigenous Canadian Arctic women, with a focus on those experiencing pregnancy and lactation, revealed that the prevalence of vitamin and mineral inadequacies was generally high (Berti et al., 2008). This was further demonstrated in a 2021 scoping review of the nutrition status among Canadian First Nations women during pregnancy, which revealed that Indigenous women residing on reserve lands and in remote communities experienced major deficiencies in many vitamins and minerals (Kloss et al., 2021).

Importantly, the same 2008 study cited above found that contributions of traditional food to energy intake varied but remained relatively low with the highest reported contribution of just over 25% among participants from Qikiqtarjuaq, a small island community in Nunavut (Berti et al., 2008). Indigenous traditional foods are defined as the nutrient-dense foods and sustenance systems utilized by First Nations, Métis, and Inuit peoples prior to European contact (Where To Buy Indigenous Traditional Food in Winnipeg, n.d.). In Canada, these food systems vary significantly based on geographical location. Historically, they are categorized into seven distinct regions: six representing diverse First Nations cultural groups (First Nations in Canada,

n.d.) and one representing the Inuit. The availability of traditional foods is a critical determinant influencing all dimensions of health and food security among Indigenous peoples in Canada (Shafiee et al., 2022). Research indicates that the primary driver behind the declining consumption of specific traditional food items is their limited or inconsistent availability within the community (Schuster et al., 2011). Indigenous traditional foods availability specifically within urban areas is a concern as well (Shafiee et al., 2022), as trends continue to show an increased migration of Indigenous peoples from rural to urban areas (Canada's Indigenous Population - Statistics Canada, n.d.).

Despite a strong preference for traditional foods among many Indigenous adults in Canada, obtaining these foods is often met with significant obstacles. In one study, First Nations participants identified a complex array of barriers ranging from climate change, industrial development, and government regulations to household-level constraints, including lack of time, the absence of an active hunter, and insufficient capital for essential equipment and transportation (Batal et al., 2021).

These documented barriers to obtaining traditional foods are concerning, as research further demonstrates that consumption of traditional foods can contribute to improved dietary quality. First Nations individuals who incorporated traditional foods into their diets achieve higher scores on both the Healthy Eating Food Index-2019 (HEFI-2019) and the Canadian Healthy Eating Index 2007 (C-HEI 2007) compared to those who do not. These findings underscore the vital role that traditional food systems play in supporting overall dietary quality (Sebai et al., 2024). Additionally, research among Syilx Okanagan adults in British Columbia demonstrated that individuals who consumed traditional foods had significantly higher intakes of protein, omega-3 fatty acids, and dietary fiber, alongside superior levels of micronutrients such as

magnesium, manganese, phosphorus, potassium, zinc, and vitamins B, D, and E (Blanchet et al., 2020). Consequently, access to these foods is a critical component of health and cultural food security for First Nation, as it directly enhances overall dietary quality (Batal et al., 2021).

Although the role of traditional foods in nutrition and health has been explored, there remains a significant gap in the research regarding the role of traditional foods during pregnancy and their potential for reducing risk of GDM. A 2021 scoping review explored the nature, extent, and range of research activity related to the role of country (i.e., traditional) food in pregnancy and early childhood on health among Circumpolar Inuit in Canada (Caughey et al., 2021). Researchers identified a gap in understanding the barriers that pregnant women and their children experience in accessing and consuming country foods and the role of country food in supporting healthy pregnancy and lactation (Caughey et al., 2021).

In addition to traditional foods, it is also important to understand the role of traditional Indigenous activities in overall health and wellness. A study done by the University of Alberta in collaboration with the Yellowknives Dene First Nation's Community Wellness Program found that being physically active in the eyes of the participants was to be culturally active and to contribute to the community actively and was beyond being sports, recreation and exercise (Tang and Jardine, 2016). Research has also shown that traditional activity, specifically, hunting has protective effects on mental and general health of indigenous people living off-reserve (Kassem et al., 2024). A systematic review, grounded in the Two-Eyed Seeing (Etuaptumumk) framework, demonstrated that land-based activities enhanced the self-reported health and well-being of Indigenous adults. These practices were found to bolster physical activity, spiritual fulfillment, and socio-emotional resilience while simultaneously strengthening community ties. Furthermore, the review highlighted that integrating these traditional activities into Western health

interventions facilitated a multifaceted approach to wellness; participants showed increased awareness of modifiable risk factors, developed effective stress management techniques, and benefited from vital inter-generational knowledge transfer and social support (Tang and Jardine, 2016). Benefits have also been observed in youth populations. A systematic review investigating the impact of traditional physical activity on Indigenous youth underscored significant spiritual, emotional, mental, and some physical benefits across the literature. These activities provided a vital mechanism for youth to reconnect with their land, ancestry, and community, fostering a state of holistic well-being (Tang and Jardine, 2016).

The role of traditional Indigenous activities during pregnancy is underexplored. While there have been important contributions to the literature related to the role of Indigenous doulas in supporting cultural aspects of birthing and family (Cidro et al., 2021), as well as interviews with Anishinabe First Nation elders describing historical cultural birthing practices that included prescriptions for healthy diets and moderate exercise during pregnancy and preparations of a moss blanket (i.e., cradleboard) (O'Driscoll et al., 2011), the importance of engaging in traditional activities during pregnancy and the potential role for these activities in supporting overall health remains unclear.

This study aimed to explore the role of Indigenous traditional foods and activities in overall health and healthy pregnancy experience of urban Indigenous women in Manitoba, with an emphasis on risk and management of GDM.

Materials and Methods

Study Design Overview

This study utilized a modified grounded theory approach. The Journal Article Reporting Standards for Qualitative Research (JARS-Qual Standards) was used to report findings (Levitt et al., 2018).

Participants

A total of 23 participants were initially surveyed and 21 of these individuals met the inclusion criteria and were recruited for the focus group and in-depth interviews through word of mouth and recruitment flyers. All participants identified as Indigenous individuals who had been diagnosed with gestational diabetes or had experienced this condition during their pregnancies while living in urban areas. Three focus group interviews were conducted, along with nine in-depth interviews. There was no existing relationship between the researchers and the participants.

Recruitment

Recruitment took place through community partnerships with Healthy Start, Winnipeg-based non-profit charity that provides free pregnancy and parenting support, and In a Good Way, a Brandon-based family resource centre providing free, culturally safe support services for pregnant women, breastfeeding mothers, and families. Recruitment involved announcements and flyers distributed through the programs, with interested individuals contacting the research team for further information and scheduling. For In-depth Interviews, a subset of participants who attended the Focus group interview were recruited. Participants in the focus group interviews received compensation in the form of a light meal, childcare services for the time of the interview, and a \$75 Amazon electronic gift card. Those who participated in the in-depth interviews were provided with childcare as well and received a \$100 Amazon electronic gift card.

Participants Selection

Participants who identified themselves as Indigenous and were participating in the Canada Prenatal Nutrition Program (CPNP) and residing in urban areas were included in this study. The interviews took place at the Healthy Start facility in Winnipeg and the In a Good Way facility in Brandon. They were conducted from April to August 2023.

Data Collection

Data were collected in the forms of Focus Group (FG) interviews and In-depth interviews (IDI).

Focus group Interviews

FGs were moderated by the PI and employed grounded theory techniques. There was a second moderator and a note-taker present at each FG (student research assistants). Each FG began with a review of the project and the consent form and allowed participants time to ask questions. Next, moderators suggested a few rules before getting started; for example, reminding participants that all responses are valid, to be respectful of each other's opinions, and to stay on topic. Moderators then utilized 3-5 predetermined questions and/or prompts to guide the conversation. Questions asked participants to consider the issue of GDM in their community, the support that they received through provincial or national programs, barriers and facilitators to obtaining culturally appropriate nutrition and overall healthcare, the role of traditional foods and lifestyle activities in their health and well-being, Indigenous knowledge frameworks that are important to health within their cultures, and preferred means of learning and communication, among other topics.

In-depth Interviews

In-depth interviews were conducted among a subset of participants identified from focus groups. The IDIs aimed to explore more detailed information about a participant's thoughts and behaviour,

explore new issues in depth, and provide context that will offer a more complete picture of the topic. Interviews were conducted by the PI or trained student research assistant. An IDI guide consisting of 15 open-ended and discovery-oriented questions was utilized.

The interviews were recorded as audio, and Otter.ai was used to transcribe them. One researcher reviewed the transcriptions, filling in missed points and correcting mistakes made by Otter.ai.

Analysis

Axial coding and grounded theory were utilized to develop a hypothesis from the collected data. Given that qualitative research is particularly vulnerable to researcher biases, three researchers were tasked with coding the interviews. To minimize personal biases regarding the study topic, they were instructed to refrain from reviewing any relevant literature. Additionally, the researchers underwent training in axial coding using pertinent articles from this field. The codes and the code groups emerged from the analysis. Each researcher performed an independent analysis of the data, assigning codes to each sentence in the transcripts. Following this coding process, codes were organized into groups. Once the code groups were established, the researchers convened virtually to identify the overarching themes. Each theme comprised one or two prominent code groups, which are referred to as sub-themes. This process was conducted separately for both the focus group interviews and the in-depth interviews. Atlas.ti (version 23; ATLAS.ti Scientific Software Development GmbH, Berlin, Germany) was used for this analysis. This process is shown in Figure 4.1.

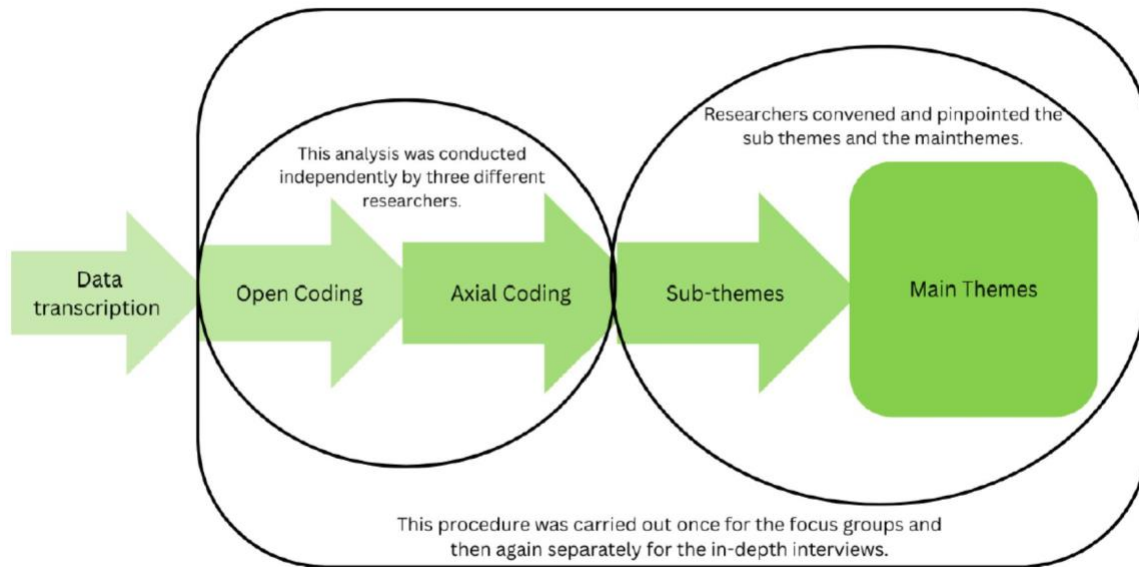


Figure 4.1: Data analysis process

Results

The findings of this study are derived from the perspectives of 21 individuals who participated in either focus groups or in-depth interviews. The demographic characteristics of the participants are detailed in Table 4.1. All participants self-identified as Indigenous, with 20 identifying as First Nations and one as Métis. All participants resided in either Winnipeg or Brandon, Manitoba.

Regarding gender identity, 18 participants identified as cisgender females, while three individuals opted not to disclose their gender identity. In terms of educational attainment, four participants reported having obtained a General Educational Development (GED) certificate or an equivalent qualification, three had completed education up to the middle school level, and nine had attained some high school education or had graduated from high school. Additionally, four participants reported having attended some college or university without obtaining a degree, while one participant declined to disclose their educational background.

With respect to employment status, nine participants reported that at least one adult in their household was engaged in full-time employment, whereas 12 participants indicated that no adults in their household were employed. Household sizes ranged from one to eight individuals.

The mean age of participants was 30.3 years. The age distribution was as follows: five participants were between 18 and 24 years old, ten were between 25 and 34 years old, and six were between 35 and 44 years old. The average annual income among participants was \$30,750 CAD, with reported incomes ranging from below 10,000CAD to between \$55,000 and 64,499 CAD. Notably, 11 participants were either unsure of their annual income or preferred not to disclose this information.

Table 4.1: Participants' Characteristics.

	n (%)
Indigenous Identity	
First Nation	20 (95.2%)
Métis	1 (0.04%)
Gender	
Female	18 (85.7%)
Unspecified	3 (14.3%)
Education Level	
General Educational Development (GED) or equivalent	4 (19.0%)
Grade School to Middle School	3 (14.3%)
High School	9 (42.9%)
Some College or University	4 (19.0%)
Unspecified	1 (0.04%)
Employment Status in Household	
At least one Adult is Employed Full-Time	9 (42.9%)
No Adults Employed	12 (57.1%)
Household Size Range	1-8 People
Age	
18-24	5 (23.8%)
25-34	10 (47.6%)
35-44	6 (28.6%)
Annual Household Income (CAD)	
Below \$10,000	2 (0.09%)
\$10,000-14,999	1 (0.04%)
\$15,000-24,999	1 (0.04%)
\$25,000-34,999	3 (14.3%)
\$45,000-54,999	1 (0.04%)
\$55,000-64,999	2 (0.09%)

Income nonresponse	11 (52.4%)
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Three focus groups and nine in-depth interviews were conducted. Three FG interviews were held for 32 to 55 minutes and the average time of interviews was 42 minutes. Nine IDI were held for 20 to 36 minutes, with average of 27 minutes. Data from the focus groups and in-depth interviews were analyzed separately. A total of eight main themes were identified, six of which were common across both focus groups and in-depth interviews. However, a deeper analysis of participants' perceptions and experiences in the in-depth interviews revealed two additional main themes. Six common themes emerged from the data and are presented as follows:

Themes Identified in Focus Groups and Confirmed in In-Depth Interviews

The overarching themes and their corresponding sub-themes are described in the sections that follow. A summary of these themes and sub-themes is provided in Table 4.2.

Table 4.2: Themes and subthemes for participants' perceptions and experiences with CPNP program and GDM

Theme #	Themes	Subthemes
Theme 1	Perceived Flaws within Healthcare System	Limited Access to Indigenous Traditional Foods and Knowledge
		Insufficient Understanding within Healthcare System
		Lack of Access to Culturally Appropriate Care
		Inadequate Patient Education
Theme 2	Community Awareness and Support	Family and Friends
Theme 3	Experience with Current Programs	Program Support
		Program Limitations
Theme 4		Appreciation of Indigenous Culture

	Indigenous Cultural Practices	Loss of Cultural Practices
Theme 5	Traditional Foods and Activities	Significance
		Barriers to Accessing
Theme 6	Related Challenges	Healthy Pregnancy
		Experience with Gestational Diabetes

Perceived flaws within healthcare system

Perceived flaws within the healthcare system can be categorized into three primary areas: limited access to Indigenous traditional foods and knowledge; insufficient understanding within the healthcare system of Indigenous traditional values and practices or lack of access to a culturally appropriate care; and inadequate patient education regarding gestational diabetes or diabetes in general. Participants highlighted several systemic shortcomings within the current healthcare system, including the absence of traditional activities and foods in hospital settings, a limited understanding of the cultural values and practices related to Indigenous pregnancy within healthcare system, and inadequate education regarding gestational diabetes and its associated testing procedures. These issues were perceived to be more prevalent in urban contexts, particularly where connections to reserve communities, as well as access to traditional harvesters and hunters, are lacking. As one participant mentioned;

“Just want more resources. ... At one point in time, I thought I wasn’t [going to] keep my babies, so just doing research, like having that resource information available. ... Even if I went to my gynecologist and just sat there...She just scribbled pamphlets, ‘Just check these out. Maybe you might be interested.’”

Participants noted that their initial understanding of GDM or diabetes in general was primarily informed by personal connections, such as family members or friends who had previously experienced GDM during pregnancy. However, they reported receiving little to no formal education regarding what is gestational diabetes, its symptoms, risk factors, or management until after receiving a diagnosis themselves. Furthermore, participants expressed that during their clinical visits for GDM testing, healthcare providers failed to offer explanations about the purpose, process, or implications of the test. This lack of communication was described as particularly distressing, given the emotional and physical demands of undergoing such procedures during pregnancy. Although there are some support programs that provide education for pregnant mothers or people who want to become pregnant, some of our participants were not aware of any programs and some were only familiar with some of the programs which could be due to the lack of advertisement of the existing programs. As one participant mentioned;

“Yeah, like somewhere easy to look up. ‘Okay. I need to ... this is my next step.’ Yeah. I had no idea what my next step would have been at that time. So I think that’s really important for every clinic ... That’s something that you don’t take for granted, and you want to help other people, make sure they’re having a safe and healthy pregnancy.”

Moreover, participants felt a lack of access to traditional activities and foods within the healthcare system, this was discussed as healthcare providers were not able to provide suggestions on traditional foods and activities during the pregnancy, lack of traditional foods or activities in the hospital setting, lack of emotional and spiritual support in healthcare system. As one participant elaborated;

“I even asked my doctor, I was like, ‘Would it be okay, if I did a sweat, while I’m pregnant?’ And she said it wouldn’t hurt to do a sweat. ... When I asked a lady who knows more about it, she say, ‘I wouldn’t prefer it.’ But she said, ‘It’s up to you, because the hotter it gets, because the baby’s already in a sweat.’”

The most frequently applied codes within this theme are illustrated in the word cloud presented in Figure 4.2.



Figure 4. 2: Word cloud of codes applied within the “Perceived Flaws within the Healthcare” theme. Terms represent participants’ perceptions of challenges, gaps, and shortcomings within the healthcare system. Font size reflects the frequency of coded references, with larger terms indicating a greater number of coded references. Colors distinguish the overall valence of the codes, with yellow representing negative or critical perceptions and green representing positive or neutral experiences.

Community awareness and support

Participants commonly became aware of GDM through the experiences of family members or friends who had previously encountered the condition. As one participant explained:

"I don't know too much about that kind of diabetes. My auntie, I think she has type two diabetes, so I do know a little bit about diabetes in general... I always seen her taking her blood... and she tells me, 'I'm making sure my sugars [are] well.'... I know you have to eat properly, take care of yourself properly, exercise... and I would say it would be the same kind of thing... with that diabetes and type 2."

They expressed appreciation for the support offered by community-based programs, particularly the educational content and culturally relevant teachings provided. However, many emphasized the need for these programs to incorporate more Indigenous traditional teachings—such as the Seven Teachings and the conceptualization of pregnancy as a sacred journey—while also recognizing that such teachings may vary across different Indigenous communities.

Participants also noted disparities in the availability and nature of community support across regions. For example, while some programs extended services to individuals living off-reserve, others did not. In certain communities, initiatives included the provision of traditional Indigenous foods and cultural activities for both on-reserve and off-reserve members. As one participant mentioned:

"...It's not a big program. It's only certain reserves can go to it. I can't remember what's there. There's only like three or four reserves can go to it."

The inclusion of Elders and Indigenous knowledge keepers, as well as opportunities to participate in support groups and sharing circles, were identified as additional strengths of these programs. Access to healthy, nutritious meals was also viewed as a significant benefit.

Despite the value of these services, many participants identified financial constraints as a major barrier to accessing healthy foods and the support they needed during pregnancy. They stressed the importance of expanding community-based support programs and called for the continuation of such services beyond the prenatal period. Participants also highlighted the usefulness of comprehensive, culturally appropriate informational resources to guide them through each stage of pregnancy.

Importantly, some participants noted that receiving this support did not necessarily require care from an Indigenous provider, so long as the services were delivered in a culturally safe and respectful manner.

Experience with current programs

Two key sub-themes within this overarching theme are program support and program limitations. Program support primarily refers to the educational content delivered through various initiatives, including information on healthy eating, available community resources, and parenting. Programs that incorporated traditional beliefs or facilitated opportunities for participants to engage in cultural activities alongside other women were particularly valued. The presence of support groups—especially those specifically designed for Indigenous women—was consistently appreciated and positively highlighted by participants. Having the presence of others and not experiencing pregnancy in isolation—particularly the opportunity to share experiences with other pregnant women—was emphasized as a significant benefit of programs that offered this type of support. One participant explained:

"...prenatal class here, they have a lot of information. Yes. And I love all that information. But I would like to be like, moss bag making in just like, you know, like, the teaching of the moss bags you know, or even like, giving a little moccasin making type of things, you know, like, in a good way, when you come for your prenatal and postnatal they, they give you a lot of information, but to really have a hands on activity. Yeah. Like, I know, there are ones that they do, too. Here's the blanket making, and it's just like, the knot blanket. You get a blanket you cut those things and you just hide them...that stuff looks cute and everything, I got like a couple of them at home. So yeah, I would say just more, you know, a little bit of activity doing, like I would love to at least try and make my baby boy his own moss thing..."

The sub-theme “program flaws” captured participant reflections on limitations within existing services and suggestions for improvement. Participants expressed that there was a need to enhance current programming or develop new initiatives and materials. A commonly discussed point was the lack of integration of Indigenous knowledge, traditional practices, and culturally meaningful content—such as the Seven Teachings, drum making, smudging ceremonies, cooking classes, recipe sharing, blessings from Elders, and opportunities to connect with knowledge keepers—into program delivery. As one participant explained:

"Elders teaching the Seven Teachings and stuff like that. So, inside knowledge, what they know, right? ... Connecting with an Elder ... gives me [a] spiritually good [feeling] about yourself afterwards."

Some participants also noted insufficient education within the healthcare system regarding the status and specific needs of pregnant individuals prior to screening or diagnosis. Additionally, limited access to culturally appropriate resources and support services was identified.

Additional challenges and benefits were identified by participants in this group. Barriers included limited access to transportation and a lack of culturally appropriate programming. Conversely, the provision of meals and childcare during program sessions was noted as a significant facilitator of participation.

Indigenous Cultural Practices

Two main subjects identified within this theme were the appreciation of Indigenous culture and the loss of cultural practices. Participants expressed a strong appreciation for engaging in traditional cultural activities, which were described as calming and beneficial for health. There was also a noted interest in learning and reclaiming these traditions. Specific activities mentioned included sweat lodge ceremonies, traditional cooking, and grounding ceremonies.

Traditional foods were frequently mentioned and praised for both their cultural significance and health benefits, and many participants expressed a craving or longing for them. However, financial constraints were identified as a barrier to accessing both cultural activities and traditional foods.

For instance, one participant stated that:

"Well, even just learning about it [traditional foods and activities], and stuff like that is awesome. My daughter here [name redacted], she loves to learn about our culture and even to like, what was it that they just had done on Indigenous peoples Day or something? There we went and checked out there, and they were making Bannock down there. She stood right there

watching even though we make Bannock at home and, you know, just seeing an elder doing it too, you know, this were to be a teaching, you know, pretty good and stuff. And so it gets everybody involved, and it just brings back that, you know, a sense of just belonging to something because, like, being indigenous and stuff, it's the way we're looked at and stuff through the whole world and everything and we just have our own sense of everything. So it's just like, you know, it was taken from us..."

Participants also discussed Indigenous perspectives on pregnancy, describing it as a sacred time during which women are to be deeply respected for their role in creating life.

The loss of culture was attributed to several factors. Participants linked this loss to the experiences of previous generations, particularly those who attended residential schools. Some shared that parents were hesitant to pass on traditions out of fear, while others described being raised in environments disconnected from their Indigenous identity, such as being brought up in the Catholic faith. A lack of access to resources and opportunities to learn about Indigenous traditions was also described as a barrier to cultural continuity.

Traditional Foods and Activities

Two key sub-themes that emerged within this overarching theme were the significance of traditional foods and activities, and the barriers to accessing them.

Participants described traditional foods and activities as important components of their well-being and cultural identity. They expressed a desire for increased availability and accessibility of these practices. Traditional activities mentioned included beading, moccasin making, sweat lodges,

ribbon skirt making, ceremonies, dances, and feasts. Engaging in these activities was also described as beneficial for mental health and spiritual well-being.

With respect to traditional foods, participants identified cost as a primary barrier. They also noted the importance of having a network of individuals who could assist in locating or providing these foods. Additional barriers included geographic distance and not being raised within the culture, which limited both familiarity and access. As one participant explained:

"I always think of it [having access to traditional foods and lifestyle activities] as being important until I was thinking and pondering over at the last time, I was doing something similar to this. And I thought that, you know, it can be important for a lot of people, help them feel closer to home or their traditions and stuff like that. And when I was looking for deer during pregnancy, I can't wait to try again, because I tried it once. But that was with a family friend. And I didn't have that access and couldn't figure out where to source it without having that. That connection. And then other than that, I couldn't figure it out on my own."

Barriers to traditional activities included limited access in urban areas compared to rural communities and reserves. Participants also reported lack of time and caregiving responsibilities, particularly caring for young children, as further challenges to participation. This constraint is reflected in the following participant account:

"It was just really hard to because like you know the beef and chicken and stuff like that is kind of cheap, but when you try to buy salmon, and like I usually like

moose meat, but it's really hard to get because it's so expensive and so the travel, the transportation, it's just really hard."

Related Challenges

The two main sub-themes that emerged from the data in this overarching theme were healthy pregnancy and Experience with gestational diabetes.

The sub-theme of healthy pregnancy reflected participants' knowledge and understanding of practices that contribute to a healthy pregnancy, including the importance of staying physically active, consuming nutritious foods, and maintaining overall well-being. Participants emphasized that traditional foods and cultural activities also play an important role in supporting a healthy pregnancy. Additionally, many participants expressed that pregnancy served as a strong motivator to adopt healthier behaviours and seek out more information related to maternal health.

As one participant explained,

"...Like some herbal teas...much I can't remember. There's this one tea that they give, is made like I can't remember what it's called. But how was it? But it was really good. Well, I didn't find it really good, but probably other people do. Yeah, it's good for you. It's like, it's a tea that helped with some medicine."

The sub-theme of experiences with gestational diabetes referred to participants' accounts of living with the condition, including its treatment and management. Participants described their previous experiences with gestational diabetes, a lack of knowledge about the condition, challenges in following a restrictive diet, the education they received about GDM, and the difficulties in accessing care in rural areas. This is reflected in the following participant account:

"I didn't [know about diabetes or gestational diabetes]. Yeah, I really didn't until they gave me the test. I should have started reading up about this pregnancy stuff. But there's a lot of people that don't know about it exactly, I think it's just a thing where they want you to be on their medication thing for a while...yeah, It should have been [communicated before the test and being diagnosed] Because you know what? I would have changed my diet beforehand."

Additional Themes Identified in In-Depth Interviews

As in-depth interviews are more detailed in nature, two additional themes emerged during the analysis of the in-depth interview data. These themes are presented in the sections that follow, and a summary of them and their sub-themes is provided in Table 3.

Table 4.3: Themes and subthemes from in-depth interviews

Theme #	Themes	Subthemes
Theme 7	Accessibility of Indigenous Traditional Foods and Activities	Accessibility
		Barriers to Accessing
Theme 8	Experiences with Culturally Appropriate Care	Current Experiences with Healthcare Services
		Importance of Receiving Culturally Appropriate Care

Accessibility of Indigenous traditional foods and activities

Accessing traditional foods and activities was identified a main sub-theme. Participants discussed differences between rural and urban areas in terms of accessibility, noting that access was more limited in urban settings. This constraint is reflected in the following participant account:

"I love wild meat and it's really difficult to get my hands on. It's just if somebody up north knows me, and they're nice enough to send me some. But it's not easy to get my hands on. Yeah. That kind of bothers me, but it is what it is."

Financial barriers to both healthy and traditional foods were commonly reported. Additionally, a lack of social networks was mentioned as a barrier to accessing traditional foods and participating in cultural activities. This challenge is illustrated by one participant, who noted:

"... because we're not on the reserve and we don't know anybody to bring it in for us. So it's very limited, I guess. Those types of traditional foods like fish and deer meat, moose meat, all that. It's harder for us I would say, I guess. Yeah, you have to know people on the reserve that bring it in and stuff..."

Being in an urban environment was consistently described as another factor that limited access to these resources.

Participants described several barriers to engaging in traditional activities. These included transportation difficulties, limited time, caregiving responsibilities—particularly having young children, and a perceived loss of cultural connection. These challenges impacted participation in practices such as ceremonies, traditional crafts, and community events. As one participant described,

"... whatever's in walking distance. Because I know transportation is [hard] if we don't have a vehicle, and it's very limited for us to really attend anything like that..."

Barriers to accessing traditional foods included limited availability in urban areas, high costs, and geographic distance from sources of traditional foods, which were often located in reserves.

Transportation challenges were also mentioned as contributing factors to geographic inaccessibility. These barriers collectively limited consistent access to traditional foods. As one participant explained,

"...That's where that'd be, you know, out here in the city you know, it's guys have to actually leave and then go hunting...or they have to bring it in from the reserves. Really all you need to know somebody to be able to get those types of foods and stuff and my kids really love deer meat, but we don't get to have that often...because we're not on the reserve and we don't know anybody to bring it in for us..."

Figure 4.3 presents a word cloud illustrating the codes most frequently applied within this theme.



Figure 4.3: Word cloud of codes applied within the “Accessibility of Indigenous Traditional Foods and Activities” theme. Green terms represent positive experiences and perceived strengths, whereas yellow terms represent negative experiences, challenges, or perceived gaps. Font size reflects the frequency of coded references, with larger terms indicating a greater number of coded references.

Participants described notable differences between urban and rural settings. Some noted that there may be a higher prevalence of diabetes in rural areas. While traditional foods and activities were reported to be more accessible in rural communities, several challenges were also identified. These included limited overall resources, transportation difficulties, restricted access to gestational diabetes mellitus (GDM) care, higher living expenses, and a lack of available funding to address

these challenges. Participants also described difficulties accessing healthy foods, such as fresh fruits, due to both financial constraints and the geographic distance to grocery stores, which were often far away and not immediately accessible. Additionally, some participants expressed concerns about personal safety when walking around reserve areas, noting fear of encountering bears and stray dogs. Some participants also reported frequently moving between rural and urban areas.

Suggestions to improve accessibility to traditional foods and activities included providing transportation to activity sites, offering incentives to encourage children's participation, and ensuring the availability of childcare to mitigate caregiving responsibilities. It was also noted that urban areas are generally preferred due to greater opportunities and resources. However, rural areas were recognized as having distinct advantages, such as access to fresh air and greater availability of Indigenous traditional foods and activities, despite the potential for increased feelings of isolation.

Experiences with culturally appropriate care

Within this overarching theme, participants primarily described their current experiences with healthcare services and emphasized the importance of receiving culturally appropriate care. They expressed a strong appreciation for care tailored to their cultural context, as reflected in the following participant statement:

".... yeah, it was definitely important. It was just the midwives over at [local Indigenous medical clinic], they offer that type of care there. They gave me cedar bath, which was very lovely. I really liked that and you could talk to

elders if you want to, talk groups, talks and stuff like that. Very, very nice. I'm glad I went there..."

A word cloud depicting the codes most commonly applied within this theme is provided in Figure 4.4.



Figure 4.4: Word cloud of codes applied within the “Experience with Culturally Appropriate Care” theme. Green terms represent positive experiences and perceived strengths, whereas yellow terms represent negative experiences, challenges, or perceived gaps. Font size reflects the frequency of coded references, with larger terms indicating a greater number of coded references. Particularly highlighting a desire for physicians to have greater knowledge of women’s health within Indigenous cultures. Participants also underscored the need for the integration of Indigenous teachings into existing care programs. Furthermore, they identified inconsistencies between biomedical and traditional sources of guidance; for example, while some physicians indicated that participation in sweat lodge ceremonies during pregnancy was acceptable, knowledge keepers advised against it.

Discussion

This study explored the pregnancy experiences of Indigenous women living in urban areas of Manitoba and their perspectives on the importance of availability and accessibility of Indigenous traditional foods and activities in the prevention and management of GDM. The significance of traditional foods, activities, and teachings emerged as an overarching theme across both focus group discussions and in-depth interviews, underscoring their centrality to participants’ identity, beliefs, and well-being. Participants described pregnancy as a sacred time during which women deserved deep respect and culturally informed support — a perspective that highlights the

profound disconnect between Indigenous understandings of pregnancy and the predominantly biomedical framework within which most participants received their care.

These findings are consistent with previous research conducted with urban Indigenous peoples in Saskatchewan by Shafiee et al., as well as with Elliott et al., who identified comparable challenges regarding access to Indigenous traditional foods in British Columbia and noted that food security can be improved through increased accessibility of these foods (Elliott et al., 2012; Shafiee et al., 2022). Despite the recognized importance of traditional foods and activities, access remained hindered by key barriers — most notably transportation challenges, financial constraints, and a loss of connection to community. Social networking and knowing someone within the community, such as a hunter or a harvester, was identified as an important facilitator for accessing these resources, suggesting that urban relocation and the resulting disconnection from community networks represent one of the primary barriers faced by participants.

These findings highlight multiple areas warranting attention within both the healthcare system and at the program level. Within the healthcare system, there is a clear need for the incorporation of Indigenous knowledge and cultural practices into care delivery, as well as a formal evaluation of the existing knowledge of healthcare providers and students to determine whether a knowledge gap exists. One reason behind the shortcomings in providing appropriate care to Indigenous patients may be a lack of provider confidence, which could itself stem from insufficient knowledge of Indigenous cultural practices, traditional foods, and activities. This is consistent with existing literature on cultural safety in healthcare, which identifies provider discomfort and lack of training could potentially stem from lack of knowledge (Curtis et al., 2019). Importantly, participants noted that receiving culturally safe care does not necessarily require an Indigenous provider — rather, it requires knowledge, genuine respect, and a commitment to cultural humility.

This is a significant finding, as it suggests that meaningful improvements in care are achievable through targeted education and training of existing healthcare providers, without requiring immediate structural overhaul of the healthcare workforce.

Another notable finding was the inconsistency between biomedical and traditional guidance received by participants. For example, while some physicians indicated that participation in sweat lodge ceremonies during pregnancy was acceptable, community members advised against it. This divergence not only reflects the possible knowledge gap among healthcare providers regarding Indigenous cultural practices but also places an unfair burden on Indigenous patients to navigate conflicting information during an already vulnerable time. Bridging this gap requires healthcare providers to develop a foundational understanding of Indigenous cultural practices and to engage respectfully with traditional knowledge systems rather than dismissing or misrepresenting them.

Participants also identified the need to provide education on GDM to pregnant women regardless of their diagnosis, reflecting a desire for proactive and inclusive health information. Many participants reported having little to no knowledge of GDM prior to receiving a diagnosis and described receiving minimal explanation from healthcare providers during testing procedures, which was experienced as distressing.

These findings align with those of Whitty-Rogers et al., whose study of Mi'kmaq women with GDM similarly identified transportation as a barrier to accessing healthcare services and appropriate support, while noting that participants relied heavily on community and family networks during difficult times (Whitty-Rogers et al., 2016). In that study, transportation limited access not only to healthcare services but also to grocery shopping and the locations where prenatal care was provided, mirroring the experiences described by participants in the present study. The

cost of healthy food emerged as a further barrier to accessing nutritious options and purchasing groceries, again consistent with what our participants reported. Likewise, the appreciation participants expressed for the support of family and friends during pregnancy and GDM echoed a theme that was also prominent in the current study. Taken together, the consistency of these findings across different Indigenous communities and contexts suggests that transportation, food affordability, and the importance of family and community support are not isolated concerns but recurring barriers and facilitators that shape the experiences of Indigenous women with GDM.

Notably, pregnancy was identified by many participants as a strong motivator to adopt healthier behaviors and seek out health information, suggesting that the prenatal period represents a critical and receptive window for proactive education and culturally informed intervention. At the program level, existing community programs should be revised to better integrate Indigenous knowledge and cultural practices, and their visibility must be increased among both healthcare providers and the general population. Participants specifically called for the incorporation of practices such as elder involvement, the Seven Teachings, smudging ceremonies, moss bag and moccasin making, ribbon skirt making, drum making, traditional cooking classes, and sharing circles into existing programming. This aligns with earlier reports that these activities are important historical and cultural birth practices (Cidro et al., 2021; O'Driscoll et al., 2011). The inclusion of these culturally meaningful elements was seen not only as enriching but as essential to participants feeling seen, respected, and genuinely supported. Practical facilitators such as the provision of meals and childcare during program sessions were also identified as significant enablers of participation and should be considered in program design and funding decisions.

Although participants appreciated the existence of support programs during pregnancy, they felt these could be better tailored to the specific needs of Indigenous peoples — a finding that points to the importance of co-designing programs with Indigenous communities rather than developing them externally. Limited awareness of existing programs among both healthcare providers and the general population may be attributed to inadequate promotion, as well as the absence of a centralized and regularly updated database of available resources or the absence of promotion of such database. This gap may be further compounded by the continuous emergence of new programs, some of which risk duplicating existing efforts rather than building meaningfully upon them.

Beyond individual knowledge gaps, systemic barriers persist in the delivery of appropriate care to Indigenous populations. These barriers are not incidental but are deeply rooted in the historical exclusion of Indigenous peoples' needs from the design and development of healthcare programs and services. The legacy of residential schools, forced urbanization, and the deliberate suppression of Indigenous cultural practices has resulted in profound intergenerational trauma and a widespread loss of cultural connection that continues to shape the health experiences of urban Indigenous peoples today. Addressing these systemic barriers therefore requires not only programmatic changes but a broader commitment to reconciliation and decolonization within the healthcare system.

To our knowledge, at the time this study was conducted, no existing research had assessed the experiences of urban Indigenous peoples in Manitoba with care received through the Canada Prenatal Nutrition Program (CPNP) — specifically regarding Indigenous traditional foods and activities and their relationship to GDM — using a CBPR approach. This study therefore addressed an important gap in the literature while contributing a methodological

framework that centers Indigenous community members as active participants in the research process. Having identified these gaps, the logical next steps involve addressing their root causes. Most urgently, a formal assessment of healthcare providers' knowledge regarding Indigenous traditional foods, activities, and cultural practices should be prioritized, as this would clarify the extent of any knowledge gap and inform the development of targeted educational interventions. In parallel, developing a centralized and regularly updated database of existing programs and services would improve information accessibility for both providers and the broader population. Evaluating existing programs to determine whether they adequately meet the needs that newer initiatives aim to address would also represent a more efficient use of resources than developing redundant programming. Finally, broader and more strategic promotion of existing support programs — both within the healthcare system and in the wider community — is essential to ensure that those who would benefit from these resources are aware of and able to access them.

Several strengths of this study are worth noting. The use of a CBPR approach allowed gaps in care to be identified in direct collaboration with the community, while also ensuring that participants' proposed solutions were heard and meaningfully incorporated into the findings. To mitigate the inherent subjectivity of qualitative research, data analysis was conducted independently by three researchers who subsequently convened to identify common themes and points of convergence, thereby reducing the potential influence of individual researcher bias. The researchers also did not possess extensive prior knowledge of the subject matter under investigation, further supporting an objective approach to analysis. Despite these strengths, several limitations should be acknowledged. Due to the challenges associated with recording and transcribing interviews, some data were lost, which may have affected the completeness of the findings. Additionally, while steps were taken to minimize researcher bias, the personal experiences of the researchers may have

had a residual influence on data analysis — an inherent limitation of qualitative inquiry that cannot be entirely eliminated.

Conclusions

This study explored the experiences of urban Indigenous women in Manitoba with the care provided through the Canada Prenatal Nutrition Program (CPNP), with a particular focus on Indigenous traditional foods and activities and their relationship to GDM. Using a CBPR approach, this study centered the voices and lived experiences of Indigenous women, enabling gaps in care to be identified in direct collaboration with the community and ensuring that participants' proposed solutions were meaningfully incorporated. The findings revealed that Indigenous traditional foods, activities, and teachings hold profound significance for participants' cultural identity, spiritual well-being, and understanding of pregnancy as a sacred journey. Yet access to these resources in urban settings remains persistently hindered by barriers including transportation challenges, financial constraints, and a loss of connection to community networks. At the healthcare system level, gaps were identified in the integration of Indigenous knowledge and cultural practices into care delivery, in providers' confidence and knowledge regarding Indigenous cultural needs, and in the consistency between biomedical and traditional guidance. While prenatal and other support programs exist and were appreciated by participants, they were felt to be insufficiently tailored to the specific cultural needs of Indigenous peoples, and many participants were unaware of their existence. The loss of cultural practices — rooted in the intergenerational trauma of residential schools and the historical dismantling of Indigenous ways of life — further underscores the urgency of creating healthcare and community environments that actively support cultural reclamation and continuity. These findings carry important implications for both practice and policy. Most urgently, a formal assessment of healthcare provider

knowledge regarding Indigenous cultural practices, traditional foods, and activities is needed to identify existing gaps and guide targeted educational interventions. Critically, participants noted that culturally safe care does not require an Indigenous provider — it requires knowledge, respect, and a genuine commitment to cultural safety, suggesting that meaningful change is achievable through training and systemic reform. At the program level, integrating specific cultural practices — such as Elder involvement, the Seven Teachings, traditional cooking, and ceremonial activities — into existing programs, alongside practical facilitators such as childcare and meal provision, would significantly improve both participation and cultural relevance. A centralized and regularly updated database of available programs and services, combined with broader promotion of these resources, would further improve access for both providers and community members. To our knowledge, this is the first study to examine the experiences of urban Indigenous peoples in Manitoba with CPNP care in relation to traditional foods, activities, and GDM using a CBPR framework, addressing a significant gap in the existing literature. Ultimately, achieving equitable and culturally safe healthcare for urban Indigenous communities requires sustained commitment to incorporating Indigenous knowledge, amplifying Indigenous voices, and dismantling the systemic and historical barriers that have long excluded Indigenous peoples' needs from healthcare design and delivery. The findings of this study underscore the urgent need for a culturally responsive and community-informed approach to the care of urban Indigenous women, particularly in the context of pregnancy and GDM. Addressing the identified gaps — through healthcare provider education, program reform, and improved access to traditional foods and activities — is essential not only for improving clinical outcomes, but for honoring the cultural identity, spiritual well-being, and holistic health of Indigenous peoples. By centering Indigenous voices and knowledge through a CBPR approach, this study contributes a meaningful step toward

more equitable and culturally safe healthcare for urban Indigenous communities in Manitoba and beyond.

Bridge to Chapter V

The findings from Project Radiant highlighted the importance of culturally appropriate care and the need for healthcare providers to have knowledge of Indigenous traditional foods and related cultural practices. Participants' experiences of limited or inadequate guidance regarding traditional foods raised an important question regarding the preparedness of healthcare providers to provide such care. This question informed the second study of this thesis, which focused on the development of a questionnaire to assess knowledge of Indigenous traditional foods among healthcare providers and students in Canada. Chapter V describes the protocol used to guide the development and validation of this questionnaire.

Chapter V: Development of a Valid and Reliable Indigenous Traditional Foods Knowledge Questionnaire: A study protocol

Abstract

Background: Ensuring patient satisfaction involves providing culturally competent care, including offering culturally appropriate advice on food and nutrition. Traditional foods, consumed by Indigenous peoples, hold culturally significant importance. Preliminary results of ongoing research exploring gestational diabetes (GDM) prevention among urban Indigenous people in Manitoba revealed their perception that healthcare professionals do not know about traditional foods or provide culturally sensitive care. To enable Canadian healthcare professionals to provide culturally appropriate care to this population, any existing knowledge gap about Indigenous traditional foods must first be identified. A valid and reliable survey is needed to assess their knowledge.

Aim: To develop a valid and reliable survey to assess Indigenous traditional foods knowledge among healthcare providers and students within Canada. **Method:** A nine-step, three-phase process was employed to develop an Indigenous Traditional Foods Knowledge Questionnaire. The central innovation of the study was Phase 1 (Steps 1–4), particularly Step 1, which involved establishing an Indigenous advisory board to provide oversight and ensure alignment with Indigenous values and priorities. The remaining Phase 1 steps included: (2) defining the construct and developing a test plan; (3) generating an item pool; and (4) selecting appropriate scoring and response formats.

Phase 2 comprised: (5) assessment of content validity and (6) assessment of face validity. Phase 3 included: (7) refinement of the scale using item analysis; (8) evaluation of factor structure and internal reliability; and (9) re-examination of item analysis and reliability.

Summary: This tool can assess knowledge gaps and inform revisions to health professional training in Canada, including curricula, continuing education, in-service trainings, and professional standards of practice.

Introduction

Cultural competency is conceptualized as the capacity to interpret and engage effectively with individuals from diverse backgrounds by maintaining a rigorous respect for cultural norms and pursuing mutually valued objectives.

Culturally competent care is a key element emphasized within most healthcare professions and has been shown to be beneficial in various studies. In one systematic review and meta-analysis, almost all of the studies reviewed found that culturally competent care was associated with patient satisfaction (Alizadeh and Chavan, 2016). A study conducted by (Damashek et al., 2012) on culturally competent care in home-based programs for child abuse and neglect mentioned that programs with higher culturally competent providers have higher client satisfaction and goal completion (Damashek et al., 2012). Additionally, a 1991 study by (Wade and Bernstein, 1991) found greater engagement in clinic-based services (Wade and Bernstein, 1991).

Recognizing the essential need for culturally competent care, many healthcare professions in Canada, including dietetics and nutrition, require education and training related to cultural safety, especially as it relates to Indigenous values and foods. Indeed, the Integrated Competencies for Dietetic Education and Practice (ICDEP) in Canada specify that registered dietitians (RDs) must demonstrate the following: awareness of the role of Indigenous traditional/country foods in dietary practices; awareness of availability and preparation of Indigenous traditional/country foods; awareness of Indigenous values and ways of knowing related to health and wellness; and

awareness of the ongoing impact of colonization/residential schools/intergenerational trauma/systemic racism on Indigenous peoples in Canada (Eisenbraun, 2020). The ICDEP also state that RDs must practice in a manner that promotes cultural safety so that dietitians can “assist all Canadians in accessing culturally safe and appropriate food and nutrition advice, care and support” (Eisenbraun, 2020). These competencies were crafted in response to the Truth and Reconciliation Committee of Canada’s call to address the health needs of off-reserve Indigenous people and they emphasize the significance of Indigenous knowledge and healing traditions. Despite this, research shows that few dietetics programs provide required coursework in cultural competency (Kuhnlein et al., 2006) and dietetics students generally report feeling unprepared to work with clients from cultures other than their own (Hack et al., 2015).

Indigenous traditional foods are defined as those consumed by Indigenous peoples in Canada prior to European contact. The significance of these foods extends beyond their nutritional value, encompassing cultural, spiritual, and relational dimensions of Indigenous life. Importantly, cultural importance is not limited to the foods themselves but also includes the practices, knowledge systems, and methods associated with their harvesting, preparation, and consumption (First Nations Traditional Foods Fact Sheets, n.d.).

Indigenous traditional foods provide numerous health benefits, as demonstrated by a research and education intervention conducted within an Indigenous community in British Columbia. Increased consumption of traditional foods among participants was associated with improvements in key nutritional biomarkers, including vitamin A, iron, and folate status. These findings highlight the nutritional value of traditional food systems and their potential to contribute to improved health outcomes. Moreover, traditional foods represent a culturally relevant approach to nutrition for

Indigenous peoples, underscoring their importance as a foundation for future research and public health initiatives (Kuhnlein et al., 2006).

A growing body of literature has further documented the role of traditional foods in the prevention and management of chronic diseases. Traditional plant-based foods, in particular, are rich in bioactive compounds that contribute to the prevention and management of noncommunicable chronic diseases (NCDs), while also supporting cultural continuity and ecological sustainability (Sarkar et al., 2020).

Additionally, a longitudinal study conducted in a First Nations community in Ontario, Canada, examined the relationship between dietary patterns and the incidence of type 2 diabetes mellitus (T2DM) over a ten-year period. Three primary dietary patterns were identified: Balanced Market Foods, Beef and Processed Foods, and Traditional Foods. Notably, adherence to the Traditional Foods pattern, characterized by the consumption of culturally significant, locally sourced foods, was not associated with an increased risk of T2DM. In contrast, the Beef and Processed Foods pattern was linked to a higher incidence of T2DM. These findings suggest that traditional dietary patterns may confer protective health benefits and emphasize the importance of promoting traditional and balanced food consumption, while reducing reliance on highly processed market foods, in efforts to address T2DM among Indigenous populations (Reeds et al., 2016).

In addition to being knowledgeable about the health benefits that traditional foods can provide, RDs should also be well informed about the important role these foods have in terms of food security. The ICDEP mandate that dietitians possess knowledge to address household food insecurity and advocate for food systems that support equity and Indigenous food sovereignty (Eisenbraun, 2020). Food security within indigenous communities is inextricably connected to the accessibility and continuation of traditional food resources. A comprehensive review of literature

on traditional diets and food security among Indigenous populations in Low- and Middle-Income Countries (LMICs) demonstrates the crucial role these diets play in ensuring food security, as well as in preserving cultural heritage and environmental sustainability. The review analyzed thirty-seven studies, highlighting the significant impact of traditional foods in supporting food security and maintaining cultural and ecological systems. The findings underscore the necessity of promoting and safeguarding traditional food knowledge among Indigenous peoples, suggesting that such efforts are crucial for their long-term food security and cultural preservation (Sidiq et al., 2022). Food security in Yukon First Nations communities is closely linked to the consumption of traditional foods, as highlighted in a study evaluating food patterns in Vuntut Gwitchin households in Old Crow and Tlingit households in Teslin. Using food frequency questionnaires and the Health Canada Household Food Security Survey Module, the study compared traditional food consumption in the spring of 2007 and winter of 2008 to data from the early 1990s. The findings revealed that the overall frequency of traditional food consumption remained stable over the 15-year period. However, significant variations in the consumption of specific food groups underscored the impact of environmental changes on food availability. The study concluded that while traditional foods remain crucial in these diets, food security challenges persist due to the limited availability of food species, lack of access to harvesting equipment, and decreased time for harvesting activities (Schuster et al., 2011). It is crucial to recognize that the shift from traditional foods to a more Western diet can have adverse effects on the public health and food security of Indigenous communities. As previously discussed, the promotion and increased accessibility of traditional foods for Indigenous people play a vital role in addressing this issue.

Additionally, preliminary findings from our ongoing project, which focuses on developing a GDM prevention program for urban-dwelling Indigenous individuals, suggest that healthcare

professionals may not be adequately equipped to provide culturally appropriate care related to traditional foods and dietary practices. As highlighted by interview participants, this gap may be attributed, in part, to insufficient knowledge and education regarding Indigenous traditional foods. Providing patients with information about traditional foods and their health benefits is a critical component of culturally competent care, as it supports the integration of cultural practices and preferences into healthcare delivery (Alizadeh and Chavan, 2016). However, healthcare providers cannot effectively offer such guidance without first possessing a strong foundational knowledge of these foods.

To assess healthcare providers' current knowledge of Indigenous traditional foods and identify areas for improvement, the development and implementation of a questionnaire represents a practical and systematic approach. Survey research, defined as the collection of data from a sample of individuals through structured questions, is widely used in academic research to efficiently gather information from large populations (Ponto, 2015). However, survey research is subject to potential sources of bias, including sampling and measurement error (Ponto, 2015). One key strategy to mitigate these limitations is the use of a validated and reliable survey instrument that clearly defines and accurately measures the population and constructs of interest (Ponto, 2015).

A central challenge in survey development lies in the accurate assessment of constructs. Constructs are theoretical concepts derived from empirical observations that are not directly measurable, such as knowledge, attitudes, or behaviours. As a result, they must be assessed indirectly through carefully developed indicators or items, which collectively represent the underlying concept. In the field of nutrition, knowledge has been conceptualized as a construct reflecting individuals' cognitive processes related to food and nutrition information (Axelson and Brinberg, 1992).

However, the construct of Indigenous traditional foods knowledge has not yet been clearly defined or operationalized within a psychometric framework.

Previous research in nutrition has established methodological foundations for the development of knowledge-based questionnaires. For example, (Parmenter and Wardle, 1999) developed a widely used instrument to assess adult nutrition knowledge in the United Kingdom, followed by further work outlining key design principles, including item generation, pilot testing, and evaluation of validity and reliability (Parmenter and Wardle, 2000). Building on this work, (Trakman et al., 2017a) incorporated advanced psychometric techniques, such as factor analysis and Item Response Theory (including Rasch analysis), and proposed an eight-step framework for developing robust nutrition knowledge instruments.

Building on these established methodologies, the present study aims to develop a valid and reliable questionnaire to assess healthcare professionals' knowledge of Indigenous traditional foods in Canada. This tool will serve as a foundation for identifying existing knowledge gaps and will inform recommendations for enhancing university curricula and educational strategies to better support culturally competent care.

Method

A comprehensive three-phase, nine-step model was employed to develop a valid and reliable Indigenous Traditional Foods Knowledge Questionnaire (ITFKQ). This process builds on the framework proposed by (Trakman et al., 2017a), with the addition of an initial step to ensure that Indigenous leadership and data sovereignty are appropriately integrated throughout the study. The whole process is outlined in Figure 5.1.

Phase I

In Phase I, the initial draft of the questionnaire was developed under the guidance and oversight of the Advisory Board. This phase consists of four steps, each of which is described in detail below.

Step 1: Formation of an advisory board

Development of the ITFKQ occurred in partnership with Indigenous knowledge keepers and experts in Indigenous traditional foods in Canada, including Elders, community members, academics, and other relevant contributors. Advisory board members provided ongoing oversight and guidance throughout all stages of questionnaire development. Purposive sampling were employed for this step. Individuals were identified and invited to serve on the Advisory Board, with a target membership of three to eight participants. The inclusion criteria included: being at least 18 years of age and having the ability to speak, read, and write in English.

Step 2: Definition of Construct and development of the test plan

A one-on-one meeting was conducted with each advisory board member. These sessions began with an overview of the project, followed by open-ended discussions on key components, including:

- Definitions of Indigenous traditional foods and traditional food knowledge
- How to assess this knowledge among healthcare professionals
- Recommended questionnaire sections and culturally appropriate question formats
- The key aspects that each section should address regarding Indigenous traditional foods

All meetings were recorded, and detailed notes were taken. Insights from these discussions informed the development of a test plan. Due to the complexity of the topic, the questionnaire is

expected to include multiple sub-sections, each addressing key aspects of Indigenous traditional foods.

Step 3: Generation of the item pool

Once the construct is identified and the test plan is developed, an item pool was created to represent each sub-section, with items targeting the key aspects within each area. The initial item pool contained approximately three to four times the number of items expected to appear in the finalized questionnaire (Trakman et al., 2017a). A certain degree of redundancy was used so that items that do not behave as expected can be removed at later validation stages (Trakman et al., 2017a). Item creation was informed by current literature, including peer-reviewed journal articles, educational materials, books, guides on Indigenous Traditional Foods, and relevant grey literature. Language was kept simple and concise, and item development was guided by the advisory board. Items were written in plain-language level appropriate for health professionals. Double negatives and double barrel questions were avoided to minimize ambiguity and confusion (Dawis, 1987; Fink, 2003; MacKenzie et al., 2011; Sudman and Bradburn, 1982). Questions were written as full sentences and slang, abbreviations, and jargon will be avoided. Case-based questions will be included to assess higher-order cognitive processes, allowing participants to apply knowledge to realistic, context-specific scenarios (Cecilio-Fernandes et al., 2018).

Step 4: Choice of the scoring system and response format

Responses were close-ended (i.e., pre-selected responses), as open-ended responses are less reliable (Fink, 2003); specifically, a multiple-choice (MC) format was used. A MC format allows for analysis of distractor options as well as valuable information regarding potential nutritional misinformation or knowledge gaps (Presser et al., 2004).

One point was awarded for each correct option selected, as this is the most common and widely accepted scoring mechanism (Parmenter and Wardle, 1999). Total score and sub scores were both reported to allow for assessment of gaps in knowledge (Trakman et al., 2017a).

Figure 5.1 Overview of the study methodology

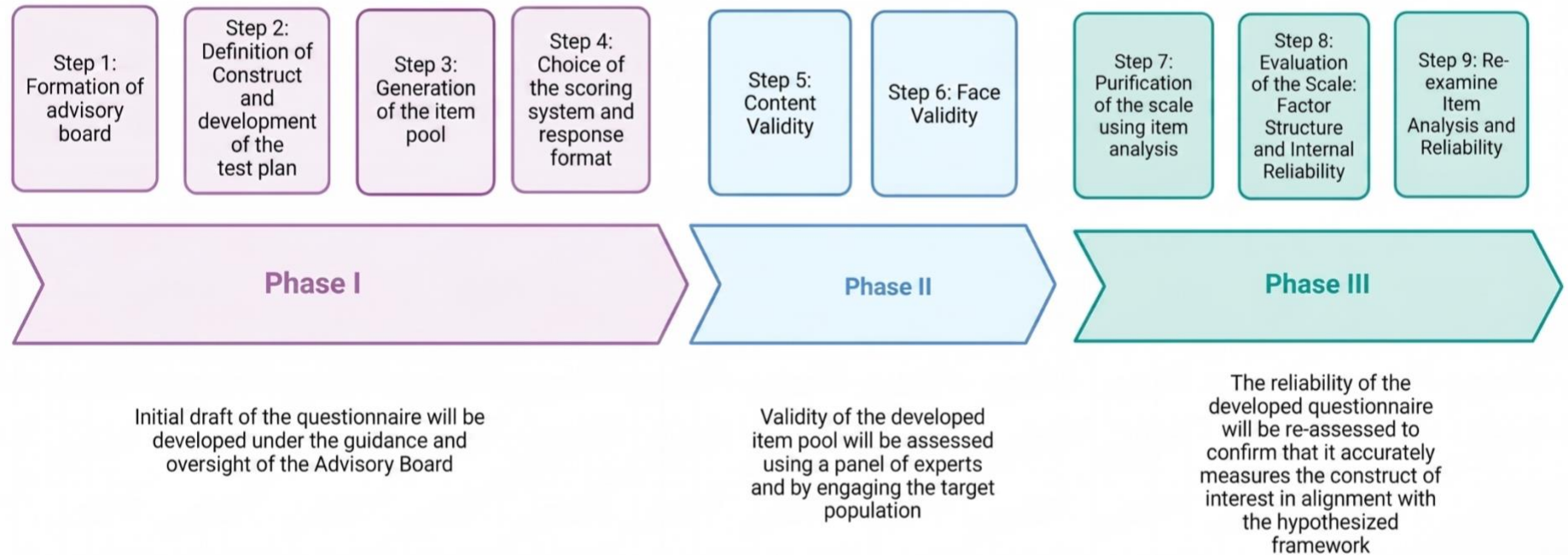


Figure 5.1: Three-phase, nine-step process for the development and validation of the Indigenous Traditional Foods Knowledge Questionnaire (ITFKQ).

Phase II

In Phase II, the validity of the developed item pool was assessed using a panel of experts and by engaging the target population of healthcare providers in Canada. This phase consists of two steps, which are described in detail below.

Step 5: Assessment of Content Validity

Content validity will be assessed by a panel of three to ten experts to ensure that items are relevant and cover all topics of the construct defined. This panel of experts will not include members of the Advisory Board to avoid bias. Rather, it will be a new panel consisting of Indigenous knowledge experts, RDs, nutritionists, and survey design scientists from a wide range of sectors, including academia, private practice, and industry (Trakman et al., 2017a). A guide outlining the definition of the construct and the key aspects of each sub-section will be provided at the beginning of each corresponding section. Validity will be quantified using the content validity index (CVI) (Polit et al., 2007). Each expert will rate the individual items for relevance on a 4-point Likert scale (1 = ‘very irrelevant,’ 2 = ‘irrelevant,’ 3 = ‘relevant,’ and 4 = ‘very relevant’). The CVI for each item is then calculated by dividing the number of raters who scored the item as 3 or 4 by the total number of raters. Scores above 0.8 are considered adequate. All questionnaires will be administered electronically via REDCap electronic data capture tools hosted at the University of Manitoba. REDCap (Research Electronic Data Capture, Vanderbilt University, Nashville, TN, USA) is a secure, web-based software platform designed to support data capture for research studies.

Step 6: Assessment of Face Validity

An assessment of face validity will confirm that the instructions are clear and easy to follow and that there are no technical issues when completing the questionnaire. It will also estimate how long

it will take to complete the questionnaire. To reliably assess face validity, a retrospective think-out-loud model will be used, whereby participants verbalize their thought process as they complete each item (Presser et al., 2004). A small sub-sample (ten to twenty participants) representative of the target audience (i.e., health professionals) will be recruited to complete the questionnaire. After completing the questionnaire, each participant will be asked to book a time at their earliest convenience to meet virtually in one-on-one interviews with a research team member to discuss their experience. Questions such as “what do you think this section is testing?” and “what questions did you find to be confusing?” may be asked.

Phase III

Phase III of the study will involve rigorous statistical analyses to ensure the reliability of the developed questionnaire and to confirm that it accurately measures the construct of interest in alignment with the hypothesized framework. This phase will consist of the following three steps.

Step 7: Purification of the scale using item analysis

After the questionnaire has been revised based on face and content validity assessments, item analysis will be conducted. This will involve techniques from Classical Test Theory (CTT), including evaluation of item characteristics, item difficulty, item discrimination, and inter-item correlations (Trakman et al., 2017a).

1. Item characteristics:

Response frequencies, means, and standard deviations will be screened and items whose responses are very positively or negatively skewed will be considered for removal (Collison et al., 1996; Gable and Wolf, 2012; Pallant, 2016). Incorrect options chosen by less than 5% of participants will be deemed ‘non-functional’ and modified (Petrillo et al.,

2015), with the goal that all distractors be endorsed by an equal number of respondents (Parmenter and Wardle, 2000).

2. Item difficulty:

Item difficulty will be assessed by reviewing how frequently respondents answered individual questions correctly; if less than 20% or more than 80% of respondents answered an item correctly, it will be considered for removal (Kline, 2000; Parmenter and Wardle, 1999). However, items may also provide useful information about gaps in knowledge, so this will be considered in the decision-making process (DeVellis, 2016).

3. Item discrimination:

An item will be considered as a poor judge of knowledge if respondents do well overall on the questionnaire but poorly on the item (Parmenter and Wardle, 2000). To assess for this item discrimination, correlation between the item score and the total score (minus the item of interest) will be determined. Items achieving a minimum correlation coefficient of 0.2–0.3 will be retained (Parmenter and Wardle, 2000). As the ITFKQ will utilize a MC format, a Pearson's correlation coefficient will be used (Trakman et al., 2017a).

4. Inter-item correlation:

Inter-item correlations will also be evaluated to determine if items are measuring the same thing (high correlations, $r \geq 0.7$) or if the items are too diverse to be assessing a single construct (low correlations, $r \leq 0.3$) (Pallant, 2016).

Step 8: Evaluation of the Scale: Factor Structure and Internal Reliability

Exploratory Factor Analysis (EFA), grounded in Classical Test Theory (CTT), will be conducted to identify the underlying factor structure of the instrument. Principal Component Analysis (PCA) will be used as the extraction method. Prior to conducting EFA, several assumptions will be

evaluated, including adequate sample size, inter-item correlations of at least 0.30, a statistically significant Bartlett's Test of Sphericity ($p \leq 0.05$) and a Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy of at least 0.60 (Trakman et al., 2017a).

Internal reliability will be assessed to evaluate consistency and minimize random error (Kline, 2000). Cronbach's alpha ($C\alpha$) will be calculated, with a threshold of ≥ 0.70 considered acceptable (Parmenter and Wardle, 2000; Streiner, 2003). Cronbach's alpha will be reported separately for each subscale identified (Trakman et al., 2017b). Inter-item correlations will also be examined alongside Cronbach's alpha to ensure that high values are not attributable to item redundancy (Briggs and Cheek, 1986).

Rasch analysis will be conducted to further assess measurement properties, including unidimensionality. This analysis will evaluate whether individuals with higher levels of knowledge are more likely to respond correctly (Trakman et al., 2017a). Model fit statistics will be used to examine consistency between observed and expected responses (Trakman et al., 2017b).

Step 9: Re-examine Item Analysis and Reliability

Construct validity will be assessed using a known-groups comparison to determine whether the questionnaire can distinguish between groups expected to differ in knowledge levels (Mokkink et al., 2010; Parmenter and Wardle, 2000). A sub-sample representative of the target audience will be recruited using convenience sampling. Academic program directors and professional organizations (e.g., Indigenous Physicians Association of Canada, Indigenous Nutritional Knowledge Information Network, etc.) will be contacted. Concurrently, a sub-sample of participants representative of a group from which knowledge should not be as high will also be recruited for this step. The above recruitment procedure will be followed; however, non-health

related academic programs and professional organizations will be targeted for the comparison group (e.g., engineering, law, computer science, etc.). A power analysis for an independent samples t-test will be conducted to determine the required sample size, using an alpha level of 0.05, a power of 0.80, a two-tailed test, and an anticipated large effect size (0.80).

Temporal stability will be evaluated to assess external reliability using a test–retest approach. The questionnaire will be administered on two occasions, two weeks apart, and the correlation between scores will be assessed using Pearson’s r , with a threshold of ≥ 0.70 considered acceptable (Parmenter and Wardle, 2000).

Summary

Culturally appropriate care plays a critical role in patient satisfaction and overall well-being. Providing guidance on Indigenous traditional foods, particularly in relation to specific health conditions or life stages, has been identified as an important component of care for Indigenous patients. However, healthcare professionals often lack confidence in delivering such guidance, which could be due to gaps in knowledge. At present, no valid and reliable instrument exists to assess this knowledge. Through a rigorous and culturally grounded development process, this study will produce a validated Indigenous Traditional Foods Knowledge Questionnaire that integrates Indigenous leadership, values, and priorities. This tool will enable the identification of knowledge gaps and inform strategies to enhance culturally safe care within the Canadian healthcare system, contributing to ongoing commitments toward truth and reconciliation.

Bridge to Chapter VI

The protocol described in this chapter established the methodological framework for developing and validating the Indigenous Traditional Foods Knowledge Questionnaire (ITFKQ), including Indigenous governance, item development, content validity, face validity, and the planned assessment of reliability and construct validity. Following this protocol, Phases I and II of questionnaire development were completed. Chapter VI reports the implementation and findings of these completed phases, including the contributions of the Indigenous advisory board, development and refinement of the questionnaire items, and assessments of content and face validity. Phase III, which will assess reliability and construct validity, remains ongoing.

Chapter VI: Indigenous Traditional Foods Knowledge Questionnaire

Abstract

Objective: To develop a questionnaire evaluating cultural competency and Indigenous food knowledge among Canadian dietetics students.

Design: A multi-phase validation framework was used to develop the Traditional Food Knowledge Questionnaire (ITFKQ), adapting established nutrition knowledge questionnaire guidelines to incorporate Indigenous governance and advisory oversight throughout. This paper reports on Phase I (forming the Indigenous advisory board, defining the construct and development of the test plan, generating the item pool, and selecting the scoring system) and Phase II (assessments of content validity and face validity).

Results: Guided by the advisory board, the final test plan includes eight sub-sections defining regional and historical contexts of Indigenous traditional foods. Evidence of content validity and face validity was confirmed based on feedback from an expert panel and participant think-aloud interviews. The evaluation of the phases resulted in modifications, including targeted item omissions, a reduction in multiple-choice response options, and terminology updates to eliminate colonial language.

Conclusions: Measuring the knowledge of healthcare providers on Indigenous traditional foods is important for providing culturally appropriate care. With the development of the ITFKQ, the potential gap in cultural knowledge among health care practitioners may be identified and Indigenous governance throughout healthcare ensured.

Introduction

Cultural competence refers to the integration of behaviors, policies, knowledge, and attitudes within a system to enable effective cross-cultural practice. This integration is essential for the provision of care that is equitable, free of disparity, and maintains acceptable standards of quality and efficacy. Research has demonstrated that culturally competent care is associated with improved patient satisfaction and trust (Castro and Ruiz, 2009; Ohana and Mash, 2015; Paez et al., 2009; Tajeu et al., 2015; Thom and Tirado, 2006). Furthermore, higher levels of cultural competency within the healthcare system have been shown to improve patient adherence to medication and treatment plans, as well as increase engagement with and utilization of health programs (McCalman et al., 2017).

Recognizing the essential need for culturally competent care, many healthcare professions in Canada, including dietetics and nutrition, require education and training related to cultural safety, particularly as it pertains to Indigenous values and foods. The Integrated Competencies for Dietetic Education and Practice (ICDEP) in Canada specify that registered dietitians (RDs) must demonstrate awareness of the role of Indigenous traditional and country foods in dietary practices, awareness of the availability and preparation of Indigenous traditional and country foods, awareness of Indigenous values and ways of knowing related to health and wellness, and awareness of the ongoing impact of colonization, residential schools, intergenerational trauma, and systemic racism on Indigenous peoples in Canada (Eisenbraun, 2020). The ICDEP further stipulates that RDs must practice in a manner that promotes cultural safety, enabling dietitians to assist all Canadians in accessing culturally safe and appropriate food and nutrition advice, care, and support (Eisenbraun, 2020).

Indigenous traditional foods are defined as those consumed by Indigenous peoples in Canada prior to European contact. The significance of these foods extends beyond their nutritional value, encompassing the cultural, spiritual, and relational dimensions of Indigenous life. Importantly, it is not solely the foods themselves that hold cultural importance, but also the practices, knowledge, and methods through which these foods were harvested, prepared, and shared (First Nations Centre, 2009). Indigenous traditional foods therefore represent more than sources of nutrition; they are connected to cultural identity, knowledge, relationships, and community well-being.

Access to Indigenous traditional foods is also closely connected to food security, cultural continuity, and community well-being (Sidiq et al., 2022; Schuster et al., 2011).

Providing guidance on Indigenous traditional foods, as mandated by the ICDEP (2020), represents a fundamental component of culturally competent care for Indigenous peoples in Canada. Culturally competent care has been shown to improve patient satisfaction and trust in the healthcare system (Brunett and Shingles, 2018; Govere and Govere, 2016).

Preliminary findings from an ongoing project focused on developing a gestational diabetes mellitus (GDM) prevention program for urban-dwelling Indigenous individuals suggest that healthcare professionals may lack the knowledge necessary to deliver culturally appropriate care related to traditional foods and dietary practices. Providing culturally competent care requires that healthcare providers have a solid foundational knowledge of their patients' traditional foods and dietary practices (Alizadeh and Chavan, 2016); however, providers cannot offer meaningful guidance in this area without first possessing that knowledge themselves.

A validated instrument is needed to assess healthcare providers' knowledge of Indigenous traditional foods and identify areas for improvement. The present study therefore developed the

Indigenous Traditional Foods Knowledge Questionnaire (ITFKQ) using a culturally grounded, Indigenous-governed approach. The complete three-phase, nine-step methodological framework used to guide questionnaire development is described in Chapter V. This chapter reports the implementation and findings of Phases I and II, including the formation of the Indigenous advisory board, development of the questionnaire content, and assessment of content and face validity.

Method

3 phase, 9 step validation process

A three-phase, nine-step framework was used to develop and validate the ITFKQ, as described in detail in Chapter V. This chapter reports the implementation and findings of Phases I and II, including item development under Indigenous governance, content validity, and face validity. Phase III, which will assess reliability and construct validity, remains ongoing.

Recruitment

Advisory Board

Purposive sampling was used to recruit members for the advisory board. With the assistance of Indigenous leaders on the University of Manitoba campus and throughout the greater community in Canada, individuals were identified and invited to participate on the advisory board, with a target membership of five to eight individuals. Inclusion criteria included being at least 18 years of age and able to speak, read, and write English. Virtual meetings were held on need basis according on the progress of the project, using the University of Manitoba Zoom platform, ranging from 60 to 120 minutes depending on the agenda. Members were compensated for their time with funds provided by the Faculty of Agricultural and Food Sciences.

Content Validity

Purposive sampling was used to recruit content validity experts. Experts were identified through word of mouth and referral by other individuals in their respective fields, and by searching Canadian academic program and professional organization websites. Inclusion criteria included being at least 18 years of age and able to speak, read, and write English. Those who agreed and completed an online eligibility criteria and consent form. Participants were then given access to the online questionnaire on REDCap to rate the individual items.

Face Validity

Convenience sampling was used to recruit face validity participants via email to Canadian health-related academic programs and health professional organizations representing dietetics and nutrition, nursing, and medicine, including physicians and physician assistants. Inclusion criteria included being at least 18 years of age and able to speak, read, and write English. Interested individuals followed a link in the email to complete eligibility screening. Those found eligible were directed to an online consent form and were provided access to the draft ITFKQ via REDCap. After completing the questionnaire on REDCap, Microsoft online booking system was used to book the one-on-one interviews which were then conducted via the University of Manitoba Zoom platform, and audio was recorded. Each interview lasted between 30 and 60 minutes.

Ethics

This study received ethics approval from the Committee for Harmonized Health Impact, Privacy, and Ethics Review (CHIPER). Participants in the content validity expert panel and the face validity think-aloud interviews provided electronic informed consent via REDCap prior to participation. All data were collected and stored securely within the REDCap system, accessible only to the research team. In accordance with the principles of Indigenous data sovereignty, the Indigenous

advisory board provided oversight throughout all phases of the study to ensure that the research process and outputs aligned with the values, priorities, and self-determination of Indigenous communities. Recruitment of the Indigenous advisory board did not require ethics approval, as board members served in a governance and oversight capacity rather than as research participants, and no personal data were collected from them. Advisory board members were compensated at a rate of \$50 per hour. Content validity expert panel members were entered into a random draw for a \$50 Amazon electronic gift card, and face validity participants were entered into a random draw for a \$100 Amazon electronic gift card.

Result

Participants

The advisory board consisted of two Indigenous dietitians and one librarian specializing in Indigenous Studies. For the content validity panel, thirteen individuals completed the eligibility screening. Of these, three did not meet the eligibility criteria; one did not sign the consent form, and two did not begin the questionnaire's rating. The final panel consisted of seven experts who self-identified as being at least 18 years of age, able to speak English, and currently working as a dietitian, nutritionist, or survey design scientist, or identifying as an Indigenous knowledge keeper in Canada. Of the seven panel members, five rated all sections of the questionnaire while the remaining two rated only some sections. For face validity, 56 individuals initiated the eligibility screening process by providing their email address. Of these, ten did not complete the eligibility screening, seven did not meet the eligibility criteria, eleven did not sign the consent form, four did not begin the process, and twelve did not schedule an interview with the research team. The remaining twelve completed the questionnaire and booked an interview; however, two did not

attend their scheduled interview. The final sample consisted of ten participants who completed the questionnaire and participated in a one-on-one interview with a member of the research team.

The final questionnaire to date

"Indigenous traditional food knowledge" was defined by the advisory board as knowledge of edible resources sourced directly from local ecosystems and landscapes that were available to Indigenous communities prior to external contact, with the diversity of these foods shaped by geographical location, reflecting the distinct ecological conditions and cultural practices of each region. Based on the Government of Canada's classification of six groups of First Nations according to geographical location prior to European arrival, this distinction was proposed to the advisory board as a framework for the development of the test plan. The advisory board acknowledged that Indigenous traditional foods differ across these regions and further recommended that Inuit peoples' distinct food culture be included as a separate section. All advisory board members also emphasized that colonialism, residential schools, and nutrition experiments have had a significant impact on Indigenous traditional foods, and that a section addressing the history of Indigenous culture and its relationship to traditional foods was necessary. Based on these discussions, a test plan with eight sections was developed, as presented in Table 6.1.

Table 6.1: *Test plan developed to address the history of Indigenous culture and its relationship to traditional foods*

Sub-sections	Key aspects
Indigenous History	Traditional foods, colonization, loss of land, residential schools, and food skills
Woodlands	Nutritional/cultural value, preparation, accessibility (food insecurities), resources, health benefits/concerns
Iroquoian	Nutritional/cultural value, preparation, accessibility (food insecurities), resources, health benefits/concerns
Plains	Nutritional/cultural value, preparation, accessibility (food insecurities), resources, health benefits/concerns
Plateau	Nutritional/cultural value, preparation, accessibility (food insecurities), resources, health benefits/concerns
Pacific Coast	Nutritional/cultural value, preparation, accessibility (food insecurities), resources, health benefits/concerns
Mackenzie and Yukon River Basin	Nutritional/cultural value, preparation, accessibility (food insecurities), resources, health benefits/concerns
Inuit Nunangat	Nutritional/cultural value, preparation, accessibility (food insecurities), resources, health benefits/concerns

In consultation with the advisory board, the key aspects of each section were identified and discussed. Based on these conversations, a member of the research team developed the test plan outlining each section and its key aspects, which was then sent to the advisory board for review and was revised based on their guidance. Additionally, the most commonly consumed foods in each region were identified using multiple resources, and a comprehensive list was developed, which is presented in Table 6.2.

Table 6.2: *List of commonly consumed foods and most consumed foods in each region*

Regions	Commonly consumed foods	Most consumed foods
Woodland	Berries, cod, lobster, oysters, eel, Atlantic salmon, scallops, dulse, Irish moss, kelp, corn, potatoes, fiddleheads, blueberries, cranberries, sunflowers, pear, plum, tomatoes, squash, cotton, flax	Moose, deer, bear, caribou, geese, ducks, muskrat, beaver, hare
Iroquoian	Squash, seeds of squash, sunflower, strawberries, raspberries, blackberries, chokecherries, maple syrup, wild asparagus, cattail, milkweed, sorrel, wild pea, wild dock, mushrooms, puffballs, artichoke root, yellow pond lily root, maple sugar, nuts, fish	Corn (sweet, popped, flint, hulled, bread), beans (soup, pole, dwarf)
Plains	Pemican, labrador tea, moose, deer, whitefish, pike, pickerel, caribou, hare, waterfowl, sucker heads, whitefish, fish eggs, pigweeds, dandelion, cattails roots, poplar cambium, rosehips, mint	Buffalo, chokecherry paste, saskatoons, bear, moose nose
Plateau	Raspberries, blueberries, salmonberries, inner bark of evergreen, poplar, waterfowl, game meat, roots, greens Cod, flounder, halibut catch, salmon, shellfish, octopus, herring, seal, sea lion, sea otter, ooligans grease, mussels, clams, crab, abalone, sea urchin, cow parsnip, sheep sorrel, lamb's quarters, shoots from salmon berries, fireweed, thimbleberries, silverweed, camas, rice root, fern, cottonwood mushrooms, raspberries, salmonberries, blueberries, huckleberries, soapberries, elderberries	Salmon, saskatoons
Pacific Coast	Cod, flounder, halibut catch, salmon, shellfish, octopus, herring, seal, sea lion, sea otter, ooligans grease, mussels, clams, crab, abalone, sea urchin, cow parsnip, sheep sorrel, lamb's quarters, shoots from salmon berries, fireweed, thimbleberries, silverweed, camas, rice root, fern, cottonwood mushrooms, raspberries, salmonberries, blueberries, huckleberries, soapberries, elderberries	Whale (all parts used, including eggs, organs, backbone, head), sea cucumber, roots clover, seaweed

Mackenzie and Yukon River Basin	Moose, caribou, mountain sheep, wood buffalo, wild duck, rabbit, seal, whales, beaver, muskrat, bear	Whitefish, muskoxen
Inuit Nunangat	Marine mammals, caribou, birds, fish, muskoxen, partridge, ducks, geese, salmon, cod, smelt, char, trout, bakeapples, blueberries, blackberries	Seal, caribou

Indigenous Traditional foods knowledge is defined as edible resources sourced directly from local ecosystems and landscapes that were available to Indigenous communities prior to external contact. The diversity of these foods inherently shaped by geographical location, reflecting the distinct ecological conditions and cultural practices of each region.

Items were only developed for food items for which sufficient information was available in the literature, as the development of accurate and evidence-based items was not possible for all commonly consumed traditional foods due to gaps in the existing literature and the fact that some existing literature examines Indigenous traditional foods through a colonial lens that does not recognize or value the cultural, spiritual, and relational significance of these foods. Questionnaire items were then developed based on the key aspects outlined in the test plan and the most commonly consumed foods in each region. Items were developed primarily using Indigenous community food guides, further prioritizing Indigenous community knowledge and perspectives throughout the item development process. Items were written in multiple choice format, which has been established as the most common and efficient format for knowledge assessment. Following the development of the initial item pool, the questionnaire was sent to the advisory board for review and approval. During this review, the advisory board identified additional food items that are widely consumed within specific regions but had not been captured in the initial literature review and recommended their inclusion. Items were subsequently developed for these additional food items in accordance with the same key aspects outlined in the test plan. The draft questionnaire was subsequently sent to the advisory board for final review and approval and was revised based on their feedback. Examples of these comments and the resulting changes are presented in Table 6.3. The initial item pool consisted of 204 items, which was revised to 212 items based on feedback from the advisory board members.

Table 6.3: *Examples of advisory board comments and question revisions*

Questionnaire section	Question/answers	Advisory Board comments	Question/answer revisions
Indigenous History	“What are not defined as traditional food skills?”	Remove “not” and ask in a positive way	Item removed
Woodland	“You have a patient who recently ate muskrat meat and is not experiencing fever, lethargy, and infected sores. What is one possible diagnosis to consider?”	Bold key symptoms or cues for question clarity	“You have a patient who recently ate muskrat meat and is now experiencing fever, lethargy, and infected sores . What is one possible diagnosis to consider?”
Plains	“Salt-curling”	Standardize terms for consistency	“Salt-curing”
Inuit Nunangat	“An Inuit woman...”	Use respectful, person-first phrasing	“A woman from the Inuit community...”

Note. Bolded words indicate changes made to the question.

Content Validity assessment

The questionnaire was administered to the expert panel via REDCap, where panel members rated each item based on the test plan to determine whether the items assessed knowledge of Indigenous traditional foods in accordance with the definition and key aspects developed for each region under the guidance of the advisory board. Items were rated on a Likert scale and content validity index (CVI) was calculated for each item. Items with a CVI below 0.80 were removed from the item pool. Following content validity assessment, the item pool was reduced to 159 items. All changes

in the number of items throughout the development process are presented in Figure 6.1. A sample of items that were removed and their corresponding CVI values are presented in Table 6.4.

Table 6.4: *Examples of questionnaire items removed and their corresponding CVI values*

Section	Question #	Item removed	CVI value
Indigenous History	1	Which of the following are not considered Indigenous traditional foods?	0.43
Woodland	9	Which of the following meats has the lowest protein content?	0.50
Iroquoian	4	How were corn grains traditionally planted?	0.50
Plains	9	What is one important consideration regarding chokecherries?	0.60
Plateau	1	What are some of the types of salmon that are used by Indigenous peoples? Choose all that apply.	0.75
Pacific Coast	9	What are some common ways that cod fish is traditionally consumed? Choose all that apply.	0.75
Mackenzie and Yukon River Basins	5	Which part of muskox is an excellent source of zinc?	0.50
Inuit Nunangat	10	Which part of seal contains vitamin C? Choose all that apply.	0.75

Note. CVI = Content Validity Index
Items with a CVI below 0.80 were removed.

Figure 6.1: Questionnaire Development Process

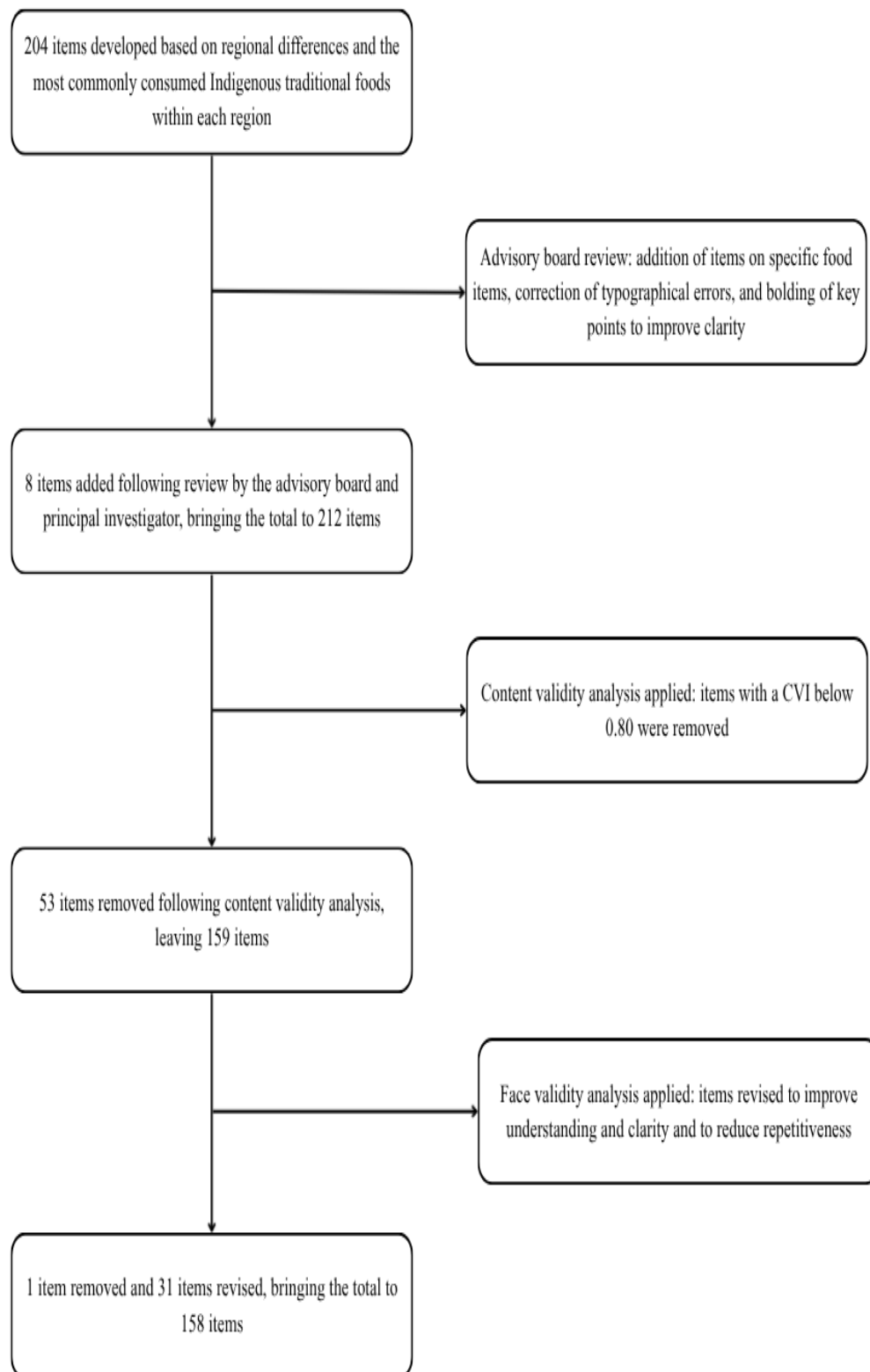


Figure 6.1: Questionnaire development process

Face Validity Assessment

Semi-structured think-aloud interviews were conducted with participants who booked an interview with the research team via Zoom. Interview duration ranged from 23 to 60 minutes. Interviews were conducted using a standardized interview guide, which included the following questions asked for each section of the questionnaire: (1) What do you think this section is testing? (2) What terms are unfamiliar to you? (3) Which questions do you find confusing? (4) Which questions do you find to be intentionally misleading? and (5) What other feedback do you have? When further clarification was needed, follow-up questions were asked in relation to specific items to encourage participants to elaborate on their responses, such as asking them to explain what they found confusing or misleading about a particular term or item. Interviews were transcribed using Otter.ai (Otter.ai, Inc., Mountain View, CA, USA), and Atlas.ti (version 23; ATLAS.ti Scientific Software Development GmbH, Berlin, Germany) was used to generate a report summarizing the suggestions made for each section and item. Some suggestions were general in nature, such as requesting clearer instructions on whether looking up answers was permitted or asking whether an "I don't know" option could be added to all questions or have progress bar for the questionnaire or save for latter button. Suggestions specific to individual sections and items were reviewed by a team member and the principal investigator. Items that were identified as confusing, misleading, or containing double negatives — where such issues were not attributable to a lack of knowledge — were revised or removed from the questionnaire. The nature of the feedback and the changes made are described for each section below, and a summary of the specific revisions, removals, and additions for each item is presented in Table 6.5. On average, completion of the questionnaire by participants took 65 minutes, with a minimum of 21 minutes and a maximum of 173 minutes.

Table 6.5: *Questionnaire section revisions, removals, and additions for each item after the Face Validity Assessment*

Section	Question/responses	Suggestions	Question/response revisions, removals, and/or additions
1	“Which of the following do you think has not had a negative impact on access to Indigenous traditional foods?”	Avoid using double negative	Item removed from questionnaire
2	“Goose is an excellent source of...?” a. B vitamins b. Iron c. Vitamin B12 d. Fiber e. Vitamin A f. Vitamin D	Decrease number of response options	“Goose is an excellent source of...?” a. B vitamins (specifically B12), iron, and protein b. Vitamin A and vitamin D c. Vitamin C and fiber d. A and B
3	“Corn is seen as a symbol of unity and peace between different tribes.”	Eliminate colonial terminology	“... unity and peace between different Indigenous nations”
4	“Hare meat is a source of which nutrient(s)?”	Eliminate possibility of multiple correct response options	“Hare meat is an excellent source...”
5	“... health benefits of blueberry juice.”	Avoid presupposition in phrasing	“...potential health benefits of blueberry juice.”
6	“How was flounder usually preserved?”	Clarify the item within a historical context	“Which preservation method was most commonly used for flounder traditionally?”

7	No items revised in this section	Comments related to knowledge, not clarity	NA
8	“What is the usual traditional season for seal hunting?”	Remove additional word to improve precision and flow of the item	“What is the traditional season for seal hunting?”

Section 1

Following face validity review, one item containing a double negative was removed as it was identified as a source of confusion. The wording of two items was revised for clarity, and the response options of one item were revised to ensure they were clear, concise, and accessible. The remaining feedback received for this section was determined upon review to reflect knowledge deficiencies rather than issues with item or instruction clarity, and therefore no further modifications were made.

Section 2

Several multiple-response items were revised due to an excessive number of response options; some were converted to single-response multiple choice items and the number of options in others was reduced. Items pertaining to the same food item that appeared consecutively were redistributed throughout the section to avoid cueing effects. The remaining feedback was determined upon review to reflect knowledge deficiencies rather than issues with clarity, and therefore no further modifications were made.

Section 3

The term "tribe" was replaced with "Indigenous Nations" throughout this section to eliminate the use of colonial terminology. One response option was removed from an item as it was the only unfamiliar option, which had the potential to lead participants to select it based on its novelty rather than knowledge. An item with two correct response options was revised and one option was removed to ensure a single correct answer. Two items were revised for specificity to reduce ambiguity; specifically, "safety concern associated with corn" was revised to "safety concern associated with fresh corn," and "pure maple syrup causes a spike in insulin levels" was revised to "pure maple syrup causes a spike in glucose levels," as individuals with diabetes may not

experience an insulin response. One item whose response options included both "all of the above" and "A and B" was revised to eliminate response option redundancy. Additionally, items pertaining to the same food item that appeared consecutively were redistributed throughout the section. The remaining feedback was determined upon review to reflect knowledge deficiencies rather than issues with clarity, and therefore no further modifications were made.

Section 4

Multiple-response items were revised to include fewer response options to reduce cognitive load, and one was converted to a single-response multiple choice item. Items pertaining to the same food item that appeared consecutively were redistributed throughout the section. One item was revised to eliminate the possibility of multiple correct response options causing confusion. The remaining feedback was determined upon review to reflect knowledge deficiencies rather than issues with clarity, and therefore no further modifications were made.

Section 5

One item with ambiguous wording was revised for clarity. One item was identified as leading in its phrasing; specifically, "health benefits of blueberry juice" was revised to "potential health benefits of blueberry juice" to avoid presupposition. One item was revised for temporal clarity; specifically, "when is bear grease most available" was revised to "when was bear grease traditionally most available based on the hunting season" to eliminate ambiguity regarding contemporary preservation practices. Typographical errors identified in this section were corrected. The remaining feedback was determined upon review to reflect knowledge deficiencies rather than issues with clarity, and therefore no further modifications were made.

Section 6

One item was revised for temporal clarity; specifically, "how was flounder usually preserved" was revised to "which preservation method was most commonly used for flounder traditionally?" to clearly situate the item within a historical context. The response options of one item were revised entirely due to their excessive length and complexity. One item was revised to include a serving size to improve precision. One item was relocated within the section to avoid consecutive items pertaining to the same food item.

Section 7

Typographical errors were corrected throughout this section. One response option was revised for clarity as it was not appropriately worded. Feedback regarding the number of response options in multiple-response items was determined upon review to reflect knowledge deficiencies rather than issues with item clarity, and therefore no further modifications were made.

Section 8

Typographical errors were corrected throughout this section. One item was revised by removing the word "usual" to improve the precision and flow of the item. The response options of one item were revised to include multiple animals rather than options all pertaining to the same animal, to eliminate response option bias and reduce leading. Feedback regarding the number of response options in multiple-response items was determined upon review to reflect knowledge deficiencies rather than issues with item clarity, and therefore no further modifications were made.

Discussion

The findings of a previous study suggest a potential gap in knowledge of Indigenous traditional foods among healthcare providers. Prior to this study, no valid or reliable instrument existed to

assess this construct. The aim of this study was therefore to develop a valid and reliable instrument to assess knowledge of Indigenous traditional foods among healthcare providers. To achieve this, a three-phase, nine-step development process was employed. Phases I and II, which are the focus of this paper, resulted in a questionnaire that has been assessed for content and face validity.

The questionnaire consists of eight sections. Acknowledging the significant impact of history and colonialism on Indigenous traditional foods, one section was dedicated to this topic which was suggested by our advisory board. The remaining sections were developed to reflect the geographical diversity of Indigenous traditional foods across Canada. Prior to European contact, six distinct groups of First Nations peoples lived across different regions of Canada, each with their own distinct food traditions shaped by their environment. In addition, recognizing the distinct food culture of Inuit peoples, a separate section was dedicated to their traditional foods. This eight-section structure was developed in collaboration with and approved by the advisory board. To our knowledge, no existing nutrition knowledge questionnaire has adopted a geographically and culturally structured approach of this nature, making this questionnaire a novel contribution to the field.

On average, completion of the questionnaire took 65 minutes, with a minimum of 21 minutes and a maximum of 173 minutes. The wide range in completion time may reflect variability in participants' familiarity with the content, which is expected given that this is a specialized and previously unassessed area of knowledge. Furthermore, the questionnaire was designed with the intention that Section 1, in combination with the section corresponding to a specific region, could be used independently to assess the knowledge of healthcare providers residing or working in that region. This modular approach could also help reduce completion time. Although the statistical analyses required to support such independent use have not yet been conducted, item development

was guided by this goal and will be evaluated in Phase III. This study adapted and extended the eight-step validation framework proposed by Trakman et al. (2017) by adding a ninth step — the formation of an Indigenous advisory board — as the foundational first step of the process. This addition represents a novel methodological contribution, as Indigenous governance was embedded throughout all phases of questionnaire development, an approach that has not been previously applied in nutrition knowledge questionnaire development.

Furthermore, this study prioritized Indigenous community and cultural wisdom throughout the entire development process. The advisory board played a central role in defining the construct, approving the test plan and its key aspects, and identifying traditional food items that were widely consumed within specific regions but absent from the published literature. However, it is important to note that items were only developed for food items for which sufficient and appropriate information was available in the literature, as the development of accurate and culturally grounded items was not possible for all commonly consumed traditional foods. This was due in part to gaps in the existing literature, and in part to the fact that some existing literature examines Indigenous traditional foods through a colonial lens that does not recognize or value the cultural, spiritual, and relational significance of these foods. This highlights a critical limitation of the current literature on Indigenous traditional foods and underscores the need for further research that is grounded in Indigenous perspectives and values. The advisory board's involvement ensured that the questionnaire reflected Indigenous community knowledge and priorities, which is consistent with the ICDEP requirement for cultural knowledge competency in dietetic practice in Canada (Eisenbraun, 2020).

In the content validity assessment, items that did not meet the threshold of 0.80 were removed. These items were predominantly those that were too broad in scope, overly specific, controversial

in nature, or did not align with the criteria defined in the test plan. Items were considered controversial when there was lack of consensus among experts regarding their inclusion, such as items pertaining to bannock, which some experts consider a traditional Indigenous food while others do not, recognizing that while bannock holds cultural significance for many Indigenous communities, it is not an original Indigenous food. As the construct definition developed by the advisory board specifically pertains to foods available to Indigenous communities prior to external contact, such items were removed to ensure alignment with the established construct definition.

In the face validity assessment, all feedback provided by participants was reviewed, and changes were applied where appropriate and consistent with the goal of this assessment, which was to evaluate the clarity and comprehensibility of the questionnaire rather than the accuracy of participants' knowledge. Accordingly, many comments were not acted upon as they were determined to reflect knowledge deficiencies rather than issues with item clarity. This was particularly evident in feedback regarding unfamiliar terms, where the majority of terms identified as unfamiliar pertained to Indigenous traditional food items themselves rather than to the wording or structure of the items or response options. This is an expected and acceptable finding at the face validity stage, as unfamiliarity with content reflects the potential knowledge gap that the questionnaire is designed to measure rather than a flaw in item construction. Moreover, feedback was received regarding the addition of an "I do not know" response option to all items, which was not applied as research suggests that explicitly providing such an option may encourage satisficing — whereby respondents select the easy "don't know" response rather than engaging thoughtfully with the item — thereby reducing the quality and validity of the knowledge data obtained (Krosnick et al., 2002).

This study has several strengths. To our knowledge, this is the first study to develop a knowledge questionnaire using a culturally appropriate approach that centers Indigenous governance, community knowledge, and cultural wisdom, while assessing knowledge of Indigenous traditional foods. The integration of an Indigenous advisory board to provide oversight and guidance at each step of the questionnaire development process was a particular strength, ensuring that the questionnaire remained grounded in Indigenous priorities and values throughout. Furthermore, the systematic and rigorous multi-step development process, modelled after and extending the framework of Trakman et al. (2017), strengthens the credibility and transparency of the methodological approach. This study also has several limitations. Although a distinctions-based approach was adopted in the development of the questionnaire by organizing sections according to regional differences in Indigenous traditional foods prior to European contact, it was not possible to develop items that reflect the distinct cultural values, beliefs, and teachings of each individual Indigenous nation, given the vast diversity of nations across Canada. Furthermore, as only Phases I and II of the study have been completed, no psychometric evaluation has been conducted, and therefore the validity assessment of the questionnaire remains incomplete and the reliability of the questionnaire has not yet been established. However, initial steps have been taken to obtain ethics approval for Phase III, which is currently under review by the ethics committee.

In Phase III, purification of the scale will be conducted through item analysis to assess item characteristics including difficulty, discrimination, and inter-item reliability. The scale will further be evaluated using exploratory factor analysis, and internal reliability will be assessed to evaluate consistency and minimize random error.

It is worth acknowledging that the development of a questionnaire-based tool could itself be viewed as a colonial approach to addressing this issue; however, the current system in Canada

requires evidence-based proof to support and accept change, which necessitates working within existing frameworks as a first step toward meaningful reform. This validated tool would be the first of its kind to assess knowledge of Indigenous traditional foods among healthcare providers across Canada and would represent an important step toward more culturally competent care. If a knowledge gap is identified, the findings could inform continuing education initiatives and curricula changes to ensure that such gaps are addressed and do not persist. Furthermore, this work could serve as a foundation for future policy changes and demonstrates a methodological approach for integrating Indigenous governance within research — one that could be adopted more broadly across health research in Canada.

Conclusion

The development of a valid and reliable instrument to assess healthcare providers' knowledge of Indigenous traditional foods is essential, particularly given that the ICDEP mandates that registered dietitians demonstrate knowledge and awareness of these foods as a component of culturally competent practice. Prior to this study, no such instrument existed. The ITFKQ represents the first step toward addressing this gap, with Phases I and II resulting in a content- and face-valid questionnaire grounded in Indigenous governance and community knowledge. Once fully validated through Phase III, this instrument has the potential to contribute meaningfully to improving culturally competent care for Indigenous peoples in Canada, with broader implications for patient satisfaction, trust in the healthcare system, and health outcomes.

Bridge to Chapter VII

Together, the two studies presented in this thesis provide complementary perspectives on culturally appropriate care for Indigenous peoples in Canada. Project Radiant explored the experiences and priorities of urban Indigenous women and identified gaps in culturally appropriate care, including care related to Indigenous traditional foods and activities. The second study responded to this gap through the development of the ITFKQ, providing a culturally grounded tool for assessing healthcare providers' knowledge of Indigenous traditional foods. Chapter VII integrates the findings from both studies, discusses their contributions to the broader research and healthcare context, and outlines future directions for this work.

Chapter VII: Conclusion and Future Directions

With the rising prevalence of gestational diabetes and the complications it brings to both mother and child, together with the growing Indigenous population in Canada , the increasing urbanization of Indigenous peoples , and the mistrust of the healthcare system rooted in a history of colonization, residential schools, Indian hospitals, and nutrition experiments , it becomes crucial to find ways to address this pressing challenge.

Culturally competent care has the potential to address these challenges on two fronts: clinically, by improving health outcomes and patient adherence to treatment, and socially, by strengthening patients' trust and satisfaction. One important aspect of providing culturally appropriate care is offering guidance related to Indigenous traditional foods. Because these foods hold strong cultural value, support good health, and can improve food security among Indigenous peoples, they form part of the solution to these challenges.

By using a Community-Based Participatory Research (CBPR) approach and centering the voices of Indigenous community members in describing their experiences with the CPNP and GDM, several pressing issues came to light. First, culturally competent care relating to Indigenous traditional foods and activities matters to the community, both for its cultural value and its health benefits. Second, participants' experiences indicated that this kind of care is often not being provided; one participant noted directly that they had received conflicting guidance from a healthcare provider and an Indigenous knowledge keeper. Third, there is a lack of awareness of existing support programs, as some participants knew of such programs while others believed none existed. Fourth, accessing Indigenous traditional foods and activities is more challenging in urban

areas than in rural ones. Finally, there appears to be a knowledge gap among healthcare providers regarding Indigenous traditional foods and activities.

Taken together, these findings make clear that these challenges are deeply interconnected. The second project of this thesis addresses the last of these challenges: because no valid and reliable instrument exists to assess healthcare providers' knowledge of Indigenous traditional foods, developing one becomes an essential first step.

Prior to the second project of this thesis, there was no guidance on how to develop culturally appropriate nutrition knowledge questionnaires. By extending the guidelines proposed by Trakman et al., adding a step centered on Indigenous governance, and ensuring that each step was reviewed and approved by the advisory board, this research has provided such guidance. The project also approached Indigenous traditional foods knowledge through a distinctions-based lens.

Several future steps and directions are needed to ensure that the needs of the community are met and that culturally competent care is provided to Indigenous Nations. First, the awareness gap surrounding existing support programs must be addressed, with a focus on making these programs more visible. Second, as the urban Indigenous population continues to grow, it is becoming increasingly important to explore how the accessibility of Indigenous traditional foods and activities can be improved. Third, it is essential that healthcare providers possess a foundational knowledge of Indigenous traditional foods and activities. While the second project has taken the initial step toward assessing this knowledge, the instrument must still complete its final phase to ensure that it is valid and reliable. Should a knowledge gap be identified, the next steps would include providing continuing education for healthcare providers in the relevant fields, reviewing the curricula of these fields to ensure sufficient training on traditional foods, and advocating for policy changes that make such training a requirement for delivering culturally competent care. The

final version of the instrument could also serve as a pre- and post-education questionnaire to evaluate the effectiveness of such training.

By centering the voices of the community and respecting Indigenous governance, these two projects represent a step in the right direction toward providing culturally appropriate care, in keeping with the calls to action set out by the Truth and Reconciliation Commission.

Reference:

- Al Ghadeer HA, Mohamed AA, Alali MA, et al. (2024) Infants of Diabetic Mothers and Associated Complications in the Neonatal Intensive Care Unit. *Cureus* 16(12).
- Alizadeh S and Chavan M (2016) Cultural competence dimensions and outcomes: a systematic review of the literature. *Health & Social Care in the Community* 24(6): e117-e130.
- Aljohani N, Rempel BM, Ludwig S, et al. (2008) Gestational diabetes in Manitoba during a twenty-year period. *Clinical and Investigative Medicine* 31(3): E131-E137.
- Archived - From urban areas to population centres. (n.d.). Retrieved July 20, 2026, from <https://www.statcan.gc.ca/en/subjects/standard/sgc/notice/sgc-06>
- Axelsson ML and Brinberg D (1992) The measurement and conceptualization of nutrition knowledge. *Journal of Nutrition Education* 24(5): 239-246.
- Batal M, Chan HM, Fediuk K, et al. (2021) Importance of the traditional food systems for First Nations adults living on reserves in Canada. *Canadian Journal of Public Health* 112(Suppl 1): 20-28.
- Behboudi-Gandevani S, Amiri M, Bidhendi Yarandi R, et al. (2019) The impact of diagnostic criteria for gestational diabetes on its prevalence: a systematic review and meta-analysis. *Diabetology & metabolic syndrome* 11(1): 11.
- Berger H, Crane J and D F (2002) SOGC Clinical Practice Guideline: Screening for gestational Diabetes mellitus. *J Obstet Gynaecol Can* 121: 1-10.
- Berti PR, Soueida R and Kuhnlein HV (2008) Dietary assessment of Indigenous Canadian Arctic women with a focus on pregnancy and lactation. *International Journal of Circumpolar Health* 67(4): 349-362.
- Bianco ME and Josefson JL (2019) Hyperglycemia during pregnancy and long-term offspring outcomes. *Current diabetes reports* 19(12): 143.
- Bilandzic A and Rosella L (2017) The cost of diabetes in Canada over 10 years: applying attributable health care costs to a diabetes incidence prediction model. *Health Promot Chronic Dis Prev Can* 37(2): 49-53.
- Blanchet R, Willows N, Johnson S, et al. (2020) Traditional food, health, and diet quality in Syilx Okanagan adults in British Columbia, Canada. *Nutrients* 12(4): 927.
- Briggs SR and Cheek JM (1986) The role of factor analysis in the development and evaluation of personality scales. *Journal of Personality* 54(1): 106-148.
- Brunett M and Shingles RR (2018) Does having a culturally competent health care provider affect the patients' experience or satisfaction? A critically appraised topic. *Journal of sport rehabilitation* 27(3): 284-288.
- Brunton NM, Friesen K, Yamamoto JM, et al. (2025) Trends in Gestational Diabetes in Manitoba From 1981 to 2019: A Descriptive Study With Geospatial Mapping. *Canadian journal of diabetes* 49(2): 114-120. e111.
- Canada Prenatal Nutrition Program (CPNP) - Canada.ca. (n.d.). Retrieved July 20, 2026, from <https://www.canada.ca/en/public-health/services/child-infant-health/supports-programs-pregnancy/prenatal-nutrition-program-cpnp.html>
- Canada's Indigenous population - Statistics Canada. (n.d.). Retrieved July 20, 2026, from <https://www.statcan.gc.ca/o1/en/plus/3920-canadas-indigenous-population>
- Castro A and Ruiz E (2009) The effects of nurse practitioner cultural competence on Latina patient satisfaction. *J Am Acad Nurse Pract* 21(5): 278-286.

- Caughey AB, Sargeant JM, Moller H, et al. (2021) Inuit country food and health during pregnancy and early childhood in the circumpolar north: a scoping review. *International Journal of Environmental Research and Public Health* 18(5): 2625.
- Cecilio-Fernandes D, Kerdijk W, Bremers AJ, et al. (2018) Comparison of level of cognitive process between case-based items and non-case-based items of the interuniversity progress test of medicine in the Netherlands. *Journal of Educational Evaluation for Health Professions* 15: 28.
- Chamberlain CR, Oldenburg B, Wilson AN, et al. (2016) Type 2 diabetes after gestational diabetes: greater than fourfold risk among indigenous compared with non-indigenous Australian women. *Diabetes/metabolism research and reviews* 32(2): 217-227.
- Chirico F (2016) Spiritual well-being in the 21st century: It's time to review the current WHO's health definition. *Journal of Health and Social Sciences* 1(1): 11-16.
- Cidro J, Doenmez C, Sinclair S, et al. (2021) Putting them on a strong spiritual path: Indigenous doulas responding to the needs of Indigenous mothers and communities. *International journal for equity in health* 20(1): 189.
- CIHR Guidelines for Health Research Involving Aboriginal People (2007-2010) - CIHR. (n.d.). Retrieved July 20, 2026, from <https://cihr-irsc.gc.ca/e/29134.html>
- Collison SB, Kuczmarski MF and Vickery CE (1996) Impact of nutrition education on female athletes. *American Journal of Health Behavior* 20(1): 14-23.
- Community Action for Prenatal and Child Health Program - Canada.ca. (n.d.). Retrieved July 20, 2026, from <https://www.canada.ca/en/public-health/services/child-infant-health/supports-programs-pregnancy/community-action-prenatal-child-health-program.html>
- Constitution of the World Health Organization. (n.d.). Retrieved July 20, 2026, from <https://www.who.int/about/governance/constitution>
- Curtis E, Jones R, Tipene-Leach D, et al. (2019) Why cultural safety rather than cultural competency is required to achieve health equity: a literature review and recommended definition. *International journal for equity in health* 18(1): 174.
- Damashek A, Bard D and Hecht D (2012) Provider Cultural Competency, Client Satisfaction, and Engagement in Home-Based Programs to Treat Child Abuse and Neglect. *Child Maltreatment* 17(1): 56-66.
- Dawis RV (1987) Scale Construction. *Journal of Counseling Psychology* 34(4): 481-489.
- DeVellis, R. F., & Thorpe, C. T. (2016). *Scale Development : Theory and Applications*. SAGE Publications, Incorporated.
<http://ebookcentral.proquest.com/lib/umanitoba/detail.action?docID=7106417>
- Diabetes in Canada Facts and figures from a public health perspective. (2011). <https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/cd-mc/publications/diabetes-diabete/facts-figures-faits-chiffres-2011/pdf/facts-figures-faits-chiffres-eng.pdf>
- Dias LC, Leslie C, Rysdale L, et al. (2026) Canadian dietetic education and training actions to support Indigenization, decolonization, and reconciliation. *Canadian Journal of Public Health* 117(1): 14-30.
- Diaz-Santana MV, O'Brien KM, Park Y-MM, et al. (2022) Persistence of risk for type 2 diabetes after gestational diabetes mellitus. *Diabetes Care* 45(4): 864-870.
- Dyck R, Klomp H, Tan LK, et al. (2002) A comparison of rates, risk factors, and outcomes of gestational diabetes between aboriginal and non-aboriginal women in the Saskatoon health district. *Diabetes Care* 25(3): 487-493.

- Eisenbraun C (2020) Integrated Competencies for Dietetic Education and Practice (ICDEP), Version 3.0. Partnership for Dietetic Education and Practice, Canada. Available at: www.catalysisconsulting.net
- Elamurugan K, Esmaeilisaraji L, Strain J, et al. (2022) Social inequities contributing to gestational diabetes in indigenous populations in Canada: a scoping review. *Canadian journal of diabetes* 46(6): 628-639. e621.
- Elliott B, Jayatilaka D, Brown C, et al. (2012) "We are not being heard": Aboriginal perspectives on traditional foods access and food security. *Journal of environmental and public health* 2012(1): 130945.
- Elomrani S, Assarag B, De Brouwere V, et al. (2025) Gestational diabetes mellitus and risk of type 2 diabetes 4 years after the index pregnancy in Moroccan women-a prospective cohort study. *BMC Pregnancy and Childbirth* 25(1): 1032.
- Fink, A. (2003). How to Ask Survey Questions. How to Ask Survey Questions. <https://doi.org/10.4135/9781412984393>
- First Nations Centre. (2009). Gestational Diabetes and First Nations Women: A literature review. https://fnim.sehc.com/getmedia/a7198c67-da87-44e9-9cc4-1d681303fef8/Gestational_Diabetes_LitReview_2009.pdf.aspx?ext=.pdf
- First Nations in Canada. (n.d.). Retrieved July 20, 2026, from <https://www.rcaanc-cirnac.gc.ca/eng/1307460755710/1536862806124>
- First Nations Traditional Foods Fact Sheets. (n.d.). Retrieved July 20, 2026, from https://fnha.ca/wp-content/uploads/migrated/WellnessSite/WellnessDocuments/Traditional_Food_Facts_Sheets.pdf
- Gable RK and Wolf MB (2012) Instrument Development in the Affective Domain: Measuring Attitudes and Values in Corporate and School Settings. Springer Netherlands.
- Govere L and Govere EM (2016) How effective is cultural competence training of healthcare providers on improving patient satisfaction of minority groups? A systematic review of literature. *Worldviews on Evidence-Based Nursing* 13(6): 402-410.
- Graham S, Muir NM, Formsma JW, et al. (2023) First Nations, Inuit and Metis peoples living in urban areas of Canada and their access to healthcare: a systematic review. *International Journal of Environmental Research and Public Health* 20(11): 5956.
- Hack R, Hekmat S and Ahmadi L (2015) Examining the cultural competence of third-and fourth-year nutrition students: a pilot study. *Canadian Journal of Dietetic Practice and Research* 76(4): 178-184.
- Harris SB, Caulfield LE, Sugamori ME, et al. (1997) The epidemiology of diabetes in pregnant Native Canadians: a risk profile. *Diabetes Care* 20(9): 1422-1425.
- Hayward A and Cidro J (2021) Indigenous birth as ceremony and a human right. *Health and human rights* 23(1): 213.
- Healthy pregnancy for First Nations and Inuit. (n.d.). Retrieved July 20, 2026, from <https://www.sac-isc.gc.ca/eng/1581523249046/1581523302054>
- Hickson SV (2022) Culturally competent healthcare. *Clinics in Integrated Care* 15: 100130.
- Kassem H, Harris MA, Edwards-Wheesk R, et al. (2024) Traditional activities and general and mental health of adult Indigenous peoples living off-reserve in Canada. *Frontiers in Public Health* 11: 1273955.
- Kline, Paul. (2000). The handbook of psychological testing (2nd ed.). Routledge. <https://doi.org/10.4324/9781315812274>

- Kloss, Dyck, Giesbrecht, et al. (2021) A Scoping Literature Review of the Nutrition Status Among Canadian First Nations Women During Pregnancy: What Does the Evidence Reveal? *Fam Med Med Sci Res*.
- Knoblock-Hahn AL, Scharff DP and Elliott M (2010) Cultural competence in dietetics education: where are we now and where do we need to go? *Topics in Clinical Nutrition* 25(4): 323-334.
- Kraut A, Walld R, Tate R, et al. (2001) Impact of Diabetes on Employment and Income in Manitoba, Canada. *Diabetes Care* 24(1): 64-68.
- Krosnick JA, Holbrook AL, Berent MK, et al. (2002) The impact of "no opinion" response options on data quality: non-attitude reduction or an invitation to satisfice? *Public Opinion Quarterly* 66(3): 371-403.
- Kuhnlein H, Erasmus B, Creed-Kanashiro H, et al. (2006) Indigenous peoples' food systems for health: finding interventions that work. *Public health nutrition* 9(8): 1013-1019.
- Kuhnlein HV and Chotiboriboon S (2022) Why and how to strengthen indigenous peoples' food systems with examples from two unique indigenous communities. *Frontiers in Sustainable Food Systems* 6: 808670.
- Kuhnlein HV, Receveur O and Chan HM (2001) Traditional food systems research with Canadian Indigenous Peoples. *International Journal of Circumpolar Health* 60(2): 112-122.
- Kunarathnam V, Vadakekut ES and H. M (2025) Gestational Diabetes. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing.
- LaVeaux D and Christopher S (2009) Contextualizing CBPR: Key principles of CBPR meet the Indigenous research context. *Pimatisiwin* 7(1): 1.
- Levitt HM, Bamberg M, Creswell JW, et al. 73 (2018) Journal article reporting standards for qualitative primary, qualitative meta-analytic, and mixed methods research in psychology: The APA Publications and Communications Board task force report.
- MacKenzie SB, Podsakoff PM and Podsakoff NP (2011) Construct Measurement and Validation Procedures in MIS and Behavioral Research: Integrating New and Existing Techniques. *MIS Quarterly* 35(2): 293-334.
- Maloney SI, Idoate R, Zuffante M, et al. (2024) Foundational features of indigenous pregnancy care: lessons learned from indigenous pregnancy care providers. *Midwifery* 135: 104025.
- McArthur LH, Greathouse KR, Smith ER, et al. (2011) A quantitative assessment of the cultural knowledge, attitudes, and experiences of junior and senior dietetics students. *Journal of nutrition education and behavior* 43(6): 464-472.
- McCalman J, Jongen C and Bainbridge R (2017) Organisational systems' approaches to improving cultural competence in healthcare: a systematic scoping review of the literature. *International journal for equity in health* 16(1): 78.
- McIntyre HD, Catalano P, Zhang C, et al. (2019) Gestational diabetes mellitus. *Nature reviews Disease primers* 5(1): 47.
- Mierzynski R, Poniedzialek-Czajkowska E, Sotowski M, et al. (2021) Nutrition as prevention factor of gestational diabetes mellitus: A narrative review. *Nutrients* 13(11): 3787.
- Miltenburg E, Neufeld HT and Anderson K (2022) Relationality, Responsibility and Reciprocity: Cultivating Indigenous Food Sovereignty within Urban Environments. *Nutrients* 14(9): 1737.
- Mokkink LB, Terwee CB, Patrick DL, et al. (2010) The COSMIN study reached international consensus on taxonomy, terminology, and definitions of measurement properties for

- health-related patient-reported outcomes. *Journal of Clinical Epidemiology* 63(7): 737-745.
- Mussa J, Meltzer S, Bond R, et al. (2021) Trends in national Canadian guideline recommendations for the screening and diagnosis of gestational diabetes mellitus over the years: a scoping review. *International Journal of Environmental Research and Public Health* 18(4): 1454.
- Nelson CR, Dzakpasu S, Moore AM, et al. (2024) Diabetes mellitus in pregnancy across Canada. *BMC Pregnancy and Childbirth* 24(1): 349.
- Nikitara M, Mba AE, Latzourakis E, et al. (2025) Healthcare Professionals' Cultural Competence in Diabetes Care: A Systematic Review. *Healthcare*. MDPI, 2910.
- O'Driscoll T, Payne L, Kelly L, et al. (2011) Traditional first nations birthing practices: interviews with elders in Northwestern Ontario. *Journal of obstetrics and gynaecology Canada* 33(1): 24-29.
- Ohana S and Mash R (2015) Physician and patient perceptions of cultural competency and medical compliance. *Health Educ Res* 30(6): 923-934.
- Onwuegbuzie AJ, Dickinson WB, Leech NL, et al. (2009) A qualitative framework for collecting and analyzing data in focus group research. *International journal of qualitative methods* 8(3): 1-21.
- Oster RT, King M, Morrish DW, et al. (2014) Diabetes in pregnancy among First Nations women in Alberta, Canada: a retrospective analysis. *BMC Pregnancy and Childbirth* 14(1): 136.
- Paez KA, Allen JK, Beach MC, et al. (2009) Physician cultural competence and patient ratings of the patient-physician relationship. *J Gen Intern Med* 24(4): 495-498.
- Pallant J (2016) Scale development, Rasch analysis and item response theory. Melbourne, Australia: Melbourne Australian Consortium for Social & Political Research Inc.
- Parmenter K and Wardle J (1999) Development of a general nutrition knowledge questionnaire for adults. *European journal of clinical nutrition* 53(4): 298-308.
- Parmenter K and Wardle J (2000) Evaluation and design of nutrition knowledge measures. *Journal of Nutrition Education* 32(5): 269-277.
- Petrillo J, Cano SJ, McLeod LD, et al. (2015) Using Classical Test Theory, Item Response Theory, and Rasch Measurement Theory to Evaluate Patient-Reported Outcome Measures: A Comparison of Worked Examples. *Value in Health* 18(1): 25-34.
- PHAC (2021) Evaluation of PHAC's Community Action Program for Children (CAPC) and Canada Prenatal Nutrition Program (CPNP) - 2015-16 to 2019-20. Office of Audit and Evaluation, Health Canada and the Public Health Agency of Canada. Available at: <https://www.canada.ca/en/public-health/corporate/transparency/corporate-management-reporting/evaluation/evaluation-community-action-program-children-canada-prenatal-nutrition-program-2015-2016-2019-2020.html>.
- Polit DF, Beck CT and Owen SV (2007) Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing & Health* 30(4): 459-467.
- Ponto J (2015) Understanding and evaluating survey research. *Journal of the advanced practitioner in oncology* 6(2): 168-171.
- Population Centre and Rural Area Classification 2016. (n.d.). Retrieved July 20, 2026, from <https://www.statcan.gc.ca/en/subjects/standard/pcrac/2016/introduction>
- Presser S, Couper MP, Lessler JT, et al. (2004) Methods for testing and evaluating survey questions. *Methods for testing and evaluating survey questionnaires*. 1-22.

- Reading, C., & Wien, F. (2009). NATIONAL COLLABORATING CENTRE FOR ABORIGINAL HEALTH CENTRE DE COLLABORATION NATIONALE DE LA SANTE AUTOCHTONE. www.nccah-ccnsa.ca.
- Reeds J, Mansuri S, Mamakeesick M, et al. (2016) Dietary patterns and type 2 diabetes mellitus in a First Nations community. *Canadian journal of diabetes* 40(4): 304-310.
- Rodrigues S, Robinson EJ, Kramer MS, et al. (2000) High rates of infant macrosomia: a comparison of a Canadian native and a non-native population. *The Journal of nutrition* 130(4): 806-812.
- Sarkar D, Walker-Swaney J and Shetty K (2020) Food diversity and indigenous food systems to combat diet-linked chronic diseases. *Current developments in nutrition* 4(Supplement_1): 3-11.
- Schoenaker DA, Mishra GD, Callaway LK, et al. (2016) The role of energy, nutrients, foods, and dietary patterns in the development of gestational diabetes mellitus: a systematic review of observational studies. *Diabetes Care* 39(1): 16-23.
- Schultz A, Nguyen T, Sinclair M, et al. (2021) Historical and continued colonial impacts on heart health of Indigenous Peoples in Canada: What's reconciliation got to do with it? *CJC open* 3(12): S149-S164.
- Schuster RC, Wein EE, Dickson C, et al. (2011) Importance of traditional foods for the food security of two First Nations communities in the Yukon, Canada. *International Journal of Circumpolar Health* 70(3): 286-300.
- Sebai I, Ing A, Nardocci Fusco M, et al. (2024) Eating traditional foods enhances diet quality among First Nations in Canada: an analysis using the Healthy Eating Food Index-2019 (HEFI-2019) and the Canadian Healthy Eating Index 2007 (C-HEI 2007). *Applied Physiology, Nutrition, and Metabolism* 50: 1-13.
- Shafiee M, Keshavarz P, Lane G, et al. (2022) Food security status of indigenous peoples in Canada according to the 4 pillars of food security: a scoping review. *Advances in Nutrition* 13(6): 2537-2558.
- Sheppard AJ, Shapiro GD, Bushnik T, et al. (2017) Birth outcomes among first nations, inuit and metis populations. *Statistics Canada= Statistique Canada*.
- Sidiq FF, Coles D, Hubbard C, et al. (2022) The role of traditional diets in promoting food security for indigenous peoples in low- and middle-income countries: a systematic review. *IOP Conference Series: Earth and Environmental Science* 978(1): 012001.
- Skinner K, Pratley E and Burnett K (2016) Eating in the city: A review of the literature on food insecurity and Indigenous people living in urban spaces. *Societies* 6(2): 7.
- Stephens C, Porter J, Nettleton C, et al. (2006) Disappearing, displaced, and undervalued: a call to action for Indigenous health worldwide. *The Lancet* 367(9527): 2019-2028.
- Stewart A and Malhotra A (2015) Gestational diabetes and the neonate: challenges and solutions. *Research and Reports in Neonatology*. 31-39.
- Streiner DL (2003) Starting at the Beginning: An Introduction to Coefficient Alpha and Internal Consistency. *Journal of Personality Assessment* 80(1): 99-103.
- Sudman, Seymour., & Bradburn, N. M. (1982). Asking questions. In *Practical guide to questionnaire design*. Jossey-Bass.
- Tajeu GS, Cherrington AL, Andrae L, et al. (2015) "We'll Get to You When We Get to You": Exploring Potential Contributions of Health Care Staff Behaviors to Patient Perceptions of Discrimination and Satisfaction. *Am J Public Health* 105(10): 2076-2082.

- Tang K and Jardine CG (2016) Our way of life: Importance of Indigenous culture and tradition to physical activity practices. *International Journal of Indigenous Health* 11(1): 211-227.
- The CPNP guidebook : a CPNP worker's guide to running a great community program / [published by] Canada Prenatal Nutrition Program - First Nations and Inuit Component (CPNP-FNIC). : H34-148/1-2008E - Government of Canada Publications - Canada.ca. (n.d.). Retrieved July 20, 2026, from <https://publications.gc.ca/site/eng/9.651320/publication.html>
- Thom DH and Tirado MD (2006) Development and validation of a patient-reported measure of physician cultural competency. *Med Care Res Rev* 63(5): 636-655.
- Trakman GL, Forsyth A, Hoyer R, et al. (2017a) Developing and validating a nutrition knowledge questionnaire: key methods and considerations. *Public health nutrition* 20(15): 2670-2679.
- Trakman GL, Forsyth A, Hoyer R, et al. (2017b) The nutrition for sport knowledge questionnaire (NSKQ): Development and validation using classical test theory and Rasch analysis. *Journal of the International Society of Sports Nutrition* 14(1): 26.
- Vincze L, Barnes K, Somerville M, et al. (2021) Cultural adaptation of health interventions including a nutrition component in Indigenous peoples: a systematic scoping review. *Int J Equity Health* 20(1): 125.
- Wade P and Bernstein BL (1991) Culture Sensitivity Training and Counselor's Race: Effects on Black Female Clients' Perceptions and Attrition. *Journal of Counseling Psychology* 38(1): 9-15
- Where To Buy Indigenous Traditional Food in Winnipeg. (n.d.). Retrieved July 20, 2026, from <https://wrha.mb.ca/wp-content/site-documents/community/seniors/files/congregate-meal-toolkit/6.6WheretobuyIndigenousTraditionalFood.pdf>
- Whitty-Rogers J, Caine V and Cameron B (2016) Aboriginal Women's experiences with gestational diabetes mellitus: a participatory study with Mi'kmaq women in Canada. *Advances in Nursing Science* 39(2): 181-198.
- Zhang C and Ning Y (2011) Effect of dietary and lifestyle factors on the risk of gestational diabetes: review of epidemiologic evidence. *The American journal of clinical nutrition* 94: S1975-S1979

Appendix I: Indigenous Traditional Foods Knowledge Questionnaire

Section 1: Indigenous History

1. Of the following, which is the best definition of Indigenous traditional foods?
 - a. Foods that are cultivated through modern agricultural practices
 - b. Foods that have been consumed by Indigenous peoples for generations, often derived from the land and water
 - c. Foods introduced through colonial trade
 - d. Foods produced in urban settings with Western methods
2. Which of the following should be considered while talking to patients or clients about their ability to access Indigenous traditional foods?
 - a. Harvesting and gathering skills
 - b. The use of processed ingredients in traditional recipes
 - c. The use of fast food in Indigenous communities
 - d. The use of modern technology in food production
3. How did residential schools impact Indigenous peoples' diets?
 - a. Led to loss of knowledge and skills related to traditional foods
 - b. Forced adaptation of a Western diet and culture
 - c. Resulted in students being under nourished
 - d. All of the above
4. Which of the following was not an impact of colonialism on Indigenous peoples' diet?
 - a. Displacement from traditional lands and food sources
 - b. Introduction of new food systems and agricultural practices
 - c. Strengthening of traditional Indigenous food networks
 - d. Forced assimilation through food policies
5. What was the main result of the nutrition experiments that were carried out in residential schools?
 - a. Significant improvements in the overall health and nutrition of Indigenous children.
 - b. Widespread nutritional deficiencies and worsening health among children.
 - c. Reduction in the prevalence of malnutrition in Indigenous communities.
 - d. Establishment of robust nutritional programs to address child health.
6. In what way do you think the loss of traditional lands has impacted the overall health of Indigenous peoples?
 - a. Increased risk of chronic diseases
 - b. Increased amount of physical activity

- c. Decreased risk of mental health issues
 - d. Increased access to nutritious foods
7. What is potentially lost if Indigenous peoples do not have access to traditional foods?
- a. Indigenous teachings
 - b. Food harvesting skills
 - c. Food sovereignty
 - d. Food preservation skills
 - e. All of the above
8. What is the definition of Indigenous food sovereignty?
- a. The right of Indigenous peoples to control and access their traditional food systems, including land, resources, and cultural practices.
 - b. A government policy ensuring Indigenous communities have access to food aid and supplies.
 - c. The process of adopting modern agricultural practices to improve food security in Indigenous communities.
 - d. The act of growing only locally sourced foods within Indigenous communities to ensure environmental sustainability.
9. Which aspects of Indigenous culture are reflected through the use of traditional foods?
- a. Teachings and knowledge sharing
 - b. Cooking and food preparation
 - c. Tool making and craftsmanship
 - d. Harvesting and gathering practices
 - e. All of the above
10. In what way has colonialism negatively impacted Indigenous traditional foods?
- a. Loss of access to traditional lands
 - b. Erosion of food sovereignty
 - c. Disruption of cultural practices
 - d. Environmental changes
 - e. All of the above
11. How do you think residential schools impacted Indigenous traditional foods and health?
- a. Disruption of cultural knowledge
 - b. Dietary changes
 - c. Loss of food skills
 - d. Negative associations with traditional foods
 - e. All of the above
12. In what ways do you think nutrition experiments impacted Indigenous traditional foods and communities?
- a. Loss of trust in food systems
 - b. Introduction of non-traditional foods
 - c. Nutritional deficiencies

- d. Disconnection from traditional food practices
 - e. All of the above
13. What are some of the key factors that have impacted Indigenous traditional foods?
- a. Colonialism and settler colonial practices
 - b. Residential schools
 - c. Environmental changes
 - d. Government policies
 - e. Cultural assimilation
 - f. All of the above
14. How did colonization affect Indigenous peoples' access to traditional foods?
- a. Forced relocation of Indigenous communities, disrupted access to their traditional land and food sources.
 - b. New farming techniques was introduced to Indigenous communities that improved their food systems.
 - c. The availability of traditional foods through trade with settlers was increased
15. How do Indigenous traditional foods vary?
- a. Local geography
 - b. Seasonality
 - c. Cultural group
 - d. All of the above
16. How did colonialism impact Indigenous traditional diets and health?
- a. Increased intake of fat and sugar
 - b. More active lifestyle
 - c. Increased access to nutrient-rich foods
 - d. Greater reliance on store-bought foods
17. How do traditional Indigenous foods contribute to cultural values?
- a. They are only important for health benefits.
 - b. They promote cultural values like sharing and cooperation.
 - c. They are valued only for their spiritual significance.
 - d. They replace the need for modern food systems.

Section 2: Woodland

1. Which of the following is a traditional food commonly associated with Indigenous peoples of the woodland regions?
- a. Corn
 - b. Moose
 - c. Buffalo (bison)
 - d. Salmon

2. What are some common ways that moose meat is traditionally consumed?
 - a. Fresh
 - b. Dried/smoked
 - c. Half dried/smoked
 - d. All of the above
3. During which season is moose meat most commonly available to Indigenous communities due to traditional hunting practices?
 - a. Late summer/early fall
 - b. Late spring/ early summer
 - c. Late winter/ early spring
 - d. Late fall/early winter
4. What are some of the common indigenous traditional foods made with moose meat? (choose all that apply)
 - a. Moose stew
 - b. Moose pemmican
 - c. Moose sausage
 - d. Moose meat pies
 - e. Moose lasagna
 - f. Moose curry
 - g. Grilled moose steaks
5. Moose meat is a primary source of which of the following nutrients? (Choose all that apply)
 - a. Iron, Zinc
 - b. Vitamin B and Choline
 - c. Vitamin C and D
 - d. A and B
6. What are some common ways that caribou meat is traditionally consumed? (Choose all that apply)
 - a. Raw
 - b. Frozen
 - c. Aged
 - d. Roasted
 - e. Dried
7. During which season is caribou meat most commonly available to Indigenous communities due to traditional hunting practices?
 - a. Late summer
 - b. Late fall
 - c. Late winter
 - d. Late spring

8. What are some of the common indigenous traditional foods made with caribou meat? (choose all that apply)
- a. Jerky
 - b. Sausage
 - c. Steaks
 - d. Caribou lentil soup
 - e. Pemmican
 - f. Stir fry
9. What are some Indigenous traditional ways of preserving foods? (Choose all that apply)
- a. Smoking and drying
 - b. Salt-curing
 - c. Canning
 - d. Vacuum sealing
 - e. Pasteurization
 - f. Freezing
10. What are some of the barriers to accessing Indigenous traditional foods? (Choose all that apply)
- a. Hunting cost
 - b. Urbanization
 - c. Loss of land
 - d. Changing food and taste preferences
 - e. Social problems
 - f. Climate change
 - g. Food storage limitations
11. What contaminant may be a concern when moose or caribou meat is consumed?
- a. Arsenic
 - b. Lead
 - c. Mercury
 - d. Cadmium
 - e. None of the above
12. Which food source does not contain Vitamin C?
- a. Bear meat
 - b. Seal meat
 - c. Moose liver
 - d. None of the above
13. Moose and caribou are unique sources of which nutrients?
- a. Protein
 - b. Calcium

- c. Functional lipids
 - d. Vitamin C
14. Which parts of a moose may contain potential contaminants when consumed?
- a. All moose meat is likely to be contaminated.
 - b. Moose meat is completely safe and free from contaminants.
 - c. The liver and kidney may contain contaminants.
 - d. None of the above.
15. How is goose usually consumed?
- a. Dried
 - b. Barbecued
 - c. Smoked
 - d. Fresh
16. When is the hunting season for the goose?
- a. Fall
 - b. Winter
 - c. Spring
 - d. Summer
 - e. A and C
17. Goose is an excellent source of ?
- a. B vitamins (specifically b12), Iron and protein
 - b. Vitamin A and Vitamin D
 - c. Vitamin C and Fiber
 - d. A and B
18. During which seasons are muskrats usually hunted?
- a. Winter/ early spring
 - b. Spring/ early summer
 - c. Summer/early fall
 - d. Fall/early winter
19. What are some common indigenous traditional foods made from muskrats?
- a. Muskrat in oven
 - b. Muskrat soup
 - c. Muskrat pemmican
 - d. All of the above
20. What is a potential health risk associated with muskrats?
- a. They cause allergic reactions in humans.
 - b. They can transmit tularemia through contaminated water, meat, or open cuts.

- c. They are a primary source of nutrient-rich food.
 - d. They help purify water sources.
21. What health risks are associated with consumption of muskrats?
- a. They can transmit various diseases and parasites to humans.
 - b. They are a primary source of medicinal remedies.
 - c. They help prevent the spread of infectious diseases.
 - d. They pose no health risks to humans.
22. You have a patient who recently ate **muskrat meat** and is now experiencing **fever, lethargy, and infected sores**. What is one possible diagnosis to consider?
- a. Tularemia infection
 - b. Leptospirosis infection
 - c. Salmonellosis
 - d. Brucellosis
23. A 68-year-old patient with a **low-iron diet** and a **history of active cigarette smoking** has been consuming **moose liver and kidney**. They are now showing early signs of **kidney damage** and have been advised to stop consuming these organs. What is a possible explanation for this recommendation?
- a. Moose liver and kidney may contain elevated levels of contaminants such as cadmium.
 - b. Moose liver and kidney are exceptionally high in iron, which could lead to iron overload and kidney stress.
 - c. Moose liver and kidney are known to accumulate mercury, which primarily causes neurological symptoms rather than kidney damage.
 - d. Moose liver and kidney have an extremely high purine content, which increases the risk of gout and could secondarily affect kidney function.

Section 3: Iroquoian

1. In Indigenous culture, what does the term “Three Sisters” refer to?
 - a. A traditional storytelling trio in Indigenous folklore.
 - b. Three main staple crops: corn, beans, and squash.
 - c. A group of sacred rivers in Indigenous traditions.
 - d. A symbolic representation of the sun, moon, and stars.
2. Which three staple crops were traditionally planted together in Indigenous agriculture?
 - a. Corn, beans, and squash
 - b. Wheat, barley, and rye
 - c. Potatoes, tomatoes, and peppers
 - d. Rice, millet, and sorghum
3. How was corn mainly used in Indigenous foods? (choose all that apply)
 - a. Bread making

- b. Pudding
 - c. Parched
 - d. Roasted
 - e. Soup
 - f. Coffee like beverage
4. What is the cultural significance of corn in Indigenous traditions?
- a. Corn represents wealth and status within the community.
 - b. Corn is viewed as a sacred gift from the Creator, symbolizing life and nourishment.
 - c. Corn is primarily used for trade and economic exchange.
 - d. Corn is seen as a symbol of unity and peace between different Indigenous nations.
5. What are some of the traditional Indigenous foods made from corn? Choose all that apply.
- a. The Three Sisters soup
 - b. Corn patties
 - c. Cornbread and hominy
 - d. Corn-husk dolls
6. Corn is naturally high in which of the following nutrients?
- a. B vitamins
 - b. Fiber
 - c. Phosphorus
 - d. Calcium
 - e. Vitamin D
7. What is the main food safety concern associated with fresh corn?
- a. Potential allergic reactions from genetic modifications
 - b. Mycotoxin contamination, especially aflatoxins
 - c. Reduced nutritional value due to genetic modification
 - d. High levels of glucose leading to health issues
8. What are the three major types of beans classified by the Iroquois based on their traditional uses?
- a. Bread beans, soup beans, and cranberry beans
 - b. Wild beans, dried beans, and fresh beans
 - c. Edible beans, medicinal beans, and ceremonial beans
 - d. Black beans, kidney beans, and pinto beans
9. How were beans traditionally consumed by Indigenous peoples?
- a. Eaten as "green beans" in the pod, cooked and eaten whole, or cut up and boiled with squash, corn, or meat
 - b. Left to ripen fully, then shelled and cooked whole, mashed, or mixed with corn bread paste and re-cooked in bread-making
 - c. Dried and ground into flour for baking

- d. A and B
10. Why is corn boiled with wood ash among the Iroquoia? Choose all that apply.
- a. It reduces the cooking time by removing the hull or pericarp.
 - b. It enables the corn to be stored for long periods of time.
 - c. It improves the nutritional value of the corn by increasing the availability of amino acids and niacin
 - d. Reduces problems associated with mycotoxins in corn.
 - e. The calcium content of corn may be increased as much as 400 percent
11. How was corn significant to the Iroquoian people in their creation story and culture?
- a. It was considered a sacred gift that provided sustenance and life.
 - b. It was only used for trade and not for consumption.
 - c. It symbolized war and was used mainly in battle rituals.
 - d. It was believed to have no connection to their creation story or daily life.
12. Which of the following nutrients are found in significant amounts in maple syrup? Select all that apply
- a. Calcium and Magnesium
 - b. Manganese, Potassium, and Zinc
 - c. Iron and Vitamin D
 - d. A and B
13. Does pure maple syrup cause a spike in glucose levels like other sugars?
- a. Yes, it has the same effect as white sugar.
 - b. No, it has no impact on blood sugar levels.
 - c. It has a lower glycemic index than white sugar but can still raise insulin levels, though not as high as white sugar.
 - d. It prevents insulin spikes and regulates blood sugar.
14. Why were the Three Sisters crops (corn, beans, and squash) traditionally planted and consumed together? (choose all that apply)
- a. They provided balanced nutrition by complementing each other's nutrients.
 - b. They improved soil health and supported each other's growth.
 - c. They were easier to harvest when grown together.
 - d. They symbolized unity and were important in cultural traditions.
15. What are some of the health benefits of the strawberry plant?
- a. To treat digestive disorders
 - b. To treat skin problems
 - c. To treat heart conditions
 - d. All of the above
16. Which of the following is a cultural belief associated with the strawberry plant?
- a. It is considered a man's medicine used for strength.

- b. It teaches young women about creation, community, and love.
 - c. It is used to promote healing for the elderly.
 - d. It is considered a symbol of wealth and prosperity.
17. What does strawberry represent in Indigenous culture?
- a. It represents “I show you I care”
 - b. It symbolizes wealth and prosperity.
 - c. It is considered a symbol of strength and power.
 - d. It represents the cycle of the seasons
18. Strawberry leaves and fruit are excellent sources of which nutrient?
- a. Vitamin C
 - b. Vitamin B group
 - c. Calcium
 - d. Pectin
19. How was venison (deer meat) usually preserved?
- a. Salt-curing
 - b. Smoking
 - c. Freezing
 - d. Canning
20. Deer meat is particularly high in which of the following nutrients?
- a. Vitamin D
 - b. Iron
 - c. Fat
 - d. Zinc
21. Why does the young woman avoid eating strawberries and other berries for a year?
- a. To test her physical endurance
 - b. To show gratitude to nature and mark her transition into womanhood
 - c. Because berries are considered unhealthy in her culture
 - d. To follow a religious dietary restriction
22. When is it most likely to have venison available in the community?
- a. Summer
 - b. Winter
 - c. Fall
 - d. Spring
23. Your middle-aged patient has just been diagnosed with **sepsis** and is also at **high risk of cancer**. When you review their diet and social history, you see that they report **consuming primarily the Three Sisters crops**, which they store in **open containers in their basement**. Which of the following is a possible explanation for their situation?
- a. The patient’s exclusive diet of the Three Sisters could result in nutrient deficiencies (e.g., B12, vitamin D) and expose them to aflatoxin contamination from corn, which may contribute to immune dysfunction, increased cancer risk, and sepsis.

- b. As beans are considered to be carcinogenic, they are the likely cause of their condition.
- c. The patient's diet of Three Sisters crops is healthy because it is rich in antioxidants, and their condition is not related to their diet at all.
- d. None of the above.

Section 4: Plains

1. Which of the following is a traditional food commonly associated with Indigenous peoples of the Plain regions?
 - a. Buffalo (bison)
 - b. Corn
 - c. Bean
 - d. Salmon
2. How did Indigenous peoples traditionally consume chokecherries?
 - a. Frozen, as they become less dry and sweeter when frozen
 - b. Eaten like popcorn
 - c. Used in pemmican and other traditional foods
 - d. Used to make syrup
 - e. All of the above
3. What is one of the common indigenous traditional foods made from buffalo (bison)? (Choose all that apply)
 - a. Cranberry buffalo (bison) meatball
 - b. Buffalo (bison) stew
 - c. Buffalo (bison) soup
 - d. Buffalo (bison) bowl
 - e. Buffalo (bison) chili
4. Buffalo (bison) meat is an excellent source of which nutrient(s)? (Choose all that Apply)
 - a. B Vitamins (specifically Vitamin B12), and Protein
 - b. Choline, Iron, and Zinc
 - c. Manganese, Magnesium, Niacin
 - d. Vitamin C and Vitamin D
5. What methods were used to preserve buffalo (bison) meat? (Choose all that apply)
 - a. Drying with Sun/wind
 - b. Drying with Shade/smoke
 - c. Drying with Fire/ hot air
 - d. Drying with Sweat house
 - e. Drying with Heated coals
 - f. Canning

- g. Salt-curing
 - h. Pemmican
6. What is the health risk associated with eating buffalo (bison) meat?
 - a. Heart disease
 - b. Food poisoning
 - c. High cholesterol
 - d. Brucellosis
 7. What is one of the teachings surrounding the buffalo (bison)?
 - a. Buffalo (bison)s need to be shot to the head
 - b. A shot to the kidney will make the meat bitter
 - c. You could travel three times faster after a meal of buffalo (bison) meat
 - d. It is believed that a person who hunts buffalo (bison) at young age will be a good hunter in the future
 8. What are some common ways that buffalo (bison) meat is traditionally consumed? (Choose all that apply)
 - a. Dried
 - b. Pemmican
 - c. Roasted
 - d. Boiled
 - e. Raw
 - f. Salt-curing
 - g. Freezing
 - h. Canning
 9. How is Labrador tea typically prepared?
 - a. One leaf picked up, washed carefully and air dried, stored and used under adult supervision
 - b. Fresh leaves are boiled immediately without drying
 - c. Leaves are crushed into a powder and mixed with other herbs
 - d. The whole plant is harvested and consumed raw
 10. What is the medicinal use of Labrador tea?
 - a. It is used to treat asthma or a cough
 - b. Used to reduce swelling and bloating
 - c. Used to treat constipation
 - d. It is considered to be a diuretic
 - e. All of the above
 11. Which statement best describes the dandelion plant?
 - a. It grows in a limited number of regions and climates
 - b. All parts of the plant are edible and can be used in various foods like pancakes, muffins, and jelly

- c. Only the flowers are edible, while the leaves and roots are toxic
 - d. It is primarily used as a decorative plant and not for consumption
12. What is one traditional medicinal use of dandelions?
- a. They can be made into a healing salve for eczema
 - b. They are only used as a food ingredient and have no medicinal benefits
 - c. The roots are used to make a cooling gel for burns
 - d. Only the flowers are used for herbal tea, with no other applications
13. How can hare meat be consumed in Indigenous culture? (Choose all that apply)
- a. Salt-curing
 - b. Raw
 - c. Boiled
 - d. Cooked
 - e. Baked
 - f. Roasted
14. When is the season for hunting hare?
- a. All year around, usually fall
 - b. All year around, usually winter
 - c. Winter
 - d. Fall
15. What is the main concern for buffalo (bison) meat regarding contamination?
- a. E. coli
 - b. Salmonella
 - c. Listeria
 - d. Brucellosis
16. What are common Indigenous traditional foods made from hare meat in this region? (Choose all that apply)
- a. Hare stew
 - b. Snowshoe hare
 - c. Hare soup
 - d. Baked hare
17. Hare meat is an excellent source of which nutrient(s)?
- a. Protein and iron
 - b. Poly unsaturated fatty acid and Magnesium
 - c. Vitamin B12 (specifically Vitamin B12)
 - d. A and C
18. How was hare meat usually preserved?
- a. Salt curing
 - b. Frozen
 - c. Pemmican
 - d. Canned

19. What contaminants are associated with hare meat?
- a. High levels of lead
 - b. Contamination with E. coli
 - c. Contamination with mycotoxin
 - d. Contamination notice has never been issued.
20. What is the Indigenous teaching surrounding hare hunting?
- a. The child who easily caught a hare one day would be a good hunter
 - b. The feet of the hare were kept as good luck charms
 - c. Elders say that hare meat is a “special food”
 - d. A and B
21. When are rose hips usually harvested?
- a. Early September
 - b. Late June
 - c. Early April
 - d. Early December
22. What are the medicinal uses of rose hips in Indigenous culture? (Choose all that apply.)
- a. Diarrhea treatment for children
 - b. Heartburn treatment
 - c. Infection treatment
 - d. Relieve headache
 - e. To treat eye soreness
 - f. Used as the heart tonic for adults
23. How are rose hips prepared for medicinal usage?
- a. Boiled and the liquid was used
 - b. Rose hips powder was prepared.
 - c. It was eaten as it was.
 - d. All of the above
24. When can cattails be harvested?
- a. Summer
 - b. Fall
 - c. Winter
 - d. Spring
 - e. A and B
25. Which parts of cattails can be used in Indigenous culture?
- a. The roots and the shoots in summer
 - b. The heads in the fall
 - c. Only the leaves in winter
 - d. Flowers in early spring
 - e. Seeds in mid-summer
 - f. Bark and branches in autumn

Section 5: Plateau

1. What parts of salmon is used by indigenous people?
 - a. Head
 - b. Eggs
 - c. Meat
 - d. Soft bones
 - e. All of the above
2. **Salmon** is rich in which nutrients?
 - a. Protein, niacin, vitamin D
 - b. Protein, thiamin, vitamin C
 - c. Vitamin A, vitamin C, riboflavin
 - d. Iron, niacin, vitamin D
3. Salmon **heads** are an excellent source of which nutrient(s)? Choose all that apply.
 - a. Protein
 - b. Vitamin A
 - c. Vitamin C
 - d. Vitamin B group
 - e. Iron
 - f. Thiamin
 - g. Calcium
4. Salmon **eggs** are an excellent source of which nutrient(s)? Choose all that apply.
 - a. Vitamin A
 - b. Vitamin C
 - c. Riboflavin
 - d. Iron
 - e. Fat
 - f. Calcium
 - g. Protein
5. What is the primary reason for cutting and cleaning salmon in a prescribed manner?
 - a. To make them easier to cook
 - b. To demonstrate reverence and facilitate preservation
 - c. To increase their weight
 - d. To change their color
6. What are the ways that salmon is being preserved in Indigenous culture? Choose all that apply.
 - a. Wind drying on racks
 - b. Smoke curing
 - c. Canning
 - d. Freezing

- e. Fermenting
7. What is one of the Indigenous traditional foods made from salmon?
- a. Salmon soup
 - b. Salmon stew
 - c. Stuffed salmon
 - d. Salmon cake
 - e. All of the above
 - f. A and D
8. How did Indigenous communities traditionally preserve blueberries? Select all that apply.
- a. Canning
 - b. Dried
 - c. Smoked
 - d. Boiled
 - e. Salt-curing
9. In Indigenous medicine, how was blueberry juice traditionally used?
- a. To treat coughs
 - b. As relaxant during childbirth
 - c. To treat diarrhea
 - d. All of the above
10. Which of the following are traditional Indigenous foods made using blueberries? Select all that apply.
- a. Blueberry pudding
 - b. Pemmican
 - c. Bannock with blueberries
 - d. Blueberry syrup
 - e. Fermented blueberries paste
11. Blueberries are rich in which nutrient(s)? Choose all that apply.
- a. Vitamin A
 - b. Vitamin C
 - c. Vitamin E
 - d. Beta-carotene
 - e. Antioxidant
 - f. Potassium
 - g. Manganese
 - h. Magnesium
 - i. Iron
 - j. Lycopene
12. Which of the following potential health benefits has blueberry juice been scientifically proven to provide?
- a. Boosting immune function

- b. Reducing blood sugar levels
 - c. Improving digestion
 - d. Increasing bone density
13. What are some common ways that Saskatoon berries are traditionally consumed?
- a. Fresh with oil
 - b. Mixed with bear grease
 - c. Dried
 - d. Salt curling
 - e. Smoked
14. When is the Saskatoon berry harvesting time?
- a. Summer
 - b. Spring
 - c. Winter
 - d. Fall
15. What are some of the common Indigenous traditional foods made from Saskatoon berries?
- a. Saskatoon berry soup
 - b. Pemmican
 - c. Saskatoon Berry Pie
 - d. All of the above
16. The Saskatoon berries are a good source of which nutrients? Choose all that apply.
- a. Vitamin C
 - b. Calcium
 - c. Fibre
 - d. Antioxidants
 - e. Vitamin B group
 - f. Iron
 - g. Vitamin D
17. How are Saskatoon berries usually preserved?
- a. Dried with fire
 - b. Dried with wind
 - c. Dried with sun
 - d. Salt curing
 - e. Canning
 - f. Buried in underground caches
 - g. Frozen
18. What are the medicinal uses of Saskatoon berries in Indigenous culture? Choose all that apply.
- a. To relieve stomach upset
 - b. Drops to treat earache

- c. Dried berries to make eye drops
 - d. Were given to mothers after childbirth for afterpains
 - e. Prescribed as blood remedy
 - f. Can slow down the aging process
 - g. No medicinal use for saskatoon berries exists in Indigenous culture
 - h. a & b
19. When is poplar buds harvesting time?
- a. Spring- April/ May
 - b. Summer- July/August
 - c. Fall-September/October
 - d. Winter-December/January
20. What are the medicinal uses of poplar buds in Indigenous culture? Choose all that apply.
- a. Fresh leaves were used to treat toothache
 - b. They were used to lessen the pain of a bee sting
 - c. Poplar tea was used to treat colds
 - d. Congestion treatment
 - e. Heart burn treatment
21. What are some of the traditional uses of poplar buds?
- a. Were used to make massage oil
 - b. To make lip balm
 - c. To make pemmican
 - d. a & b
22. When was traditionally bear grease most available based on the hunting season?
- a. Fall
 - b. Spring
 - c. Winter
 - d. Summer
23. What are the medicinal uses of bear grease in Indigenous culture? Choose all that apply.
- a. To relieve muscle and joint soreness
 - b. To improve hair thickness
 - c. To make lip balm
 - d. a & b

Section 6: Pacific Coast

1. Which parts of the halibut fish were traditionally consumed? Choose all that apply.
- a. Tails
 - b. Skin
 - c. Roe
 - d. Backbone
 - e. Stomach

2. What are some of the beliefs surrounding the halibut in Indigenous culture?
 - a. Needed to wash themselves of the smells of “uncleanness” before fishing
 - b. Used songs or prayers while fishing halibut
 - c. They asked permission from the spirits before fishing
 - d. a & b
3. When was flounder usually harvested?
 - a. Fall
 - b. Summer
 - c. Spring
 - d. Winter
 - e. a & d
4. What are some common ways that flounder is traditionally consumed? Choose all that apply.
 - a. Steam
 - b. Boiled
 - c. Broiled
 - d. Roasted
 - e. Smoked
 - f. Raw
5. Which preservation method was most commonly used for flounder traditionally?
 - a. Dried
 - b. Salt curling
 - c. Canned
 - d. It was not preserved for later use
6. What is the cultural belief surrounding a dish made from flounder?
 - a. They avoided drinking too much water after eating it, as they believed it would cause them to always be thirsty.
 - b. They washed their hands before eating it, believing this was a way to honor the spirit of the flounder.
 - c. They did not waste any part of the fish, believing that doing so would prevent them from catching flounder again.
 - d. None of the above
7. Halibut is a good source of which of the following nutrients?
 - a. Protein
 - b. Calcium
 - c. Iron
 - d. None of the above
8. How is cod fish usually preserved?
 - a. Dried
 - b. Salt curled
 - c. Froze

- d. Cod fish was not preserved for later use
9. What is one of the Indigenous teachings around cod fishing?
- a. Fishermen performed various dances to ensure a good catch
 - b. It is taboo to put the cod carcass on the ground if it has been skinned.
 - c. People could travel three times as fast and three times as long after a meal of cod.
 - d. All of the above
10. Cod fish is a good source of which nutrient?
- a. Protein
 - b. Calcium
 - c. Vitamin b group
 - d. Vitamin D
 - e. Omega-3
11. Which of the following fish are good sources of omega-3 fatty acids?
- a. Salmon
 - b. Halibut
 - c. Cod
 - d. Flounder
 - e. None of the above
12. Which of the following has the highest amount of protein (per 100g cooked)?
- a. Salmon
 - b. Halibut
 - c. Cod
 - d. Flounder
13. Which of the following fish species is at the highest risk of contamination?
- a. Salmon
 - b. Halibut
 - c. Cod
 - d. Flounder
 - e. All of the above are at equal risk.
14. Which of the following fish species is the least likely to be contaminated?
- a. Salmon
 - b. Halibut
 - c. Cod
 - d. Flounder
 - e. All of the above are at equal risk.
15. How were salmon berries traditionally preserved?
- a. They were not being preserved
 - b. Frozen
 - c. Dried

- d. They were fermented and stored underground for several years
16. What is one of the Indigenous beliefs surrounding salmon berries?
- a. The coyote was instructed to place these berries in the mouths of each salmon he caught in order to ensure continued good fishing.
 - b. Salmonberries were believed to ward off evil spirits when worn as necklaces.
 - c. Eating salmonberries before sunrise would bring bad luck for the entire season.
 - d. Salmonberries were believed to grow only in places where thunder had struck the ground.
17. When is silverweed usually harvested?
- a. Fall
 - b. Winter
 - c. Summer
 - d. Spring
18. How is silverweed usually preserved for winter use?
- a. Dried
 - b. Smoked
 - c. Frozen
 - d. Salt curled
19. What is the medicinal use of silverweed roots in Indigenous culture?
- a. Roots can be made into a medicinal tea for diarrhea and chest pains.
 - b. Silverweed roots were chewed to improve night vision.
 - c. The roots were burned and the smoke inhaled to cure headaches instantly.
 - d. Silverweed roots were used as a sleep aid by placing them under pillows.
20. What significance do salmonberries hold in Indigenous culture?
- a. Salmonberries were cultivated in dedicated gardens and traded as a primary currency among Pacific Northwest nations.
 - b. They were considered bad luck and avoided during important ceremonies.
 - c. Salmonberries were thought to be poisonous and were never consumed.
 - d. Salmonberries are culturally significant as they mark the return of salmon and the changing of seasons.

Section 7: Mackenzie and Yukon River Basins

1. How is muskox meat usually preserved for future use?
- a. Dried
 - b. Smoked
 - c. Frozen
 - d. Salt-curled
2. What is the primary health risk associated with consuming muskox meat?
- a. It can contain Brucellosis.

- b. It is naturally high in toxic mercury levels.
 - c. It has no nutritional value and provides little energy.
 - d. It causes severe allergic reactions in most people.
3. Duck meat is an excellent source of which nutrient(s)? Choose all that apply.
- a. Protein
 - b. Iron
 - c. Omega-3
 - d. Vitamin B group
 - e. Vitamin C
 - f. Vitamin A
4. Duck eggs are an excellent source of which nutrient (s)? Choose all that apply.
- a. Vitamin B group
 - b. Vitamin D
 - c. Omega-3
 - d. Omega-6
5. What is the primary health risk associated with consuming duck meat that has not been properly handled?
- a. Containing bacteria such as salmonella
 - b. High cholesterol levels
 - c. Excess sodium content
 - d. Risk of mercury contamination
6. How was mountain sheep meat traditionally preserved?
- a. Dried
 - b. Roasted
 - c. Smoked
 - d. Frozen
 - e. Salt-cured
7. What is one of the Indigenous teachings regarding whitefish?
- a. Fresh whitefish was strictly prohibited among pregnant women.
 - b. Whitefish was only eaten during the winter months.
 - c. Whitefish was believed to cause bad dreams if eaten at night.
 - d. Only the elders were allowed to prepare whitefish.

Section 8: Inuit Nunangat

1. Which parts of beluga were traditionally consumed? Choose all that apply.
- a. Maktaaq
 - b. Skin
 - c. Blubber

- d. Meat
 - e. Flippers
2. Beluga maktaaq is an excellent source of which nutrient(s)? Choose all that apply.
- a. Vitamin E
 - b. Vitamin A
 - c. Zinc
 - d. Vitamin D
 - e. Vitamin C
 - f. Iron
 - g. Omega-3
 - h. Omega-6
3. Which part of the beluga is an excellent source of iron?
- a. Maktaaq
 - b. Blubber
 - c. Dry meat
 - d. Skin
4. What is the main health concern related to beluga?
- a. Botulism
 - b. High gluten content
 - c. Risk of E. coli contamination
 - d. Excessive carbohydrate levels
5. Which parts of seal are traditionally consumed? Choose all that apply.
- a. Meat
 - b. Liver
 - c. Broth
 - d. Blubber
 - e. Heart
 - f. Intestines
 - g. Brain
 - h. Kidney
 - i. Skin
 - j. Lungs
6. What are some common ways that seal is traditionally consumed? Choose all that apply.
- a. Raw- fresh
 - b. Raw-frozen
 - c. Boiled
 - d. Broiled
 - e. Roasted
 - f. Dried
 - g. Aged

- h. Smoked
 - i. Barbecued
7. When is the traditional season for seal hunting?
- a. Winter/spring
 - b. Spring/summer
 - c. Summer/fall
 - d. Fall/winter
8. What is considered a “special food” in Inuit culture?
- a. Seal
 - b. Beluga
 - c. Whale
 - d. Caribou
9. What is one Indigenous teaching regarding seal meat?
- a. It generates body warmth, and you will start sweating if you eat it.
 - b. It should only be eaten raw to preserve spiritual energy.
 - c. It must never be shared with visitors or outsiders.
 - d. Eating seal meat before sleep causes restless dreams.
10. Which part of the seal is advised for pregnant women to consume to help absorb vitamin c?
- a. Meat
 - b. Liver
 - c. Intestine
 - d. Heart
11. Which part of seal is an excellent source of vitamin A?
- a. Liver
 - b. Meat
 - c. Blubber
 - d. Intestine
12. Which of the following foods is recommended for Inuit women who are pregnant or planning to become pregnant to ensure vitamin C intake?
- a. Ringed seal meat
 - b. Ringed seal liver
 - c. Ringed seal heart
 - d. Beluga Maktaaq
 - e. None of the above
13. What is the best source of protein in Inuit Nunangat Indigenous traditional foods?
- a. Caribou dry meat
 - b. Moose meat
 - c. Seal meat
 - d. Muskox meat

14. What traditional food is a good source of folate for An Inuit community member individual hoping to become pregnant?
- a. Seal liver
 - b. Seal meat
 - c. Caribou liver
 - d. b and c
15. Which of the following Indigenous traditional foods has the highest amount of iron in a 100-gr serving?
- a. Dried narwhal meat
 - b. Seal Liver
 - c. Caribou liver
 - d. Dried char
16. What is the most important traditional food source of vitamin C for Nunavummiut?
- a. Whale skin
 - b. Cranberries
 - c. Tomato soup
 - d. Blueberries
17. Which of the following has the highest vitamin C content among traditional foods?
- a. Cloudberries
 - b. Whale skin
 - c. Seal liver
 - d. Blueberries
18. Which of the following Indigenous traditional foods is a good source of vitamin C?
- a. Creamy maktaaq chowder
 - b. Caribou meatballs
 - c. Baked bannok
 - d. A and B
19. When is the season that narwhal maktaaq is most available?
- a. Spring and summer
 - b. Fall and winter
 - c. Winter
 - d. All year around
20. How is maktaaq usually consumed in Indigenous culture?
- a. Raw
 - b. Boiled
 - c. Aged
 - d. Cooked
 - e. Smoked
 - f. Roasted