

**Understanding Perceptions of Adherence to Dietary Advice among
Women with Type 2 Diabetes**

By

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Abstract

Background: The foods people choose to eat can determine their health status because inadequate or excessive amounts of certain food components are associated with risk of disease. A number of factors influence the foods people choose and the amounts of these foods, such as social situations, habits, advertising and the cost of food (Delormier, et al., 2009). The aim of this study is to identify the perceptions and environmental factors that are associated with food choices and the extent of perceptions to adherence to dietary advice among women with type 2 diabetes.

Objectives: 1) To describe food behaviours of women who have diabetes, within their own daily food patterns; 2) To describe the perceptions of women who have diabetes about their social, economic and environmental situations that influence their food choice;, and 3) To identify the perceptions that are associated with the intent or ability to adhere to recommended health and nutrition behaviours.

Methodology: Semi-structural individual interviews were used to collect data from 20 women with type 2 diabetes. The Food Choice Map was used to generate the food patterns and food perceptions, Interviews were recorded and transcripts were analyzed by using principles of the Theory of Planned Behavior, constant comparison method to extract themes, and coded by Nvivo software. In addition, the women completed a demographic questionnaire.

Results: Of the major factors that the women perceived as influencing their food behaviours, four major factors enabled women to follow nutritional advice, while three factors acted as barriers to following the advice. Groups of women were identified: those who wanted to follow advice and did, those who did not want to follow advice and did not, those who wanted to follow advice but could not, and those who wanted to follow advice but experienced psychological conflict in doing so.

Conclusion: Results showed that food behaviours could be better understood through multi-dimensional factors. The four groups of women with diabetes according to perceived intent or ability to adhere to health and nutrition advice was possible in this study, but further studies are needed to justify the use of these groupings in interventions that enhance adherence to dietary advice in the context of type 2 diabetes.

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List of Abbreviations

AMDRs	Acceptable Macronutrient Distribution Ranges
BMI	Body Mass Index
CNF	Canadian Nutrient File
DEC	Diabetic Education Clinic
DRIs	Dietary Reference Intakes
FCM	Food Choice Map
GL	Glycemic Load
HDL	High-Density Lipoprotein
HFCS	High Fructose Corn Syrup
RDP	Regional Diabetes Program
TPB	Theory Planned Behavior
WHO	World Health Organization

CHAPTER 1 INTRODUCTION

The foods people choose to eat can determine their health status because inadequate or excessive amounts of certain food components are associated with risk of disease. Considerable research has been published on the metabolic mechanisms through which food mediates chronic disease and diseases of deficiency (Ford, et al., 2005; Willows, 2005).

The factors that influence the amount and types of food people choose to eat include social circumstances, habits, advertising and cost (Martins, 2005). The influence of these factors depends on a great range of contextual factors, such as interpersonal relationships with family and peers, the physical environment involving food accessibility and availability, cultural background, the economy in terms of marketing food for profit, and social status—including income, education and gender (Chapman, et al., 2012; Ranie, 2005; Sevenhuysen, 2003). People who immigrate to Canada are growing in number and increasingly are of diverse cultures. For example, in 2011 there were over 200 ethnic origins and this number is continued to increase, identified by Statistics Canada. This growth and diversity in cultures may open many opportunities for food processing and food production to provide specialty and ethnic products (Ranie, 2009; Wasserman, 2009). When food obtains a psychological meaning, it is no longer simply a means of nutrients. Food habits are a learned process, and the psychological causes of eating are varied. For example, one factor that influences food choices is children's upbringing, how the children are fed, and why food is given to them (Ranie, 2005; Taylor, 2005). Another factor that can affect the food people choose is education during one's life experiences. More educated consumers may be inclined to choose products that provide benefits beyond the fundamental nutrition such as nutraceuticals, beverages, functional foods and products with

specific quality characteristics (Agriculture and Agri-Food Canada, 2008; Wansink, 2004). These factors form the background for healthy food choices (Gibney, 2004).

The Government of Canada recommends that every Canadian choose foods according to the Canadian Food Guide (Raine, 2005). According to Canada's Food Guide the Canadian government uses policy to ensure adequate food production and relevant education for Canadians to adopt good nutrition and healthy lifestyles (Bush, 2007).

Obesity is one of the main causes of several chronic diseases such as diabetes and heart disease (Haffner, 1998). Despite the fact that information on healthy diets has been widely available for many years, obesity rates do not decrease (Delormier, et al., 2009). Obesity has been linked to environmental and societal factors that may lead to overeating, and less physical activity (Delormier, et al., 2009). Research has linked obesity prevention to changing the behaviour of individuals (Nestle and Jacobson, 2000). Diabetes is a chronic disease resulting from obesity (Ponikowska, 1996). The prevalence of type 2 diabetes continues to increase worldwide (Wild, 2004). From the medical point of view, numerous research studies have been conducted to understand the difference between the factors that influence adherence to treatment in individuals with type 2 diabetes, such as complexity of drugs, diabetic knowledge, side effects, cost of treatment and social factors, including the physician-patient relationship (O'Donohue, 2006). However, few studies have discussed adherence to dietary advice and food choice behaviours, and this will be one of the main objectives of this present study. A review of Canadians' diet will be addressed in the literature review.

People receive nutrition information, including advice about actions that can help to avoid diabetes, from many different sources. However, there appear to be gaps between the information people receive and the actions(s) they take—if any. Many people do not respond to

diabetes nutrition information until it is too late; they have the disease. Once they have the disease, they need different information and advice to deal with the new situation. Reasons for this gap between receiving useful information and taking useful action need to be investigated.

This study aims to address the interpretive gap in the use of nutrition information by describing food behaviours of women with type 2 diabetes in Winnipeg, and to identify the perceptions and environmental factors associated with food choices, including those factors that may not promote health.

CHAPTER 2 LITERATURE REVIEW

2.1 FOOD AND HEALTH STATUS

Food choices can affect an individual's health status (Chapman, et al., 2012). Although most people are aware of the importance of health and are given advice about the way different factors could affect their health, large numbers of people still ignore and fail to follow this advice. There are several reasons that clarify why people do not follow the nutritional advice, including: taste of food, deficiency of resources, lack of awareness of the importance of complying with nutrition instructions, health beliefs, difficulty in sticking with a balanced diet for a long time, and personal attitudes (Slater, 2012). The personal attitude toward unhealthy food choices might come from believing that all food has the same effect on the body. In addition, from the social point of view, sometimes people with a health condition want to be seen as normal within their society, whether they follow the nutritional advice or not. Some individuals would prefer to do something that satisfies them rather than worry about the effects that might occur later in life (Sevenhuysen, 2003).

2.2 CHANGES IN EATING PATTERNS

People tend to eat the meals that they have grown up with; therefore, meal patterns reflect their dietary patterns (Chapman, et al., 2012). Only dramatic changes in circumstances, such as immigrating to another country or getting married, would change their dietary patterns (Kohinor, 2011). Diet has an important role in the majority of the chronic diseases that have led to the largest cases of death worldwide (Yach, 2004).

Dietary pattern analysis has developed to examine the association between the risks of chronic diseases and diet (Hu, 2002). “Pattern analysis examines the influence of overall diet rather than considering specific nutrients” (Schroder, 2007). Moreover, dietary patterns cover a broader image of food and nutrient consumption, and therefore can anticipate higher risk of disease than a study of specific foods or nutrients (Kastorini & Panagiotakos, 2009).

According to Canada’s economy Report of November 2009, people favour eating simpler meals with main courses, at home. Eating patterns among Canadians at home indicate that people are looking at food differently, in that the number of meals that people eat and cook at home, and take from home, are consistently increasing. In addition, planning meals in advance and eating foods at non-traditional times, such as eating cold cereal for snacks and yogurt for evenings, as well as replacing eating out at restaurants with eating more meal replacements at home have become very common (McCann-Hiltz, 2009). Changes outside home include carrying lunch from home more often, eating out in restaurants less often, using more grocery coupons and eating at less expensive restaurants (Delormier, et al., 2009). It appears eating patterns are changing, although the demand for taste and convenience continues to be high (Myers, 2006).

2.3 FACTORS AFFECTING FOOD CHOICES

There are many reasons for eating specific foods every day. People with *busy schedules* often do not have enough time to purchase food ingredients to prepare meals and share them with their families (Martins, 2005). Specifically, Canadians are exposed to many different and sometimes conflicting nutrition messages every day because food is available everywhere at all times, and families and peers also influence their way of eating (Bush, 2007). Furthermore, *parents* are models in helping children to an enriched taste for healthy food. Taking the time to prepare meals for the family supports the valuable moment of being together and helps children to develop a healthy attitude toward food (Cutler, 2012). Despite the challenges that people face in eating healthy food, it is possible for people to adapt healthy eating practices. Canada's Food Guide provides practical advice about healthy eating for children, adults and seniors from all cultural backgrounds. Educators are in a position to influence the choices that people make (Delormier, et al., 2009).

Studies about eating of behaviour and food characteristics in humans reveal that energy intake is influenced by *food environment* properties (Wardle, 2007). Similar studies shown that consumption of calories is greater when the meal consists of different foods, the food is displayed in energy-dense formulations and the food is more palatable, compared with a meal that consists of a single food type (Martins, 2005). *Food taste* is usually related to good consequences such as being a source of calories, which tends to make food more favorable. Therefore, *food preferences* are usually changed as a consequence of people's experience and disease conditions (Dammann, 2009). The effect of familiarity in which familiar foods are preferred because of past favorable experiences, can readily be seen in children (Wardle, 2007). This will lead to maximizing food consumption when there is plenty of food and allows selecting

safe, energy-dense foods (Myers, et al., 2006). There is a difference in food preferences within and between cultures. For instance, our ancestors more likely preferred to eat sweets in the form of fruits, and avoided sour foods that were more likely to be poisonous (Rozin, 1982). Also, the preference for salt could be necessary, as adding salt to a meal is necessary in maintaining the body's natural sodium balance (Shepherd, 1986). It is difficult to prove the validity of adaptation as an explanation of human behaviour toward food choices.

It has been found that the hypothalamic response following glucose ingestion is delayed significantly in obese individuals. This suggests that obesity could be associated with an abnormal neuronal activity in some regions of the brain and a delayed response in satiation over the course of a meal (Matsuda, et al., 1999). Some studies point out that obesity may be partially due to a greater response to outside food cues and a lower response to inside satiety cues (Jasinska, 2012). Results of children have confirmed this hypothesis. For example, the food intake of obese children at meals test was depressed by administering a fixed amount of a given food and was stimulated by exposure to the food smell (Rudderman and Wilson, 1979). Also, there is evidence that differences in appetite reactions are heritable (Kissileff, 1984). Weight gain is more likely to be the outcome of an interaction between individual hereditary reactions to foods and the environment factors to which individuals are exposed (Carnell, et al., 2007). Thus, to understand food acceptance and food rejection, it is necessary to consider human nature. As food varies, humans potentially consume an extensive range of edibles, and avoid unfamiliar foods (Wansink, 2003).

2.4 FOOD INSECURITY

One of the factors that might hinder people from following nutrition advice is a difficulty in accessing food. According to The World Food Summit, food security defined “when all

people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life." (FAO, 1996, para.1). In other words, food insecurity represents problems of inadequacy of food supplies in households; therefore, reduced the quality of consumed food and is often associated with the household's financial ability to access sufficient food (Huet, et al, 2012). The following figure shows the interaction between factors that influence food security either food supply or food access. (See Figure 1)

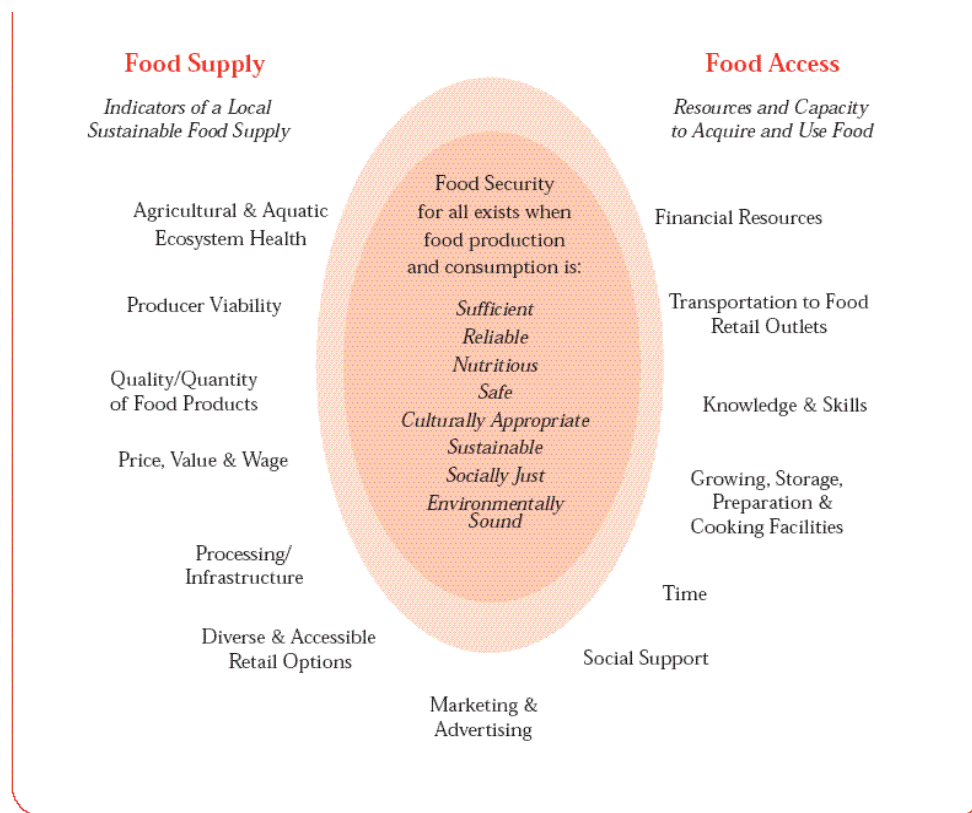


Figure 1: Determinants of food security (Adapted from Atlantic Health Promotion Research Centre, Nova Scotia Nutrition Council, 2006).

Generally, few studies have discussed how food insecurity impacts different eating patterns among Aboriginals (Willows, 2011). Aboriginal households are more likely than non-

Aboriginal households to experience the social factors related to food insecurity such as extreme poverty, living in a rental accommodation, single-motherhood and reliance on social assistance (Willows, 2005). Food insecurity remains a higher risk for aboriginal households, whether related to food from the market or traditional sources (fishing, hunting); broader factors such as climate change and environmental pollution may be important (Daniel, 1999). To develop the right interventions when approaching the field of food insecurity of aboriginal people, it is necessary to consider their beliefs, habits, cultures and political systems (Huet, 2012). In the short term, food insecurity can be a reason for hunger, and anxiety related to a lack of energy and deficient resources. It can also lead to feelings of exclusion and social disruption to family life. In the longer term, the individual response to food insecurity can lead to both overweight or obesity because of poor nutritional quality foods and because foods that are high in salt and/or sugar and high in fat are usually the lowest cost options; whereas, diets that are based on whole grains, fresh vegetables, fruits and lean meat cost more (Iwasaki, 2004). Moreover, children are particularly vulnerable to both the longer-term and short-term effects of food insecurity as it impacts both their physical and socio-emotional development and learning abilities (Fergie, 2005). Further, experiences in early life are recognized as a factor in increasing over-weight and chronic disease in adulthood (Power, 2005). The WHO Report of Diet, Nutrition and the Prevention of Chronic Disease (2002) states that food insecurity could be a reason for poor nutrition, as well as having an effect on an individual's physical and mental ability and social life. There have been insufficient policy programs or research focused on food supply and food access, and the majority of urban based nutrition programs focus on education (Browne, 2009). While food and nutrition education can be important to enhance the quality of diet, effectiveness depends on healthy food being both available and accessible (Huet, 2012).

2.5 CHRONIC DISEASE – TYPE 2 DIABETES

According to WHO (1999, p.1) diabetes mellitus “a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbance of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both”.

According to Canadian Diabetes Association (2013, ch.14) “type 1 diabetes mellitus is primarily a result of pancreatic beta cell destruction due to an immune-mediated process that is likely incited by environmental factors in genetically predisposed individuals”; whereas, “type 2 diabetes is a disease in which your pancreas does not produce enough insulin, or your body does not properly use the insulin it makes” (Canadian Diabetes Association, 2010, p.1). Type 2 diabetes rates, likely linked to obesity and a sedentary lifestyle, continue to rise in Canadian populations along with the growing rates of obesity (Fung, 2001). The focus of the present study will be on type 2 diabetes which is diagnosed if “the (venous) fasting plasma glucose value is ≥ 7.0 mmol l⁻¹ (126 mg dl⁻¹), or if the casual plasma glucose value is ≥ 11.1 mmol l⁻¹ (200 mg), or if the plasma glucose value 2 hours after a 75g oral load of glucose ≥ 11.1 mmol l⁻¹ (200 mg)” (WHO, 1999, p.1). According to the Diabetes Classifications Committee Report (1997) hyperglycemia is a term characterized by elevated blood sugar that describes diabetes mellitus. Individuals having type 2 diabetes are often referred to as non-insulin dependent diabetics. This may be because there is less insulin produced in the blood, or the cells of the body are resistant to insulin, which means the cells do not respond to insulin.

It is more likely that type 2 diabetes will occur in adulthood, and its prevalence has been claimed to increase with age (Glasgow & Nutting, 2004). Type 2 diabetes is the most spreading among all types of diabetes, comprising 90-95% of all cases of diabetes (Rubin & Peyrot, 2001). Hypoglycemia is the term used to describe low blood sugar levels; individuals with diabetes have

to be concerned with hyperglycemia. They might experience hypoglycemia if they inject too much insulin, get too little exercise or eat too little food (Lawton, 2004). Individuals with diabetes have also been found to have general anxiety symptoms and generalized anxiety disorder (Grigsby, 2002). Treatment of type 2 diabetes consists of lifestyle modifications that involve diet and exercise, oral medications, and/or insulin injections (Goodall & Halford, 1991). Individuals demonstrate preoccupation with having or obtaining a serious illness due to the association of health anxiety with many factors that also influence treatment adherence. This includes the amount of information obtained by an individual regarding a disease emotion-focused coping and satisfaction with health care providers (Bourgault-Fagnou & Hadjistavropoulos, 2009).

The prevalence of diabetes is changing rapidly; type 2 diabetes has now spread to every country in the world. Chronic disease and diabetes are serious growing public health problems within the First Nations populations of Manitoba (Haffner, 1998). According to Manitoba First Nations Chronic Diseases and Diabetes in 2012, the number of individuals with chronic disease conditions, including diabetes, has continued to increase along with the prevalence of disease related to other diabetes complications including heart disease and stroke, renal failure, hypertension, loss of eyesight, infections and foot ulcers. O'Neil, et al., (1998) revealed that the incidence of First Nations people requiring diabetes education is increasing in a system where health care services are limited.

The gap between the need and the availability of health services increases significantly every year. The result is a substantial increase in costs to the system (Peterson, 2008). In addition, there is a greater risk specifically for chronic diseases when compared with other risk factors such as personal health practices (stress, diet, physical activity, exposure to

alcohol/tobacco/smoke) (Mokdad, 2003). Furthermore, the death or illness of parents or caring adults can lead to increasing poverty of First Nations children (Adelson, 2005). Generally, diabetes is reported to affect more cases of Aboriginal individuals, specifically adults over 40 years, and children and youth of high-risk (First Nations Centre, 2005; Kirmayer, 2000). According to the Canadian Diabetes Association (2010), over two million Canadians have been diagnosed with type 2 diabetes and this number is anticipated to increase to three million by the year 2025. Patients with diabetes face medical fees for care that are higher than people without diabetes. In addition, life expectancy declines by 5-10 years among people with type 2 diabetes (Dinca-Panaitescu, et al., 2011). Epidemiologically, in Manitoba Aboriginal women with diabetes frequently are admitted to hospitals for acute pyelonephritis during pregnancy (Kliwer, 2002). Yet diabetes raises the chances of infections as well as affecting people's psychosocial state (O'Neil, et al., 1998). Diabetes is a multi-factorial disease, including both environmental and genetic tendencies (Haffner, 1998).

Maintaining ideal body weight and promotion of healthy behaviours are very important to be included in primary diabetes prevention programs (Hu, 2011). There have been community-based diabetes prevention projects all across Canada, e.g. British Columbia, Manitoba and Quebec, in stores or schools (Bhattacharyya, 2009). Thus, coping with diabetes is not exclusive to hospitals or clinics; it requires participation from the whole community, government voluntary agencies, Aboriginal organizations and health care professionals to attain the required management prevention of disease (Daniel, et al., 1999).

2.6 POPULATIONS AFFECTED

According to Centers for Disease Control and Prevention (2011) type 2 diabetes is found more often in adults than among children and youth. The factors that put people at risk are

obesity (at age 40 or over), genetic susceptibility, obesity as a child, high blood pressure and high cholesterol or fatty acids in the blood (Hariri, 2011). Heart disease or strokes are the most common causes that about 80% of diabetic patients die of (Canadian Diabetes Association, 2009). Among Canada's First Nations and Inuit, Type 2 diabetes is a health concern (Jin, 2002). The rate of diabetes among First Nations who are on reserve is 3-5 times higher than that among other Canadians (O'Neil, 1998). Because of the risk factors such as obesity, physical inactivity, and unhealthy eating patterns; diabetes prevalence is anticipated to rise in the future (Health Canada, 2009). While diabetes occurs in people of all ages and ethnicities, some groups have a greater risk of getting the disease than others (Carter, 1996). Centers for Disease Control and Prevention (2011) claimed that diabetes is more common among African Americans, Native Americans, Hispanic and Asian Americans, the aging population and Pacific Islanders. However, the interactions between diet, lifestyle and genetic background may accelerate the increase of diabetes (O'Neil, et al., 1998).

2.7 FOOD MEDIATED DISEASE

Despite the fact that malnutrition has a significant role in developing type 2 diabetes, specific dietary factors have not yet been determined. In fact, the relationship between the amounts and type of fats and diabetes, and carbohydrates are not very clear (Hu, 2001). A damaging issue to human health status is lack of exercise and a sedentary lifestyle (Chapman, 2012).

According to Swinnen (2009), the pancreas starts producing less insulin as we age which may lead to high blood pressure and high cholesterol. In addition, regular consumption of high glycemic foods may contribute to developing type 2 diabetes. However, it has been noted that many people consume these foods without getting the disease (Wardle, 2007). Moreover, foods

with a higher glycemic index might have the same sugar amount as foods with a lower index. This area needs active exploration, including the possibility that a diet with a low glycemic index could lower the risk of diabetes especially among those who have a family history of diabetes (Mitka, 2012). Malik (2010) claimed that drinking high sugar-sweetened beverages raises the risk of type 2 diabetes.

Furthermore, trans fat intake is associated with adverse cardio-metabolic risk profiles and increases heart disease possibility, and may also lead to insulin resistance and long-term inflammation (Kastorini, 2009). Insulin resistance is a sign that indicates a difficulty in glucose metabolism, and this can develop into high cholesterol levels and high blood pressure (Virtanen, 1994). Researchers cannot understand the causes of insulin resistance completely; however, they suggest that the excessive fat around the body organs decreased insulin sensitivity (Pelikanova, 2001). It has been claimed that diets full with monounsaturated fatty acids and polyunsaturated fatty acids could enhance lipid profiles and control glycemic index of people with type 2 diabetes (Martines-Gonzalez, 2008). Higher intake of nuts has been recommended for decreasing the risk of type 2 diabetes (Lovejoy, 2005). The fat consumption increased the energy intake with 18% whereas other elements of food 22%, which may be a cause for developing type 2 diabetes (Statistics Canada, 2002).

Despite the belief that artificial sweeteners are effective in decreasing body weight, studies have found that these free-caloric sugars stimulate the appetite, and the desire for eating carbohydrates, leading to increased weight (Malik, 2010). Interestingly, there is a positive correlation between artificial sweeteners and weight gain, and experiments have found that in spite of caloric content, the sweet taste enhances the appetite, and therefore may develop over caloric-intake and body weight gain (Bellisle, 2007; Davidson, 2011). Regular sugars supply the

human body with sufficient calories and consequently activate the signals of satiety. However, when sweetness stimulates the appetite and the body does not receive the required calories, the feeling of craving more food will develop (Vartanian, 2007). In a black women's health study, the increased consumption of soft drinks and fruit drinks was seen as increasing the risk of diabetes in a long-term study of approximately 60,000 African-American women in the United States (Palmer, et al., 2008). In one study, men and women who consumed one or more soft drinks per day were 25% more likely to have trouble controlling their blood sugar and 50% percent more susceptible to experience metabolic syndrome (Nettleton, 2009). Increasingly, risk factors such as higher insulin levels, central obesity, high blood pressure, low HDL cholesterol and high triglycerides levels might lead to developing heart disease or type 2 diabetes (Dhingra, et al., 2007). Some researchers believe that drinking diet soda may stimulate the appetite and increase the desire for eating carbohydrates leading to weight gain and probably type 2 diabetes and metabolic syndromes (Bellisle, 2007).

A large national study completed in 2007 showed that people who had one or more servings of diet soda every day had a high risk of developing type 2 diabetes: 67% higher than those who did not drink diet soda (Franz, 2010). Although no direct role of diet soda in type 2 diabetes development was reported in the study, the researchers suggested that drinking sugar-free soda may have an indirect influence on the risk of diabetes by affecting insulin function and leading to gain weight (Yantis, 2010). Overall, many factors contribute to developing type 2 diabetes, such as obesity, stress, micronutrient deficiency, fats, heart disease and high blood pressure (Young, 2000).

2.8 DIABETES AND EATING PATTERNS

“Dietary patterns associated with the prevention of type 2 diabetes are distinguished by high consumption of fruits, vegetables, whole grains, fish and poultry, and low consumption of red meat and processed foods: in short, a Mediterranean diet” (Kastorini & Panagiotakos, 2009). Forty years ago dietary patterns for Canadian Aboriginal people shifted from the traditional diet that was low in sugars and high in protein and complex carbohydrates to a diet high in energy and saturated fats (Delormier, 2009). Moreover, dietary behaviour is substantial in blood glucose management among people with type 2 diabetes to prevent complications on the long run (Nothlings, et al., 2011). Statistics show that diabetic participants consume more protein than non-diabetics; however, there are variations in fibre intake (Young, et al., 1990). In a study of diabetic patients, food patterns with high potato, butter, meat and whole milk were observed to increase the risk of type 2 diabetes, while patterns with vegetables and fruits were associated with a decreased the risk of type 2 diabetes (Chandalia, et al., 2000). Overall, a diet rich in fats, refined grains and French fries raises the risk of type 2 diabetes; whereas, diets that are full of fruits and vegetables decreased the risk of the disease in Canadian society (Montonen, 2005). Fats and carbohydrate types are important determinants in type 2 diabetes development (Chandalia, et al., 2000). In particular, food with higher dietary glycemic load (GL) and trans fats are related to increase the risk of type 2 diabetes; whereas, higher consumption of complex carbs (cereal fibre) and polyunsaturated fat are related with decrease risk of diabetes (Everitt, et al., 2006). Evidence suggests that two servings/day of whole-grain is associated with a 21% lower risk of diabetes (Hu, 2011).

Canada’s Food Guidelines (2007) claims that a healthy eating pattern is based on scientific evidence that was developed by finding the difference of combinations in food types

and quantities to obtain healthy eating patterns to satisfy nutrient demands. In general, dietary carbohydrate is the main element that determines glycemic index for diabetes (Atkinson, 2011). According to Canadian Diabetes Association the suggestion for carbohydrate intake is not less than 130g/day. In addition, they recommend 60-70% kilo-calories of starch intake. The quantity of carbohydrate intake with fibre is more beneficial for controlling the glycemic index versus the consumption of carbohydrates exclusively. Complex carbohydrate consumption is preferred for diabetics (Griel, et al., 2006). A person with type 2 diabetes is often advised to avoid foods with high sugar content and to maintain a balanced diet and medication schedule to keep the blood sugar level as normal as possible (Erbe, 2009). Controlling (lowering) blood sugar might decrease the development of certain complications of the disease (Griel, et al., 2006). Although it is true that avoiding many risk factors including obesity may reduce the possibilities of type 2 diabetes, specific types of foods may play a little role (Gittelsohn, 1998). A study looked at the higher fructose corn syrup consumption rates found to be related to an increase in the prevalence of type 2 diabetes (Bray, 2008). Researchers discovered that countries where consumption of fructose corn syrup (HFCS) is high, type 2 diabetes rates are 20 % higher, compared to the disease rates in countries having low consumption of this specific syrup (Goran, et al., 2012).

The Canadian Diabetic Association has declared that there is no clear evidence that indicates which specific food items can cause diabetes. However, some studies have suggested that this disease could occur when the intake of energy exceeds the recommended intake or overweigh the energy intake from fats or protein (Cutler, et al., 2012) Simple sugars such as white or refined starches break down quickly and increase the glucose in the blood. A quick rise in blood glucose can often be followed by a quick drop and can lead to cravings for more sugary foods and feelings of hunger and fatigue (Hodson, 2008). In addition, milk-opioid peptides, other

peptides, hormones and growth factors in milk might raise insulin secretion (Saukkonen, et al., 1998). Consequently, the blood-glucose level fluctuates, especially after consuming a small amount of fats, which subsequently exhausts the insulin-energy cells that leads to diabetes (Sheard, 2004).

Franz (2002) suggested that a moderate amount of sugar can be added into a healthy diet, and the sucrose and sucrose-containing foods need not be restricted completely for people with type 2 diabetes.

2.9 FACTORS AFFECTING FOOD CHOICES

Many reviews of studies by the Canadian Diabetes Association show education and income as dimensions affecting the probability of having of diabetes in low socio-economic households (Dammann, 2009). Also, the socio-economic conditions have a significant effect on psychosocial characteristics of the individual as well as their health over time (Health Canada, 2003). For instance, First Nations people's health is determined by complex interactions between social and economic factors, including living environments, surrounding environments, genetics, income, education, and personal relationships (Willows, 2005). Chronic diseases force additional direct and indirect expenditures on the poor, which can push families into poverty (Wray, et al., 2006).

A major factor of food choice is the ability of a person monitoring his/her intake to decide how much food could be eaten in a distracting environment (Kral, 2004). Eating is a biological process that has several aspects that are difficult to monitor sometimes and can cause individuals to focus more on food choice, rather than food volume (Wansink, 2004). Another major factor affecting food choice involves people's lack of knowledge about the energy or nutrient content of foods, which becomes a problem over the long-term when they intend to

reduce consumption of energy, fat and sugar (Wansink & Linder, 2003). Mainly, external factors affect eating behaviours by interfering with consumption habits or the ability to monitor how much has been eaten (Wansink, et al., 2009). For many people, making a decision on how much to eat or drink is difficult, so instead they rely on consumption norms to help in choosing food quantities. Food consumption may be influenced by how much and how often one buys food (Wansink, et al., 2004). Consumption may also be affected by other cues in the environment such as package size, variety, portion size, or the presence of others. These norms suggest an optimal quantity that should be considered during eating (Wansink, et al., 2009).

2.10 DIET MANAGEMENT

For Manitobans who are living with diabetes, early detection, treatment and health care accessibility are very important. Government is collaborating with many organizations in order to prevent chronic diseases such as type 2 diabetes and to minimize complications (Peterson, et al., 2008). The person who experiences the disease needs to be involved in self-care management of the disease (Mitka, 2012). Individuals with risk factors should be tested frequently from an earlier age (Lawton, 2004). Additionally, the educational material has to focus on economical ways as well as on ways to manage diet efficiently (Vijan, 2005). A healthy diet containing vegetables and fruit might help in decreasing the risk of type 2 diabetes. The eating pattern outlined by Canada's Food Guide determines the DRI for carbohydrate, protein and fat in the diet for various age groups. It can also be used as a guide for calorie contents of a diet that provides required energy and other nutrients. For example, AMDR for carbohydrate is 45%-65%, protein 10%-35% and fat 20%-35% of the total caloric intake (Raine, 2005).

According to the Canadian Diabetes Association, people with type 2 diabetes should consider eating a low fat, reduced-calorie and low-sodium diet based on heart-healthy food

options. These people also have to monitor the amount of carbohydrates consumed. Nutrition counselling is essential in diabetes self-management (Desroches, et al., 2013). Moreover, nutrition education can be conducted whether individually or in group settings would enhance patients understanding about their food including carbohydrate choices that influence their diabetes management (Bhattacharyya, 2009). The use of insulin or oral medication may demand snacks in order to avoid hypoglycemia among patients with past experience of hypoglycemia American Diabetes Association (2014). Medical treatment plans should include these snacks as prescribed only by health care providers as needed (McCulloch, 2000).

In spite of medical management is important, self-management is also a main factor in type 2 diabetes individuals health (Goodall and Halford, 1991). Diabetes treatments have often requires patient willingness to cooperate with difficult lifestyle changes (Vijan, 2005). However, although adherence to prescribed therapy is necessary, there is little information on patients' views of and preferences for different types of therapies (Yach, 2004). Diet is considered a base for type 2 diabetes management and is usually a first-line therapy (United Kingdom Prospective Diabetes Study, 1995).

The benefits of managed diet are high; appropriate diet and exercise can result in improved glycemic control, reduced cardiovascular risk and overall death rates (Metz, 2000). According to UK Prospective Diabetes Study (1998) long-term studies of patients with type 2 diabetes could not show sustained weight loss or glycemic improvements with dietary behaviour changes alone, few studies have discussed the reasons for that and how patients look at dietary restrictions.

2.11 SERVICES AVAILABLE

To reduce the prevalence of diabetes, primary prevention through promotion of a healthy lifestyle should be a global public priority (Hu, 2011). In 2004, a province-wide Regional Diabetes Program (RDP) was launched to improve Diabetes Education Resource Program which includes regular assessment for individuals at risk of type 2 diabetes and assessment for the complications for individuals living with diabetes. Assessment of risk includes awareness and education components to help individuals identify positive behaviour change (Diabetes in Manitoba, 2009). In order to have better healthy choices, people must learn about the foods that will help to maintain health, as well as find healthy food options through reading and understanding the nutrition labels on products (Delormier, et al., 2009). People can determine the specific content of food products by reading the ingredients on the product's label. For example, whole grain foods indicate for the words "whole" or "whole grain" that come after the name of the grain as one of the first ingredients (Jacobs, et al., 2000).

2.12 ADHERENCE

The first step in understanding the mechanism of adherence in depth is to define this term. According to the World Health Organization adherence "is the extent to which the patient follows medical instructions. However, the term "medical" was seen as narrow and appropriate only for interventions used to treat chronic diseases" (Sabaté, 2011, p.3). A wider definition, "Adherence is the active, voluntary, and collaborative involvement of the patient in a mutually acceptable course of behaviour to produce a therapeutic result" (Meichenbaum & Turk, 1987, p.20).

Evidence supports positive dietary modification and adherence to advice, in spite of many environmental, behavioural and psychological factors that can influence the food habits of

individuals negatively (Desroches, 2013). Researchers have found that the following factors would probably affect adherence to treatment such as factors related to the individual: anxiety, depression, stress, coping styles, perceived barriers; the treatment and the disease: complexity of treatment, adverse or side effects; social support, patient-provider relationships, comprehension of treatment, and treatment setting or treatment costs: accessibility, staff cooperation (O'Donohue, 2006; Mishali, et al., 2007). For example, Peyrot, et al., (2006) pointed out that 70% of their participants with diabetes had difficulties with treatment adherence for psychological reasons. Other scientists have suggested that type 2 diabetes is mainly influenced by the availability of family, social relationships and satisfaction with the relationship with their physician (Mishali, et al., 2007). A study by Howteerakul, (2007) demonstrated that patients with diabetes were highly adherent to medication use (92.2% with good adherence), less adherent to diet (54.3%), and even less adherent to physical exercise (31.7%).

These results are similar to past research indicating that patients with diabetes state that they struggle most with managing diet and exercise (Glasgow, et al., 1997). Furthermore, effective behavioural treatments focus on helping people to control and monitor the exposure to triggers that affect their eating in order to modify their behaviour (Carnell, et al., 2007). Studies that focused on dietary behaviours amongst people with type 2 diabetes found that patients are less adherent to exercise or diet and most adherent to taking medications (Jin, et al., 2008). In one study that tested food behaviours of adults with type 2 diabetes, 60-75% failed to eat the appropriate types or amounts of food at the correct time (Pendleton, 1987).

A review of the adherence of patients with diabetes suggested that individuals are commonly non adherent (Kurtz, 1990). In a study, only 7% of patients with diabetes were fully adherent with all aspects of their regimen (Brownell, 1995). Poor adherence can be a risk to the

health of patients, and adherence to dietary advice is significantly important in managing chronic diseases (Desroches, 2013). There is no full agreement on a combined specific set of self-care behaviours that could be applied to all patients with type 2 diabetes. Without defining these behaviours, the regimen to diabetes will not provide accurate measurements to allow adherence to occur among patients (Lewis, 1989). There are several barriers that prevent these diabetes self-care behaviours (Brownell, 1995). One barrier to following the prescribed diet plan for type 2 diabetes is the cost of healthy food that exceeds what the patients can afford. Another issue that affects the patient's adherence to the diet is the portion sizes, which is obvious among elderly when they were asked to eat little or inadequate quantities of meat items. For example, three ounces of meat each day is the requirement for eating within the limits (Smith, 2004). In addition, social and family supports are quite important to keep the pace of commitment towards dietary instructions. The last barrier is the difficulty of managing eating during holidays or special occasions, when people usually eat different kinds of foods varied in carbohydrates and meats. Thus, controlling some food items could be a challenge to people with type 2 diabetes during these times (Vijan, et al., 2005). Apparently, there is no recent data on the area of research on understanding adherence and diet.

2.13 THE FIVE DIMENSIONS OF ADHERENCE: (WHO, 2003)

2.13.1 Social and economic factors

According to the WHO (2003), socio-economic status may force patients to choose between compulsive priorities that are more likely to reduce the use of resources to fulfill the demands of all family members, both parents and children. Some of the factors that are observed to have a substantial effect on adherence are: illiteracy, poverty, low socio-economic status, low education level, unemployment, lack of productive social support, distance from the treatment location,

high transportation expenses, changes in living conditions, higher medication expenses, and unstable environmental situations (Haynes, 2002).

2.13.2 Health care team and system-related factors

There are many factors that have negative effects on the health care system. These include: poor health services with insufficient refunds by plans of health insurance, poor medication systems, knowledge deficiency and lack of training for health care providers in order to manage chronic diseases, short duration of consultations, the system's low capacity to educate patients and provide regular follow-ups, deficiency of community support, lack of knowledge about adherence as well as lack of effective interventions (Rose, et al., 2000).

2.13.3 Condition-related factors

A patient with a chronic disease usually faces specific illness-demands related to his condition-related factors. Some potential determinants of adherence are those linked to the symptoms severity, disability level (vocational, psychological, physical and social), rate of progression and the availability of efficient treatments. These factors determine the influence of the patient's perception and the effect of the importance of the follow-up treatment, and co-morbidities (Ciechanowski, 2000).

2.13.4 Therapy-related factors

Several factors of therapy are associated with adherence. The most observable factors are those associated with the medical treatment plan, duration of this treatment, the onset of beneficial effects, frequent changes in treatment side effects, and medical support to handle these factors. Interventions for adherence should be agreeable with the patient's demands in order to achieve effective outcomes (Farmer, 1999). (See figure 2)

2.13.5 Patient-related factors

Patient-related factors are associated with resources, attitudes, beliefs, knowledge, patient's perspective. Additional factors include the awareness of patient's about their illness, trust in their ability to attain illness-management, their motivation to manage the illness and their expectations about the outcomes of treatment. The influence of adherence behaviour is not covered clearly (Farmer, 1999), see figure 2.

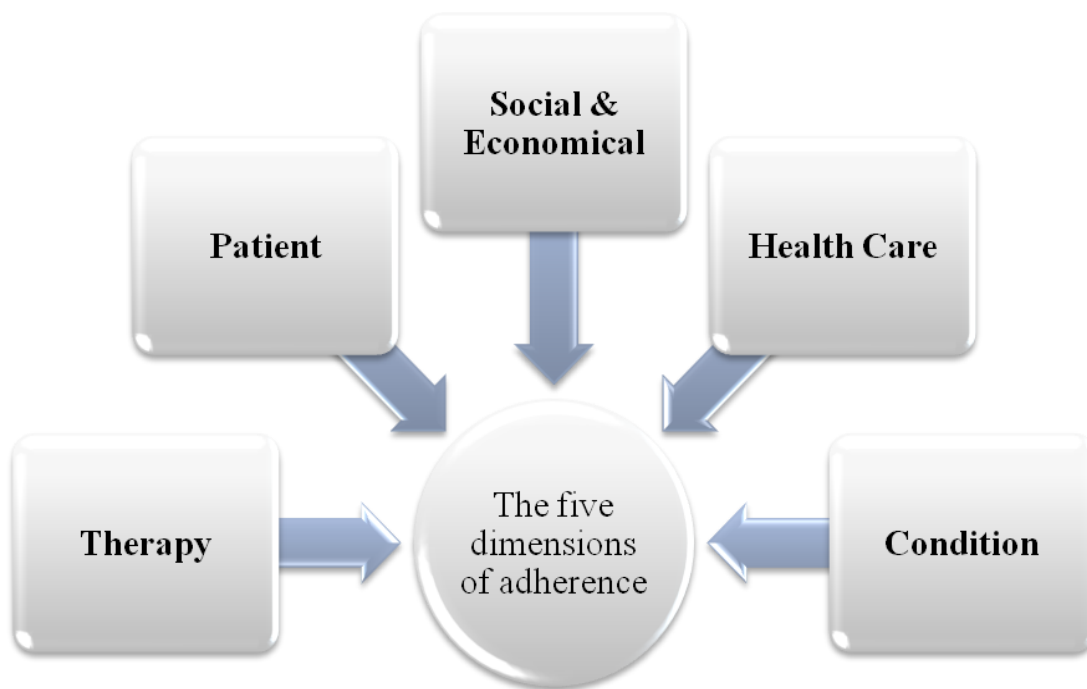


Figure 2: The five dimensions of adherence (Farmer, 1999; WHO, 2003).

Good adherence to treatment for diabetes leads to avoidance of health complications for patients and lowered costs to the health care system (Nau, 2012). The control of diabetes can be expanded to modify lifestyle. According to American Diabetes Association self-management, maintaining blood glucose levels, modifying diet, foot care and eye examinations have all been addressed to reduce significantly the rates and the progression of diabetes. Poor adherence to

standard care is the main cause of type 2 diabetes complications and other related individual, social-economic costs (Liebl, et al., 2001). Patients with type 2 diabetes often suffer of medical conditions that make their treatment more complicated such as hypertension, obesity and depression result from poor adherence (Liebl, et al., 2002).

According to WHO (2003), the economic and health load of diabetes is increasing. The healthcare system spends in treating patients with type 2 diabetes costs in excess of 1.5 times the per capita health care expenditure. The complications cost from poor control of diabetes are 3 - 4 times higher than those of proper control (Henriksson, et al., 2000; Herman, et al., 1998). Clearly, an individual's social and economic benefits would be significant; if health care systems were more efficient in adherence to diabetes management (Caraher, 2004). Most of the studies discussed adherence to diabetes treatment; however, few focused on adherence to dietary advice through people's food behaviours and choices. This will be discussed further by the present study.

2.14 METHODOLOGY CHOICES

More comprehensive individual data on food patterns and food perceptions are needed to answer the study's research questions. Qualitative descriptions of individual's food patterns and perceptions can generate data to answer the research questions. Common methodologies for such data include:

24-hour recall interview: Data is collected on the food items eaten in one 24-hour period, together with their amounts, meal combinations and time of day. The data collection needs to be repeated 7 times to begin to estimate the usual diet (Ma, 2009). The data collection does not include qualitative data.

3-day food record: Data is collected on 3 days of food intake. The three days do not represent the usual diet. Analysis is time consuming because the data has to be verified with the respondent before data entry (Thompson, 2008). No qualitative data is included.

Food frequency interview: Data is collected on a pre-defined set of food groups and foods. Only semi-quantification of the food amounts is possible (Field, et al., 1999). The limited number of foods used in this method does not fully represent the food choices of the respondents in this study. The data is limited, as food choices cannot be associated with food perceptions.

Food choice map interview: Data is collected on a usual week of food intake of the respondents. Data on alternative meals, and substitute foods, in a usual week is included. The data is represented as a food pattern. The data can be quantified, and weekly nutrient intakes can be calculated. This method is designed to include qualitative data related to food and health behaviours (Shuaibi, 2008).

2.15 GAPS IN KNOWLEDGE

The understanding of the reasons that individuals with diabetes use to make food choices is incomplete. People with type 2 diabetes are, as are other people, influenced by factors that surround their food choices, such as cultural influence, personal preference, and social and economic status. A number of perceptions and environmental factors associated with food choices do not promote health. Identifying the various factors that influence food choices and behaviours might help in designing support programs for individuals who have diabetes but whose needs and daily lives may differ.

Most studies have pointed to the importance of diabetic self-management, and the related factors, but few studies have reported the reasons for adhering to dietary advice. Health care services have an important role in delivering knowledge and information to people with type 2

diabetes demands that will require taking into account their environment. The research questions and objectives of this study will address this issue, which could be relevant to improving the effectiveness of health and nutrition education.

CHAPTER 3 RESEARCH DESIGN

3.1 RESEARCH QUESTIONS

- 1- What factors appear to be related to food perceptions and/or food behaviours that are expressed by women with type 2 diabetes?
- 2- What factors and perceptions toward food are associated with adherence to dietary advice?

3.2 OBJECTIVES

- 1) To describe food behaviors of diabetic women, in the context of their own daily food patterns.
- 2) To describe the perceptions of diabetic women about their social, economic and environmental situations influencing their food choices
- 3) To identify the perceptions associated with the women's intent or ability to adhere to recommended health and nutrition behaviors.

3.3 TYPE OF DATA

The study expected to interview 20 women having type 2 diabetes, and attended a Winnipeg diabetes education centre. Based on the characteristics of common dietary assessment methods, the Food Choice Map was an appropriate method to generate the comprehensive data required for the study. The data consists of quantitative records, such as the frequencies and amounts of food, and qualitative records, such as the explanations and opinions of respondents about food, food use and health. Qualitative data, which includes perceptions and environmental

factors, can be generated to look at food choice behaviour of people and why they do not follow specific advice.

The University of Manitoba Joint Faculty Research Ethics Board approved the research protocol (see p.160). Each respondent signed an informed consent form shown in (see Appendix 5).

CHAPTER 4 METHODS AND MATERIALS

4.1. RESPONDENTS

Twenty women diagnosed with type 2 diabetes self-selected to participate in the study. They were selected from the people attending the Health Sciences Diabetes Education Clinic (DEC). Staff at the clinic distributed a flyer that briefly introduced the study and the interview to potential participants. For the text of the flyer see Appendix 3. The director of the DEC gave permission for participants to be recruited in the clinic. After a clinic staff member gave a potential participant the flyer, the person consented to have her name and phone number shared with the researcher. The participant was then contacted by telephone to provide further explanation about the study, to ensure that the person met the inclusion criteria, and to arrange a meeting time for the interview. The location for the interview was in a confidential space in the clinic. See Appendix 4 for the script of the telephone contact. The interviews were conducted according to the process and the interview guide of the Food Choice Map method, which generates a food pattern and a qualitative record of perceptions for each participant.

Qualitative data was collected during in-depth interviews with the participants considering their perceptions about food and food use, and descriptions of environmental factors that influence their food choices. Participants were prompted for topics by the interviewer who referred to foods, meals or patterns already visible on the food grid. The prompts explored the participant's reasons for food choices, including personal, social and economic. All three parts of the FCM interview, food pattern, frequency of consumption and qualitative record were audio-recorded. In addition, each participant was asked to complete a demographic questionnaire.

4.1.1 Inclusion criteria

The selection criteria for women with type 2 diabetes were:

- Woman diagnosed with type 2 diabetes.
- Received at least one nutrition education session in the DEC.
- Not pregnant (effect on dietary patterns and possible gestational diabetes).
- Able to read (to complete the demographic questionnaires).
- Able to communicate in English (to participate in completing the FCM interview).

4.2 METHODOLOGY

4.2.1 Food pattern interviews

The Food Choice Map (FCM) is a “dietary assessment method that includes an interview designed to obtain the habitual food intake of people, and a computer program to quantify food and nutrient intakes” (Shuaibi, et.al, 2008). The FCM nutrient analysis program calculates nutrient intake based on food composition data for 1,462 food items (Shuaibi, 2008). These foods reflect the items that reported by a similar sample in other studies, and they include a number of ethnic foods that reflects multicultural diets of individuals (Metka, 1992). The Canadian Nutrient File 2001b food composition data were used in calculating the estimated nutrient intakes (Health Canada Food program Canadian nutrient file, 2008). The food pattern describes what people eat, and when, in a usual week.


The interviewer and the participant use food pictures to create a common understanding about the foods and meals that the participant eats in a usual week. Food pictures are magnetic, 1.5 cm², and are placed on a white board of 30 cm by 43cm in a black-line grid according to the time of the day and frequency per week. The food grid and pictures are visible to both the interviewer and the participant, and together they create the food map, iteratively, throughout the

interview. The food pattern and nutrient intake is generated from the process of frequency of consumption of each food reported by the participant and the picture of the food is placed on the food grid. Each food picture is identified by barcode that should be entered into a computer program that sets up real-time results of nutrient and energy intakes. Each barcode triggers a list of foods similar to the one in the picture, but with a different composition so that the food that most closely matches the participant's description can be selected and used later in results calculations. The FCM visually describes the foods, meal composition, time of the meals, and alternative meals eaten. The result shows eating patterns that have the frequency of meal times. The FCM is composed of a food picture board (see Figure 3.1) and a food map board (see Figure 3.2).



Figure 3.1: Food Picture Board

FOOD CHOICE MAP



RESPONDENT #: _____
 LOCATION: _____
 DATE: _____
 INTERVIEWER: _____
© Matthew Technical Data Inc.

	1x / Week	2x / Week	3x / Week	4x / Week	5x / Week	6x / Week	7x / Week
EARLY (1)							
SNACK 1 (2)							
MID DAY (3)							
SNACK 2 (4)							
END OF DAY (5)							
LATE (6)							

Figure 3.2: Food Map Board

Both interviewer and participant locate the food pictures that illustrating the participant choices on the map throughout the interview. The food pictures that placed vertically on the board indicate for the daily meals times. Participants are encouraged to express or discover their own reasons for food choices by answering the open questions, including personal, social and economic reasons (Sevenhuysen, 2008). The first question was “what foods were eaten most often in a usual week?” A food picture was placed on the map for each food mentioned by the respondents. Moreover, answers regarding food intake were tape-recorded during the interviews and a variety of issues that were associated with those foods such as the place of purchase, time and with whom consumed.

It took approximately 30-35 minutes to complete the food map and interview as conducted by the researcher. During the conversation, the participant helped to create a visual map of food frequencies through food symbols placement shown in the Figure 3-3 below. Each food symbol was placed vertically in place to show the time of consumption of that day, and horizontally in place to reflect the frequency per week, ranging from 1 to 7 (Sevenhuysen, 2003). The participant was encouraged to move the food symbols in order to create her own map. A question guide was used to prompt respondents to talk about other aspects associated to food and topics that were interesting to their situation, such as economic information, availability and accessibility of foods, social information, cultural aspects, foods considered as healthy, and concerns about chronic diseases and type 2 diabetes (see Appendix 1). Finally, to combine the same item to different alternatives in a different frequency, the researcher circled food items with a red coloured line shown in Figure 3-3.

FOOD CHOICE MAP

RESPONDENT #: _____

LOCATION: _____

DATE: _____

INTERVIEWER: _____

© Northern Technical Data Inc.

	1x / Week	2x / Week	3x / Week	4x / Week	5x / Week	6x / Week	7x / Week
EARLY (1)	 						
SNACK 1 (2)							
MID DAY (3)							
SNACK 2 (4)							
END OF DAY (5)	 	 	 	 	 		
LATE (6)			 				

Figure 3-3: Food Choice Map

4.2.2 Food health interviews

For the in-depth qualitative interview component of the FCM interviews, open-ended questions were used to obtain the why and how answers from the participants. These questions allowed the researcher to explore the participant's feelings and perspectives on a topic and gave the participant freedom to answer the questions in their own words.

This qualitative data can be interpreted throughout the interview and prompt follow-up questions can be posed to seek clarity and increased understanding. The in-depth interviews involved not only asking questions, but also recording and documenting the responses to investigate for deeper meaning and understanding of each participant's perceptions. This data often was initiated from interview transcripts or observation notes that narrated major themes describing the phenomenon. Data reduction reveals results efficiently (Taylor & Bogdan, 1984). A digital tape recorder was used to record the conversation for all interviews after getting approval from respondents. The recordings were transcribed to identify the perceptions of participants for choosing food items and to connect the reasons for their dietary patterns. The researcher could interpret the conversations by listening to the audiotapes and looking at the map at one time.

Aspects about the importance of health, perception of cost, and other aspects of interest to the participant were mentioned in the tape too. The record showed the "most significant" food options of participants and their perceptions for the food choices and food pattern (Sevenhuysen, 2003) in terms of social, economic, health concerns and living environments.

4.2.3 Demographic data collection

The demographic questionnaires were administered to participants at the beginning of the interview session. The researcher clarified any questions that were not clear enough to participants. The participant's weight, height, age, marital status, education level and income range were documented (see Appendix 2).

4.3 DATA ANALYSIS

4.3.1 Demographic data analysis

Demographic data were used to calculate participant's characteristics collected in the questionnaire. Self-reported weight and height data were used to calculate BMI with the following formula:

$$\text{Body mass index (BMI)} = \frac{\text{Weight}}{\text{Height}^2}$$

Values were categorized according to the cut-off

points shown in Table 1.

Table 1. BMI categories and health risks associated

BMI Categories	Risk of having health problem
Underweight < 18.5 kg/m ²	Increased
Normal 18.5 – 24.9	Least
Overweight 25.0 – 29.9	Increased
Obesity class I 30.0 – 34.9	High

Obesity class II 35.0 – 39.9	Very high

4.3.2 Food Pattern Interview analysis

The weekly frequencies of consumption of all foods reported by the participants were entered in an Excel file using the FCM computer program. One of the result files generated by the software is the contribution of the foods reported in each Food Map to predefined food groups, such as vegetables fruits, grains and starches, meat and alternatives and milk and alternatives. The food group definition is that used by Health Canada in constructing the Canadian Nutrient File (CNF), which is the nationally available food composition data available for foods in the Canadian market. The definitions for each group are based on two criteria. The first criterion, the similarity of origin, such as meat, dairy, or fruit, is used to group unprocessed foods. The second criterion, the similarity in use of the food, such as breakfast cereal, soups or sauces, is used to group processed foods that can contain food from more than one unprocessed food group. The definitions provide groupings that are related to the ways in which people use foods in general. The frequency standardized to compare between food groups. For this study, the contributions of all the foods reported on a participant's food map to any of the CNF food groups were calculated using the frequencies of consumption. The contributions were expressed as percent of the total food frequencies on the food map. The data represents 7 days of intake, which is divided by 7 to generate frequencies per day. The resulting daily frequencies can therefore be integers or decimals for any one food reported on the food map.

The following table shows frequencies of some food in each group expressed as percent of total food group's frequencies for 20 participants.

Table 2. Examples of food's groups proportion frequencies for 20 participants.

ID	Diary %	Vegetables %	Grains %	Fruits %
Participant 1	6.82	18.18	10.23	22.73
Participant 2	14.06	20.31	8.59	4.69
Participant 3	9.30	10.08	4.65	24.03
Participant 4	12.12	16.67	6.06	13.64
Participant 5	10.48	16.19	6.67	9.52
Participant 6	14.89	11.70	2.18	22.34
Participant 7	0.00	13.39	10.71	8.04
Participant 8	11.32	11.32	0.00	0.00
Participant 9	9.76	41.46	0.61	7.32
Participant 10	16.35	9.62	8.65	9.62
Participant 11	15.38	16.35	0.96	22.12
Participant 12	0.00	14.29	15.87	7.94
Participant 13	19.61	11.76	0.00	13.73
Participant 14	3.28	11.48	1.64	24.59
Participant 15	8.26	15.57	5.74	6.56
Participant 16	20.51	7.69	5.13	8.97
Participant 17	13.68	13.68	2.11	6.32
Participant 18	11.76	11.76	4.20	18.49
Participant 19	13.68	16.84	4.21	13.68
Participant 20	1.09	4.35	10.87	28.26
Average	10.6	14.6	5.5	13.6

(The average is presented to show the differences of proportion between food groups).

4.3.3 Food Health Interview analysis

The qualitative analysis procedures are described in the following thesis sections, which start by transcribing the interview record and subsequently identifying constructs that give meaning to the reported perceptions and behaviours. The dietary patterns data provides an important context for the interpretation of behaviour. In this study the dietary pattern data consists primarily of the daily food frequency data.

4.3.4 Framework for qualitative analysis

The theoretical framework of the present study is based on the Theory of Planned Behavior (Ajzen, 1991), development of original theory, the Theory of Reasoned Action (TRA) proposed by Ajzen and Fishbein in 1980. TRA attempted to evaluate the difference between attitude and behavior. The theory was linked to voluntary behavior; however, when the behavior seemed to be not completely voluntary, the addition of perceived behavioral control was added later to this theory (see figure 4). The extended theory is called the Theory of Planned Behavior (TPB) because the behavior is perceived to be something one can plan for.

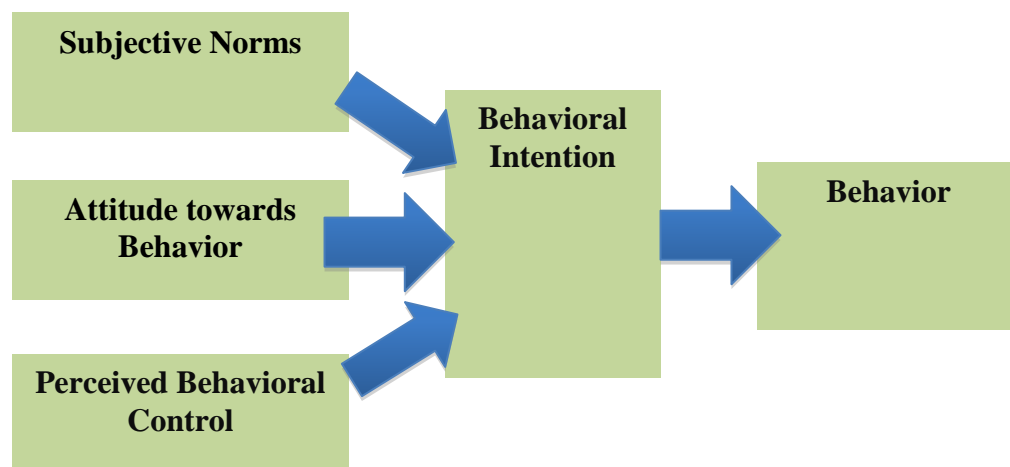


Figure 4: The Theory of Planned Behavior (Ajzen, 1991)

The Theory of Planned Behavior established by Icek Ajzen (1991), assumes that “influencing behavior is done through influencing the intention to perform that behavior”. Ajzen considered that two factors have an important role in deciding if a person is capable of achieving a given behaviour: 1) the evaluation of personal attitude; that is, a person’s attitude toward the behaviour; and 2) social-norms considerations; what the person believes others think about performing the action. The theory was to explain all behaviours of people who were capable of self-control. The important part of this model is the intention behind the behaviour. Behavioural intentions are “influenced by one’s attitude about the behaviour that will have the anticipated outcome and one’s evaluation of the pros and cons of that outcome” (Fishbein & Ajzen, 1991). The behaviour that resulted of person's attitude consists of the belief that a specific behaviour could result in a particular result and an estimation of the result of that behaviour. If the pros overweigh the cons, then the person might intend to attain a specific behavior. This theory includes the concept of subjective norm (Fishbein & Ajzen, 1991).

According to (Ajzen, 1991) “intention is the cognitive representation of a person's readiness to perform a given behavior, and it is considered to be the immediate antecedent of behavior”; the predictors of intention to perform behaviour are characterized by three sets of beliefs: attitudes, perceived behavioral control and subjective norms. Each of these factors is also associated with a set of beliefs.

Table 3. Set beliefs of Ajzen behavioral theory

Belief	Definition
Attitude	“Is conceptualized as an individual’s overall appraisal of the behavior and is a result of behavioral beliefs; are derived from the multiplication of strength in the belief by the evaluation of the outcome of the behavior.” (Ajzen, 1991).

Subjective norms	“Is conceptualized as the perceived pressure from important people in the individual’s life to engage or not engage in the behavior and is associated with normative beliefs; Normative beliefs refer to an individual’s perception of whether other people think he or she should engage in the behavior. Subjective norms are derived from normative beliefs multiplied by the individual’s motivation to comply with the individual/group’s opinion.” (Ajzen, 1991).
Perceived behavioural control	“It refers to an individual’s perception of his or her capacity to carry out the behavior and is associated with beliefs about control. Perceived behavioural control is a function of beliefs about the occurrence of a factor affecting the behavior and the influence of that factor in enhancing or decreasing the behavior under consideration” (Ajzen, 2005).

The TPB suggests that the intentions to perform behaviour will increase if attitudes and subjective norms are positive, and perceived behavioral control is high (Ajzen, 1991). Although perceived behavioral control is a factor affecting the intention to carry out the behaviour, actual behavioural control is also necessary in influencing the performance of behaviour (Ajzen & Albarracin, 2007).

Applied to diabetes, the TPB predicts that, considering external and internal factors, a person will intend to undertake a healthy behaviour, such as regular exercise, if the people close to him/her believe it to be beneficial (subjective norm) and the person perceives himself as having the ability to do it, possibly because of past experience.

4.3.5 Transcript qualitative analysis

4.3.5.1 Content analysis

Content analysis is “a research technique for making replicable and valid inferences from text or other meaningful matters to the contexts of their use” (Krippendorff, 2004, p.18). The aim of the analysis is to achieve general explanation of the phenomenon resulted in providing categories that describe the phenomenon (Elo, 2008). In addition, “Open coding is the process of dividing the data into distinctive parts of meaning that begins with a full transcription of an interview followed by coding the text’s lines to grasp phrases or important words that link the researcher’s concern to the experience that require investigation” (Goulding, 2000, p.76; Spiggle, 1994). Moreover, it incorporates the use of memos that are the notes written immediately after the collection of data to document the notes (memo) of the researcher and describe the situation.

Interview transcriptions were imported into NVivo9 (QSR International, 2010) software program. The interviews were transcribed verbatim, coded line by line, including phrases, words, sentences and even verbal expressions used to create connections between the ideas. Through this process, the meaning of a participant’s comments was interpreted to gain a deeper understanding using constructs of the Theory of Planned Behavior, the constructs identified during the coding and also keeping the same meaning of each intended expression that reported by participants. Afterward, words, sentences and sections that appeared repeatedly in the interview transcripts were labelled as well as those sections with interesting meanings and parts that related the study questions. The content analysis classified constructs into themes, sub-themes and outcome behaviours. Themes and sub-themes represented data that pertained to distinct perceptions or behaviours of the participants. Outcome behaviours are those that suit the framework of this study: food choice behaviour.

4.3.5.2 Identifying outcome behaviours

Food behaviour includes not only decisions about food, but also decisions about other issues that relate to food behaviour such as time, places and social activities (Bisogni, 2007). The characteristics of individuals that influence their food choice decisions and behaviours involve psychological factors (personality, food preference), social factors (gender differences, family responsibilities) and physiological factors (genetic predisposition to disease, sensory sensitivity to food tastes) (Dammam, 2009).

- 1- To recognize food choice behavior is to address sentences in the interview transcripts in which this behavior is expressed as thoughts that relate to people's considerations reflecting food choice such as convenience, relationships, cost, health and taste. The following example shows a question and answer that demonstrate this:

Researcher: I notice that you eat rice once a week?

Participant: I try not to eat rice because I know it is making my sugar go up.

- 2- People arrange foods and situations according to the characteristics of the foods they witness, or their personal experiences such as food preference and traditional family meals that lead to continued practicing of the same patterns of food choices over time.

The following example clarifies this idea:

Researcher: What food do you eat very often?

Participant: Since I'm an Indian, I eat Indian food.

Each transcript has many independent thoughts that indicate the food choice behaviours of that participant.

4.3.5.3 *Identifying constructs*

During the analysis, a number of themes that were a combination of constructs were defined. Constructs were selected from previous literature on health behaviour models (Ajzen & Fishbein, 1980; Ogden, 1996). Those combinations were seen as necessary in describing respondent's behaviour because the respondent used the combination to record reasons for the behaviour, not a single factor. Only the most frequently occurring constructs were noted as representing common aspects in the process of food choice. The construct (Behavioural Belief) is that "belief that underlies a person's attitude towards the behaviour and explains the perceptions that are derived from the participant's experience" (Ajzen & Fishbein, 1980). This construct was a part of all the themes, and it was added to the constructs list.

Understanding the participant's responses and thoughts was the main reason for the following table (see Table 4). In the process of analysis, I was expecting to see more or fewer of those constructs as not all of the constructs appearing from the first transcribed interview, some appeared in the last once; because they were not a constant list and it will be modified according to the study participants' perceptions.

To apply Ajzen and Fishbein's (1980) behavioral theory to this study, the pertinent constructs as defined by the theory were used in the analysis. Each construct's definition is described with a statement shown in Table 4.

Table 4: Most common constructs and functions

Theme	Function
<u>Attitude</u> Constructs: (Behaviour Belief,	To what extent the person has a favourable or unfavourable estimation of the given behaviour.

attitude)	
<u>Knowledge</u> <u>(analysis)</u> constructs: (Behaviour Belief, knowledge)	Perceives a need for information and believes own knowledge.
<u>Resource access</u> <u>(Campbell, 1991)</u> constructs: (Behaviour Belief, Resource access)	“Perceives that getting access to resources involving food is sufficient for making appropriate choices”.
<u>Subjective norms</u> constructs: (Behaviour Belief, Subjective norms)	The belief about the judgement or opinions of important people whether family or friends in the one’s life to act a specific behavior.
<u>Internal control</u> constructs: (Behaviour Belief, control)	People will intend to undertake a healthy behaviour such as using food to cope with perceived internal needs or demands.
<u>Coping</u> <u>(Cohen, 1979)</u> constructs:(Behaviour Belief, coping)	“A person knows that he has to do something, but can’t for any reason; therefore, he creates another way to do it”.
<u>Emotion (analysis)</u> constructs:	Feelings towards an action, person or thought.

(Behaviour Belief, emotion)	
<u>Social support</u> <u>(Berkman, 1984)</u> constructs: (Behaviour Belief, family support)	“A person’s perceived support from his/her social network, whether emotional or financial aid”.

4.3.5.4 *Identifying themes*

During the analysis, a number of themes were developed. Definitions of themes were created from participants’ perceptions with supporting data in the form of examples of participant’s phrases mentioned in the conversations. For each transcript, sentences used by participants were coded by Nvivo software and were organized under different main themes, then classified into sub-themes. The analysis allowed creation of a variety of themes for each participant. Some sub-themes appeared more frequently than others, while other sub-themes were repeated, but under different main themes. Each transcript displayed a selection of predefined themes and predefined themes not used would have no importance in the decision-making of the respondent. New theme definitions were added to the list of themes, together with examples of participant expressions. By adding new theme definitions and omitting predefined themes not used in the transcript, the analysis provided a unique personal list of themes for each participant.

According to Boyatzis (1998) qualitative data analysis composed of recognizing themes, labeling, and categorizing patterns that are exist in the data and describing any qualifications or exclusions criteria used to identify themes. The 20 participant’s interview transcripts were read,

and every statement coded using thematic analysis. Following thematic analysis, the main (most prevalent) themes and sub-themes were categorized; each participant's statements was identified under the main themes or sub-themes and then entered as an independent case in NVivo software along with the participant demographic data.

4.3.5.5 Thematic analysis

The constant comparison method “offers the means whereby the researcher may access and analyze these distinctive perspectives; therefore, they might be combined in a model that further explain the social processes under the intent study; it also involves breaking down the data into discrete units and coding them to categories” (Lincoln & Guba, 1985, p.1). The categories that come from this method often take two forms: those derived from the participants' language and those identified by the researcher as significant to answer the study questions. The purpose here is to reconstruct the categories that are often used by participants to reflect their perspective, experiences and world-view. Thus, the process of constant comparison creates ideas that lead to classification categories whether descriptive or explanatory (Lincoln & Guba, 1985; Boeije, 2002). Taylor & Bogdan (1984) claimed that the “constant comparative method assists the researcher to create codes and analyze data to develop concepts by continually comparing specific categories in the data, identifying their properties, exploring their relationships to one another, and integrating them into a coherent explanatory model”.

Interviews were read and coded using the constant comparison method, where the responses were coded under the identified main themes. As coding analysis was carried out for the remaining interviews, the emerging themes were defined and associated with responses of all participants. Coding analysis for completed interviews was done at the same time that new interviews were conducted. As coding analysis progressed, there were fewer new constructs

identified in each subsequent interview. The interview of participant #16 yielded no new constructs, but the interview of participant #17 did. In the subsequent three interviews, no new constructs emerged. Thus, it was concluded that the participants had achieved data saturation for the perceptions of health and nutrition information.

4.3.6 Criteria of adherence

Research question 2 focuses on the extent to which participants adhere to information or advice on health and nutrition behaviour. This question can be answered in two contexts. The first context is the adherence behaviour, which is either exhibited or not. This context should be extended to include an understanding of why the participant chooses to adhere or not. Hence, the criteria are based on the common reasons given by certain groups of participants for adherence or not. Thus, the predefined criteria for adherence to dietary advice that answers the 2nd research question when the participant says “I consider my diet healthy” or “yes I eat healthy diet”. The only criteria that are predefined and all other criteria used to identify distinct groups among the participants are derived from the participants themselves.

The second context is a group of behaviours related to adherence, such as maintaining supportive social networks, for example. This context extends into observable behaviours that can be used to recognize participants likely to adhere. Hence, the criteria would include not only common reasons, but also common behaviours.

To the extent possible with qualitative data, the selection of criteria should follow existing processes. For example, according to Johnson (1992), the methods that could be used for measuring adherence to diabetes regimens are: health status indications, evaluation of health-care provider, behavioural records, and patient self-report that include 24-hours recall interviews, behaviour ratings and patient’s diaries. Adherence must be selected based on credibility, validity

and responses to diabetes regimen, and measurements that are beyond patient's health status (Johnson, 1992). The American Diabetes Association (1991) uses panels of experts to develop agreement standards for patient care for glucose tests, insulin, oral medication, diet and physical exercise.

4.3.7 Educational content at the DEC

Participants who visit the DEC receive advice according to the Canadian Diabetes Association (2010) guidelines. The criteria for selecting group participants for adherence needed to take into account the following guidelines:

- Eat three meals per day at regular times and space meals no more than six hours apart. You may benefit from a healthy snack.
- Limit sugars and sweets such as sugar, regular pop, desserts, candies, jam and honey.
- Limit the amount of high-fat food you eat such as fried foods, chips and pastries.
- Eat more high-fibre foods such as whole grain breads and cereals, lentils, dried beans and peas, brown rice, vegetables and fruits.
- If you are thirsty, drink water.
- Add physical activity to your life.
- Have a glass of milk and a piece of fruit to complete your meal.
- Alcohol can affect blood glucose levels and cause you to gain weight. Talk to your healthcare professional about whether you can include alcohol in your meal plan and how much is safe.
- Eat more vegetables. These are very high in nutrients and low in calories.
- Choose starchy foods such as whole grain breads and cereals, rice, noodles, or potatoes at every meal. Starchy foods are broken down into

glucose, which your body needs for

energy. Include also fish, lean meat.

Have at least 3 out of the 4 key food groups at each meal from Eating Well with Canada's

Food Guide:

- Vegetables and fruit
- Grain products
- Milk and alternatives
- Meat and alternatives
- Have portion sizes that will help you reach or maintain a healthy body weight.
- Include high-fibre foods such as whole grain breads, cereals, and pastas, fresh fruits, vegetables and legumes.
- Make lower fat choices (e.g. use skim milk and lean ground beef, trim fat on meat, chicken etc., and use small amounts of added fat such as oil and salad dressings).
- Healthy eating habits should be built around a healthy lifestyle – keep active every day.

If you are a 35 year-old woman you should aim to have the recommended number of food guide servings per day:

- 7-8 vegetables and fruit
- 6-7 grain products
- 2 milk and alternatives
- 2 meat and alternatives
- (2 to 3 Tablespoons) of unsaturated oils and fats

4.4 Quality control

4.4.1 Demographic data

Participants completed all demographic questionnaires. Each participant's questionnaire was reviewed before the beginning of each interview in order to make sure clarity of the data was achieved. Each participant was given the choice not to answer any of the questions on the demographic questionnaires.

4.4.2 FCM interview data

Standard methods were used in the interview structure, content analysis, and coding. Before starting the study interviews, the researcher did pilot training in FCM interviews and on data handling and content analysis. The training confirmed that the interviewer was capable of receiving and exploring similar and sufficient information from the respondents to ensure that the participants answered according to the intent of the conversations. The researcher received training in content analysis, and coding, then worked with an experienced academic in order to re-code the important sentences in the transcription and to check the accuracy of coding. The process of interviewing and creating visual maps during the interviews was taught as well as the coding of transcripts. For the sake of themes reliability, all comments under a specific code were collected and then the most explicit one was chosen that provided the exact or the closest meaning with indicating definitions, and examples for each theme (see themes table 8). For all participants, the same questions were posed, and all interviews were completed in approximately 35 minutes. All information collected in the research project was kept strictly confidential. ID numbers were used to identify participants and no names appeared on research records. The consent forms and the list of ID numbers and names are kept in a separate secure location to which only the researcher has access. Temporary paper records obtained during interviews were

kept in a locked filing cabinet in a locked office. The paper records were destroyed once they were scanned into electronic format. The storage of documents related to the interviews, the audio recordings and transcripts of audio are stored on a secured encrypted USB device where a password is required to access the data. All records and lists will be destroyed within 2 years of the start of the project. Each interview's participant received a \$20 gift card from Shoppers Drug-mart.

CHAPTER 5 RESULTS

5.1 SAMPLE DESCRIPTION

All information used by respondents came from the DEC. Fifty flyers were distributed to potential participants; 30 respondents met the inclusion criteria of the study. However, only 24 respondents were interviewed for data collection. Four respondents were disturbed during the interview, leading to incomplete data gathering; therefore, these four respondents were excluded from the study sample. Consequently, the analysis had 20 completed participant interviews who living in Winnipeg. All the respondents completed the demographic questionnaires administered by the researcher.

A summary of the demographic characteristics data for the 20 respondents to compare between the present study and other studies is shown in Table 5. All participants were women with type 2 diabetes; their ages range from 25 to 70 years. Half of the women were married, and half single or widowed. 18 women completed high school; 2 women had elementary or less school. Twelve women earned \$20,000 to \$60,000 annually; the rest earned less than \$20,000 annually. Nine out of twenty respondents chose to participate in the present study; were Aboriginal people from Winnipeg, while the remaining respondents were from different ethnic groups such as Filipino, Indian and Caucasian. All demographics are not influencing the results of the study; only to compare between other studies findings.

5.2 DEMOGRAPHIC DESCRIPTION

Table 5. Demographic characteristics of the 20 respondents

Characteristics of participants	Number of participants	Characteristics of participants	Number of participants
Age (years)		Level of Education	
18-25	1	Elementary or less	2
26-35	3	Completed high school	11
36-45	3	Some college	7
46-55	8	Completed university	0
56-65	4		
66+	1		
Marital Status		Annual Income Range	
Single	8	Less than \$20,000	7
Married	10	\$20,000 to \$40,000	8
Divorced	0	\$40,000 to \$60,000	4
Widowed	2	More than \$60,000	1

5.2.1 Body Mass Index (BMI)

The BMI distribution by body weight categories of Health Canada 2012 shows that the majority of participants were either overweight or obese; only 2 had normal body weight (see figure 5). Three BMIs were excluded due to reporting errors. The data is likely influenced by

self-reporting bias and error by participants and shows only a general distribution of women BMIs in this study.

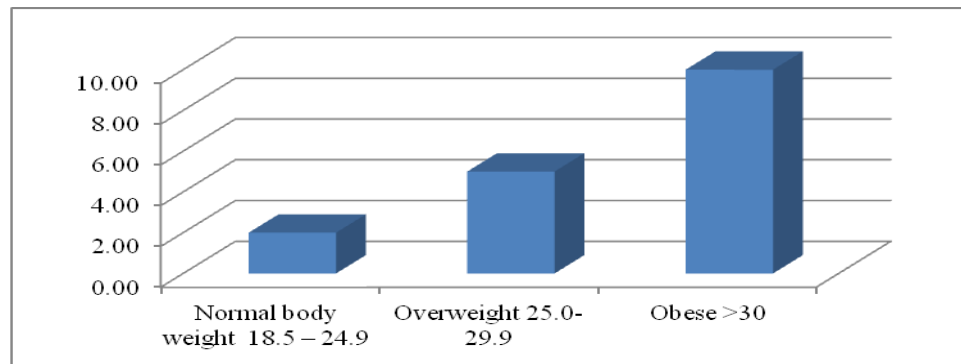


Figure 5: An overview of BMIs for 20 participants

5.3 RESULTS RELATED TO RESEARCH QUESTION 1

For research question 1: “What factors appear to be related to food perceptions and/or food behaviours that are expressed by women with type 2 diabetes?”

Six main themes (factors) and sub-themes related to food perceptions and/or food behaviours were created among the 20 participants. Participants not only live a difficult life because of diabetes and its management, but also because they face other complex issues such as inadequate resources, cultural influences, family or friends pressure, disease complications and sometimes insufficient knowledge to interpret the given dietary advice. Those reasons will lead to food behaviours eventually (see Table 6).

Table 6. Main themes (factors) and sub-themes related to perceptions or food behaviours

(1) Personal characteristics:	(2) Access to food
Beliefs, subjective norms, attitudes (lack of motivation, careless, fast food, soft drinks),	Specific seasons, availability, help or depending on spouse, media, short of budget

knowledge, food appearance taste, flavour, item quality), emotions (boring, denial, guilt), personal preference , time management, mental constraints (moods, internal impulse), self-awareness, physical capability, way of cooking and appetite

(3) Social connections

Family preference, family habits, special occasions, usually with friends, culture aspect

(4) Financial cost

Income, affordability, travel cost, item quality

(5) Health reasons

Taking supplement, medical reasons, taking medications

(6) No plan to follow

Two participants mentioned that there is no specific diet plan given by the dietitians to follow

Each of the above factors (themes) is defined and supported by participants' expressions in Table 8 (see p.139). The above are the themes and sub-themes that were established from the TPB constructs, and some constructs added based on participants' perceptions later in the data analysis (p.55) such as knowledge, resource access, emotion, social support and coping. Figure 6 shows examples of themes and constructs.

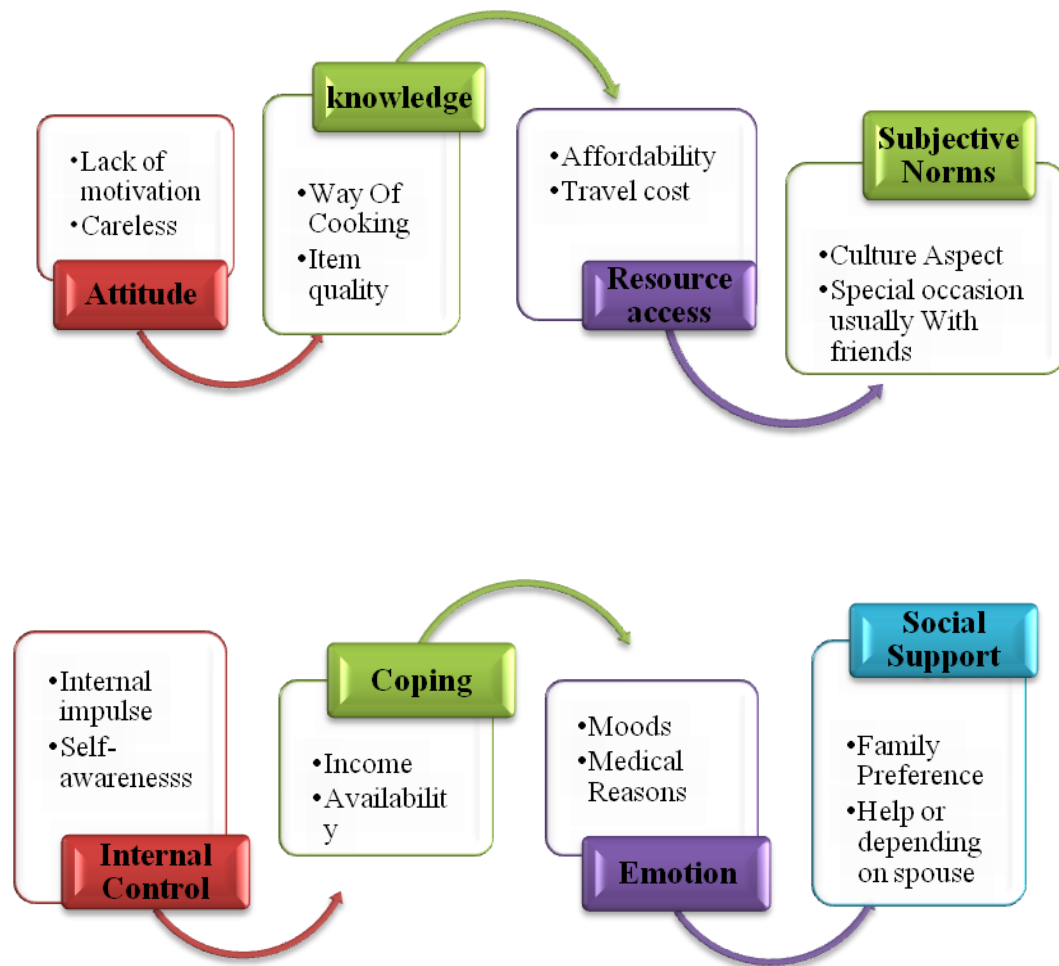


Figure 6: Examples of themes and constructs

Data analysis revealed the following interpretations (factors) that reflect the women's beliefs of food choice and expressions that demonstrate each participant's reasons for following the advice. The following quotes are verbatim that might include grammar errors.

(Participant 1): She has a perception about food choices due to the variety of eating choices. She controls her food choices unless there is lack of resource; she would eat what is available.

*“I’m the type of person when I cook on my own... because I’m diabetic I kind of try to make different meals so that my blood sugar stays at a norm... **I don’t eat bread unless I don’t have anything else left to eat**”.*

(Participant 2): Because high quality food always is expensive, she copes with the available choices.

*“ I need to eat unprocessed food, fresh vegetables, fruit, and the meat needs to be lean, and lean is way more expensive than regular meat, and the bread, sometimes the bread is okay, it’s mostly just the meat and buying better quality **food is more expensive**, it’s usually why I eat what I eat”.*

(Participant 3): She has a perception about food preparation. She eats a healthy diet because of her husband’s help. If he is absent for any reason, perhaps she will not be able to cook a healthy meal for herself.

*“I would think so, yeah, the way **he cooks** them, because he doesn’t fry anything. These are baked and boiled, so actually... yeah, I think I would say that they’re healthy”*

(Participant 4): She has a perception about food choices and perception about food preparation; she internally controls the way of selecting foods, but she might stop in the future because she complains about her life due to the burden of medication, so, there is a positive part that she knows what she should eat and at the same time the negative part which is the pressure of taking many medication.

*“ My breakfast... just put cereal in the pot, add some milk and boil it, and only with my cereal, have some dried fruit... cranberry or raisin, and put a half an apple inside... cinnamon. Life is really **difficult** when you have to go through all these medications ”*

(Participant 5): She has a perception about food choice. She would eat good quality of food if she could afford it, after covering the priorities and the personal demands that need to be paid first; so she tries to cope with her situation as much as she can.

*“Whatever I could get my hands on, it could be grapes, it could be apples. Not really, but the only healthy ones I’d probably say would be are sometimes the bread, it all depends on the bread you buy and the fruits and vegetables and meat are pretty much the healthy stuff. I try to get as much food as I can with **whatever money I have left after paying bills and rent**”*

(Participant 6): She has the potential to change behaviour and knowledge since she intended to do so because of her inner belief, control and her acceptance of the situation.

*“I’m not worried. Because I got it already, that’s it. I have **to control my diet** and taking my pills”*

(Participant 7): She has a perception about food choice; she would eat a healthy diet under certain conditions, which are her readiness, her time, and her ability to afford buying good foods.

*“Not very often. **It depends on what I’m doing**; it depends on how busy I am, it depends on how I feel. This morning I didn’t get a chance to get anything in me because I ended up throwing up... and my meds came up with it. I am following the instructions. (sobbing) Doesn’t make it*

hurt any less. I do. I eat bananas, I eat oranges, I eat apples, but then, that doesn't always happen... whenever I can get them"

(Participant 8): She knows; she believes she has to follow the advice- positive part (but time management is absent which is the negative part). Also, her son does not like eating fruits and vegetables, which might affect her choices (subjective norms). She is not following the advice after all.

*"I know sometimes, I was told, they say you should have a snack, you have your breakfast, have snack, have your lunch, but it's something, **but I don't have time** to do that at work because I'm always on the go. That's why I said a lot times, I have a banana or apple, and it's something where I can take a quick bite in between customer's type of a thing. **I find that we don't eat enough fruits or vegetables**, but my son, it's hard because he's the type, "I really don't want that" ...and he's 25 years old, and I thought, no I can't really make him anymore"*

(Participant 9): She is convinced that she needs to treat herself sometimes. Social support is strong because she has a sister; she believes she has the disease because of her family history and also her lack of resources. She would eat healthier under special circumstances.

*"I think I'm doing as well as I can. I don't think that you can eat healthy 24/24 because then it's like being on a diet. **You're gonna have a moment where I just can't stand it anymore then splurge or binge on something that you're not supposed to have.** I don't like touching raw meat. I'm thankful that I live with my sister 'because she does all the cooking... I do worry a lot about my diabetes because it's been very hard on the women on my Mom's side of the family...money*

is tight, there's a lot of stuff that we don't buy. We buy frozen vegetables as opposed to fresh vegetables"

(Participant 10): She knows the importance of controlling her food choices due to her belief about food choice; she has no social support, and follows cultural foods even though it affects her health in a bad way.

*"Because I think that it has everything that is needed in a meal. I try to add proteins. I try to add calcium. I try to add fruit and vegetables. Maybe I'm missing on something. I'm concerned about my diabetes.... I start my day early so I don't eat my breakfast with my family, no lunch with my family, it's just the suppertime we get together, so we try to eat together, and I like **Indian food**, but it's full of carbs and calories so I just try to eat it like one time in the day"*

(Participant11): She believes she chooses an appropriate diet to keep her blood glucose under control, but she is not doing exercise, and intends to do it in the future.

*"Well, it's from the food groups, your fruit and your starch and your vegetables... yeah. Yeah, if I'm having salad for lunch. Usually I only have one vegetable with supper. Twice a day I'm having vegetable. No. My sugars are under control. My sugars stay around 5 or 6. What I'm doing is working. That's pretty much the extent of my activity right now. But we **do plan; it's** in our heads to start walking. We just have to implement it"*

(Participant 12): The factor of subjective norms is clear in the following example, and time management has an influence on her food choices. She tries to eat various foods due to her fear and to avoid the complications or death from the disease (family history).

*“Supper usually is something baked, either be chicken, pork. **I don’t eat fish ‘because my kids don’t eat fish... Just about every day. We try to have fruit in the fridge all the time ‘because it’s fast food for the kids just to grab and eat. Or if we’re in a hurry, we eat out of the box. Either pizza, or mac and cheese, that’s already prepared, or I make soup....My family has a history of cancer, has a history of diabetes, and has a history of heart disease.... So, kinda scary. I’m worried about my children. I avoid potatoes, fries. Anything to do with potatoes”***

(Participant13): She has many expenses that have priority over foods and cultural influences have the upper hand in food choice. She believes she has to eat a healthy diet to control her disease.

*“I know it’s healthy... The meat, chicken, fruit... Every time I go to the grocery, **I limit my budget because I have to pay the bills, right... Yeah. But before I ate lots, now that I have diabetes, I only eat a small amount, but still rice. (laughs). There is spaghetti, pasta. Yeah, Filipinos eat rice... Sometimes with fish or a slice of meat, but sometimes only rice, because I have to take my medication and I don’t want to take it with empty stomach and water”***

(Participant14): She eats wisely: she eats different kinds of fruits and vegetables; she has a perception about food choices.

*“When I get to work at 9:30, I have a snack: one slice of dry toast. **But not every day the same thing. Monday, I have banana, the next day, I have oranges. It varies; I don’t eat it every day. One day without vegetables, some other day vegetables like roasted eggplant, sometimes cabbage”***

(Participant 15): She is not following the advice due to the pressure that her son puts on her, and his influence on her food choices. Thus, she is coping with integrating different foods in order to ensure she eats healthy choices.

*“What I usually do is **I buy brown rice and I buy white rice and I do them together**, because there’s no way he’ll eat his brown rice”*

R: Are you considering this healthy for your family too, the food?

P: *Not really.*

R: Why?

P: *I find that we don’t eat enough fruits or vegetables, but my son, it’s hard because he’s the type, “I really don’t want that”...and he’s 25 years old, and I thought, no I can’t really make him anymore (laughs).*

(Participant 16): She has strong perception about food preparation, and she believes it is healthy.

*“When I cook... I had to learn this the hard way... If I’m cooking bacon, instead of just frying, I will boil it first, **and this way it drains off all the grease**, it gets rid of all the excess fat and then I will drain it and then I will put a little bit of water in the frying pan and then try and brown it just a little bit”*

(Participant 17): She is aware of her behaviour and the influence of her family (subjective norms) in terms of often missing breakfast; however, she starts to change her usual behaviour once she got the disease.

*“I’ve never been a good breakfast morning person so the hardest part about me being a diabetic is learning to eat in the morning, **because nobody in my family, or none of us is big milk***

drinkers, or big breakfast eaters I've never started eating breakfast during the week until I became diabetic"

5.4 RESULTS RELATED TO RESEARCH QUESTION 2

For research question 2: "What are the factors and perceptions toward food that are associated with adherence to dietary advice?"

The participants were categorized into 4 groups depending on their reported behaviours. Participants in each group had common reasons for adhering to dietary advice even if they differed on other, more specific criteria. Furthermore, the groups of participants were classified based on three factors that came from the qualitative analysis of the food choice map in-depth interviews, health concerns, demographic characteristics and the intakes of fruits and/or vegetables according to Canadian Diabetes Association and Canada's Food Guidelines recommendations.

In particular, if a participant mentioned "I consider my diet healthy" and one of the constructs or combination of constructs occurred even once (frequency of occurrence in the transcript), she would be placed into the suitable group automatically. Recognition that certain perceptions and behaviors are shared among the people who adhere compared to those who do not. Also, the shared constructs give additional meaning to adhering or not, and common combinations of constructs can be defined as new sets of criteria for grouping people.

To recognize each group, information about the participant's number, physical activity, income range, education level, visiting dietitian were added to provide an overview of the group's classification (see Table 7). Based on frequency of occurrences of participants' expressions beliefs and some of their demographics, the 4 groups separated into those who

follow the advice with their individual situations, and those who do not. This part will be presented in detail in the results and discussion later.

Table 7. Classification criteria of participants groups

INDICATOR	CRITERIA	
Indicators showing adherence behaviour		
Perception of knowledge	Valuable	Not valuable
Fruits and/or vegetables intake	According to advice, e.g. food group contribution high	According to advice, e.g. food group contribution low
Food preparation method	According to advice, e.g. Boiling, steamed, no fat added	Not according to advice, e.g. Fried, fat added
Physical activity performed	Moderate	Sedentary
Indicators influencing adherence		
Family health history event	Mentioned	Not mentioned
Social support available	Mentioned	Not mentioned
Inadequate resources available	Coping mentioned: food is low priority and low quality.	Not following advice, no coping mentioned
Insufficient time available	Not mentioned	Mentioned

5.4.1 Participant groups and examples of expressions

Using the participants' reported behaviour and the themes and sub-themes, four groups of participants were categorized by describing their situations and to access the inner world of perception and beliefs in order to understand, interpret, and therefore explain adherence to dietary advice from the perceptions of study participants. Relationships between the criteria were obtained from the data itself through implied reasons:

5.4.1.1 Group (A): Positive belief / adhere to advice

-
- 5 Participants
-
- Low active (daily living +30-60min/day moderate activity)
-
- Steaming, boiling, grilled
-
- \$20,000-\$40,000
-
- High fruits and vegetables 5-7 times a week
-
- Positive belief about following advice (**knowledge, internal control, time, social support and access to resource are available**)
-
- Some college
-
- Visit dietitian often (1-2 times a month)
-

This group has met most of the criteria (see p.76) that make them likely to adhere to the advice, and it does not appear that additional education would be important to them.

Participants' expressions

(Participant 1) *"It could be any vegetables. Mixed vegetables, any vegetables I can think of like I have a variety of vegetables, it could be beans, carrots. It might be broccoli. It could be anything, you know whatever vegetables sets. A variety of fruits, apple is basically the one the most, mandarins. 7 times a week... The vegetables are steamed or boiled"*

R: How many times?

P: Pretty well every day, 3 times a day I will have my fruits and then I will have my yogurt quite often still low calorie mostly in the evening.

R: Do you add anything to yogurt?

P: No

P; *It controls my blood sugar, if I start eating instead of grains like brown rice buckwheat, barley ,my blood sugar starts going down, but if I start eating stuff like pasta my blood sugar it shoots right up. So, that's more of controlling my diabetes as much as I can.*

*"That's because of I enjoyed it and its sort of a I guess instead of I have a few cookies or piece of pie or whatever so basically, I eat fruits except of bananas or the real orange just because of the potassium. I consider it **healthy**".*

R; How active are you?

P; *In the summer very much, and then in the winter I walked a treadmill a mile and a half.*

R; How often per week do you walk on the treadmill?

P; *Pretty well every day. In the summer I gotta a lot of walking outside, I gotta garden I gotta walked to it. It's a large garden, and then I do my own backyard, the flowers, occasionally, the grandkids they cut you u know when they around, usually when they arrive, I don't mind cutting the grass.*

(Participant 5) *"I would think so, yeah our food is healthy, the way he cooks them, because he doesn't fry anything. These are baked and boiled, so actually... yeah; I think I would say that they're healthy"*

(Participant 6)

R: Are you concerned about chronic diseases?

P: *No. My sugars are under control. My sugars stay around 5 or 6. What I'm doing is working. Well, my diet is healthy because it's from all the food groups, your fruit and your starch and your vegetables... yeah pretty much.*

(Participant 12) *"Most of the times, yeah healthy foods. I probably should eat more in breakfast, but like I said, I'm not a big breakfast eater so just the fact that I can get in oatmeal in the morning I'm happy...But most of the time I think it's pretty healthy... Because I do live with my sister and her two kids, well she's... got two kids, to a certain extent, kids have their junk food, But I think on the whole, I'm eating a whole lot better than I was 5 years ago and my biggest problem when I became diabetic is I'm useless in the kitchen...I don't like touching raw meat. I'm thankful that I live with my sister 'because she does all the cooking. I do worry a lot about my diabetes because it's been very hard on the women on my Mom's side of the family. My Mom died from diabetes"*

(Participant 20)

R: Do you consider this food healthy?

P: *Well, as far as, yes, I do.*

R: In which way?

P: *Because now, as I age, I watch what I eat now, because I like to put my blood sugar in under control.*

R: And, is it healthy for your family too?

P: *Well, for my husband yeah, it helps too because he's got gout, so he has lots of food that's no good for him.*

5.4.1.2 Group (B): Negative belief / do not adhere to advice

-
- 4 participants

- Negative belief about following the advice could be for the following reasons (**Lack of time, cultural influence, lack of motivation due to arthritis, fresh vegetables and sea food are expensive, no coping**)

- Sedentary (daily living+ household tasks)

- Low fruits and vegetables (2-3 times/week)

- Vegetable is stir -fried, fried

- Less than 20,000 \$

- Visit dietitian once every 3 months or not often

- Completed high school

This group did not meet most of the criteria that make them likely to adhere to the dietary advice.

Women in this group lacked the desire or interest to eat healthy foods. Therefore, education programs are required as well as governmental support programs.

Participants' expressions

(Participant 3)

R: Do you consider this food healthy?

P: *No, not really. The food that I'm eating now? No.*

R: Why?

P: *Because I know it's not good for my health and a lot of it's processed.*

R: I noticed that you mentioned rice in every meal, is that true?

P: *"Yeah, Filipinos eat rice a lot. (laugh)"*

"I am not active because I have pain all the time always pain, I have fibromyalgia and I have diverticulitis, so, it prevents me from walking, so when I start walking I feel it... I open a bottle of Pepsi in the morning and it's gone by the end of the day. So, it's five to 19 per week. Couples times of water a week. Like this week I have not a have a bottle of water at all this week..."

(Participant 4)

R: I remember you mentioned apple, when usually do you eat an apple?

P: *That would be in my lunch sometimes an apple, orange or banana. Some kind of fruits or strawberry. I'm not a consistent eater.*

R: Can you tell me approximately, how many times do you eat a fruit in the usual week per lunch?

P: *in a good week, probably three times a week*

“My house is scattered, my children goes up by themselves and my husband goes somewhere else. We don’t sat on a table and eat. because I’m at work for breakfast and lunch and if he’s working in evening that works for supper and I don’t see him during the day and my children if they had a sport that would mean that they are not home, we have busy home, so not often we eat meals together unless we go out. Exercise wise not very but I’m not home very often because I usually going somewhere with a child but I don’t have the energy”

(Participant 9) *“Lean is good not fat but lean is expensive that’s why I mostly bought fat...; Every day, 3 times a day, sometimes too much, more that even 3 times a day. Because I’m not satisfied to eat something when I feel hungry but its heavy in the body, they told me, I figure out brown rice is good but it’s not taste good but they said it’s healthy but you know...”*

(Participant 7)

R: Are you concerned about chronic disease?

P: *What chronic disease?!*

R: You said that you worry about diabetes?

P: *yeah, I’m concerned because I wanna learn about how you control our self to not having a diabetic you know because they said everyone that diabetic you need take care of yourself, but when you eat too much. I have a high blood sugar before and he told me already be careful on your health and I didn’t listen and I got high cholesterol because I eat too much fats and I got high blood sugar because I can’t control myself sometimes I feel hungry...alone because I’m not home. I start my day early so I don’t eat my breakfast with my family, no lunch with my family,*

it's just the suppertime we get together, so we try to eat together, and I like Indian food, but it's full of carbs and calories so I just try to eat it like one time in the day.

5.4.1.3 Group (c); Positive belief / do not adhere to advice, (sometimes adhere)

<ul style="list-style-type: none"> • 6 participants
<ul style="list-style-type: none"> • Sedentary (daily living+ household tasks), Low active (daily living +30-60min/day moderate activity)
<ul style="list-style-type: none"> • Low fruits and vegetables intake
<ul style="list-style-type: none"> • Boiling, steaming, grilling
<ul style="list-style-type: none"> • Less than\$20,000, More than \$60,000
<ul style="list-style-type: none"> • Every 3 months, none
<ul style="list-style-type: none"> • Completed high school

Despite the fact that some participants intend to change their behaviour, they do not. Reasons for non-adherence include lack of knowledge, poor internal control, limited access to resources, time required to eat well. Family history motivates intention; they wish to avoid what their beloved ones passed through; they **cope** with their limited resources. They behave when they choose to, and do not engage in the behaviour completely because they put other social needs, family demands and priorities first. Interestingly, this group could change their food choice behaviour over the weekends to focus more on eating healthy choices such as fruits that are hard to be eaten away from home.

Participant's expressions

(Participant 10) *"Difficulty yes, because I'm on assistance and I try to get the healthiest food that I can, but I only get \$80 for food so most of the time that's why I eat chicken nuggets, pasta and fries, because it's cheaper"*

(Participant 11) *"Well I'm concerned with other people and myself. I have diabetes, high cholesterol and high blood pressure, so for me to be eating right is mandatory... yeah, because we have to travel out about an hour and a half to get vegetables... mostly the store carries processed foods. There are hardly any fresh vegetables. Or fruit, if it's there, it's expensive. A bag of apples, they'll charge you \$9, and when you can go into a town and buy them for \$4, and also I have to pay my other bills!"*

(Participant 8) *"Well, in order for me to eat better, I just met with the dieticians, I'm going to have to eat better for my health problems right now, but I find that a lot of the good food that I do need to eat, I need to eat unprocessed food, fresh vegetables, fruit, and the meat needs to be lean, and lean is way more expensive than regular meat, and the bread, sometimes the bread is okay, it's mostly just the meat and buying better quality food is more expensive, it's usually why I eat what I eat"*

(Participant 2)

R: Are you concerned about chronic diseases?

P: *Well, my Mom had heart disease, so of course, I'm trying to keep my weight down because of that and my diabetes, my grandmother had arthritis and I have arthritis in my knee.*

5.4.1.4 (Group D): Positive belief/adhere to advice, but they may not continue in the future

<ul style="list-style-type: none">• 5 participants
<ul style="list-style-type: none">• Sedentary (daily living+ household tasks), Low active (daily living +30-60min/day moderate activity)
<ul style="list-style-type: none">• Moderate vegetables and fruits intake
<ul style="list-style-type: none">• Grilled, steaming
<ul style="list-style-type: none">• \$20,000 to \$40,000, (\$40,000 to \$60,000)
<ul style="list-style-type: none">• Every month, twice a month, every 2 months
<ul style="list-style-type: none">• Completed high school, some college

Some participants believe in following the advice; however, they **complain** about life-barriers that are difficult to overcome, and to live with full acceptance of their condition. Lack of social support might affect their desire to eat, or eating high calorie, empty nutrient meals. They adhere to the dietary advice, but they do not receive the enough education of diabetes and its complications. In addition, women in this group do not accept their situation and therefore they give up or struggle to continue adhere to dietary advice. This group needs help, attitude counselling and education. Emotion plays an important role in defining their personality. The minute they go to the DEC, they intend to change some behaviour. They know, they believe, and they follow the advice but they are not happy; they might be affected by family pressure to change their behaviour in the future. They are convinced from their point of view that they are doing everything correctly in terms of following a healthy diet; nevertheless, they wonder why they got the disease in the first place.

Some women of this group may not have money problems, because they obviously can afford different kinds of seasonal fruits. They try to avoid foods that raise blood glucose. They could

complain about the quality of the knowledge they receive from health services. The burden of diabetes is difficult on the long run among this group. However, the regular expenses of chronic disease (diabetes), such as paying for medications could sometimes interfere with paying for variety foods such as fish and different types of vegetables. Therefore, they get exhausted to carry on diet management. Some participants have mixed opinions (ambivalent) about their diet. They are aware that they sometimes follow the advice, and sometimes they do not. In fact, their food behaviour does not match what they report.

Participant's expressions

(Participant 14) “ *My breakfast... just put cereal in the pot, add some milk and boil it, and only with my cereal, have some dried fruit... cranberry or raisin, and put a half an apple inside... cinnamon. Life is really **difficult** when you have to go through all these medications... You know, the problem with diabetes is, when you've been diabetic for so long, people assume that you know everything about diabetes, and if something changes along the way, people assume that you know it and don't tell you... When I first became diabetic, and they told me when I'm giving myself a needle in my leg to pinch my skin, now she's telling me we don't do that anymore*”

(Participant 16) “*I don't know. It's boring sometime, if I'm tired, I would just have toast and peanut butter, supertime. Sometimes steamed vegetables... No, he can eat rice every day, so he's a rice person. He actually deep fries his food, whereas mine I have to steam it. I'm taking care of myself and he's eating all the nice stuff, and he has no sickness so I should start eat like him... Because if it's not controlled, then chance is you can end up, your foot can be amputated, you can get a heart attack, and you can get a stroke*”.

(Participant 15)

R: Do you consider this food healthy?

P: I would say yes.

R: Why? In way?

P: I'm just thinking in terms of your meats, your vegetables, your starches... there's 5 of them.

R: I noticed you don't eat any fruits?

P: I do. I eat bananas, I eat oranges, I eat apples, but then, that doesn't always happen...

whenever I can get them. Because they don't stay fresh that long.

R: Are you concerned about chronic disease?

P: *I worry about everything.*

R: For example, are you concerned about Type II Diabetes?

P: *Yes. Because I'm trying very hard to get a handle on it. I am told now I have double chronicle kidney infection... It's just... it's a constant battle; it's like one thing into another. It's like the harder I try to get this much further I feel like I'm going 10 steps back. I get this further, I go 10 steps back. And it's... (Trails off, begins to cry) It's taking control of me, instead of it being the other way around. I am the kind of a person that just had two jobs. I have always been on the go. Suddenly I come to a halt and I'm only 50 (sobs). I smoke. I am trying to quit smoking 'because it does go hand in hand with diabetes. I am trying to eat healthier.*

"If it's too hot out there, I can't eat. And I'm not going to force myself to eat. I don't care if I don't eat all day. If it's just too hot, I will not eat, but I will have water, because you can't be dehydrated either, so I will drink water"

(Participant 17)

I see you have fruits every day?

Yes, I don't skip fruit. I always have fruit.

Are you concerning about chronic disease?

Of course, if it's a long-term, I'm worried about what I have right now.

Why?

I'm worried because my Mom has it. It's hereditary.

Type II?

All of us are Type II. No one is Type I... My Mom died with diabetes, my sister is having a hard time now with her diabetes. And I'm trying to control mine... Yes, I don't skip fruit. I always have fruits... making wise choices, eating in moderation, eating whole wheat, keeping away from the bad stuff, not eating potato chips, and have a crappy diet, then other than that I think it's pretty good, to be honest.

Overall, there are different perceptions of groups of women with type 2 diabetes in this study, see figure 7-1 and figure 7-2.

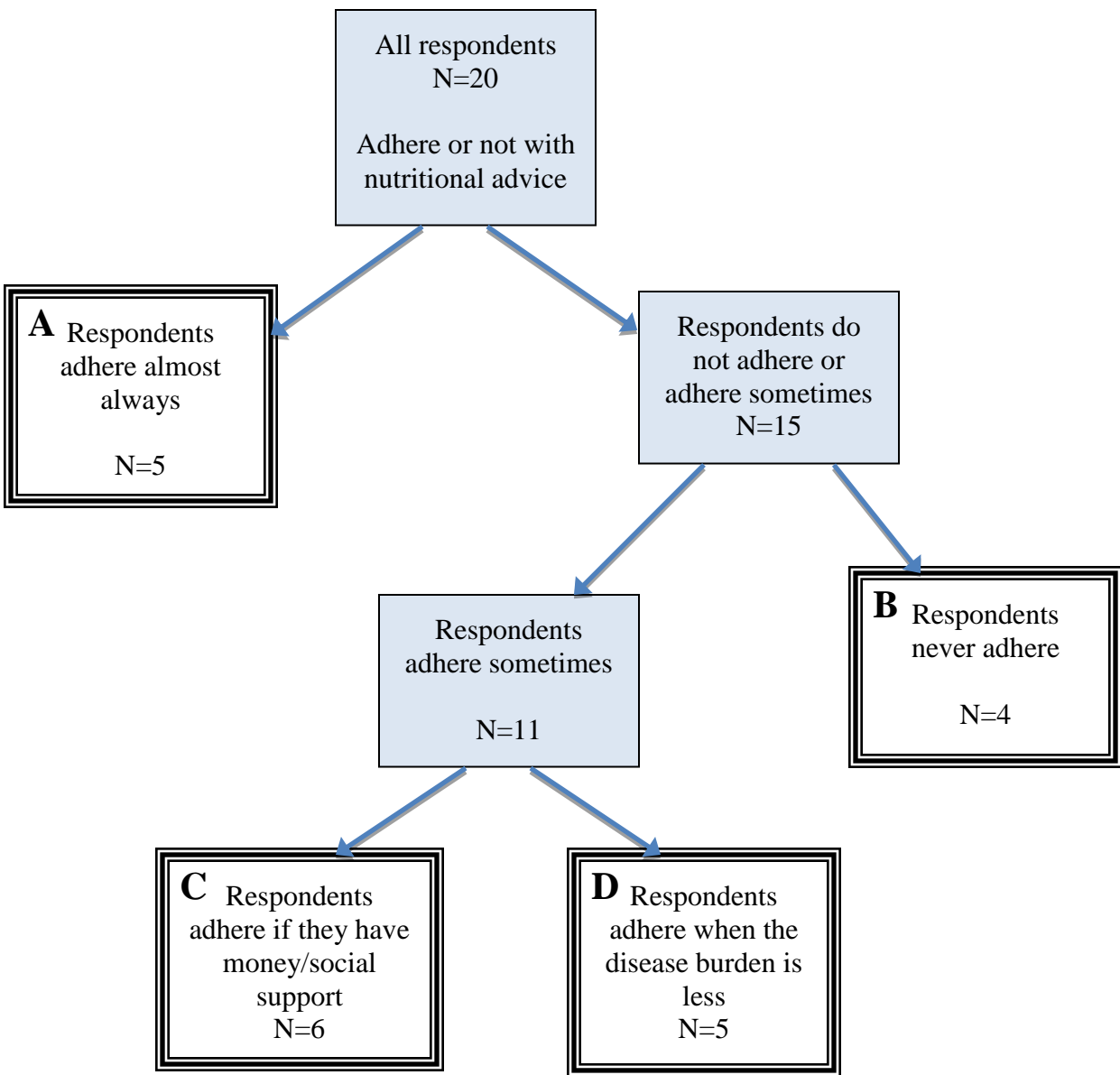


Figure 7-1: Summary of women groups with different adherence's beliefs.



Figure 7-2 Additional factors for women adherence

CHAPTER 6 DISCUSSION

Due to the fact that most of the factors related to food behaviour come from the themes and constructs that contribute to the present study's context, this discussion will cover the results of the two research questions in detail: 'The factors that appear to be related to food perceptions and/or food behaviour (6.1) which are personal attitude, emotion, coping and internal control. Those are some of the sub-themes that used to answer the 1st research question, while additional sub-themes used to answer the 2nd research question. The remaining factors will be discussed in the second part 'The extent to which factors and perceptions of people toward food are associated with adherence to dietary advice (6.2). The focus on the personal factors in discussion because women in present study talked about their perceptions, thoughts, fears and other psychological issues. They also expressed some environmental factors such as their physician-relationships, social support and limited access to resources. These factors could change overtime by diet management.

6.1 FACTORS RELATED TO FOOD PERCEPTIONS AND/OR BEHAVIOR

6.1.1 Personal attitude

"Attitude is conceptualized as an individual's overall appraisal of the behavior and is a result of behavioral beliefs" (Ajzen, 1991). More specifically, attitudes are derived from power in the belief by the evaluation of the result of the behaviour whether positive evaluation or negative. Background factors: demographics, personality, psychological factors, previous experience and knowledge, lead to specific attitudes. Thus, food choice is influenced by personal attitudes and values, beliefs about performing the behaviour, lack of motivation. In the current study, some women with type 2 diabetes of group (B) reported that due to dying her mother from diabetes complications, consequently she will face the same incident , they also reported a

frequent lack of motivation or giving less attention to their food behaviour than it should be given. This was because of a physical injury, the disease itself, lack of motivation to change behaviours, working long hours and the burden of taking medications. As shown through research in the UK, a person might become exhausted from living as a chronic disease patient and using medications. The negative feelings associated with taking medication may lead a person to stop, forget/avoid the drug treatment and develop unorganized meals patterns (Wardle, 2003). In contrast, Blue (2007) claimed the support for all TPB constructs predicting intention to engage in healthy eating by individuals who are at risk for diabetes; however, Blue found no support for attitudes (construct) that anticipate an intention to commit to physical activity.

6.1.2 Emotion

Results from the present study show that some participants of group (D) act based on their different emotions and feelings and use food to deal with mixed emotions. The women's behaviour towards food can be triggered by boredom, mood swings, guilt, like or dislike of some foods, denial of the severity status of disease and rewarding themselves. Similar observations showed that food can change an individual's character and mood, therefore, influencing food choice (Shepard, 1999). For example, when individuals address food desires through their moods, especially during a woman's premenstrual time, the relationship with food may cause the person to feel guilty after indulging, causing a decrease in food quantities. Unfortunately, this decrease in quantities often results in an increased desire to eat (Shepard, 1999). When low motivation for preparing food combined with low appetite; often lead to irregular eating patterns or unhealthy food options. Frustration can lead individuals to eat a greater amount of food than their actual needs (Shepard, 1999). Participants of the present study ate healthy diets to deal with fears, or they enjoyed eating to avoid thoughts that were scary or annoying such as

getting diabetes complications or death. Food can be used to express emotions of love and caring: such as sharing food with families or friends.

Psychosocial distress has been found to affect patients negatively in maintaining the recommended self-care (Peres, et al., 2008). Peres, et al. found that participants reported the psychological and emotional stress of diabetes to hinder their management and compliance with their treatment regimen. Thus, diabetes should be understood from the medical concept as well as the psychological behaviour.

6.1.3 Coping

The results of this study found of participants of groups (B and C) not following the dietary guidelines given by their dietitian; nevertheless, group (C) was willing to adapt and handle the difficulty they faced to obtain appropriate resources, and accepted the current situation. On the other hand, group (B) struggled to cope. For example, one participant mentioned that she is more likely to buy frozen vegetables and fruits than fresh as she would save money and still achieve the healthy eating recommendations due to the high price and limited quantities of fresh produce in stores. A study pointed out that low-income groups reported consuming unbalanced diets and low intakes of fruit and vegetables (Shepard, 1999). The cost of food and the ability of the person to afford specific foods in relation to income are major determinants of food choice behaviour. Being diabetic means losing the only resource available for survival: one's own body. Health ensures the condition of keeping active and allows the satisfaction of some basic needs such as eating and housework (Shepard, 1999; Peres et al., 2008). One of the groups of the present study earns high or reasonable income; however, this does not necessarily mean that they consumed a more balanced diet, or made healthy food choices.

6.1.4 Internal control

The positive beliefs held by Groups A and D of this study's participants about following dietary advice show strong internal control. In other words, they have confidence towards their food choices and they are motivated by their knowledge and self-awareness. For instance, the constant knowledge that they receive from the dietitian plus their positive desire (impulse) or need to manage their behaviour, therefore they restrict fats intake to maintain blood sugar. Similar findings parallel the present study findings, suggesting that understanding of the impact of diabetes on health and lifestyle seems to be a significant factor in adherence to advice (Rubin, 2005). Therefore a basic knowledge will perhaps increase the internal control factor among women with type 2 diabetes. In addition, health for women with type 2 diabetes is challenging: it means losing their own work capacity since they are usually responsible for their family sustainability. Thus, dietitians play a significant role in reinforcing the previous knowledge of participants to motivate them towards positive food choices. Similar findings in a study amongst the health care professionals concluded that patients need to be aware that type II diabetes is a potentially serious disease (Snoek, 2002). Education programs might promote this awareness by facilitating commitment and motivation to adhere with the diabetic regimens and to maintain behavioural change. However, understanding dietary information does not necessarily lead to an action; there should be a will to change personal behaviour.

6.2 FACTORS AND PERCEPTIONS ASSOCIATED WITH ADHERENCE

This study found four major factors that lead to following the nutritional advice, three barriers to following the advice, and three factors that contributed to both adherence and/or non-adherence. These factors will be discussed in the following section.

Factors leading to adherence	Barriers to adherence	Factors contributing to both adherence and/or non adherence
<ul style="list-style-type: none"> • Perception about food choices • Perception about food preparation • Social support • Belief about getting the disease (family history) 	<ul style="list-style-type: none"> • Lack or limited resources • Conflict of time • Lack of knowledge 	<ul style="list-style-type: none"> • Subjective norms • Cultural influence • Belief

6.2.1 Factors leading to adherence

6.2.1.1 Perception of Food choice and food preparation

There are many factors that lead to following the dietary advice, including food choice and food preparation. Results of this study agree with Kapur's (2008) findings that many factors in association with both type 2 diabetes patient and health care provider influence the outcomes of adherence to dietary advice. For example, some of the women in study groups (A, D) understand exactly why they select food items: whether it is for quality, taste or nutrition; they rely on the variation and include healthy food options. This is a clear indication of deep internal control of perception about food choice and knowing what foods are to be avoided. Their knowledge might be a motivator to avoid certain foods; they also fear not achieving a controlled blood sugar. Similar evidence claimed by Paquette (2005) about perceptions of healthy eating was mainly focused on food choices such as fruits and vegetables intakes. Food characteristics such as texture, sugar, fat and salt content were also necessary in people's perceptions of healthy eating (Paquette, 2005). Therefore, the perceptions of including healthy food choices could be considered as one of the important factors that affect individuals eating habits. Furthermore, different healthy approaches to cooking were often mentioned by participants during the

interviews. Participants used terms of food preparation such as boiling, steaming, soaking the fats, using the oven, and they knew the difference between each approach. It is apparent that they believe in the importance of food preparation and its effects their health status. In addition, the message was being delivered to people who live with the participants or who take care of the food preparation. Thus, the perception about food preparation is one of the factors having a positive influence in following the advice. Similarly, Canadian Diabetes Association recommends that food preparation be considered a key message for people with type 2 diabetes.

6.2.1.2 Social support

Social support, whether physical or emotional, particularly from friends and family is significantly important to adherence. There is evidence show that social support has main role in adherence to dietary advice (Gonder-Frederick, et al., 2002). When a participant's spouse is always available to provide the service of cooking and is knowledgeable about the participant's situation, the possibility of adherence to dietary regimen will increase. Conversely, the absence of this support might work as a barrier to adherence. In fact, family members are the engine that operates the process of adherence, especially when they are concerned enough to make appropriate food choices. MacLean (1991) found out that following dietary advice was much easier if the appropriate foods were convenient and accessible rather than having inappropriate foods consistently available.

Family members are more likely not interested in making changes in their usual eating habits, even when there is an emotionally support of patient's dietary adherence. Consequently, inappropriate foods might be readily accessible and therefore making adherence to dietary regimens more challenging (Glasgow, et al., 2001). More importantly, positive social supports enhanced improved food choices and healthful dietary change of the participants in groups (A,

D) of the present study improved. Family and peers are positively associated with an increase in fruit and vegetable intakes (Sorensen, et al., 1998). Not much is clear about how social support impact adherence to dietary advice (Culos-Reed, 2000). Nevertheless, literature on adherence to dietary advice and social support does not discuss specifically cases with type 2 diabetes, rather their adherence to medical treatment. Social supports might promote health status through the fostering of belonging and assisting people to feel more comfortable (Berkman, 1995). Interestingly, when social support is important to people with type 2 diabetes, they are more likely to be concerned by the behaviours of others (Glasgow, 1988). Family relationships play an important role in diabetes management; positive relationships help to facilitate dietary adherence, which is part of this management.

6.2.1.3 Family history

Family history is a strong risk predictor for being susceptible to type 2 diabetes (Hariri, 2006). In this present study, participants having a family history of type 2 diabetes perceived that perhaps they have the disease due to lifestyle factors (stress) or genetic susceptibility. Lifestyle influences the development of type 2 diabetes. For example, obesity tends to spread amongst one family, as the family tends to have similar eating and exercise habits (Roumen, 2009). Results of the present study suggest that family history may be a significant impetus to motivate some of the participants to change their behaviour and follow the dietary advice. They wish to maintain their well-being for their children as they fear developing complications of diabetes if they do not adhere to the advice. Patients with type 2 diabetes are more likely to perceive the threat of the disease specifically if they witness it among their loved ones (parents). As a result, they are more likely to change behaviour and follow nutritional advice (Travis, 1997). Interestingly, participants of group (C) in the present study believe that they will develop disease

complications eventually; therefore, they change their behaviours toward healthy food choices as a preventative measure. Thus, they are more engaged in risk-reducing behaviours and health promoting programs such as maintaining bodyweight (Forsyth, 1997).

6.2.2 Barriers to adherence

6.2.2.1 Lack of resource

Money is a significant issue when it comes to following the advice of healthcare professionals. Participants of groups (B, C) of this study who are on social assistance, or have low income, are more likely to experience tight budgets; consequently, they spend less on healthy choice food items. Low socio-economic status has been associated with lower regimen adherence (Delamater, 2006). More importantly, some of the participants were willing to commit to nutritional advice; however, the price of expensive food items hindered adherence. Highly processed or empty-nutrient foods can be less expensive than healthier choices such as fresh fruits, dairy and vegetables.

Healthy diet consumption for low socio-economical populations is critical who have higher disease risk than higher socio-economic groups (Rao, 2013). Findings by Muraven & Baumeister (2000) reported that adherence to a particular diet, or meal plan can be accomplished through self-control; however, this strength can be depleted when there are insufficient resources. According to Wardle (2003) people having diabetes require more care to the body. It is more likely that people in a low-income social class give less care to their bodies due to their focus on work. There is no time to listen to their body's needs. Consequently, signs of disease are ignored because it is important to believe that everything is working efficiently, since survival relies on being capable of working for a living. Places where food is consumed can greatly affect an individual's food choice due to the limited supply of healthy options. Healthy

food readily available at home increases consumption of healthy food; nevertheless, access to healthy food is limited in many work environments and restaurants (Shepard, 1999). In one study, it was reported that higher income households often spend their grocery budgets on healthier food options; whereas, lower income households spend their grocery budgets on eating out at fast food places, where food choices are high in fat and beverages are high in sugar, all due to the lower prices of these choices (French, 2010). Further, people who are low-income often have inadequate access to resources to visit less expensive, large grocery stores rather than closer, but more expensive convenience stores (Smoyer-Tomic, 2006). Thus, limited access to resources has a negative impact on adherence to a dietary regimen.

6.2.2.2 Conflict of time

Participants in this study who have a less busy work life tend to prepare healthier ingredients for more healthy regular meals; however, lack of time management was a factor that became an obvious barrier to their commitment. Similar results show that lack of time is one of the critical barriers to adherence (Williamson, 2000). Some of the women in groups (B, C) of the present study reported that they work outside home from early morning until evening, eating just small snacks. They do not have time to prepare a complete meal during the day and end up missing meals due to their stressful work environments. Once home, they do not have the enthusiasm needed to prepare healthy ingredients for a meal, and thus, the cycle of random intake continues. On the other hand, mothers working outside the home who juggle with a busy family life have considerably less time to prepare healthy foods and have the family eat together (Paquette, 2005; Slater, 2012). This suggests that spending less time eating with the family throughout a typical week is one of the main barriers of dietary adherence. Interestingly, weekends seem to provide some participants of group (C) with a sufficient amount of time to eat

healthier meals, while other participants look to eat fast or not healthy meals outside the home. A study (Devine, 2009) used telephone surveys that combined fathers and mothers who worked long hours weekly. Participants reported that the conflict between the work-family demands and the overload of daily roles significantly influenced their food choices. Most participants ate one or more fast-food meals and/or take-out meals during the week. The study also found that mothers and fathers used several coping strategies; fathers who worked long hours or had irregular schedules were prone to buying take-out meals, skipping family meals, purchasing prepared appetizers and eating during work.

6.2.2.3 Lack of knowledge

Since the interviews of participants took place at DEC, dietitians were the main health care providers advising participants. A very common area contributing to non-adherence could be that participants may not have received enough information and dietary advice or tips in self-management from the dietitian. The participants can also misinterpret diet-disease associations or dietary advice from the health care provider, resulting in a poor understanding of dietary advice, and might explain why group (B) experienced difficulty in managing dietary intakes in practice. Participants in groups (A, D) who followed dietary advice were more likely to have given advice and visited a dietitian more often. Kapur (2008) claimed that usually this advice involved elements to promote health, as well as the control of blood sugar. Patients often received other types of advice including printed diet charts, healthy food options, cooking methods and lifestyle's modification guidance. Travis (1997) showed that the knowledge of foods choice had a positive effect on adhering to the dietary regimen. In the present study, insufficient information on dietary advice was claimed to stop changing dietary behaviour. In general, diabetic patients often receive vast information on food; they become much more aware of serving sizes, and they

try to monitor their dietary intakes to keep blood sugar within the normal level (Yannakoulia, 2006). Delormier, (2009) found evidence that diabetics did not apply their knowledge because the perceived pressure to change their usual eating patterns and adapt a new healthy diet might cause them to avoid foods that do not meet nutritional recommendations.

6.2.3 Factors contribute to both adherence and/or non adherence

6.2.3.1 Subjective norms

A participant's perception whether other people think she should engage in the behaviour implied subjective norms. Findings of the present study determine that the pressure women might face could be associated with their family's opinion about food choices or even that of friends. Increasingly, taking into account an individual's behaviour within the larger social context is necessary to understand adherence (Kidd & Altmann, 2000). This makes sense because people with low internal control do not perceive themselves as being able to manage their diabetes independently. They may look to others to get behavioural cues and therefore are more affected by their social surroundings (Brekke, 2004). In another study, different findings reported that subjective norm was the best factor to explore the behaviour of healthy eating in boys; watching television, after school programs, family settings and friends were the strongest influences (Fila, 2006). However, this predictor could have both positive and negative effects on following nutritional advice. Some women of group (C) excluded important healthy food choices such as fish and milk because their children could not tolerate or disliked them. A positive effect can be found in women who started eating whole grain rice and adding more steamed vegetables in their diet because of their husband's health status. A review associated to health behaviours of the TPB's application contrasts to the present study. A model testing the ability to predict intention among heavy episodic college drinkers found that the subjective norm did not have

a significant influence on the intention prediction (Godin & Kok, 1996). Some participants of the present study resisted making new food choices due to their fear that the food could be wasted if the family rejected eating this new food. Thus, some participants of the present study were influenced by their family's preferences or close friends' opinions to some of the food items, rather than making food choices suggested by the dietitian.

6.2.3.2 Cultural influence

Culture is defined as “the adaptations of people to the conditions of life that are carried over multiple generations, and that become resistant to change even when conditions of life change” (Hofstede, 2002). Results of the present study show that class disparities and cultural influences impact food consumption and nutritional intake. Cultural norms sometimes lead to eating particular foods and to special traditions of preparing meals as in the case for some participants of group (B). This could lead participants to ignore restrictions from their diet or participate in excessive eating of some food items over others. However, cultural influences can be changed according to the adopted environment; when an individual moves to a new country, they usually choose or adapt to certain foods and/or food habits of the new culture (Shepard, 1999). Kohinor, (2011) showed that cultural food habits could affect adherence negatively for Surinamese diabetic patients eating practices are associated with values and cultural beliefs. Conserving one's Surinamese identity and “Dutch” habits may hinder a patient's adherence to dietary guidelines. Culturally based diabetes education, adapted at the surface, but maintaining the deep structural roots, such as the Surinamese, can help an immigrant's understanding of dietary guidelines of another country (Kohinor, 2011). In contrast, cultural habits appear to change when some individuals move to a different place and culture and they adopt the food habits of that new culture. For instance, South Asian females who migrated to Scotland increased

their intake of fats as an adaptation of change. This perhaps negative habit was associated with an increased BMI, incidence of heart disease and type 2 diabetes (Greenhalgh, 1997). Some evidence suggests that traditions, beliefs and values are the main factors influencing preference and nutritional status (Slater, 2012).

6.2.3.3 Belief

Results of the current study show that some participants have positive beliefs and attitudes towards their dietary behaviours in terms of high attention and care in food choices, whether it is for the preparation of meals, or their healthy dietary intake. These people are more prone to stick to dietary advice and are more adherent. Others, however, concentrate on the barriers they face and just accept the life they live including their food behaviours. If patients are not ready for change, it takes them effort and time to accept and produce change. The efforts put into food preparation are reinforced by the women's beliefs and identities allowing the frequent consumption of these foods (Slater, 2012). When behaviours and beliefs have to be changed, the complexity of the interaction between the current beliefs and situations modify the information and actions required to attain a new behaviour (Kapur, 2008). Moreover, patients adhere well when the dietary advice makes sense to them and when it appears effective. Thus, adherence to the advice is attained when they believe the benefits outweigh the costs, when their environment supports food choices related to behaviours and when they believe they are capable of success.

6.3 FOOD CHOICE MAP

This study looked at full dietary patterns rather than specific nutrients or food components. The data from the FCM is simply a snapshot of food behaviour, expressed as a visual pattern and is intended to represent key aspects of the food pattern of each participant (Sevenhuysen, 2003). The clinic delivers education with standard content and content specific to

the condition of the participants, but it's not clear whether they were present at the sessions of dietary advice or understood the intent of dietitians. However, the aim of the FCM is to find the importance of specific dietary aspects to a person, and to discover the extent to which a person's actions regarding their diet mirror what they report. There are many possible reasons that hinder positive change in dietary behaviour including a lack of, or insufficient knowledge about food and nutrients, different psychological factors, culture, social aspects, health concerns, access to food and, most significantly, the desire to change (motivation). The FCM could be an extra tool to connect the dietary intakes for patients with chronic disease not only by looking into nutrient intakes, but also into food patterns and life experiences. It is claimed that the dietary pattern captures multiple nutrient effects rather than single dietary item and observes its beneficial impact in dietary interventions (Tseng & DeVellis, 2001). Moreover, quantitative data on food intake and the associations of chronic diseases with social aspects of dietary patterns could be provided by FCM. Also, FCM can provide a great deal of information about cultural backgrounds and social factors, thereby developing interaction to promote health for the community. The FCM is different from other dietary assessment methods that measure individual intakes; it links people's perceptions behind their dietary behaviour to the quantitative data on these behaviours. What distinguish FCM from other assessment methods are the associations built by participants; therefore, the role of researcher in explaining the associations does not take a significant place (Sevenhuysen, 2003). The validity of using the FCM interview is achieved when the researcher gives the participant time to correct details they had mentioned already. It is more likely that these corrections about food frequency or food items are prompted when the participant discusses other food-linked experiences later in the interview. Within this context, the analysis of the conversation will be much more accurate than other traditional diet

history interviews (Tapsell, 2000). Corrections were taken into consideration once they were reported by a participant and compared with the information already on the visual FCM, providing an entire description of the participant's experience not found using other record methods. By the time of conducting the interviews, the interviewer had become more knowledgeable in how and when to ask the correct questions, and in modifying the questions, especially if a participant did not understand the question. Also, the qualitative researcher looked at the participant's answers and tried to follow the responses by asking appropriate questions to give a reflexive worldview through interaction. The researcher tried to find connections between the ideas to build a deep understanding of the phenomenon, and after analyzing the interviews identified sub-themes that were similar, but under different themes.

6.4 ADHERENCE

According to (Millen, et al., 2001) the importance of connecting health behaviours to dietary patterns could lead to a better understanding of chronic diseases. The connections mentioned by participants about their perceptions of food or health related behaviours, their social surroundings and their responses to those surroundings will make professionals willing to go further than the ordinary dietary advice that they usually provide. Adherence to nutritional recommendations is not only influenced by many factors, but also by the culture and motivational factors (Kastorini and Panagiotakos, 2009). Also, the barriers for people who are trying to follow a healthier diet such as lack of time, cost, low quality foods, lack of family support (Kearney, 1999). People are usually ready to accept lean meat products, low-fat milk products and fruits in their diet; however, fish intake is not well accepted (Brekke, 2004). The prevalence of type 2 diabetes is growing and increasing worldwide with huge economic burdens. Lifestyle factors, including dietary habits, play an important role against the development of

diabetes. Therefore, the focus should be given to improving lifestyle through creating solutions that increase the adherence to healthy dietary patterns and prevent the development of type 2 diabetes (Roumen, 2009).

SIGNIFICANCE OF RESEARCH

This study provides information on the usual food patterns among women with type 2 diabetes. It describes perceptions related to food, such as the relative health importance of specific foods or food products, and increases the understanding of food choice behaviours within the context of type 2 diabetes. People eat not only according to their individual preferences, but also for essentially social circumstances. Thus, the challenge for health professionals is to set different strategies to trigger a change in the behaviour of people with different priorities.

LIMITATIONS

There are several limitations in this study. First, due to the need to focus on diet patterns, the deep perceptions of participants toward food choices and the amount of time spent talking about the reasons for these perceptions, portion size of food items have been excluded from reporting of the diet patterns during the FCM interviews. Portion size would provide more details about a participant's nutrient intake, but is not the main aim of this study. Secondly, to avoid the influence of gender on analysis, men have been excluded from this study. Furthermore, the BMIs for three participants have been excluded because of errors in self-reported weight or height data. Relying on the memory of participants to answer the interview questions and questionnaires could lead participants to have more of a deviation from reality than what their answers could really have been. In the process of content analysis, some of the interview transcripts rechecked

with an academic professional to ensure agreement on themes, but not all of them. In addition, the sample size of this study is small and does not represent the wider population of people with type 2 diabetes living in Winnipeg. The study interviewed only people attending the DEC, and as such, hinders meeting patients with different perspectives toward food choices attending different clinics. Spontaneous questions asked of some participants and not others can be seen as unfair and time consuming. Finally, family income, which might influence a participant's choices of food and other demands, was not included in reporting the participant's demographic characteristics.

FUTURE IMPLICATION

There are several options for follow-ups to this study to further enhance our understanding in designing education strategies among people with type 2 diabetes. Many reasons for food choice behaviour were identified. Some of the reasons are easily addressed in a brief conversation due to the strong internal desire or strong external impact of participants. Other reasons took more time to be identified, but as the researcher explored more personal factors about lifestyle and the concern of type 2 diabetes, those reasons become clearer.

Interviewing people with type 2 diabetes who do not attend DEC might be productive, to meet with more diverse participants having different dietary patterns. In addition, due to the small sample size and time limitation of this study, new research could be done in the application of the study findings to test whether education programs are effective and provide more accurate information in the demographic features distribution. Several education techniques could be constructed for different groups of people with type 2 diabetes to associate these differences with perceptions and environmental factors associated with the food choices. Moreover, different

health behaviour theories as a framework for future studies would test if the constructs are applicable to similar data. Food choice is a complicated process that is affected by individual physiological and psychological characteristics, socio-economic status, and ethno-cultural backgrounds. Thus, future research can focus on a greater sample size of men with diabetes from different ethnic and socio-economic groups. Because of their significant role and impact in the dietary change process, another direction of the present study can incorporate the work of dietitians into the in-depth interviews to encourage them to become more aware and engaged of perceptions of patients with type 2 diabetes. Dietitians can also help find alternative solutions in case patients cannot afford some of the nutritious food items; therefore, diet management can be more effective. Health care providers must have the ability to understand behavioral change as part of the given advice. The influence of the family is definitely one of the significant results of this study. Education programs should target the role of the family to enhance better food choice behaviours. The fact that the key findings of the present study resulted in capturing different perspectives of women having type 2 diabetes in situations similar to those who participated in the present study could be a screening tool to help health care providers in future research. Other implications on managing food supply could be done in relation to this study. For example, food resources for diabetics could be allocated to understand their needs in terms of food choices. It is important that decision-makers consider creating programs for consumers according to the quality of products they seek. Furthermore, long-term chronic illnesses require not only combined research efforts, but also longitudinal study programs. Thus, the experience of coping with chronic conditions can be captured over time. Finally, programs that integrate dietary behaviour procedures, including self-monitoring, control, and coping skills with relapse prevention must be taken into consideration.

CONCLUSION

This study contributes to the literature through providing recent data on understanding women's perceptions of adherence to dietary advice. The intent of this study is to understand perceptions, attitudes and practices that described by the participants themselves of the present study, and also the factors that help or reduce in adherence to dietary advice. Women have different reasons for food choices and personal health concerns. These factors influence food choices, but are beyond taste, preference and appearance. Knowledge, representations of the disease, cultural issues and beliefs strongly influence food choice behaviour. Participants might experience limited financial resources and still be able to obtain food. The in-depth interviews with visual representations of food include information contribute to a deep understanding of the daily life experiences of participants in terms of diet management. This helps to interpret what is behind dietary patterns and the extent to which people with type 2 diabetes follow dietary advice. Results of the present study revealed that different groups of women differ in their opinions about following dietary advice. Even women who see the value in the advice, and others who find it important can apply un-recommended food choice behaviours. Their perceptions about adhering to advice were used in the criteria of defining adherence, and this approach differs from other studies where the criteria of adherence are based on clinical recommendations. Thus, the effect of differences in adherence criteria created additional associations with factors determining food choices. The key findings in the study summarize the variety of participants' perspectives.

Being aware of healthy food choices, food preparation and having the strong belief do not always assure complete adherence to dietary advice. Barriers of adherence related to life circumstances are more likely to be non-modifiable; however, barriers that could be modifiable

are related to behavioural aspects and the inconsideration of health care providers to provide specific individualized dietary advice. Efforts in the field of enhancing adherence to dietary advice must be applied through improved counselling skills, resulting in participants who have time to manage their dietary intake, have good family supports, often visit a dietitian, and adhere to dietary advice

Dietary advice addresses healthy food options and cooking methods; nevertheless, regular education of patients with type 2 diabetes must be achieved to improve compliance and better quality of life. Food behaviour is a compound process and needs to be understood through multi-dimension factors such as social, cultural, environmental, economic and psychological aspects, especially for people who find difficulty in accessing information or low-income women in this study. The research questions have been answered, with an additional understanding about reasons for perceptions and behaviours, which could be used in professional practice. Four groups of women were identified: those who wanted to follow advice and did; those who did not want to follow advice and did not; those who wanted to follow advice but could not; and those who wanted to follow advice but experienced psychological conflict in doing so. There is need for further long-term studies by using more standardized measures of adherence to address the interventions that enhance adherence to dietary advice in the context of type 2 diabetes.

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Table 8. Themes definition

Themes	Definitions	Examples
Income	Most of women with type 2 diabetes who came to the clinic are on social assistance, so the money they get is not enough to buy whether fresh meat or vegetables.	Researcher; Do you have a budget for buying food? Is this budget increase in a specific time? Can you tell me more? Participant; Yea. I'm on the assistance you know, they only give you a little.
Affordability	Some food items are expensive- such as fish, red meat or specific fruits. Also, some foods are cheap and can be affordable.	R: what type of fish? P: Halibut or pickerel, it'll be pickerel if I can find it cheap because it's expensive. Well, right now sort of the kind of toast I can get from the food bank because I have to go to the food bank, but if I'm lucky enough then I try and get rye.
Travel cost	The amount of money that will be spent to going grocery stores and coming back from.	Yeah, because we have to travel out about an hour and a half to get vegetables and fruits.

Taste	Is preferable or it has acceptable palate.	I cannot stand the taste of fish, cannot stand it. I don't want to smell it cooking.
feel Bored	When there are not enough food choices for the participant to eat.	Geez, I'm looking at all your little things I think I look like a really boring person when it comes to eating. (laugh)
Lack of motivation	When the participant feels tired, lazy or it takes so much time to do so.	The kids eat minute rice, 'because it's faster for them and easy. So usually our biggest meal is supertime. R; Why do you eat fish once a week? P; Too much work to clean.
Guilt	Is an emotion that occurs when the participants believe that they have done something ashamed of or contradict what they believe in.	Ooh, I feel terrible because I'm the one who suffer it, it's good to eat but it's not good for health that's why I try to stop eating fatty food, you know (laugh).
Denial	Refusing to state the problem.	R; So, are you worried about dying to diabetes? I'm not worried. P; Why you don't worry? 'because I got it already, that's it.

Time management conflict	Participants usually know that they have to take the time to eat healthy or practice physical activity but they don't due to their busy schedule or unorganized daily duties.	Then I have apples the other two... I always forget about the weekends. On the weekends I try to have grapes, cherries, peaches or nectarines. I usually have those on the weekend. Those ones are harder for me to eat when I'm at work.
Fast food	Junk food that tastes better which hindering from eating healthy food instead. Or taking the time to cook at home. Also, the food that ready and instant to be eaten.	R ; Why do you eat instant noodles? P ; 'because they're quick to make, especially at suppertime. Because I get home between 8 and 9 at night, I don't feel like cooking a pork chop or chicken that'll take almost an hour to make so I make something quick and easy. Either that or I have a sandwich, but mostly it's been noodles late.
Lack of knowledge	When the participant has no information about the suitable diet plan and how and when should eat this foods.	Well you see nobody actually gave me a diet. See I told different people... I would love it if someone could give me a two-week diet, and said, ok, for breakfast you have this, lunch you have this, and not like ok have so many ounces of this, so

		<p>many ounces, you have to have protein. I don't know all the proteins; I don't know all the starches... I'd rather have someone say, for breakfast you're going to have say oatmeal and a piece of toast or something like that, for lunch you're gonna have some tuna, or whatever. I wish somebody would do that. I could follow that, no problem.</p>
Internal Impulse	<p>The participant's self-talk that encourage him to eat healthy or that has a positive action to motive.</p>	<p>Any type of juice but my favorite is pine apple juice and mango juice. When I feel thirsty. I work in a receiving home for medical, and people are staying there that have long-term, like diabetes and kidneys, they're on dialysis so they're there and I see what's happening to them, and I'm like, "What if that happens to me?"</p>
Moods	<p>An unstable feeling that preventing participants of eating a specific food.</p>	<p>I usually have white milk or chocolate milk and if I'm not in the mood to make coffee. Just about every day depending on, sometimes it's just have the sandwich, if I'm not feeling too good I'll just have a bowl of soup. Sometimes I feel like a pop</p>

		pizza.
Flavor	The food item smell and taste good that attract the participant to eat.	Twice a week maybe. And I make my own soups. I cut up vegetables and potatoes, but the only thing I use is canned tomato soup or vegetable soup and put it in there to give it color and flavor.
Season	Some vegetables or fruits have a specific time throughout the year to be grown and therefore to be eaten.	And meat however are available, and u know meats or fruits or vegetables are up price all the time, it's not a , the only time we get a little bit break is in the summer and we get over local vegetables or fruits on season it will be a little less know otherwise it's a miss or whatever.

Belief	<p>A belief is reserved for information that a person accepts to be true. The beliefs that we hold are an important part of our identity. They may be religious, cultural or moral. Beliefs are precious because they reflect who we are and how we live our lives. Cognitive content held to be true, The ideas that shapes your behavior.</p>	<p>R; Why do you eat whole wheat or is it barley? No, rye. I normally eat rye bread more than I eat whole wheat. Why? My understanding is it's a lot healthier than white bread, but I could be wrong on that. Usually I eat yogurt almost like 7 days like every night because I give myself thing before I go to bed, so I got to eat something. I prefer chicken most of the time, because it doesn't put... my sugar doesn't go high with the chicken.</p>
Behavioral Belief	<p>Is the belief that underlies a person attitude towards the behavior and explained the perceptions that derived from the participant's experience.</p>	<p>I don't eat breakfast usually.</p>
Medications	<p>Sometimes drugs might be a burden for the participant to eat foods. Also, the need for taking the medications could be a reason to eat foods.</p>	<p>I should have had breakfast this morning, but I didn't instead, my pills came up so when I feel like that I just walk away I don't even want to eat I will try to eat when I get home if not then I will have a snack instead of lunch. Sometimes with fish or a slice of</p>

		meat, but sometimes only rice, because I have to take my medication and I don't want to take it with empty stomach and water.
Dislike	Participant doesn't really prefer some items and avoid eating them for taste or color.	I generally eat the brown meat, 'because I don't like white meat, I just like the brown meat... most times she is shake-n-baking' it or not very often does she ever fry it. Mandarins; I can't eat the regular orange.
Likeness	When participants eat what makes them feel happy, (gives them pleasure) and what is really enjoy eating.	<p>For a snack, I like to eat snacks before bed; I tend to get hungry at night, so I would have a diet pop and popcorn or chips.</p> <p>Yeah, I like to drink my Diet Coke, but I do drink water all through the day.</p> <p>R; I noticed that you drink coffee?</p> <p>P; Yeah I drink too much,</p> <p>R; Can you tell me why?</p> <p>P; I enjoyed it.</p>

Careless	Participant doesn't really pay attention to what they eat.	<p>R; Breasts and legs or all parts?</p> <p>P; I'll eat the drumsticks and the thighs; I really don't care for the white meat I find white meat too dry.</p> <p>R; How often do you eat this sandwich?</p> <p>P; I don't know. Once a week. I don't really care for it.</p>
Item Quality	If the product has a good taste, flavor and color that a motive to be eaten.	<p>R; I notice that you don't eat fruits much?</p> <p>P; sometimes I eat strawberries if they good I buy them, orange juice.</p>

Availability	Food is on convenience or easy to find everywhere.	<p>R; This all raw fish or cooked?</p> <p>P; Cooked. Fried. Or sometimes Barbecue with banana, or a cantaloupe, whatever we have fruit available.</p> <p>I'm the type of person when I cook on my own... because I'm diabetic I kind of try to make different meals so that my blood sugar stays at a norm... I don't eat bread unless I don't have anything else left to eat.</p> <p>R; Yogurt?</p> <p>P; I'll probably have, if it's in the house, maybe 2 times a week.</p>
Shortness of budget	When there isn't enough money to buy some foods.	<p>Less. I try to get as much food as I can with whatever money I have left after paying bills and rent. And on top of it, I have to get medication too, so, money's quite tight.</p> <p>We don't eat outside often. If we do I had a penne for supper, we try not to eat out it was 7 at night because it's expensive especially for teenagers but we do if we went out for father's day.</p>
Soft drinks	When participants consume large amount of soft drinks that contain	I open a bottle of Pepsi in the morning and its gone be the end

	high sugar content and high caloric intake like pop. Sucralose (Splenda), 600 times sweeter than other sweeteners.	of the day. So, it's five to 19 per week. Couples times of water a week. Like this week I have not a have a bottle of water at all this week.
Subjective norms	An individual's perception about the particular behavior, which is influenced by the judgment of significant others (e.g., parents, spouse, friends, teachers).	<p>R: Why do you prefer to eat vegetables with each meal?</p> <p>P: hmm I have it when I was a kid we always have vegetables and potato with meat and that's what I raised on, (laugh) it's a habit when kids like their vegetables.</p>
Supplement	Some of the diabetic participants taking special drinks that have full nutritious needs with high calories that hinder taking a balanced diet.	<p>Slim-Fast for breakfast. Milk and Slim-Fast powder.</p> <p>R; How many times?</p> <p>P; Every day.</p> <p>P; sometimes I drink its VH splash, I had one yesterday. So, that's will be once a week, maybe. Another time will have a boost or Glucerna.</p>

Way of cooking	The approach in preparing the food in healthy way without putting fats on it.	When I cook... I had to learn this the hard way... If I'm cooking bacon, instead of just frying it... I will boil it first, and this way it drains off all the grease, it gets rid of all the excess fat and then I will drain it and then I will put a little bit of water in the frying pan and then try and brown it just a little bit.
Help from spouse Or Dependent on someone	Some participants receiving their meals cooked by their family who lived with them or friends. Someone buy and makes the food for the participants.	R ; Do you prepare these foods yourself or someone help you? P ; My son helps me. R ; Which meal? He cooks all the meals for you? P ; Sometimes he cooks. R ; What meal? Boiled chicken... P ; these ones... (Lunch).

Healthy choice	Eating a balanced meal that contains all the food groups could either prevent or minimize the effect of diseases. Also, avoiding meals that have empty nutrients or processed, high sugar, high fat.	R ; Also caring about eating food? P ; That's because of I enjoyed it and its sort of a I guess instead of I have a few cookies or piece of pie or whatever so basically, I eat fruits except of bananas or the real orange just because of the potassium. I consider it healthy.
Family preference	People who live with the participant wanting to eat a specific kind of foods.	Supper usually is something baked, either be chicken, pork. I don't eat fish 'because my kids don't eat fish.
Special occasions	In special days like weekends or when the friends and family gathering to eat and drink.	We roast a whole chicken, and sometimes there are some cases on the weekend we do chicken breast, barbecued chicken breast with mixed vegetables, barbecued too. Leftover soup, salad. On occasion we've had frozen pizzas for lunch. On breakfast, on the weekend if I'm having brunch at my sister's we'll have fried potatoes, bacon or sausage, eggs, toast, it's a big meal, but that's just on the weekends.

Physical capability	They just exhausted to cook or having injury prevents them of making healthy food choices.	<p>R; What else do you eat in the breakfast?</p> <p>P; Sometime I would just, if I'm tired, I would just have toast and peanut butter.</p>
Self-awareness	<p>To what extent they aware about food and what they should be eating and what they are actually eating but they don't apply it.</p> <p>Also, their Feeling about their food choices.</p>	<p>Ooh bread every breakfast just 3 times a week, everyday rice, meat and pork. Too much aha too much sugar (laugh).</p> <p>R; How do you feel about these foods? Why?</p> <p>P; ooh, I feel terrible because I'm the one who suffer it, it's good to eat but it's not good for health that's why I try to stop eating fatty food, you know (laugh).</p>
Family habits	When participants raised on eating special foods since they were young due to cultural preference.	<p>R; Why do you eat lentils?</p> <p>P; That's the kind of food that we have been brought up to eat. (Cultural influence).</p>
Media	Sometimes the advertisements attract part. Also, stores usually offer a discount on food items or make them packages to reduce the price, so they can attract consumers.	<p>R; When I go out to A&W downtown afternoon once in a while.</p>

Medical reasons	A medical conditions or reason that hindering eating normally.	<p>This one probably 3 or 4 times a week. Because I have no teeth, so it's easier to eat oatmeal.</p> <p>R; And the vegetables, every day?</p> <p>P; No, because I get diarrhea.</p>
Appetite	When there is no desire for foods or drinks.	<p>You wouldn't know this, but about 2 years ago I lost a lot of weight and I was about 99lbs. and nothing I ate, I couldn't... I had no appetite whatsoever, so by the time I hit 99lbs. I was living on soup and shakes. I'm just trying to get my appetite back now, and I still have days where I don't feel like eating anything and just the thought of eating food will make me sick or I could take a bite of something and then I'm throwing it up because I just can't seem to get it into me.</p>

Appendices 1 - Question guide for individual interviews

Diet pattern:

- a. What food do you eat very **often**?
- b. **When** during the day do you eat that?
- c. What **other foods** do you usually eat with this food?
- d. How often do you eat these foods?
- e. What food do you eat on the days that you do not choose this food?
- f. What other foods do you eat very often?
- g. Do you usually eat them at the same meals?
- h. Can you substitute these foods with other ones at the same meal?

With the following 3 prompts the respondent chooses which topics are important to talk about:

- Why do you eat this food more often than that food?
- Why is this food a substitute for that food?
- Are there days when you eat at other times than the meal pattern shown in your map?

The answer can lead to issues of **health** (low fat is good for my heart), **money** (the food is cheaper), **culture** (my family expects it to be there), **tradition** (I learnt from my mother), **access** (it available in the shop down the road), **social network** (my co-workers share foods of equal value), and others.

Economics:

- a. When do you spend more than the usual amount on food?
- b. Could you spend less on food than you do now?
- c. How? For how long? Why?
- d. Is your food budget a burden in comparison to other expenses?

Health aspects:

- a. Which foods are particularly important for the health of your **family**?
- b. In what way? For all family members?
- c. Are you concerned about chronic disease?

- d. Are you concerned about type II diabetes?
- e. Are any of these healthy foods difficult to get?
- f. Which ones? Why difficult?
- g. Do you worry about being able to get these foods tomorrow or next week?
- h. Do you depend on anyone to get these foods for the family?

Access to food:

- a. Which of these foods do you **buy**?
- b. Does anybody other than yourself **decide how much to pay** for food?
- c. Which foods do you **prepare yourself**?
- d. Does **anybody help** you with food preparation?
- e. What other household work do you **need help** with?
- f. Can you usually get this kind of help when you need it?
- g. Are there others you go to when you need this help?
- h. Do you help anyone?

Social connections:

- a. Which of these meals do you eat alone, with family or with others?
- b. What the relationship are these people to you?
- c. How often do you eat together?

Appendix 2 – Demographic Questionnaire

Participant #:

Please select the best answer that describes your status and fill out the blanks

Age: ☐ 18-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ 56-65 ☐ 66+

Weight: Height:

Marital Status: ☐ Single ☐ Married ☐ Divorced ☐ Widowed

Do you live alone? ☐ Yes ☐ No

If no, how many people are in your household?

Do you work outside home? ☐ Yes ☐ No

How often do you visit any health services?

Level of education:

☐ Elementary or less ☐ Completed high school ☐ Some college ☐ Completed
university

Household annual income range:

☐ Less than \$20,000 ☐ \$20,000 to \$40,000 ☐ \$40,000 to \$60,000 ☐ More than \$60,000

Appendix 3 – Flyer Text

Why do we eat the food we do?

Interested in joining a study that trying to find some answers to this question?

A study of food perceptions, food behaviors and reasons behind them, for people with diabetes is run by the department of Human Nutritional Sciences at the University of Manitoba and the Diabetes Education Center are participating in a study called.

You can participate in a conversation that is between 45 minutes and an hour, and that includes a detailed nutrient assessment. Afterwards you will receive a \$20 grocery gift card.

If you decide to participate or have any questions, please let the clinic staff know, or contact us at this number (TBA).

Appendix 4 – Script for phone call

Hello;

This is Rzaz Kheir. The Diabetes Education Clinic at Health Sciences told me that you were interested in participating in a study about food perceptions. The idea of the study is to better understand people's food choices, and which ones are easy and which ones are difficult.

If you agree to join, we would meet in a private room in the hospital for an interview of about 1 hour. You can choose a meeting time that works for you. Our conversation will need to be audio-recorded so that the analysis of the information you give is as reliable as possible. All of the information you give us will be kept strictly confidential.

Are you interested to join the study? Can we set a meeting time? Can I have your phone number to call you back in case arrangements change?

Thank you.

Appendix 5 – Consent Form

Faculty of
Human Ecology

Office of the Dean
GP Sevenhuysen
Dean

209 Human Ecology
Winnipeg, Manitoba
Canada R3T 2N2
Phone: (204) 474-9704
Fax: (204) 474-7592
h_ecology@umanitoba.ca

Research Project Title: Understanding Adherence to Dietary Advice

Principal Investigator and contact information: Rzaz Kheir, (204) 951-6285

Research Supervisor: Dr. Gustaaf Sevenhuysen, (204) 474- 9704

This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The study aims to increase our understanding about people's food perceptions, food choice and food behaviors and to collect information that describes why people make certain types of choices and not others. The purpose of the study is to generate information that may be useful in the implementation of health services, particularly services for people with type II diabetes.

You are asked to participate in a 60 minute interview, which includes the Food Choice Map method to create your usual food pattern with magnetic food pictures, estimates of the amounts of foods eaten in a usual week, and a conversation about food and health perceptions.

You are also asked for permission to allow the interview to be audio-recorded.

I agree to audio-recording: Yes ☐ No ☐

Participation does not carry risks beyond those of normal life. All information you provide will be kept strictly confidential and kept in a locked office. The information will be anonymous and stored with a generic ID number, not your name or other identifying details. Only the researcher and the supervisor will have access to the data. The data will be destroyed after the study ends.

The benefits of your participation are that you can request a copy of your own food and nutrient intake results that can be sent by email or by post that you can request a copy of the summary report of the research and that will receive a \$20 grocery gift card. The general benefit is that the information can be used to address one aspect of the difference between knowledge of recommended food behaviors and actual food choice and food practices of Winnipeggers, and associating the difference with perceptions and environmental factors associated with the food choices.

The researcher will use the data to write a Master's thesis and publications for scientific journals. The results will be shared with the Diabetes Education Centre and other agencies delivering services to people with diabetes.

You can withdraw from this study in the middle of the data collection, or withdraw afterwards without penalty up to September 2013. You will still get a gift card. Also, you can stop the recording at any time and you have the option to withdraw your tape from the data collected before September 2013.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

This research has been approved by the [JREB]. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Coordinator (HEC) at 474-7122. A copy of this consent form has been given to you to keep for your records and reference.

Participant's Signature _____ Date _____

Researcher and/or Delegate's Signature _____ Date _____



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APPROVAL CERTIFICATE

May 16, 2013

TO: **Rzaz Kheir** (Advisor G. Sevenhuysen)
Principal Investigator

FROM: **Susan Frohlick, Chair**
Joint-Faculty Research Ethics Board (JFREB)

Re: **Protocol #J2013:062**
"Understanding Adherence to dietary advice"

Please be advised that your above-referenced protocol has received human ethics approval by the **Joint-Faculty Research Ethics Board**, which is organized and operates according to the Tri-Council Policy Statement (2). **This approval is valid for one year only.**

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Secretariat in advance of implementation of such changes.

Please note:

- If you have funds pending human ethics approval, the auditor requires that you submit a copy of this Approval Certificate to the Office of Research Services, fax 261-0325 - please include the name of the funding agency and your UM Project number. This must be faxed before your account can be accessed.
- if you have received multi-year funding for this research, responsibility lies with you to apply for and obtain Renewal Approval at the expiry of the initial one-year approval; otherwise the account will be locked.

The Research Quality Management Office may request to review research documentation from this project to demonstrate compliance with this approved protocol and the University of Manitoba *Ethics of Research Involving Humans*.

The Research Ethics Board requests a final report for your study (available at: http://umanitoba.ca/research/orec/ethics/human_ethics_REB_forms_guidelines.html) in order to be in compliance with Tri-Council Guidelines.



June 6, 2013

Rzaz Kheir
Principal Investigator
11 Evergreen Place
Winnipeg, MB R3L 2T9

Dear Rzaz Kheir

RE: UNDERSTANDING ADHERENCE TO DIETARY ADVICE.

ETHICS #: J2013:062 RIC #: RI2013:087

The above-named protocol, has been evaluated and approved by the HSC Research Impact Committee.

The Department of Research wishes you much success with your study.

Sincerely

[Redacted signature]

Karen Shaw-Allan
Research Protocol Officer
Health Sciences Centre

cc: Director of Research
Ancillary Services, Finance Department



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Figure 1: Determinants of food security (Adapted from Atlantic Health Promotion Research Centre, Nova Scotia Nutrition Council, 2006).

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