ROLE OF FOOD CHOICES IN DIETARY BEHAVIOUR OF PATIENTS WITH TYPE 2 DIABETES

By

Rhiza Regalado Lam Chew Tun

A thesis
Submitted to the Faculty of Graduate Studies,
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Abstract

Dietary management is a well-established component of diabetes treatment. Dietary advice is important for patients with type 2 diabetes to help manage the disease and to minimize the risk of complications. However, diet compliance has been described as the most difficult aspect of the diabetic regimen. One of the major reasons for non-compliance is that the beliefs and perceptions associated with food influence the patient's interpretation of dietary advice and diet management recommendations. This study investigated the following questions:

1. What are the specific reasons that patients with type 2 diabetes give for making their food choices?
2. Are food beliefs associated with the food choices of patients with type 2 diabetes?
3. Is the data from the Food Choice Map (FCM) similar to the data from the Food Frequency Questionnaire (FFQ) in terms of food items, frequencies, and patterns?

Data was collected from 40 follow-up patients with type 2 diabetes attending the education programs of the Diabetes Education Centre (DEC) at Health Sciences Centre, Winnipeg, Manitoba. Each patient completed a demographic questionnaire, a 45-minute in-depth interview (FCM), and a food frequency questionnaire (FFQ). During the interview, each patient created a visual map of their food consumption during a typical day and discussed the reasons for these food choices.

Content analysis was used to identify 35 constructs from the 40 patient interviews. Of all 35 construct variables, 20 showed statistically significant associations. The 3 construct variables that showed the strongest relationships with food consumption were diabetes knowledge positive ($R^2 = 0.779947$, $df = 1$, $p < 0.001$), preferences ($R^2 = 0.611499$, $df = 1$, $p < 0.001$), and physiology positive ($R^2 = 0.60124$, $df = 1$, $p < 0.001$).

Patients tended to report more foods in the FCM compared to the FFQ, but the difference were not statistically significant (match paired t-test, $t = 0.9286$, $df = 39$, $p > 0.05$). It was found that the food patterns of patients who reported different frequencies of consumption in the FCM and the FFQ also reported seeking variety in food selections and coping with unstable blood sugar. By contrast, the patients who reported similar food frequency data in the FCM and the FFQ showed stable food consumption patterns and their comments reflected the ability to follow recommendations from health practitioners ($\chi^2 = 17.81$, $df = 1$, $p < 0.001$).

The results appear to support the positive communication strategies of the DEC about diabetes management. This study showed that patients with type 2 diabetes who claimed to be following recommendations from health practitioners reported a higher proportion of appropriate diets ($\chi^2 = 3.8$, $df = 1$, $p < 0.05$), that could contribute to effective and favorable health outcomes.

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"Mahal na Panginoon, sa Iyo ako'y magpupuri sa habang panahon."

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CHAPTER I

INTRODUCTION

1.1 Problem Addressed

Dietary management is a well-established component of diabetes treatment. Many patients with type 2 diabetes require dietary advice to help manage the disease and minimize the risk of complications. However, diet compliance has been described as the most difficult aspect of the diabetic regimen.

Evidence from recent research shows compliance with the diabetic diet is generally low due to discrepancies in views between health practitioners and patients regarding management of the condition (Anderson, 1995; House, Pendleton, & Parker, 1986; Merz, Buze, Tuncer, & Twillman, 2002; Shultz, Sprague, Branen, & Lambeth, 2001). Traditionally, health educational strategies have tended to rely on the health practitioners' perceptions of what patients need to know. This approach carries the risk that health practitioners' own beliefs will be involved in setting dietary recommendations, thereby creating possible biases in the recommendations. In practice, this sort of routine approach tends to be resisted and rejected by patients with type 2 diabetes (Greenhalgh, Helman, & Chowdhury, 1998; Storer, 1977). Likewise, evidence from recent research applies knowledge about the patient group as a whole, with only some attention given to individual patient situations if time permits, ignoring the fact that food is acquired, prepared and consumed within certain contexts such as beliefs, opinions, interpretations, points of view, or other hidden meanings. If health practitioners are aware of these contexts, they can draw on complete information about the motivations and patterns of decision making of each patient in food selection when developing the diabetic regimen.

Analysis of a patient's diet in terms of his or her own beliefs could provide practitioners with an indication of where dietary modification could be most readily made and where resistance might be anticipated. Such analyses could also add to health professionals' understanding of the phenomenon of non-compliance with the dietary regimen.

Dietary advice is less likely to be followed if it is not personally meaningful and acceptable to the individual. Health practitioners need to understand the underlying food belief systems of those whom they advise. Only a few studies have attempted to measure nutritional beliefs and attitudes of patients with diabetes. Patterson, Kristal, and White (1996) stressed that additional research was needed to identify strategies that affect beliefs and knowledge about diet and health. Specifically, Spencer, Shadick, and Kasik-Miller (1996) emphasized the need for health professionals to understand food behaviour for diabetes management. Research is needed to provide a more accurate description of patients' reasons for food choice. This need is captured in the research objectives of this study.

1.2 Research Objectives

This study describes beliefs and perceptions associated with food choice that influence the patient's interpretation of dietary advice and dietary management recommendations. Specifically, the study intends:

1. To identify the reasons given for food choice by patients with type 2 diabetes.
2. To determine the relationships between the use of food and frequency of consumption patterns of patients with type 2 diabetes.

3. To determine the association of food beliefs and food consumption patterns of patients with type 2 diabetes.

4. To compare two food survey methodologies, one new and one traditional, in terms of food items and frequency.

1.3 Outcome

This study will provide more information on health-related dietary decision making of patients with type 2 diabetes and will provide better recognition and description of individual food choices. Results are expected to identify important reasons for food choice, which is useful information for health practitioners when making recommendations for dietary behavior modification.

The study will demonstrate the relative efficiencies of two survey methodologies in describing food choices, the reasons for those choices, and the associated implications for nutrition health intervention programs for patients with type 2 diabetes. Results are expected to be useful for implementing diabetes nutrition education programs in service settings aimed at promoting dietary compliance.

CHAPTER II

REVIEW OF LITERATURE

2.1 Diabetes Mellitus

In 1996, diabetes was recognized by Manitoba's Minister of Health as a major public health issue in Manitoba (Manitoba Health, 2002). Diabetes, a metabolic disorder, is characterized by the presence of hyperglycemia that is caused by a defect in insulin secretion, in insulin action, or both. Two major types of diabetes are type 1, or Insulin-Dependent Diabetes Mellitus, which occurs when the pancreas does not produce (or produces very little) insulin and type 2, or Non-Insulin-Dependent Diabetes Mellitus, which occurs when the pancreas does not produce enough insulin, or when the body does not use the insulin that is produced effectively. Approximately 10% of people with diabetes have type 1 and approximately 90% have type 2.

The prevalence of type 2 diabetes is increasing in Manitoba. Every year, more than 4,000 Manitobans are diagnosed with diabetes, bringing the estimate in Manitoba to more than 55,000 adults (Manitoba Health, 2002). As a result, the number of individuals living with diabetes has increased substantially over the past years. Manitoba Health (2002) has reported that the incidence of new cases of diabetes per year increases with age among both men and women. Hence, the prevalence of diabetes is now very high among Manitoba's growing elderly population. The increase is even more alarming among Manitoba's Aboriginal population than it is in the rest of the population. Diabetes has been identified in more than 20% of Status women and 13% of Status men (Manitoba Health, 2002). Most Status adults with diabetes are less than 45 years old, whereas most adults with diabetes in the general population are over 55 years of age. In

fact, population projections for Status people suggest that the prevalence of diabetes will triple by the year 2016 (Manitoba Health, 2002).

2.1.1 Risks for Complications from Diabetes Mellitus

A devastating disease for individuals and their families, diabetes can lead to many problems. Persons with diabetes are at high risk for developing many medical complications, such as blindness, kidney failure, nerve problems, and amputations (Leontos, Wong, Gallivan, & Lising, 1998). As a result of these complications, long-term risk of disability and early death reduce quality of life for the patient (Erby, Kuller, Becker, & Orchard, 1998).

Long-term complications are considered to be the major cause of morbidity and mortality in type 2 diabetes patients. In fact, older adults have the highest morbidity and mortality from atherosclerotic complications (Horwath & Worsley, 1991). Therefore, the primary aim of diabetes management is the prevention of complications by lowering blood glucose levels and reducing the cardiovascular risk profile (Van den Arend, Stolk, Krans, Grobbee, & Schrijvers, 2000).

Adlerberth, Rosengren, and Wilhelmsen (1998) and Pham, Fortin, and Thibaudeau (1996) reported that the very high risk of cardiovascular disease, stroke, limb amputations, and renal failure can be reduced by effective education regarding appropriate health behaviours. Studies have shown that people with diabetes should be encouraged to obtain optimal metabolic control through a balance of food intake, physical activity and, if required, medication to reduce the likelihood of specific diabetic complications. By adopting healthy food choices such as lowering fat intakes, increasing

physical activity (James et al., 1998), and proper weight management (Jacobson, 1992), the serious complications associated with diabetes can be minimized. Similarly, Jenkins et al. (1984) reported that diet plays a central role in the management of diabetes. Because a large proportion of people with type 2 diabetes are treated with diet alone, their subjective reactions to different foods will be of special importance to health practitioners.

2.1.2 Food Choice in Diabetes Mellitus

In general, nutrition recommendations for people with diabetes are the same as those for all Canadians, follow the principles of *Canada's Food Guide to Healthy Eating,* and remain one of the cornerstones of effective therapy (Health Canada, 1992). People with diabetes can continue to enjoy the foods they love, in moderation, while following the nutritional advice promoted by *Canada's Food Guide to Healthy Eating* such as:

1. Enjoy a variety of foods.
2. Emphasize cereals, breads and other whole grain products, vegetables and fruit.
3. Choose lower-fat dairy products, leaner meats and food prepared with little or no fat.
4. Achieve and maintain a healthy body weight by enjoying regular activity and healthy eating.
5. Limit salt, alcohol and caffeine.

Compliance with a diabetic diet is reported to be the most difficult aspect of the diabetic regimen (Ary, Toobert, Wilson, & Glasgow, 1986; House et al., 1986; Shultz et

al., 2001). Patients and health professionals typically regard diet compliance as the biggest problem in diabetes management (Ary et al., 1986; Christensen, Terry, Wyatt, Pichert, & Lorenz, 1983; Dalewitz, Khan, & Hershey, 2000; Delamater, Smith, Kurtz, & White, 1988; Lockwood, Frey, Gladish, & Hiss, 1986; Teza, Davis, & Hiss, 1988). Compliance with a meal plan involves making appropriate food choices in constantly changing family, work, and social environments. Schlundt, Rea, Kline, and Pichert (1994) described some dietary problem situations such as difficulty with negative emotional eating, resisting social pressures, and resisting temptations such as consumption of forbidden foods among adults with diabetes. Low compliance with diabetic diet was reported to be caused by discrepancies in views between health practitioners and patients regarding management of the condition (Anderson, 1995; Shultz et al., 2001).

However, compliance with health advice can be improved (Glasgow & Osteen, 1992; McLeod, 1990; Nilsson, Johansson, & Sundquist, 1998; Sullivan & Joseph, 1998). Although patients with diabetes are generally aware of the devastating complications associated with the disease, they are not the only factors that patients consider in following advice from health practitioners. Patients also consider factors such as personal living conditions, social supports, ability to purchase services, personal health-related knowledge, cultural norms, and access to information from other sources (Mitchell, 1998). Dalewitz et al. (2000) reported that in order to improve the quality of care for patients with diabetes, problems with dietary compliance must be addressed.

2.1.3 Food Choices of People with Diabetes Mellitus

Dietary compliance is one of the most important aspects of diabetes management. Yet patients' often find that following dietary recommendation from health practitioners to be the most challenging part of managing diabetes. Recent studies illustrate the difficulties of these challenges for these patients. In order to solve the problem of non-compliance with dietary regimen, findings from a study based on a large population sample suggested that dietary advice for people with diabetes should be tailored to individual needs, circumstances, and preferences (Horwath & Worsley, 1991; Rosenstock, 2001). The authors reported that the dietary habits of elderly persons with diabetes suggest an awareness of the need to limit simple sugars but showed poor compliance with dietary fiber, carbohydrates, and fat. Individuals with diabetes had lower intakes of refined carbohydrates but were just as likely as those without diabetes to eat high-fat foods, and they ate eggs and cheese more frequently than those without diabetes. Furthermore, Close et al. (1992) found that among the 92 adult participants with diabetes, only three achieved the recommended 50-60% energy intake as carbohydrate, four achieved < 30% energy as fat, one participant had < 10% saturated fat, and 20 participants consumed > 30 grams of fibre per day. The overall nutrient intakes of these participants with diabetes reflected those of non-diabetic subjects in the study except for a greater intake of protein and smaller intakes of sugar and alcohol.

In addition, Peterson, Dattani, Baylis, and Jepson (1986) highlighted the discrepancies between Asian dietary practices and current recommendations. The study found that most Asian diabetics in Britain followed a diet with a low carbohydrate and high fat content and consumed sugar and refined carbohydrates regularly. There was

widespread use of dairy products such as milk, ghee, and yogurt, which are rich in saturated fats. And finally, a study by Samanta et al. (1987) revealed that the majority of Asian diabetics continued to use sugar or 'gur' (jaggery), Asian sweets, and Asian snacks which have a high fat content. The authors reported that such failure to achieve dietary goals seemed to result from lack of basic knowledge and understanding about eating and cooking habits of patients coming from different ethnic backgrounds.

2.2 Factors Affecting Food Choice

There are numerous factors that affect the food choices of each individual. The potential contribution of these influences makes the study of food choices so challenging. Understanding the reasons that people have for choosing their food has specific applications in implementing dietary change. Recognizing the potential contribution of these influences under different conditions can serve to explain many of the observed characteristics of human eating.

Food is defined as any substance that provides nourishment necessary to maintain life and growth when ingested. Individual differences in food choices are influenced by many factors such as biological, social, and physiological factors. First, food preferences are to some extent based on universal biological predispositions such as preferences for sweet and fat texture, and avoidance of bitter, irritating and strong tastes. The "taste" of foods includes not only the four basic tastes: sweet, sour, salty, and bitter, but also food aroma and food texture (Drewnowski, 2000). These taste sensations may permit individuals to judge whether a given food should be eaten or not. Commonly, sweet taste is associated with acceptance whereas bitter taste is rejected and often signals dietary

danger. Moreover, foods that are described as good tasting often taste sweet, or are rich in fat, or both.

These sensory responses to sweet and high-fat foods also have a physiological origin. Studies on taste sensation in the preterm infant suggest that the preference for sweetness is evidenced before birth (Maone, Mattes, Bernbaum, & Beauchanp, 1990), while preferences for energy-dense fats are acquired in infancy or early life (Birch, 1992). However, these built-in responses to tastes can be modified through exposure, conditioning, and social learning (Eertmans, Baeyens, & Van den Bergh, 2001; Mela, 2001) and can change during development, probably as a function of both physical maturation and response to the environment (Drewnowski, 2000; Mennella & Beauchamp, 1996). These changes also allow some people, even entire cultures, to accept foods to which they have an innate aversion, for instance hot, spicy foods, such as jalapeno peppers and fiery curries (Rozin, 1982).

Second, social factors such as food availability and control of food may affect food choices. These factors include income, occupation, type of job, lifestyle, job location, time spent in the job, living status, and education. For example, income restricts what foods an individual or family can purchase, occupation[1] influences food choices in several ways, and the type of activity involved in a job affects the actual number of calories a person can consume. Epidemiological studies often report that habitually active persons eat more and ingest more fruits and vegetables than their less active peers (Bellisle, 1999). Job location influences meal patterns as well as food availability. Furthermore, the greater the number of hours spent in one's job, the fewer the hours spent

1 Traveling sales representatives, students, truck drivers, and others regularly stop at quick-service food stores. The types of foods available are often limited.

in meal preparation (Kittler & Sucher, 1998). Overall, in today's fast-paced world, many people look for ways to save time. Estimates show that women want to spend only 30 minutes or less each day selecting and cooking food, and men want to spend only 15 minutes on such activities (McBean, 1994). Other lifestyle factors often exert a much greater influence over what someone eats than what they actually know about nutrition (Kittler & Sucher, 1998). Among elderly men living alone, finding foods that were the right portion size and easy to open, prepare, and cook was more important than the amount of money left after paying the bills (Donkin et al., 1998). Educational attainment may also influence food choices, such as acquisition of nutrition knowledge and understanding of health concerns. However, this knowledge may or may not translate into knowledgeable behaviour.

Finally, physiological factors may influence food choices. These characteristics include age, gender, and state of health. Food preferences and the ability to eat, digest and absorb foods vary with age and over the life cycle. Pregnant and lactating women often eat differently than other adults. Puberty is a time for special food rites in some cultures. Increased metabolism at this time also affects the amount of foods consumed. The opposite is true for older adults. Physiological changes associated with age, including slower gastric emptying, altered hormonal responses, decreased basal metabolic rate, and altered taste and smell may contribute to lowered energy intake (Drewnowski & Shultz, 2001). Gender has also been found to influence what people eat. In certain cultures, men are served with the best pieces of food. Some people in the United States consider steak to be a masculine food, salad to be a feminine one; women prefer white wine, while men drink beer (Kittler & Sucher, 1998). Females, as opposed to males, associate food most

with health and least with pleasure (Rozin, Fischler, Imada, Sarubin, & Wrzesniewski, 1999). Likewise, state of health has an impact on what people eat. A chronic disease such as renal failure requires individuals to restrict or omit certain foods from their diet. Individuals who are not feeling well may not have an appetite, or may find it difficult to eat. Even minor illnesses may result in dietary changes, such as drinking hot tea with lemon for a cold or eating plain crackers and drinking ginger ale for an upset stomach (Kittler & Sucher, 1998).

Individual differences in food choices are influenced by many factors. In addition, the very nature of food intake -- what people eat, when, how, where, why and how much -- is largely influenced by social, economic, political and cultural processes (Sanjur, 1982). Food choice is richly multi-determined and context dependent (Rozin, 2000). The choices of which foods to eat, where, and when are intensely personal. Foods are selected and consumed within certain contexts such as beliefs, opinions, interpretations, points of view, experiences, and other hidden meanings.

2.2.1 Food Beliefs

Food beliefs are individual convictions or opinions about foods attributed to "religious, traditional, medicinal, or pseudo-scientific origin" (Storer, 1977). Most critically, the meaning of food, whether as a source of nutrition, a source of pleasure, or a social-moral statement, is laid down by culture. Either popular or scientific information about food and nutrition when rationally or traditionally accepted becomes a belief. Examples of food beliefs are fat foods are unhealthy and natural foods are healthy. Most beliefs are derived from socially transmitted information (Rozin et al., 1999). Food

beliefs are among the factors affecting why people eat and contribute in large measure to what they feel emotionally about food. Carruth and Skinner (1991) state that food beliefs can be restrictive, prescriptive, and may emphasize positive aspects of health although food combinations or amounts may be limited. Food beliefs and food choices are factors of which health educators must be very aware if they are to do an effective job of translating the science of nutrition to people with type 2 diabetes particularly those from different ethnic groups (Storer, 1977).

2.2.2 Food as Self-Expression

The way humans use food goes far beyond the animal instinct to feed. People bond with others and express goodwill around the dinner table. Foods are used to define social status and are often used for social interaction. For example, caviar and champagne may imply wealth, while mesquite-grilled foods and goat cheese suggest upward mobility.

Food as a means of self-expression is also evident in the experience of dining out. Researchers suggest that restaurants often serve more than food alone, meeting people's emotional needs such as belongingness, social position, and self-realization. For example, in Japan, homes are considered private; therefore, guests are entertained in the homelike environment of a restaurant (Kittler & Sucher, 1998).

Food may be used as a way of demonstrating mood and emotions. Refusal to eat food can be an obvious sign of resentment or a means of getting attention. Counihan (1999) explained that food refusal is a sure denial of relation, and fasting to death is the ultimate rupture of human connection. People cope with stress and tension by eating or

not eating. In a recent study, Oliver and Wardle (1999) reported that snacking behaviour was increased by stress regardless of gender or dieting status. They also learned that stressed emotional eaters eat more sweet, high-fat foods and more energy-dense meals than unstressed and non-emotional eaters (Oliver, Wardle, & Gibson, 2000). In addition, intake of meal-type foods, such as fruit and vegetables, meat and fish, was reported to decrease during stressful periods.

Food choice can be a reflection of one's social needs, for example, the need to reflect identity or self-image. Advertisers take advantage of this social need by promoting identification with a particular brand of food. Foods consumed by individuals can disclose their identity whether as discerning, thrifty or extravagant, modern or old-fashioned (Kittler & Sucher, 1998).

In addition, food choice can be a reflection of one's religious beliefs. Some may express religious beliefs or display creative talents through food preparation and ceremonies. For example, the practice of vegetarianism may be an expression of certain values such as health and personal striving for ecological welfare, and for understanding self and the world. Thus, individual food choice becomes a firm manifestation of one's personality (Rozin, 1990).

2.2.3 Symbolic Use of Food

From the diverse uses of food, food is certainly perceived as more than its nutritional aspects. Food is both substance and symbol. Humans use foods symbolically (Kittler & Sucher, 1998), and symbols may suggest something about values, relationships, associations, or conventions. Bread is an excellent illustration of food

symbolism. White bread was traditionally eaten by the upper classes whereas dark bread was eaten by the poor. Today, people consume whole wheat bread and dark bread for health reasons rather than for status. Bread is also seen as a symbol of life in religious practices. In the Christian tradition, bread represents the body of Christ in the Christian sacrament of Holy Communion (Kittler & Sucher, 1998). For Passover, some of the symbolic foods are bitter herbs, a reminder of the bitterness of the Jew's enslavement in Egypt; shank bones, symbolic of the ancient Passover sacrifice of lamb at the Temple; parsley and hard boiled eggs, symbols of renewal and new life (Simon, 2002).

Certain foods customarily represent security and comfort. During periods of stress or illness, people often yearn for the foods they ate during childhood. In times of adversity, familiar foods are highly valued. Fieldhouse (1995) explained that immigrants use familiar foods as a means of feeling secure and keeping their own identity in a foreign land and are often willing to pay high prices for these familiar symbols of home.

People may consume the foods that are eaten by their social group to demonstrate belongingness. For example, African-Americans who live outside the South may choose to eat what is called Southern black cuisine on certain occasions as an expression of ethnic identity. Ethnic restaurants appeal to those individuals seeking authenticity in the foods of their homeland.

Therefore, food is certainly perceived as more than its nutritional aspects and individuals use foods symbolically. The symbols people use suggest something about the values, relationships, associations, or conventions they associate with food.

2.2.4 Food Categorization

People use the categories and rules of their specific cultures, subcultures, and ethnic groups to frame what they consider to be acceptable and preferable foods, the amount and combination of foods they choose, and the foods they consider ideal or improper. Culture may describe patterns of behaviour, knowledge, beliefs, and other capabilities and habits acquired by individuals as they live their everyday lives. But most of the determinants of human food choice fall within the sphere of the influence of individual experience and either direct or indirect cultural influences (Rozin, 2000).

In every society there are rules which specify what is considered food and what is not. Within the larger classification of "food," categories are identified according to cultural usage, emotional value, nutritional importance, or a combination thereof (Fieldhouse, 1995). Researchers agree that there are numerous ways of categorizing foods and food usage (Fieldhouse, 1995; Jelliffe, 1967; Schutz, Rucker, & Russell, 1975).

Originally, foods were assigned value according to an ancient system of treatment by opposites called allopathy (Fieldhouse, 1995). Foods and diseases are assigned various special attributes, particularly hot-cold valences. Disease is believed to occur when the body is out of balance and balance is restored by treating a cold illness with hot foods and vice versa. Likewise, the concept of yin-yang is applied to foods and diseases. The maintenance of proper balance is paramount to create harmony and to accompany health in the body. It covers all aspects of traditional Chinese life. "Yin" is female, dark, wet, and cold whereas "yang" is male, light, dry, and hot. According to the Chinese food beliefs, various foods fit into the categories of "hot" or "cold" and they should be consumed in proper balance, taking into account the seasonal variations and the

individual's body constitution, temperament, and state of health. For instance, "hot" food should be eaten in the winter, by postpartum women to generate energy whereas "cold" foods should be eaten in the summer, for sore throat, dry lips, and to relieve irritability (Henderson, 1974).

Secondly, foods are assigned value according to their perceived nutritional and non-nutritional effects (Fieldhouse, 1995). In fact, this division is the basis for food guides such as the *Canada's Food Guide to Healthy Eating*, the *Food Guide Pyramid in the US*, and the *Food Groups of the UK National Dairy Council*. Generally, each food group includes a wide selection of food items rich in a particular nutrient or nutrients; by mixing food choices from each group, a wide spectrum of nutrients is acquired, thereby ensuring optimal nutrition. However, according to Fieldhouse (1995), food groups developed by public health agencies are basically a teaching tool for nutritionists and do not seem to reflect the way in which people actually classify their own foods.

Later, as an alternative to the nutritional role of foods, Jelliffe (1967) developed a "world-wide" classification system of foods which has five categories:

1. Cultural super foods: which are the dominant staple foods often involved in the religious rituals and mythology of a society.
2. Prestige foods: which are characterized by relative scarcity and high price and usually reserved only for important people and/or important occasions.
3. Body-image foods: which contribute to health by maintaining balance in the body, based on ancient allopathic principles of yin-yang dichotomies (e.g. hot and cold).

4. Sympathetic magic foods: which are believed to have special properties that are imparted to whoever consumes them.
5. Physiological foods: which are restricted to a particular age, sex or physiological condition. For example, many Chinese women ritualistically consume special food preparations to replenish their body from the weakening results of menstruation (Chan Ho, 1985).

More recently, in 1975, a food use classification system was reported in a study by Schutz, et al. (1975). Based on consumer responses to different food items, the authors created five main categories of food use:

1. High calorie treats: which are considered appropriate for social occasions (e.g. cakes and pies).
2. Speciality meal items: which are served only in particular situations and are definitely not everyday foods.
3. Common meal items: which are foods served at the dinner meal and seen to be suitable for all occasions and all ages.
4. Refreshing foods: which are thought to be nutritious and easy to digest.
5. Inexpensive filling foods: which are often high in calories but lack social prestige and are often regarded as unsuitable when weight loss is desired.

In the 1990s, consumers began to view food from a radically different vantage point. Besides being classified by allopathic principles, cultural factors, and food use factors, food can also be classified by medicinal function. As Hasler (2000) reported, this "changing face" of food has evolved into an exciting area of food and nutritional sciences known as functional foods. Functional foods are defined as those providing health

benefits beyond basic nutrition. These foods include whole, fortified, enriched, or enhanced foods that have a potentially beneficial effect on health when consumed as part of a varied diet on a regular basis at effective levels (Hasler, 2000). Many foods are promoted with claims suggesting that they are more nutritious, safer to use, and have special therapeutic value. For example, "organically" grown foods are said to be best for consumption because of the absence of "artificial" fertilizers or chemicals (Barrett & Herbert, 1994). Similarly, "natural" is said to represent foods that contain no artificial additives or preservatives. The term "health food" is used to suggest that foods have special health-giving properties not found in "ordinary" foods (Barrett & Herbert, 1994). Interest in functional foods is overwhelming due to a number of key elements, including the growing self-care movement, changes in food regulations, and enormous scientific evidence highlighting the critical link between diet and health (Hasler, 2000).

As may be seen from the numerous factors that influence food choices, the study of any one person's diet is obviously more complicated than just simply recording the usual food intake. Food choice is a function of people's thoughts and perceptions. Food categories used by individuals in their everyday lives may bear little resemblance to those of either the allopath or the scientist, but rather may be the result of their own cultural experience (Fieldhouse, 1995). Eating, like speaking in a native language or dressing in a traditional clothing, is a daily testimony of one's identity (Kittler & Sucher, 1998). Therefore, food choice is seen as a reaffirmation of a world of a view and a subtle modification of its shape as the individual interprets and restates it (Gofton, 1986).

2.3 Food Survey Methodologies

Information about the food choices of people with type 2 diabetes is essential in the dietary management of the disease. Dietary survey methods are instrumental in characterizing the food choices of this group. In summarizing the usefulness of dietary survey methods, Pennington (1988) reaffirmed that such data are essential for assessing and monitoring dietary results, estimating the incidence of dietary inadequacies, planning nutrition interventions, developing both dietary guidelines and public health policies, developing nutrition education programs, and assessing food consumption patterns.

Of the major food survey methods available, those food surveys collected from metabolic study protocols in which all food is provided by the researchers are considered the most valid method. Amounts consumed are accurately measured, and the nutrient composition of the food is determined by laboratory analyses (Food and Nutrition Board, 1997). However, such protocols are used for studies with a small number of subjects, and for short periods, and are seldom possible for larger studies due to budgetary, time, and other constraints. Thus, food intake data are often self-reported using different methodologies such as 24-hour food recalls, diet records, or food frequency questionnaires.

The 24-hour recall is considered one of the more accurate, feasible methods of collecting nutrient intake data of populations at any one time. However, due to the reported wide day-to-day variation in food consumption, the results cannot be assumed to represent usual intake. For this reason repeated 24-hour recalls are necessary, which limits the feasibility of the method and the cooperation of the subjects. In addition, accuracy of recording decreases as the number of days studied is extended. The 24-hour

recall also entails professionally trained interviewers, rigorous standardization, and thorough analysis procedures. Moreover, Block (1982) and Gibson (1990) reported that this method is likely to omit foods that are not eaten frequently.

The dietary history is another possible method for assessing an individual's food intake and usual meal pattern over varying periods of time. In theory, the dietary history may refer to any given period of the past, but in practice it most often refers to the last month, or the last 6 months, or the last year. However, multiple day diet records are lengthy, expensive, and difficult to administer in research settings. The dietary history is unsuitable for collecting data from patients who have no regular pattern of eating (Cameron & Van Staveren, 1988). Also, the major disadvantage of the method is that it has a high subjective component because the information it gathers is based entirely on the subject's ability to give correct information on food frequencies and portion sizes.

The semi-quantitative, self-administered food frequency questionnaire is a method that estimates how frequently certain foods are consumed during a specified period of time. It has been used in many studies investigating possible associations between diet and health. The food frequency questionnaire is a cost effective, simple, and quick method, which can be completed by the subjects themselves or by personnel without special training (Cameron & Van Staveren, 1988). The method has high response rates and low respondent burden, but its accuracy is lower than other dietary survey methods.

All these self-reported food intake assessment tools are known to have inherent limitations. Potential sources of error include over- or under-reporting of portion sizes, omission of foods, and inaccuracies in tables of food composition. Accordingly, reviews

on dietary assessment methods concluded that self-reported dietary data are subject to a number of inaccuracies and biases (Buzzard & Willett, 1994; Kohlmeier, Mendez, McDuffie, & Miller, 1997; LSRO/FASEB, 1986; Thompson & Byers, 1994; Willett, 1990; Willett & Sampson, 1997). No best method has been reported by researchers, and each method has specific advantages and disadvantages.

For this study, it is necessary to use a methodology that focuses on the use of food and dietary patterns, rather than nutrient intakes. In order to increase accuracy and reliability, an interview is more appropriate than a self-report methodology. The methodology should make efficient and intuitive links between food choices and their determinants.

2.4 Identifying Individual Transcript Theme Using Phenomenological Studies

The objective of phenomenology is to describe the essence of behaviour, based on meditative thought, with the purpose of promoting human understanding (Omery, 1983). Phenomenology examines human experiences through the detailed descriptions of the people being studied using a verbatim transcript for each person interviewed. As a method, the procedure involves studying a small number of people through extensive and prolonged engagement to develop patterns and relationships of meaning (Dukes, 1984; Oiler, 1986). Through this technique the researcher "brackets" his or her own experiences in order to understand those of the informants (Nieswiadomy, 1993). Bracketing one's own experience means that the researcher sets aside his or her own prejudgements, personal experience, preconceptions, knowledge, and insight during the analysis process. Omery (1983) noted that it is essential that the researcher have no preconceived notions,

expectations, or frameworks as guidelines in gathering and analyzing the data. Morse and Field (1995) explained that phenomenology accepts experience, as it exists in the individual's consciousness.

Ray (1987) summarized the main characteristics of the phenomenological method as (a) focusing on the nature of lived experience, (b) holding in abeyance one's scientific assumption about a phenomenon, (c) conducting intense dialogues with people about the meaning of an experience, (d) developing themes from recorded dialogues, and (e) reflecting deeply on the meaning of the whole experience.

Phenomenological data analysis continues through the methodology of reduction, analyzing specific statements and themes. The phenomenological report finishes with the reader understanding the essence of the personal experience, recognizing that a single unifying meaning of the experience exists (Creswell, 1994). For this study, themes defined from recorded interviews can be used to describe the meaning of the personal experiences of patients with type 2 diabetes.

2.5 Theoretical Framework

As noted, diet compliance has been described as the most difficult aspect of the diabetic regimen. Successful management of diabetes requires understanding of individual needs, beliefs, attitudes, and lifestyles (Bradley & Gamsu, 1994; Horwath & Worsley, 1991). Effective modification of dietary patterns of people with diabetes depends on an understanding of these factors governing food choice. For health practitioners to understand these factors, they may need information about the reasons for food choices. These reasons may include perceptions, experiences, social, and physical

interactions. Recommendations for changing eating habits are more likely to have an impact if they are based on an understanding of factors that affect food choices (Thomas, 1991). Furthermore, to identify service strategies that will optimize health for specific populations requires an understanding of qualitative data consistently; this distinctively involves understanding of health behaviour theories. Health behaviour theories provide explanations for the factors governing food choice.

Therefore, decision-making theories are selected for theoretical framework of this study. These theories are: Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen 1975) and Social Learning Theory (Bandura, 1977). The fundamental concept of these decision-making theories is that people will take action if they perceive that the action will lead to expected or anticipated outcomes that they want or value (Contento, 1995).

2.5.1 Theory of Reasoned Action

The Theory of Reasoned Action (TRA) is based on the assumption that human beings are quite rational and make systematic use of the information available to them when making decisions on engaging in or not engaging in a given behaviour (Ajzen and Fishbein, 1980). The ultimate goal of this theory is to predict and understand an individual's behaviour by first identifying and measuring the behaviour of interest and then determining the causes for that behaviour. For the purposes of understanding reasons for food choices, applying constructs from this theory may help explain why people with type 2 diabetes make individual food choices. Important constructs in this theory are beliefs, normative beliefs, subjective norms, intention, attitudes, and behaviour.

Beliefs are the primary building blocks in the TRA. They represent the information one has about an object based on direct observation or information received from outside sources. Beliefs associate objects with certain attributes. For example, an elderly woman may associate the belief that "using herbs and spices" (the object) "will cure her diabetes" (the attribute). The object of belief can be a person, an event, a group of people, an organization, a behaviour, or a policy. The associated attributes can be any object, trait, property, quality, characteristic, or outcome.

Normative beliefs are the pressure experienced by an individual from others (specific individuals or groups) who think that the individual should or should not perform a particular behaviour (Fishbein & Ajzen, 1975). These beliefs are modified by how much the individual wants to comply with the requests of specific individuals or groups. Normative beliefs underlie a person's subjective norm that is perceived as social pressure. For example, a woman is motivated to comply with what she perceives to be the requests of her friend. If she believes that this individual thinks she should eat potato chips, her subjective norm will exert that pressure to perform this behaviour. On the other hand, a woman who believes that her children think that she should not eat potato chips will perceive social pressure in the opposite direction. Therefore the entirety of one's beliefs, normative or otherwise, serves as the informational base that dictates one's attitudes, intentions, and behaviours.

Subjective norms refer to perceived social pressure to perform the behaviour in question. Beliefs that underlie subjective norms are termed normative beliefs. Subjective norms are assumed to be determined by the sum of the normative beliefs, about what significant reference groups or individuals believe about the behaviour, weighted by the

motivation to comply with each of these people. For example, a mother who believes that her husband, children, father, and close friends all think that she should eat cereal for breakfast, her normative beliefs will exert that pressure to perform this behaviour.

The construct of intention refers to a person's decision to act or perform various behaviours. Intention may also be viewed as a special case of beliefs where the object is always the person and the attribute is always a behaviour. For example, a man may have decided to follow the dietary recommendations from his dietitian in order to maintain his blood glucose level. Ajzen and Fishbein (1980) stated that the best predictor of a person's behaviour is assumed to be one's conscious intention to perform a behaviour.

Attitude -- a determinant of behavioural intention -- is also a construct in the TRA. Attitude is an individual's learned favourable or unfavourable response to a given object. Attitudes are based on one's salient beliefs about that object, leading to a set of intentions that are indicative of a certain amount of affect towards the object in question. Fishbein and Ajzen (1975) made a distinction of attitude from other concepts by its affective and evaluative nature. For example, a woman may express her strong aversions to brown bread based from her response: *" I hate brown bread, I don't care whether it's good for you or not."* Therefore attitude is defined by how the individual views the object, from superior or mediocre, safe or unsafe, harmful or beneficial.

And finally, the TRA includes the construct of behaviour. Behaviours are the observable acts of the subject. Overt behaviours are either considered in their own right or used to understand more about beliefs, attitudes, or intentions. For example, in food choice applications, such behaviours would be purchasing, preparing, serving, consuming, and preserving particular food items.

The TRA (Ajzen & Fishbein, 1980) has been used extensively in recent years in the area of food choice and health-related behaviour research (Brewer, Blake, Rankin, & Douglass, 1999; Conner, 1993; Freeman & Sheiham, 1997; Grogan, Bell, & Conner, 1997; Mesters & Oostveen, 1994; Rappoport, Peters, Corzine, & Downey, 1992; Saba, Vassallo, & Turrini, 2000; Shepherd & Stockley, 1987; Sparks, Shepherd, Wieringa, & Zimmermanns, 1995; Stafleu, Van-Staveren, De-Graaf, Burema, & Hautvast, 1995; Towler & Shepherd, 1992; Tuorila & Pangborn, 1988; Woodward et al., 1992). The constructs used in this study taken from TRA are the following: beliefs, normative beliefs, subjective norms, intention, attitudes, and behaviour. This approach offers a clear framework within which to measure attitudes and relate them to behaviour (Conner, 1993).

2.5.2 Social Learning Theory

Social Learning Theory (SLT) assumes that people are active in determining their own behaviour. SLT acknowledges that human behaviour can be markedly influenced by observation and direct experience. This theory explains human behaviour in terms of continuous reciprocal interaction between cognitive, behavioural, and environmental influences (Bandura, 1977). These influences uniquely determine a person's behaviour. A change in one influence will imply changes in other influences (Bandura, 1977; Perry, Baranowski, & Parcel, 1990). The major constructs used in this study taken from SLT are the following: environment, behavioural capability, self-efficacy, and emotional coping responses.

First, environment is defined as the factors that are physically external to the individual. Environmental influences include the social aspects of family and friends as well as the physical environment such as market conditions. For example, a woman from Northern Manitoba has no control of the resources (e.g. fresh fruits and vegetables) available in the market. Another example, a woman may be so opposed to limiting fatty foods in her diet that her friends come to expect her to maintain a high fat diet. The woman has strengthened this expectation about fatty foods by avoiding any social environments in which she might be expected to consume low fat foods (for example, fitness groups or community healthy weight clubs). However, at some point, a dramatic event may occur in this woman's life (for example, the death of a close family member from a cardiovascular disease and exposure to the information that cardiovascular disease may in part be caused by high fat diet) that makes her decide to start following a low fat diet. The woman will now encounter the expectations of her high fat friends, who may pressure her not to follow a low fat diet. In order to avoid these negative pressures, she may seek new friends who value low fat diet and support her new behaviour.

Second, behavioural capability is defined as the knowledge and skills to perform a given task or behaviour. This construct differentiates between learning and just performing a given task or behaviour. For example, a patient may learn that consuming high fiber foods will be beneficial for glucose control, but the patient may not perform the given task. The development of behavioural capability is the result of the patient's training, intellectual capacity, and learning style. Thus, the purpose of many education programs is to provide the patient with the behavioural capability to perform a new type of behaviour (in this case, consuming high fiber foods).

Third, self-efficacy is defined as the person's ability and level of confidence in performing a given task or behaviour. Repetition of a given behaviour indicates confidence in performing that task, which in turn affects task persistence, initiation, and endurance, which promote behaviour change (Perry et al., 1990). Boyle and Morris (1994) show that this construct affects how much effort is invested in a given task. For example, health practitioners who are training patients with diabetes to self-monitor glucose levels may divide the self-monitoring process into a series of simplified steps that patients can learn through repetition. When these patients are confident about each step, they can gradually put the steps together and build self-efficacy about the entire task.

Fourth, emotional coping responses are defined as the strategies that an individual uses to deal with emotional stimuli. Coping strategies provide training in problem solving and stress management. For example, severely obese people may find it difficult to deny their condition. Society often reacts negatively to obese people, and these reactions can intensify anxiety about being obese (Hudson & Williams, 1981). Researchers agree that for some severely obese people, this anxiety causes overeating (Leon & Roth, 1977; Slochower & Kaplan, 1980; Slochower, Kaplan, & Mann, 1981). Heightened anxiety also makes it difficult to follow education messages coming from health professionals (Ley & Spelman, 1965).

SLT (Bandura, 1986) integrates the constructs of environment, behavioural capability, self-efficacy, and emotional coping responses. This approach offers a clear framework within which to explain human behaviour in terms of continuous reciprocal interaction between cognitive, behavioural, and environmental influences. These influences uniquely determine a person's behaviour. As with TRA, it has been used

extensively in recent years in the area of food choice and health-related behaviour research (Brinberg, Axelson, & Price, 2000; Connors, Bednar, & Klammer, 2001; Gribble, Falciglia, Davis, & Couch, 2003; Jaycox, Baranowski, Nader, Dworkin, & Vanderpool, 1983; McCann, Retzlaff, Dowdy, Walden, & Knopp, 1990; Osler & Jespersen, 1993; Rodin, 1980; Trevino et al., 1998; Wallin, Bremberg, Haglund, & Holm, 1993).

Numerous decision-making theories have been applied in sociological and psychological research. Constructs defined in the theories TRA and SLT represent some of the fundamental explanations of health-related behaviours. Selected constructs from these theories can be used to analyze the data obtained from the patient. Lewis, Sims, and Shannon (1989) observed that these theories form a basis for examining food and health behaviours because they allow for a wide range of variables known to influence these behaviours. Therefore, by focusing on individual traits, social contexts and values, it is possible to identify motivating and decision-making factors related to food choices (Houts & Warland, 1989).

2.5.3 Application of Theory

Constructs defined in the Theory of Reasoned Action (TRA) and Social learning Theory (SLT) provide fundamental explanations of human behaviors, even without their theoretical relationships. For this study, selected constructs from the TRA and SLT can be used to examine the data obtained from the patients. To use constructs for transcript coding is the beginning of the content analysis because the constructs recognize individual contexts, motivations, and decision-making in food selection among patients

with type 2 diabetes. Constructs from both theories are useful for coding transcripts from the FCM interview.

Patients may express ideas that are not satisfactorily explained by these constructs. In that case, new constructs will then have to be created, possibly by adopting concepts reported in other studies involving patients with type 2 diabetes. However, examining the determinants of food choices of patients with type 2 diabetes within the frameworks of these two theories has been useful in understanding their food choice behaviours (Hui, 2002). The theories can serve to explain many of the observed characteristics of individual food choice by this population.

CHAPTER III

RESEARCH DESIGN AND METHODS

This chapter will describe the research questions and hypotheses used in this study. Details of patient selection, data collection, data analysis, and quality control will be explained. Likewise, the survey methods used in this study will be described.

3.1 Research Questions and Hypotheses

Dietary management remains the cornerstone of diabetes treatment. Dietary advice is important for patients with type 2 diabetes to help manage the disease and to minimize the risk of complications. However, dietary advice is less likely to be followed if it is not personally meaningful and acceptable to the individual. The beliefs associated with foods influence compliance and the patient's dietary management. This study investigated the following questions:

1. What are the specific reasons that patients with type 2 diabetes give for making their food choices?
2. Are food beliefs associated with the food choices made by patients with type 2 diabetes?

   Hypothesis 1: The frequencies with which food belief constructs are mentioned are associated with the consumption frequencies of foods reported by patients with type 2 diabetes.
3. Is the data from the Food Choice Map (FCM) similar to that from the Food Frequency Questionnaire (FFQ) in terms of food items, frequencies, and patterns?

Hypothesis 2 (Null): *Patients report no difference in the numbers of food items reported in the FCM and the FFQ.*

Hypothesis 3 (Null): *Patients report no difference in frequencies of consumption in the FCM and the FFQ.*

Hypothesis 4: *Personal experience with dietary management associates with frequency of consuming an appropriate diet.*

3.2 Patient Selection

Two trained researchers conducted the study from September 1998 to April 1999. The sampling frame for this research was patients with type 2 diabetes who attended the diabetes education programs at the Diabetes Education Centre (DEC) at Health Sciences Centre, Winnipeg, Manitoba and were identified by the DEC as follow-up patients over a period of 2 months. Follow-up patients were those who attended at least one full session at DEC after being referred from a physician in hospital or in any private practice and were able to come back to the DEC after two months for further education, monitoring, and assessment of progress. All patients were from the City of Winnipeg or Northern Manitoba. They were recruited in three ways: referrals from the DEC dietitians and nurses, DEC mailing lists, and open invitation during follow-up classes given at the centre. Patients who met the following criteria were contacted for the study:

1. Must have attended at least one full education session over 2 months (to allow application of knowledge acquired from the DEC into everyday life).
2. Must be literate (to ensure the patient can complete the Food Choice Map and the Food Frequency Questionnaire).

3. Must be able to communicate in English (to be able to participate in the Food Choice Map interview).
4. Must not be pregnant (to avoid having differing physiological status influence dietary practices).

An introductory letter was given to all potential participants stating the purpose and nature of the research project (see Appendix A). All patients were informed about the length of the interview and the type of nutrition assessment to be used. A facilitator from the DEC placed telephone calls to the potential participants to confirm participation and to schedule interviews. Prior to the interview, the patients signed a consent form (see Appendix B). All patients were given the opportunity to raise any questions and concerns they had. All questions and concerns were addressed and explained to the satisfaction of the patients. Anonymity of all patients was ensured.

The Faculty of Human Ecology Ethics Review Committee approved the procedures for contacting the patients. Authorization to conduct research was requested from, and granted by, the Director of the DEC. All records used number coding of patient identification to ensure confidentiality. Lists of patient names and code numbers were kept secure and separate from the data records and destroyed upon completion of the study.

One hundred contact letters were sent to potential participants. Eighty follow-up patients met the inclusion criteria for the sample. Of the 80 follow-up patients who met the criteria, 42 participated in the initial stage of data collection and the rest were not able to schedule interview appointments for reasons related to the cost and time for travel, as well as family and work commitments during the time of the study. Interestingly,

anecdotal information on people who failed to participate in the study suggests that these people may have not met the selection criteria.

Tape-recorded interviews were conducted with 42 patients. Interruptions during the interview led to ineffective data collection for two patients. Consequently, these two patients were excluded from the study. Data collection was completed for 40 patients.

3.3 Data Collection and Analysis

Two trained researchers, including the author of this study, each carried out 20 separate tape-recorded interviews. A hands-on training period for both researchers prior to data collection minimized differences in data quality. The researchers were required to give a standard set of instructions to each patient prior to completion of the survey.

Both researchers completed 20 interviews each. The author of this study coded all 40 verbatim transcripts. The constructs identified from the first 20 interviews were compared to the constructs in the second 20 interviews. The two sets of data were compared for consistency because each researcher might possibly have different interview dynamics due to differences in personality or environmental factors during the interview that may have affected the data.

Comparison was made between the ten highest frequency ranks among the constructs in both sets of data using unpaired t-test analysis (see Appendix C). The ten highest constructs with the highest frequencies were used because it was anticipated that these would be included in the most common constructs in the two data sets. The frequencies for eight out of the ten constructs were identical in both data sets. The difference on the frequencies of the constructs for the two sets of data was assumed to be

due to patient differences. The construct frequency distributions were compared. There were no significant differences in frequencies between the two data sets (unpaired t-test, $df = 1$, $p > 0.05$). Hence, the two sets of data were regarded as coming from the same population and combined for further analysis.

Data were collected using a demographic questionnaire, Food Choice Map (FCM) interview, and Manitoba Heart Health Food Frequency Questionnaire (FFQ). Each patient completed:

1. The demographic questionnaire to provide information such as height, weight, age, gender, and education level (see Appendix D).
2. The FCM interview, a semi-structured interview to capture personal experience about food beliefs that determine the reasons for food choice, as well as specific health issues that are important in the design of nutrition intervention programs. The type of data collected from this tape-recorded in-depth interview with visual mapping procedure included food items, food consumption frequencies, and reasons for food choices.
3. The FFQ to record information about usual food intake. The type of data collected from this questionnaire included food items and food consumption frequencies.

The initial stage in data collection was the completion of demographic questionnaire. The FCM interview started right after the completion of the demographic questionnaire. The 45-minute tape-recorded FCM interview was followed by the explanation of the FFQ. Patients were given one week to complete the FFQ at home. A self-addressed stamped envelope was also provided to all patients for mailing in questionnaires. All data

was obtained in a comfortable and confidential location at Health Sciences Centre, Winnipeg, Manitoba. All data collected was analyzed with supervision from academic staff at the University of Manitoba.

3.3.1 Demographic Questionnaire

Demographic information that was gathered on all patients included age, gender, weight, height, marital status, ethnic background, occupation, education, income, and family size. Demographic data generated was in the form of numerical and categorical values. Data collected from the demographic questionnaire were used to compare the following: the proportions of characteristics observed among the patients and the general population of Winnipeg and the characteristics of the different groups identified in the study. All patients were requested to complete the demographic survey before completion of the food choice map interview to ensure consistency in data collection procedures. The researcher was present to clarify questions where necessary.

The Body Mass Index (BMI) was calculated from the self-reported weight and height data (Formula 1). The BMI was defined as weight in kilograms divided by height in meters squared (Gibson, 1990):

Formula 1 $$BMI = \frac{weight\ in\ kg}{height\ in\ m^2.}$$

The BMI values were categorized according to the cut-off points shown in Table 1.

Table 1 BMI Body Weight Categories and Associated Health Effects

Body Mass Index	Body Weight Categories/Health Effects
<20	*Underweight* - May be associated with health problems for some people
20-24.9	*Normal* - Lowest risk of health problems for most people
25-29.9	*Overweight* - May lead to health problems in some people
>30	*Obese* - Increased risk of developing health problems

Health and Welfare Canada, 1990

3.3.2 Food Choice Map (FCM)

The Food Choice Map (FCM) is a semi-structured interview technique designed to obtain a visual representation of the food choices of patients along with their narrative reasons for food choices. The method draws on environmental, physical, cultural, economic, and social experiences as they relate to food and health-related behaviours. The interview was designed to record differences in food choice among patients, together with their personal perceptions and experiences with the food items they consume in daily life.

The interview provided two records: first, a record of usual food choices associated frequencies of consumption and related comments, and second, a record of activities during a typical day centered on food choices. The areas included in the interview involved in-depth questions focused on the following areas:

1. Food consumption as to frequency, what foods, when consumed, and why they were consumed.
2. Economic context: income, where and who purchases or provides the food.
3. Social context: the interactions of the patient during food consumption.

4. Physical context: where different meals were consumed and how these meals were prepared.
5. Information context: information on diabetes control and general health choices of the patient.

3.3.2.1 Creating a Food Choice Map:

In the FCM interview, the patient participated in recording his or her answers by using food stickers to visualize food items consumed over a given period of time. Throughout the interview, patients witnessed their replies being recorded, creating a visual representation, and were able to modify the record themselves in response to later questions providing internal validity checks as the interview progressed (Sevenhuysen & Gross, 2002). This internal checking mechanism is one of the promising aspects of creating such a visual record; its built-in flexibility allows both researchers and patients to double-check and modify answers at any point in time during the conversation.

Food pictures from the Department of Human Nutritional Sciences were used to create food stickers. These pictures were simplified generic line drawings in black and white for easy recognition and identification by any patient. The picture size was approximately 0.5 inches by 0.5 inches. Food stickers were placed on clear plastic sheets with temporary adhesive; these stickers were organized into a quick retrieval kit by grouping them according to starch foods, fruits, vegetables, protein foods, and miscellaneous. In addition, white labels were used for any food items not available in the food sticker kit. The use of temporary adhesive enabled the interviewer and patient to move the stickers if necessary.

To create a food choice map, foods were recorded on an 11" by 14" grid sheet of paper. This grid sheet was prepared as the base for the food map. The horizontal scale numbered 1 to 7 allowed both the patient and the interviewer to position pictures of food items according to their weekly frequency of consumption (see Appendix E). The vertical scales showed daily time periods of usual food consumption. The meal periods were noted in the empty margins to the left or right of the grid. The first stages of the interview comprised questions and answers, because the patient reported foods and times of eating, while later stages reflected more of a conversation when the patient explains the reasons for food choices.

Audio tape recording equipment with charged batteries and a blank tape were needed for each interview. The areas included in the interview are listed in FCM interview guide (see Appendix F). Recording the interview minimized incomplete records, and enabled the interviewer to organize the data collected. The initial question asked by the interviewer solicited the foods that were eaten most often. For each food mentioned, a food sticker was placed in the margin of the grid. Relative frequencies of usual food intake were discussed for each food item reported. As the food was reported, the food sticker was moved horizontally into the grid to a position that showed how often in the week that particular food was consumed (see Appendix G). In situations where a patient changed his or her answer about any food item already placed on the map, the food sticker was moved easily.

3.3.2.1.1 Quality Control:

It was important to ensure that the cassette recorder was placed in a position that could capture all comments during the interview process. The interviews used the same

topic guide for all patients. All topic areas were introduced to each patient but the depth of information obtained was dependent on patient's personal experience. Food topics were discussed according to the interest and perceptions of the patient. This approach ensured that data reflecting the personal experience of, and relevance to, patients was collected.

3.3.2.2 Content Analysis:

The transcribed interview and the food choice map from each patient were used for the analysis. The entire transcript was read once to get an overview of its content. It was assumed that patients provided valid and reliable information.

Content analysis was used to answer research question #1: What are the specific reasons that patients with type 2 diabetes give for making their food choices? Content analysis was used to categorize the data so that it could be summarized and compared. Holsti (1969) defined content analysis as a phase of information processing in which communication content is transformed through objective and systematic application of categorization rules, into data that can be summarized and compared. The categories in the content analysis were termed constructs. Constructs are defined as words, phrases, and sentences, which help the researcher categorize reasons for a behaviour.

A number of constructs were defined prior to the analysis. These constructs were selected from previous literature on behavioral theories (Ajzen & Fishbein, 1980; Bandura, 1977; Fishbein & Ajzen, 1975). Each defined construct was expanded with a statement that described the application of the construct and with associated examples of

phrases or comments patients might use that expressed the construct in normal interview conversation.

The construct definitions, applications, and examples were used as rules and guidelines for recognizing constructs in the comments of patients (see Appendix H). Consistent application of the construct examples was seen as a way of reducing the subjectivity of the coding process. The transcript text of every thought expressed regarding food choice was reviewed. The wording was matched with one or more constructs where possible by comparing the wording or meaning of the comment with the definition, application, and example of the constructs. For example:

Patient 1: *"My dietitian, Lawrence at Diabetes Education Centre at Health Science, told me to eat cereal for breakfast to regulate my blood sugar,"*

Food Item: cereal

Construct: diabetes knowledge physiology

The consumption of cereal in this example used the constructs diabetes knowledge and physiology to explain the reasons for food choice. To organize the data, an Excel spreadsheet was created for each patient with four columns displaying the food items, absolute frequency of consumption, reasons for food choice, and their related constructs, as shown in Table 2.

Table 2 Example of Construct Analysis

Food Item	Freq.	Construct	Reason for Food Choice
Banana	14	Preference	I have my fruit before I eat my breakfast. I like it.
		Habit	[Laugh...] I don't know, that's a habit.
		Physiology	Yes, I eat it when I'm hungry.
		Social relationship	My wife thinks it's better. [Laugh...]

Table 2 *(continued)* **Example of Construct Analysis**

Food Item	Freq.	Construct	Reason for Food Choice
Tomato	7	Taste	I got used to taste and I found that this variety is just
		Food quality	Nice and firm,
		Taste/Preference	It is sweet and now I actually preferred.
Potato	7	Tradition	We basically grew up eating potatoes
Ham Sandwich	5	Convenience/ Diabetes knowledge	It is easy to make and you can have a variety
Apple	5	Taste	It taste very sweet, delicious!
Pasta	5	Tradition	My grandmother used to cook this for us so now I cook it for my children
Peanut Butter	4	Access	It's readily available anytime for me when I want to
Egg	3	Physiology	Esp. after they took off my gall bladder
Salad	1	Physiology Access	I was trying to help my stomach a little bit so It is just next door Wendy's
		Cost/Price	It's very cheap. It's like $1.59 something.
Cheese	1	Resources	I can't afford because of my limited money coming
		Emotion/ Resources	You get depressed. I can't afford to eat out anyway.
Yogurt	1	Preference	I like it with my fruits
		Diabetes knowledge	My dietitian said I can have one in the morning
Cheese	1	Diabetes knowledge	Lawrence from DEC told me to eat cheese with my toast in the morning
Bacon	1	Social	I eat this only when I eat out with my friends
Ice Cream	1	Treat	It's a treat!

The transcript of the patient interview revealed the selection of predefined constructs. The predefined constructs that were not used would be deemed to have no importance in the reasons for food choice of that patient. On the other hand, in cases where comments in the transcript did not match any of the predefined set of constructs, new construct definitions were added to the list of constructs, together with applications and examples of comments. By excluding some predefined constructs that were not used in the analysis of the transcript, and by including new construct definitions, the analysis created a uniquely personal set of constructs for each patient.

The categories were initially broad so that a large amount of data could be sorted into a few groups. The categories were usually between 10 to 15 constructs per study.

Morse and Field (1995) highlighted that these constructs should be kept to a minimum, because if the constructs are too specialized, very small amounts of data will fit into each category.

However, once the categories have ample data, the researcher may elect to divide these categories into two or more sub-categories (Field & Morse, 1985). Table 2 shows that for each construct sub-categories were identified namely: "positive" and "negative." A "positive" sub-category was coded to some of the constructs when someone who was explaining their food choices mentioned that their reasons for food choice promoted intake of that food. A "negative" sub-category was coded when someone who was explaining their food choices mentioned that their reasons for food choice inhibited intake of that food. The researcher recognizes positive knowledge about diabetes when someone who is explaining their food choices mentions that the advice they get from dietitians at the Diabetes Education Centre promotes intake of that food. These are considered the positive reinforcements given by health practitioners to patients with type 2 diabetes. The researcher recognizes negative knowledge about diabetes when advice from Diabetes Education Centre hinders intake of that food. These are considered the negative reinforcements given by the health practitioners to patients with type 2 diabetes. Similarly, positive physiological experience is coded when someone who is explaining their food choices mentions that a physiological experience increases the intake of that food while negative physiological experience is coded when a physiological experience hinders the patient from consuming that food. Examples of these positive and negative sub-categories are shown in Table 3.

Table 3 Example of Positive – Negative Construct Analysis

Food Item	Freq.	Construct	Reason for Food Choice
Brown bread	7	Diabetes knowledge positive	I have been trying to eat this bread because my dietitian told me to
Pasta	5	Diabetes knowledge negative	I been watching what I eat, like you know pasta I don't eat too much of it, they told me at DEC
Cereal	5	Physiology positive	I eat cereal in the morning because it keeps me regular – you know what I mean eh?
Pork Chop	4	Cost/Price negative	Right now you know the price is too high. I can't eat it.
Hamburger	3	Social relationship positive	Oh, we got grandchildren. So we go quite often to McDonalds (laugh).
Eggs	1	Physiology negative	I can't have fried eggs more than once a week because of my cholesterol.
Rice	1	Access negative	you can buy it in the States, but you can't get it here
Cheese	1	Emotion negative Resources negative	You get depressed that you can't eat And I can't afford to eat out everyday anyway. No income.
White bread	1	Diabetes knowledge negative	The RD at DEC told me white bread is no good at all so why bother
Applesauce	1	Physiology negative	When I eat applesauce my sugar goes up so I don't eat much

The association between the food beliefs and food choices of each patient was also investigated. The initial stage of the analysis showed high consumption frequencies reported on beverages like coffee, milk, tea, and cola (see Appendix I). Patients reported the fewest constructs on all beverages as compared to all other foods (see Appendix J). Patients provided comments on the foods they usually consumed but not on the beverages they consumed. Because of these reasons, the beverages reported were omitted in the analysis.

The constructs were used as variables in this study. One food may be associated with more than one construct. For example, the food item rice may be associated with more than one construct such as preference, positive access, negative access, positive

diabetes knowledge, and negative diabetes knowledge. These same constructs can be associated with other foods, such as pork. The construct variable value is the frequency with which the construct occurred in the food reported by all patients. The greater the number of comments the patients provided about the food, the greater the frequency of the construct variable for that food.

3.3.2.2.1 Quality Control:

Constant and consistent identification of constructs was possible through logical discussions with fellow researchers for cross checking coding and generating additional theoretical ideas (Chenitz & Swanson, 1986). This systematic approach was used for this research. To verify construct validity, internal validation was completed (see Appendix K). All comments expressing a certain construct were grouped together. Any construct descriptions that did not fit with the other construct descriptions were checked for the precise coding of the construct. Where necessary, a new construct was created to create a unified construct definition list.

3.3.2.3 Identifying Relationships between Food Consumption Frequency and Construct Frequency:

To test hypothesis 1: The frequencies with which food belief constructs are mentioned are associated with the consumption frequencies of foods reported by patients with type 2 diabetes, linear regression analysis using Number Cruncher Statistical System (NCSS) 7.0 version software (Hintze,1995) was performed.[2]

[2] NCSS is a multifunctional statistical analysis system with comparable functions to SAS and SPSS.

The first step in identifying relationships between food consumption frequency and construct frequency was to summarize the food choices for the 40 patients. The summary of food choices for the 40 patients was characterized by differences in food consumption frequencies and the associated construct variables. Some foods were consumed more frequently than others. Some foods had more construct variables than other foods, meaning patients expressed more comments on some foods than others while not commenting at all on some food items, despite probing during the interview.

To summarize the data for the 40 patients, an Excel spreadsheet was created with columns displaying the food items, absolute frequency of consumption, and frequency of constructs associated with the food. Frequency of consumption of a food and the frequency of the constructs associated with that food were added for all patients who reported that food. Table 4 shows the example of the consumption of cereal. Table 4 shows that 33 patients reported consuming the food item cereal with the total frequency of consumption of 192.5. Half values for frequency of consumption were obtained from the FCM. For example, patient # 115 reported eating cereal 5 to 6 days a week, for an average value of 5.5. Similarly, patient # 119 reported eating cereal 3 to 4 days a week, for an average value of 3.5.

Table 4 Example of Summary of Data for All Patients on Foods Consumed and Associated Constructs

Patients	Food	Freq.	Preference	Diabetes knowledge positive	Diabetes knowledge negative	Physiology positive	Physiology negative
101	Cereal	7	0	4	0	3	0
102	Cereal	3	0	0	1	0	2
103	Cereal	2	0	0	0	0	0
104	Cereal	2	1	0	1	0	0
107	Cereal	4	0	0	0	0	0
109	Cereal	7	1	0	0	3	0

Table 4 *(continued)* **Example of Summary of Data for All Patients on Foods Consumed and Associated Constructs**

Patients	Food	Freq.	Preference	Diabetes knowledge positive	Diabetes knowledge negative	Physiology positive	Physiology negative
110	Cereal	7	1	3	0	0	0
111	Cereal	8	0	6	0	3	0
112	Cereal	7	0	0	0	0	0
113	Cereal	7	0	4	0	4	0
114	Cereal	14	1	8	0	2	0
115	Cereal	5.5	0	0	0	0	0
116	Cereal	7	1	3	0	0	0
117	Cereal	14	2	23	0	7	0
119	Cereal	3.5	0	2	0	2	0
120	Cereal	1	0	0	0	0	0
201	Cereal	6	0	7	0	3	3
202	Cereal	2	0	0	0	0	0
203	Cereal	2	0	2	0	0	0
203	Cereal	3	0	0	0	0	0
204	Cereal	7	0	0	0	0	0
205	Cereal	3	0	2	0	5	0
206	Cereal	7	0	0	0	0	0
208	Cereal	5	0	0	0	0	0
209	Cereal	4	1	2	0	4	0
210	Cereal	7	0	0	0	0	0
211	Cereal	7	0	0	0	0	0
213	Cereal	7	1	1	0	0	0
215	Cereal	10	0	2	0	3	0
216	Cereal	7	0	2	0	0	0
217	Cereal	7	1	3	0	2	0
220	Cereal	3.5	0	0	0	3	0
222	Cereal	6	2	0	1	1	0
TOTAL	**CEREAL**	**192.5**	**12**	**74**	**3**	**45**	**5**

Each frequency of consumption of identical food, reported by 40 patients, is summed. The summary of each frequency of consumption of identical food was used in testing hypothesis 1: The frequencies with which food belief constructs are mentioned are associated with the consumption frequencies of foods reported by patients with type 2 diabetes.

The second step in identifying relationships between food consumption frequency and construct frequency was to create a simple graphic plot of these two measurements (food consumption frequency versus construct frequency). For each construct variable identified in the study, a scatter diagram of data from all 40 patients was used to show the frequency of occurrence of the construct variable versus the number of foods associated with the construct variable.

To test for an overall association on all patients between their food beliefs and their food choices, linear regression analysis using Number Cruncher Statistical System (NCSS) 7.0 version software (Hintze, 1995) was performed. Food beliefs are described by using the summary of construct frequencies while food choices are described by using the summary of food consumption frequencies of all 40 patients. After significant statistical relationships were identified, a 95% confidence interval was calculated to identify the foods that showed the relationship between the food beliefs and the food choices of all patients. The foods outside the confidence interval were seen as not contributing to the statistical relationship.

3.3.3 Food Frequency Questionnaire (FFQ)

This FFQ had been used previously in the 1992 Provincial Nutrition Survey (see Appendix L). This questionnaire, previously tested in Ontario, was adapted for use in Manitoba. A number of changes were made to the food items (e.g., the addition of bannock and perogies) as well as portion sizes associated with food items, in order to reflect the differences in food habits between Ontario and Manitoba (Sevenhuysen,

1991). The questionnaire was validated among several population groups for daily average group intakes of energy, fat, calcium, and crude fiber (Sevenhuysen, et al., 1993).

The FFQ reviewed the consumption of 95 food items including everything consumed at home and away from home. The questions were with reference to the kinds and amounts of foods and beverages regularly consumed by the patient. Questions 1 to 93 describe the usual consumption of defined food items, while question 94 solicit a list of foods in the diet not mentioned in other questions. Question 95 asked about possible use of calcium supplements together with amounts in milligrams, but the data was not included in this study because supplement consumption was not part of the study design. Information as to whether patients were following a special diet and information on who prescribed the diet advice were solicited in questions 96 and 97, respectively. The questionnaire also provided additional space for any comments that patients would like to add.

Each answer about the consumption of a certain food item had three parts, two of which defined frequency of consumption and one that defined the usual portion size. The FFQ assigned each food and beverage item a 2-digit code for the frequency of consumption and provided 3 frequency type choices of daily, weekly or monthly to categorize consumption. Food items reported as consumed either daily or weekly were recorded in this study. Monthly food frequencies were not included because the study aimed at assessing the consumption of certain food items over a seven-day period, thus providing data on usual food intake of patients actively involved in Diabetes Education Centre activities.

Most questions regarding the frequency of consumption of condiments and supplements eaten with the main food item allowed for one of four answers to describe the frequency: (a) always, (b) usually, (c) sometimes, and (d) rarely/never. The categories were expressed as the percentage of the frequency reported for the main meal or staple food item:

1. Always	100%
2. Usually	67%
3. Sometimes	33%
4. Rarely/Never	0%

For example, in the question – "If you eat bread or bannock do you add peanut butter?" If the patient answered *"always"* among the four given categories and bannock is being consumed once at breakfast daily then peanut butter will be given the same frequency as bannock which is 7 times a week.

3.3.3.1 Quality Control:

All incomplete answers in the questionnaire were omitted from the analysis. If all three parts of the answer were filled out, two that defined frequency of consumption and one that defined the usual portion size, the answer was considered complete. If all parts of the answer were missing, or two parts of the answer were missing, or only one of the three parts was missing, the data were not included. Examples of these incomplete data are: a response that reported consumption of any food items by answering "yes" to the question – "Do you have this food or beverage at least once a month?" but failed to report the actual number or frequency of consumption; or a response that reported consumption

with frequency of intake but failed to report whether such consumption was per day, per week, or per month.

3.3.4 Similarity of the Food Frequency Questionnaire (FFQ) and the Food Choice Map (FCM)

3.3.4.1 Similarity of data in terms of food items:

To test research hypothesis 2: Patients report no difference in the numbers of food items reported in the FCM and the FFQ, the total number of food items reported in the FFQ and the FCM by all 40 patients, were tabulated. To investigate the agreement in the number of foods reported from the FFQ and the FCM, a match paired t-test statistics was performed using Number Cruncher Statistical System (NCSS) 7.0 version software (Hintze, 1995). A significance level of $p < 0.05$ was used.

3.3.4.2 Similarity of data in terms of food frequency:

Individual food intakes of the patients were summarized into weekly frequencies of intake. Some foods were reported twice in the FCM, in which case the frequencies were added to calculate the total frequency for that food. The consumption frequencies of all food items reported in both FFQ and FCM were tabulated.

To test hypothesis 3: Patients report no difference in frequencies of consumption in the FCM and the FFQ, a correlation coefficient was calculated for each patient. The r-value was used to determine a threshold value to identify patients who reported no real difference in food frequencies in both FFQ and FCM from patients who did report a real difference. The r-values 0.6 and above were shown to have no significant difference

using regression statistics. The threshold value was set at r = 0.6. A correlation coefficient of 0.6 was seen as the minimum strength for a relationship with practical meaning, because relationships with lower coefficients were deemed to have too much variability or too great a range of results from one method for any particular result from the other method. In addition, when the distribution of the correlation coefficients from all 40 patients were displayed in a histogram, most of the correlation coefficients have values between 0.6 and 0.7, with the most common value being close to 0.6 (see Appendix M). The proportion of significant ones by chance will be 2/40 ($p < 0.05$). A binomial test was done to check whether the proportion observed was different from the proportion expected.

3.3.5 Phenomenological Analysis of Food Choice Map (FCM) Interview:

In order to describe the personal experiences of patients with type 2 diabetes (for hypothesis 4: Personal experience with dietary management associates with frequency of consuming an appropriate diet), phenomenological analysis was performed on the FCM interview transcript. As discussed in the review of literature, phenomenological analysis was performed to describe the overall theme of each patient's transcript, describing the personal experience of patients (see Phenomenological Studies pp. 22-23). During the in-depth interview, the patients were asked non leading questions, which were designed to elicit descriptions of perceptions or experiences. Patients provided varied information according to their own contexts. In this way the researcher avoided narrowing the patient's definitions or explanations. Probing questions enriched the descriptions.

The first step in data analysis was immersion in the data as a whole. This was achieved by listening to the tapes and by extensive reading and rereading of the transcripts. The researcher then reflected on these data in their entirety (Omery, 1983). The meaning of each sentence was considered in light of the complete transcript, and statements that appeared to be particularly revealing were highlighted. Thus, a disciplined and systematic search was performed for descriptive expressions that were identified at the center of the experience (Tesch, 1987). These experiences were continually rephrased, their relevance confirmed, and then they were described in a few sentences by the researcher. A significant aspect of phenomenological research was maintaining the experience in totality. A specific theme was identified for each patient. Some themes were common to most patients and others were not.

3.3.5.1 Quality Control:

For phenomenology, the goal was to describe accurately the experience of the phenomena under study (reasons for food choices) and not to generate theories or models or develop general explanations. Validity rests in the richness of the discussion during the in-depth interview (Morse & Field, 1995). To ensure validity of personal experience (theme), the researcher should suspend all his or her prejudgements (bracketing) in order to obtain a picture of the experience.

3.3.6 Meal Pattern Analysis of Food Choice Map (FCM) Record:

In order to identify diet appropriateness of all 40 patients, to associate with personal experience with dietary management, study results of Hui (2002) on meal

patterns of the same 40 patients were used in the analysis of the FCM food record. Hui (2002) categorized the meal patterns of these patients into *Appropriate Diet* and *Not Appropriate Diet.* She used the criteria developed for recommended diets in the *Canada Food Guide, Diabetes Food Guide* and the *Good Health Eating Guide* for people with diabetes for her meal pattern analysis. Hui (2002) used the same food maps of all 40 patients in this study to calculate the frequency of consumption of vegetables, foods with added sugar, and the number of different foods reported and then categorized the meal patterns of these patients into *Appropriate Diet* and *Not Appropriate Diet.*

A food choice map meeting all of the following criteria was defined as *Appropriate Diet:*

1. Limited added sugar (none or low frequencies of table sugar, jam, honey, etc.).
2. The proportions of vegetables, starchy foods, and high-protein foods in weekly food frequencies are 45-55%, 20-30%, and 20-30% respectively.
3. Consumption of carbohydrates with protein (more than 70% of meals show both types of food).
4. Consumption of vegetables and fruits (frequency more than 5 times per day).
5. Limited high fat foods (fast foods, processed meats, and other products likely to be high in saturated fats and salt consumed less than 3 times per week).

The total frequencies of all starchy foods in a map were not used as one of the criteria of an *Appropriate Diet,* because one's carbohydrate intake is based on body size, age, physical activities, and medications. Hence, the main focus of the *Appropriate Diet*

category was to identify whether an individual was incorporating the recommended food groups into their diet.

In addition, consumption of milk products was not used as one of the criteria because the diet recommendation on calcium intake for individuals with diabetes include foods other than dairy products. These alternative foods are not mentioned in *Canada's Food Guide, Diabetes Food Guide,* and the *Good Health Eating Guide* as replacements for dairy products. For example, patients who consumed these alternative foods instead of dairy products for ethnic reasons would have their food selections categorized as not desirable according to the Food Guide. In order to avoid possible bias, dairy products were not included in the criteria for an appropriate diet.

CHAPTER IV

RESULTS

This chapter will describe the sample characteristics. It will show the results of the tests of the hypotheses. In addition, this chapter will answer research questions and will provide additional observations from the data.

4.1 Sample Description

Thirty-five of the patients resided in Winnipeg, 3 patients came from areas within 50 km from Winnipeg, and 2 patients came from Cross Lake Reserve. All 40 patients completed the demographic questionnaires. Table 5 shows the summary of demographic characteristics for all patients.

The study sample comprised 24 women and 16 men whose ages ranged from 26 to 72 years. Sixty-five percent of the patients in the study sample were over 55 years of age. This age distribution of the study sample is consistent with the diabetes population distribution in Manitoba (Manitoba Health, 1998).

The patients in the study sample had a wide range of educational, occupational, and ethnic backgrounds. Forty-five percent of the patients had high school education, compared to 28% of the Winnipeg population that has high school education (Statistics Canada, 1996).

Forty-seven point five percent of the patients in the study sample were retired or unemployed, which could be explained by the presence of a large proportion of seniors in the sample group. Twenty-five percent were homemakers and the remaining 27.5% were either employed or running their own business.

Table 5 Demographic Characteristics (n=40)

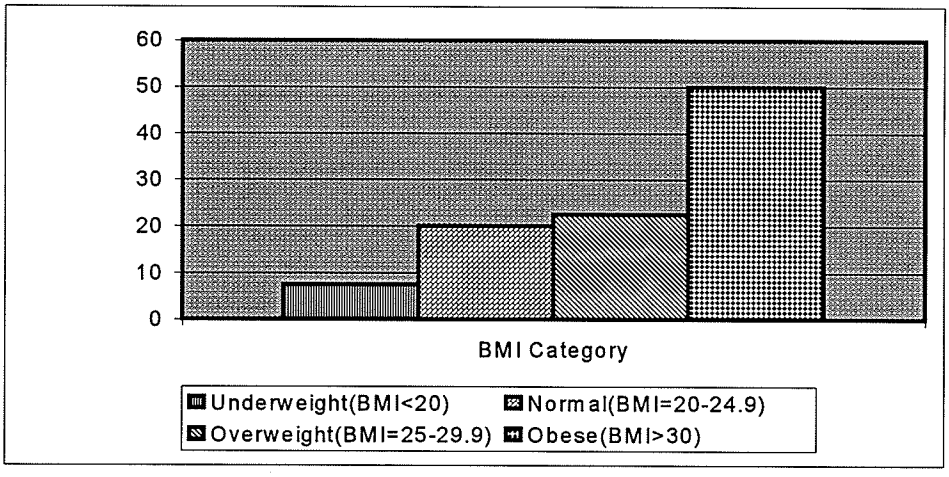
	Number	Percentage
Gender		
Female	24	60
Male	16	40
Age (years)		
35 and below	1	2.5
36-45	8	20
46-55	5	12.5
56-65	11	27.5
66 and above	15	37.5
Marital Status		
Single	13	32.5
Married/Common Law	27	67.5
Divorced/Separated	0	0
Widowed	0	0
Education Level		
Secondary/Lower	22	55
Post secondary	18	45
Employment Status		
Employed	10	25
Self employed	1	2.5
Home maker	10	25
Retired	18	45
Unemployed	1	2.5
Ethnic Background		
Aboriginal	5	12.5
Non - aboriginal	35	87.5
Annual Income		
< $50,000	35	87.5
$50,000 and over	5	12.5

Twelve point five percent of the patients were aboriginal people from the City of Winnipeg and Northern Manitoba. This proportion is higher than the aboriginal population of Winnipeg, which is estimated at 7% (Statistics Canada, 1996). The educational level and ethno-cultural characteristics of the study sample were similar to the structure of the general population of Winnipeg.

Eighty-seven point five percent of the study sample had an annual income of less than $50,000. Annual income of the population of Winnipeg in 1994 was an average of $24,136 (Statistics Canada, 1996). The prevalence of diabetes is greater among low income Canadians than other groups. Approximately 6% of 45 to 64 year-olds with household incomes of $10,000 to $29,000 have diabetes. For individuals who have the same age but with household incomes of $60,000 or more, the prevalence was only approximately 3% (James, Young, Mustard, & Blanchard, 1997).

Figure 1 shows the BMI distribution of all 40 patients according to the four body weight categories (see Design and Methods, pp. 37-38) defined by Health and Welfare Canada (1990). Seven point five percent of the patients were underweight, 20% had normal body weight, 22.5% were overweight, and 50% were obese. Overall, 72.5% of the patients in the study were overweight or obese, compared to 80% of people with type 2 diabetes in Canada (CDA, 2000).

Figure 1 BMI Distribution According to Body Weight Categories (n=40)



4.2 Specific Reasons for Food Choices

The major focus of analyzing the comments of patients with type 2 diabetes about each food reported was to identify the specific reason for each food choice. As previously discussed, content analysis was performed (see Design and Methods, pp. 41-46) and constructs were identified for each food choice to answer the first research question: What are the specific reasons that patients with type 2 diabetes give when making their food choices?

The content analysis identified 35 constructs for the 40 patients (Table 6). Not all the constructs defined prior to the start of the coding of transcripts were used. Three new constructs, energy/boost, filling, and treat, were identified on the basis of patient comments and were added to the construct list. Recall that definitions, applications, and examples of these constructs are shown in Appendix H.

Table 6 Summary of Constructs Identified in the Transcripts of 40 Patients

Construct	Definition
Access positive	promotes food intake due to availability of food and the ability to acquire available food (Campbell, 1991)
Access negative	inhibits food intake due to unavailability of food and the inability to acquire available food (Campbell, 1991)
Aversion	avoidance of certain food items due to a belief system (correct or incorrect food facts) (FCM working group, 2001)
Convenience positive	promotes food intake due to use of convenient items such as dried, frozen, tinned foods that can be used quickly (FCM working group, 2001)
Convenience negative	inhibits food intake due to inconvenience/difficulty in food preparation (FCM working group, 2001)
Cost/Price positive	promotes food intake due to favorable cost/price of food that is available (Campbell, 1991)
Cost/Price negative	inhibits food intake due to unfavorable cost/price of food that is available (Campbell, 1991)

Table 6 *(continued)* **Summary of Constructs Identified in the Transcripts of 40 Patients**

Construct	Definition
Diabetes knowledge positive	promotes food intake due to advice/positive reinforcements acquired from Diabetes Education Centre (FCM working group, 2001)
Diabetes knowledge negative	inhibits food intake due to advice/negative reinforcements acquired from Diabetes Education Centre (FCM working group, 2001)
Emotion	expressing a feeling towards an object (food) (FCM working group, 1996)
Energy/Boost positive	promotes food intake due to perception of extra energy being available (Fieldhouse, 1995)
Energy/Boost negative	inhibits food intake due to perception of low energy being available (FCM working group, 2001)
Filling	food or drink regarded as being safe and/or suitable for consumption when blood glucose level is a concern (FCM working group, 2001)
Food quality positive	promotes food intake due to desired appearance, palatability, and wholesomeness of foods (FCM working group, 2001)
Food quality negative	inhibits food intake due to undesirable appearance, palatability, and wholesomeness of foods (FCM working group, 2001)
Habit	something that a person does often or regularly (FCM working group, 2001)
Health Promotion	foods used to promote or maintain health condition (FCM working group, 2001)
Medicinal/Curative	promotes food intake due to perception that foods cure or heal certain ailments or diseases (Chan Ho, 1985)
Physiology positive	promotes food intake due to positive physiological experience (FCM working group, 2001)
Physiology negative	inhibits food intake due to negative physiological experience (FCM working group, 2001)
Preference	to choose a food or other activity over another designated food or other activity (Rozin, 1990)
Preventive	foods used for certain disease prevention (Chan Ho, 1985)
Resources positive	promotes food intake due to available household resources (money and time) and proportion of resources available for food acquisition (FCM working group, 2001)
Resources negative	inhibits food intake due to unavailable household resources (money and time) and proportion of resources available for food acquisition (FCM working group, 2001)
Social function positive	promotes food intake due to desirability for certain social functions or gatherings (FCM working group, 2001)
Social function negative	inhibits food intake due to restriction in use for certain social functions or gatherings (FCM working group, 2001)
Social relationship positive	promotes food intake due to social pressure to situations considered socially significant (Ajzen & Fishbein, 1980)

Table 6 *(continued)* **Summary of Constructs Identified in the Transcripts of 40 Patients**

Construct	Definition
Social relationship negative	inhibits food intake due to social pressure to situations considered socially significant (Ajzen & Fishbein, 1980)
Social support positive	promotes food intake due to the emotional, instrumental, and financial aid that is obtained from one's social network (Berkman, 1984)
Social support negative	inhibits food intake due to the emotional, instrumental, and financial stress resulting from one's social network (Berkman, 1984)
Taste positive	promotes food intake due to oral sensory properties such as taste, smell, etc. (Rozin, 1990)
Taste negative	inhibits food intake due to oral sensory properties such as taste, smell, etc. (Rozin, 1990)
Tradition positive	promotes food intake due to customs or beliefs that have been practiced or held for a long time and are not expected to be changed (FCM working group, 2001)
Tradition negative	inhibits food intake due to customs or beliefs that have been practiced or held for a long time and are not expected to be changed (FCM working group, 2001)
Treat	specially pleasant or enjoyable food(s) for the individual and definitely not everyday foods (FCM working group, 2001)

4.3 Association of Food Beliefs and Food Choices

The second research question to be examined was: Are food beliefs associated with the food choices made by patients with type 2 diabetes?

Research Hypothesis 1: *The frequencies with which food belief constructs are mentioned associated with the consumption frequencies of foods chosen by patients with type 2 diabetes.*

Table 7 shows the overall pattern between the 8 most common construct variables of the 20 most commonly consumed food items reported by all 40 patients. The food consumption frequencies of these 20 food items and associated construct frequencies are shown. Food consumption frequencies and associated construct frequencies of all foods

reported by all 40 patients are shown in Appendix N. A number was calculated for: (a) frequencies of consumption of the same food items, (b) frequencies of occurrence of the same construct variables reported by 40 patients, and (c) total frequencies of similar construct variables.

Table 7 Example of Summary of Food Consumption Frequencies and Construct Variables of Food Items of All 40 Patients

Food Item	Frequency of Consumption	Access positive	Diabetes knowledge positive	Food quality positive	Health promotion	Physiology positive	Preference	Social relationship positive	Tradition positive
Cereal	192.5	4	74	2	0	45	12	1	0
Toast	167.5	7	73	5	0	42	28	1	6
Potato	160.5	6	18	0	0	0	23	9	18
Sandwich	155	24	39	3	4	36	23	7	1
Soup	136	10	42	4	11	38	26	14	11
Carrots	130	16	41	5	15	20	28	6	13
Banana	123.5	18	27	14	7	16	30	1	0
Bread	123	5	32	10	4	6	13	1	1
Salad	108.5	17	35	1	1	14	34	16	13
Cheese	97.5	5	32	1	10	23	15	2	0
Apple	94	11	21	19	8	13	29	5	0
Chicken	85	5	37	10	2	5	22	13	2
Crackers	83.5	5	20	0	4	31	2	2	0
Orange	67.5	10	25	1	4	8	16	0	0
Grapefruit	56.5	7	19	12	1	3	19	0	2
Peas	53.5	3	7	1	1	3	9	3	8
Cauliflower	52	6	11	6	4	7	5	7	4
Broccoli	51	7	12	7	4	7	7	2	4
Fish	49	40	8	6	3	7	14	7	23
Pasta	44	10	9	1	0	0	14	16	17
TOTAL		**216**	**582**	**108**	**83**	**324**	**369**	**113**	**123**

In Table 7, the overall pattern shows that diabetes knowledge positive was the most prominent construct variable reported by all patients. Next to diabetes knowledge positive was preference, which might indicate that patients preferred food items that were considered important in managing diabetes. On an individual food basis, cereal had a total food consumption frequency of 192.5 and had a total number of 6 construct

variables, namely: access positive, diabetes knowledge positive, food quality positive, physiology positive, preference, and social relationship positive. The most frequent construct variable identified for cereal was diabetes knowledge positive followed by physiology positive. Another example was pasta, with a total food consumption frequency of 44 and a total number of 6 construct variables, namely: access positive, diabetes knowledge positive, food quality positive, preference, social relationship positive, and tradition positive. Tradition positive was the most common reason given for food choice of this food item.

The significance of the relationship between a construct and the frequency of consumption of all foods associated with that construct by any of the 40 patients was determined by linear regression. Appendix O shows the correlation coefficient values and probability values of all 35 constructs associated with frequency of consumption for all 40 patients. Of all 35 construct variables, 20 showed statistically significant associations. The 3 construct variables that showed the strongest relationships with food consumption were:

1. Diabetes knowledge positive ($R^2 = 0.779947$, $df = 1$, $p < 0.001$).
2. Preference ($R^2 = 0.611499$, $df = 1$, $p < 0.001$).
3. Physiology positive ($R^2 = 0.60124$, $df = 1$, $p < 0.001$).

Figures 2, 3, and 4 show the positive relationship between frequency of food consumption and the three construct variables diabetes knowledge positive, preference, and physiology positive. Appendix P shows the scatter plots of sums of frequencies reported by 40 patients of all 35 constructs and the consumption of the food items associated with the construct. The plots show a large range in frequencies of constructs,

with some having been mentioned often by patients and others very few times. Hence many plots have zero values that leave few values to define the relationship. Except for the 3 strongest relationships, the plots show poor prediction of the frequency of food consumption from the frequency of a construct. In addition, R^2 values for all relationships except the 3 strongest are below 0.3. For these two reasons, further analysis was conducted on only the 3 strongest relationships.

To identify which foods influenced the positive association of frequency of food consumption and the construct variables, a 95% confidence interval was calculated for each of the three construct variables (Figures 2, 3, & 4). Foods inside the confidence interval were identified as contributing to the relationship with the construct variable. In each case, high frequency foods were identified because they contributed most to the strength of the relationship. The five high frequency foods that are common to the three constructs showing a significant relationship with food choice were: toast, soup, sandwiches, carrots, and bananas.

Figure 2 **Sums of Frequencies Reported by 40 Patients of the Construct Diabetes Knowledge Positive and the Consumption of the Food Items Associated with the Construct**

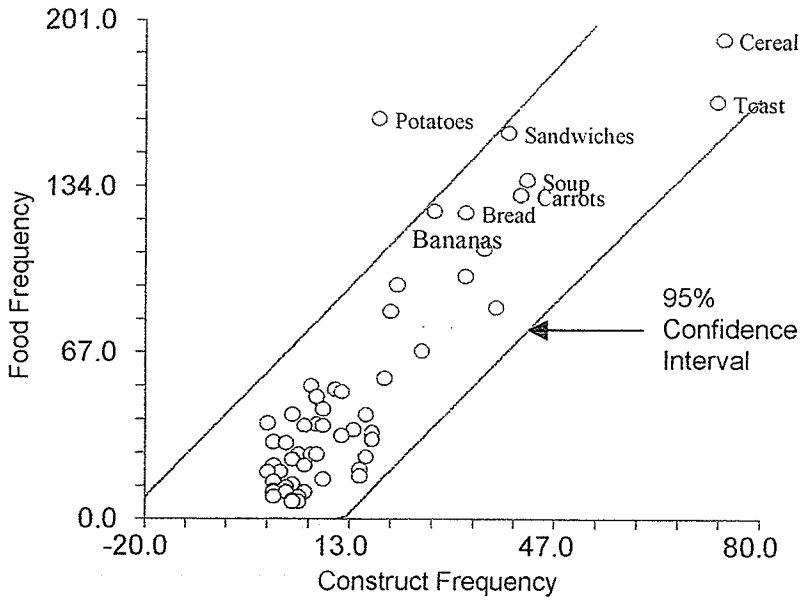


Figure 2 shows that cereal, toast, sandwiches, soup, carrots, bread, and bananas were identified as contributing to the positive association of frequency of food consumption and the construct variable diabetes knowledge positive. Potatoes were identified as not contributing to the relationship with the construct variable diabetes knowledge positive or physiology positive but were identified as contributing to the relationship with the construct variable preference (Figures 2, 3, & 4).

Figure 3 **Sums of Frequencies Reported by 40 Patients of the Construct Preference and the Consumption of the Food Items Associated with the Construct**

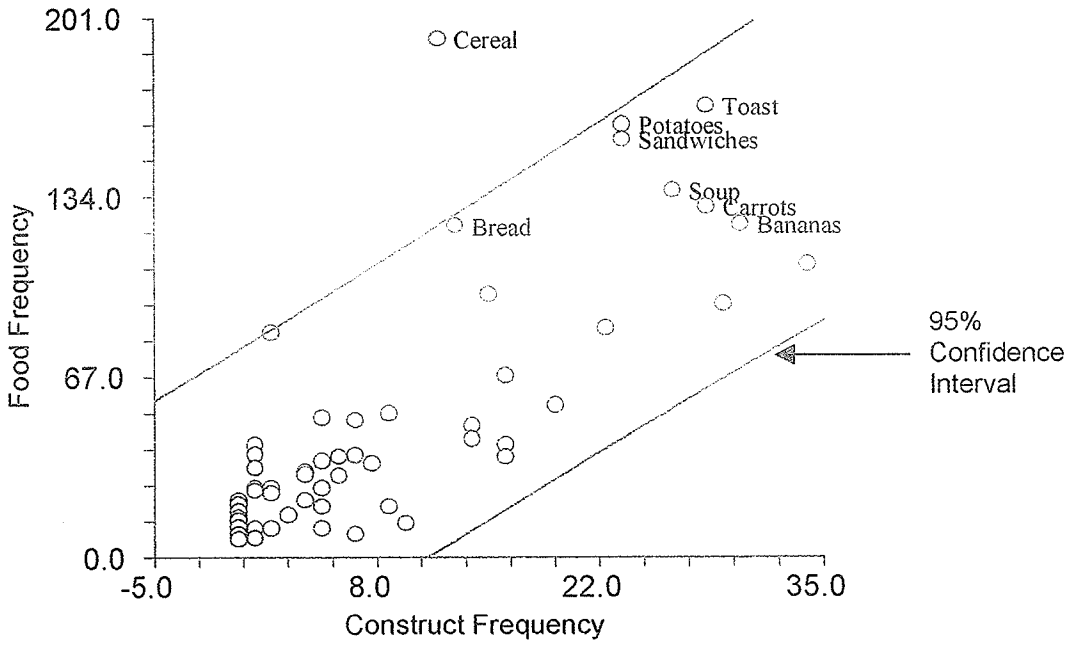


Figure 3 shows that toast, potatoes, sandwiches, soup, carrots, bananas, and bread were identified as contributing to the positive association of frequency of food consumption and the construct variable preference, while cereal was found not contributing to the relationship.

Figure 4 **Sums of Frequencies Reported by 40 Patients of the Construct Physiology Positive and the Consumption of the Food Items Associated with the Construct**

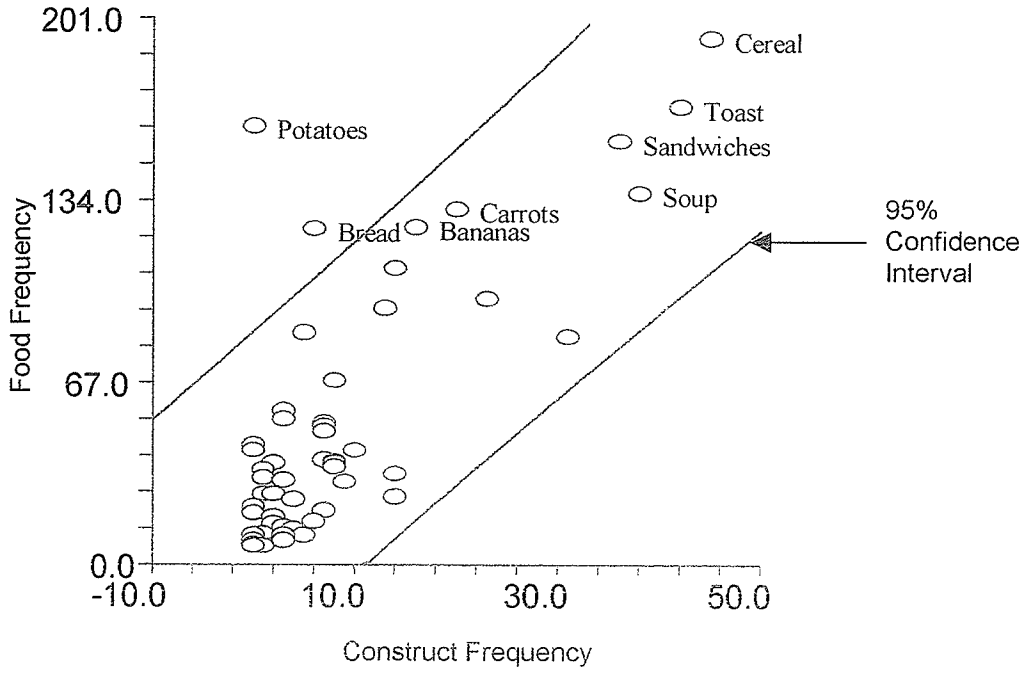


Figure 4 shows that cereal, toast, sandwiches, soup, carrots, and bananas were identified as contributing to the positive association of frequency of food consumption and the construct variable physiology positive, while potatoes and bread were found not contributing to the relationship.

4.4 Similarity of the Food Frequency Questionnaire (FFQ) and the Food Choice Map (FCM)

The third research question investigated was: Is the data from the FCM interview similar to the FFQ data in terms of food items, frequencies, and patterns?

Research Hypothesis 2 (Null Hypothesis): *Patients report no difference in the numbers of food items reported in the FCM and the FFQ.*

The total number of food items reported in the FFQ and the FCM were compared. To test if patients reported no difference in the numbers of food items on the FCM and the FFQ, a match paired t-test using a significance level of $p < 0.05$ was performed. Results indicated no significant differences in numbers of food items in the FCM and the FFQ ($t = 0.9286$, $df = 39$, $p > 0.05$). Therefore, the results indicate that the reporting of food items on the FFQ and the FCM was similar for all patients in the study and that the null hypothesis should be accepted.

Both records appeared to be skewed but in opposite directions (Figures 5 & 6). The distribution of frequencies of the number of food items reported in 40 FFQ records was skewed to the right, while the distribution of frequencies of the number of food items reported in 40 FCM records was skewed to the left.

Figure 5 **Frequencies of the Number of Food Items Reported in 40 FFQ Records**

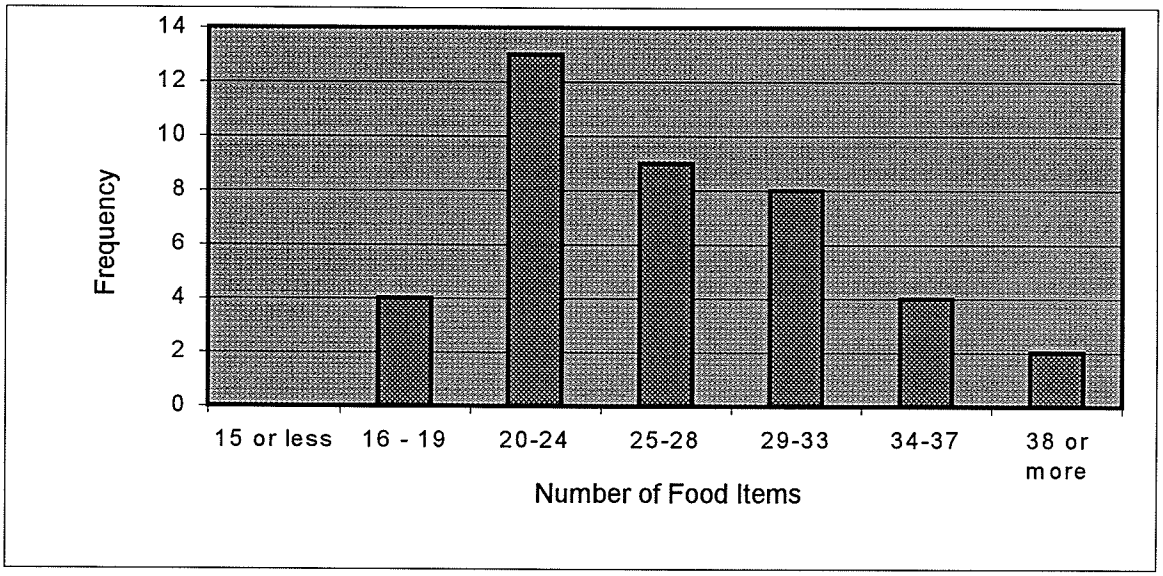
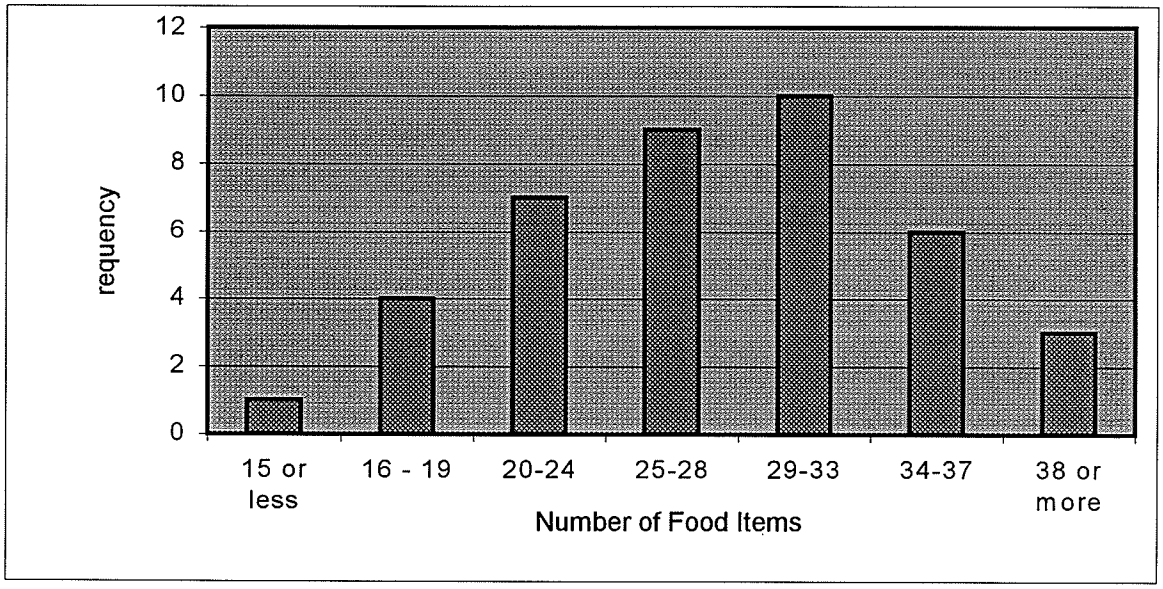


Figure 6 Frequencies of the Number of Food Items Reported in 40 FCM Records



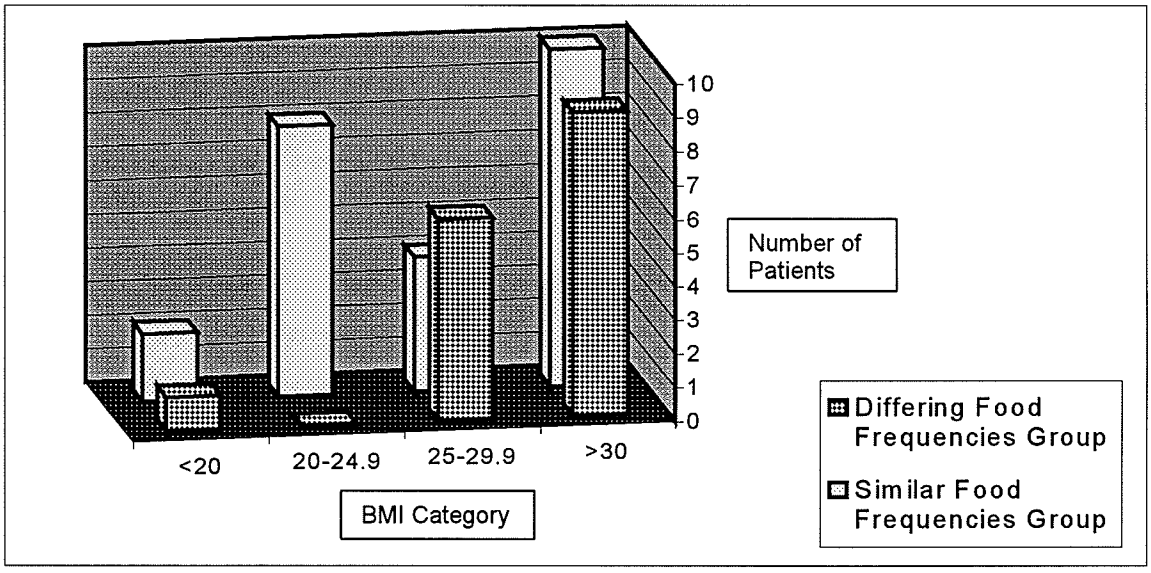
Research Hypothesis 3 (Null Hypothesis): *Patients report no difference in frequencies of consumption in the FCM and the FFQ.*

All meaningful differences in food frequency consumption between the two surveys per patient were identified through correlation coefficients (see Design and Methods pp. 52-53). The r-value was used to determine a threshold value to identify patients who reported no real difference in food frequencies in both FFQ and FCM from patients who did report a real difference. The r-values 0.6 and above were shown to have no significant difference using regression statistics. The threshold value was set at $r = 0.6$. Recall that when the distribution of the correlation coefficients from all 40 patients were displayed in a histogram, most of the correlation coefficients had values between 0.6 and 0.7, with the most common value being close to 0.6 (see Appendix M).

Results showed that the two surveys did not record the same frequencies of consumption for all 40 patients (see Appendix Q). Sixteen patients had different frequencies of consumption in the FCM and the FFQ (Differing Food Frequencies Group) while twenty-four patients had the same frequencies of consumption in both the FCM and the FFQ (Similar Food Frequencies Group). This proportion is significantly larger than what was expected by chance using the Binomial test ($p < 0.001$). Because the reported food frequency obtained from the FFQ and the FCM was not similar for all patients in the study, the null hypothesis was rejected.

The differing Food Frequencies Group and Similar Food Frequencies Group were compared using demographic data. The patients in these two groups had similar patterns of education, income, employment, and age but differed in body mass index (BMI) distribution. All patients in the Differing Food Frequencies Group were either underweight, overweight or obese (Figure 7).

Figure 7 Number of Patients by BMI Distribution and Food Frequency Groups



4.5 Phenomenological Analysis of Food Choice Map (FCM) Interview

Research Hypothesis 4: *Personal experience with dietary management associates with frequency of consuming an appropriate diet.*

The first step in identifying associations between personal experiences of the patients and frequency of consumption was to identify overall themes (see Design and Methods, pp. 53-54). The transcript of each patient was reviewed in order to determine one specific theme. A total of 6 themes were identified (Table 8). Some themes occurred more often than others. For example, the theme "Punishment and Reward" was reported by only 2 of the patients, while the theme "Follows Recommendations from Health Practitioners" was common to 18 patients.

Table 8 Frequency of Transcript Themes (n = 40)

Transcript Theme	Number of Patient
Variety	4
Unstable Blood Sugar	4
Access/Resources	5
Punishment/Reward	2
Social Influence	7
Follows Recommendations from Health Practitioners	18
Total number of Patients =	**40**

The second step in the analysis was to compare the food frequency groups (Similar Food Frequencies Group and Differing Food Frequencies Group) within each transcript theme. By inspection, a comparison of food frequency groups by transcript themes suggests that the food pattern of the Differing Food Frequencies Group was more variable due to reasons involving variety in food selections and physiological conditions (Table 9).

Table 9 Comparison of Food Frequency Groups within Each Transcript Themes

Transcript Themes	Similar Food Frequencies Group	Differing Food Frequencies Group
Variety	0	4
Unstable Blood Sugar	0	4
Access/Resources	2	3
Punishment/Reward	1	1
Social Influence	3	4
Follows Recommendations from Health Practitioners	18	0

To test for an association of personal experience related to adapting food and lifestyle of the patients with the frequency of consumption, a 2 x 2 contingency table statistical analysis was performed (applying Yates' correction) between the food frequency groups (Similar Food Frequencies Group and Differing Food Frequencies Group) and the overall themes identified from the transcripts (Table 10). There was an association between these two food frequency groups and the overall themes of the transcripts ($\chi^2 = 17.81$, df $= 1$, $p < 0.001$). The finding indicates that personal experience

related to adapting food and lifestyle of the patients are associated with the ability to have a stable food consumption patterns.

Table 10 Comparison of Food Frequency Groups with Transcript Themes

Transcript Themes	Similar Food Frequencies Group	Differing Food Frequencies Group
Variety, Unstable Blood Sugar, Access/Resources, Punishment/Reward, Social Influence	6	16
Follows Recommendations from Health Practitioners	18	0

4.6 Meal Pattern Analysis of Food Choice Map (FCM)

Using the FCM, the meal patterns for the 40 patients were also categorized into two groups, *Appropriate Diet* and *Not Appropriate Diet* (Hui, 2002). Fourteen patients were categorized as having an appropriate diet while 26 patients were categorized as not having an appropriate diet. Of all the 18 patients who claimed to be following recommendations from health practitioners, fifty percent had an appropriate diet.

To test for an association between personal claim of the patients related to following recommendations from health practitioners with the ability to consume an appropriate diet, a 2 x 2 contingency table statistical analysis (applying Yates' correction) was performed between the group of patients who claimed to be following recommendations from health practitioners and the group of patients categorized as consuming an appropriate diet (Table 11). There was an association between these two categories ($\chi^2 = 3.8$, df = 1, $p < 0.05$). The finding indicates that patients who claimed to

be following recommendations from health practitioners are more likely to have the ability to consume an appropriate diet.

Table 11 Comparison of Patients who Claimed to be Following Recommendations from Health Practitioners with Patients Categorized as Consuming an Appropriate Diet

	Number of Patients Categorized as Consuming an Appropriate Diet	Number of Patients Categorized as Not Consuming an Appropriate Diet
Following Recommendations from Health Practitioners	9	9
Not Following Recommendations from Health Practitioners	5	17

CHAPTER V

DISCUSSION and CONCLUSIONS

This chapter will compare and contrast the results from the study with information published by other researchers. The specific reasons for food choices of patients with type 2 diabetes will be discussed. In addition, implications from differences between the FFQ and the FCM will be highlighted. Conclusions on the hypotheses will be given, together with implications and suggestions for future research.

5.1 Specific Reasons for Food Choices

The verbatim transcripts from the FCM from all 40 patients with type 2 diabetes were analyzed using content analysis. This analysis eventually produced 35 constructs. Constructs defined in the Theory of Reasoned Action (TRA) and Social learning Theory (SLT) provided fundamental explanations of human behaviors of these patients. However, some patients expressed ideas that are not satisfactorily explained by these constructs. In that case, new constructs were created, by adopting concepts reported in other studies involving patients with type 2 diabetes.

The analysis revealed that the food choices of patients were influenced by diabetes knowledge, preferences, and physiology. Diabetes knowledge is a construct defined in the TRA and SLT. Both of these theories relate beliefs or knowledge to behaviour, both intention and action. These two theories hold that human beings make systematic use of the information available to them when making decisions on engaging in a given behaviour. On the other hand, physiology and preference are constructs

defined in the SLT. SLT holds that observation and direct experience could markedly influence human behaviour.

These findings are consistent with the reasons given for food choices among people with type 2 diabetes found in the literature. The results of this study suggest that food consumption of patients with type 2 diabetes is influenced by many different factors, such as health beliefs, physiology, social, economic, and cultural processes. The findings in this study also support the conclusion that food choice is multi-determined and context dependent.

Consumption Frequency and Common Foods Consumed by All Patients

The food choices of all 40 patients revealed disparity in food consumption frequencies between food and beverages. Beverages such as coffee, tea, milk, and cola were consumed more frequently than any other foods. The results of this study are consistent with the findings of Starkey, Johnson-Down, and Gray-Donald (2001) who conducted a study on food habits of Canadians. The *Food Habits of Canadians* study, conducted in the late 1990s, is the first comprehensive Canada-wide nutrition survey since *Nutrition Canada* survey in the early 1970s (Health and Welfare Canada, 1975). The authors' comparison of food intake with *Canada's Food Guide to Healthy Eating* indicated that beverages such as coffee, tea, and cola were consumed more frequently than any other foods. Food choices from these "other foods" group contributed over 25% of energy intake for all ages and gender groups. Therefore the finding of this study confirms that consumption of beverages of type 2 patients with diabetes was similar to the consumption of beverages of the general population of Canada.

5.2 Association of Food Beliefs and Food Choices

Food choice is a key factor in the dietary management of type 2 diabetes (Miller, Warland, & Achterberg, 1997). To increase the effectiveness of nutrition education in promoting sensible food choices, diabetes educators must learn and understand the underlying belief systems of those whom they advise, since no health advice will ever be acted upon if it is not personally meaningful and culturally acceptable to the individual.

The analysis revealed that the food choices of patients were influenced most consistently by three factors: diabetes knowledge, preference, and physiology. Patients in the study associated foods with different beliefs. In this case, patients associated their food choices based on diabetes knowledge promoting intake acquired through Diabetes Education Centre (DEC) education program. Identification of numerous functions of specific foods for patients with type 2 diabetes means translating dietary theory into practice. Nutrition educators and health practitioners must understand the underlying belief systems of those whom they advise to increase the effectiveness of nutrition education in promoting sensible food choices. For effective communication and management of diabetes, health information must incorporate the contemporary food beliefs of the patients (London & Guthridge, 1998).

Diabetes knowledge promoting intake acquired from DEC was well accepted and was regarded as having a strong and positive impact on dietary management by the 40 patients with type 2 diabetes. Hui (2002) observed similar results in understanding food choice behaviors in her study of the same 40 patients. Miller, Edwards, Kissling, and Sanville (2002) reported similar findings for adults with diabetes who can benefit from nutrition education designed to improve knowledge and skills necessary for diabetes

management. Likewise, Savoca & Miller (2001) reported that food selection and eating patterns among patients with type 2 diabetes was influenced by patient's knowledge of diabetes management. Therefore, the findings of this study are consistent with recent research confirming the importance of diabetes knowledge on dietary management of type 2 diabetes.

Food preference was associated with the food consumption of the patients in this study. The influence of preference was expected, and confirms the fact that the data is consistent with other work. As a rule, people eat what they like to eat (Hill, 2002). Freeland-Graves and Nitzke (2002) reported that eating practices are influenced primarily by food preferences. Drewnowski, Hann, Henderson, and Gorenflo (2000) reported similar findings among adult women; the more preferred foods were the more frequently consumed. Food preferences of patients in this study were associated with frequency of consumption; this relationship is consistent with what is established in the literature.

Moreover, physiology promoting intake influenced food choices among the patients in this study. As highlighted by Weingarten (2000), all behavioral processes, including food choices, are governed by underlying physiological mechanisms. The comments obtained from the patients in his study deal with ways of adjusting food intake to suit physiological needs.

Citing positive consequences of compliance to any health education information was more effective than citing negative consequences. Making patients apprehensive by citing negative consequences of non-compliance to any health education information was not as effective in maintaining health and lifestyle choices among patients with type 2 diabetes (Van de Laar & Van der Bijl, 2001). Ultimately, only positive messages from

DEC were valued by patients in this study as reflected in their reasons for food choice. As patients apply diabetes management recommendations in the context of their everyday lives, as noted, the three main influential factors (a) diabetes knowledge, (b) preferences, and (c) physiology, affected the food choices of patients with type 2 diabetes. These three factors are considered internal influences. These main influential factors, guided by patients' perceptions and experiences, all play a role in internal decisions about what to eat.

In contrast, external influences related to the environment appear not to have a significant influence on food choices of patients with type 2 diabetes. Examples of external influences are: social relationship, social support, tradition, access, resources, convenience, food quality, and cost. The failure to find significant relationships maybe attributed to insufficient data points. Having more patients may yield more comments for these reasons for food choice, thus resulting in sufficient data points to establish significance.

5.3 Similarity of the Food Frequency Questionnaire (FFQ) and the Food Choice Map (FCM)

The analysis of food consumption patterns rather than food nutrients has an increasingly important place in nutrition research (Fanelli & Stevenhagen, 1985). The FFQ and the FCM are two survey methods capable of exploring food intake in two ways: (a) number of foods and (b) frequencies of consumption. The FCM method gives the patients freedom to share information about their usual food choices. The FFQ restricts responses to predefined foods and does not record meal patterns. Both methods record data for a 7-day period.

The FFQ approach has considerable appeal for use in large-scale studies because of the relative ease of administration in comparison with other methods for obtaining dietary intake (Bazzarre & Myers, 1979; Block, 1982). The FFQ is specifically useful for studies where limited, where time and money prohibit the collection of more detailed dietary intake information. Also, the FFQ is a simple and quick method that can be completed by the patients themselves or with personnel without special training. Most questionnaires are pre-coded which makes data analysis simple.

The FCM is specifically useful for studies where time and money allow the collection of more detailed dietary intake information. The FCM is designed to obtain meal and diet patterns. These can either be quantified or lead into in-depth discussions that can draw on environmental, physical, cultural, economic, and social experiences as they relate to food and health-related behaviours. The FCM is designed to record differences in food choice among patients, together with their personal perceptions and experiences with the food items they consume in daily life.

No significant differences were reported between the number of foods in the FCM and the FFQ. However, patients tended to report more foods in the FCM compared to the FFQ. Both records appeared to be skewed, but in opposite directions. The distribution of frequencies of the number of food items reported in 40 FFQ records was skewed to the right, while the distribution of frequencies of the number of food items reported in 40 FCM records was skewed to the left. This finding means that some patients reported higher numbers of foods on the FCM compared to the FFQ. For instance, the most common number of food items reported in the FCM was between 29-33 while the most common number of food items reported in the FFQ was only between 20-24. This

difference in number of foods reported by all patients might be due to the ability of the FCM interviewer to prompt patients to recall other food selections in their dietary patterns thus producing more complete responses. In addition, the FCM might have generated more food items than the FFQ since visual representation of foods provided easy reference points for the patients to recall their detailed usual food intake. Vuckovic, Ritenbaugh, Taren, and Tobar (2000) reported that validity and reliability of self-reported food consumption is greatly influenced by the ways people interpret and respond to dietary survey methods. The practical significance of this difference in number of foods reported by all patients may imply that the FCM can generate more precise food patterns as compared to the FFQ.

On the other hand, the comparison of reported food frequency of the same foods reported between the FFQ and the FCM was not similar for all patients in the study. The correlation coefficient measured the relationship between food consumption frequency reported from the FFQ and food consumption frequency reported from the FCM. The value of the correlation coefficient measures the strength of the relationship on a scale of zero (no relationship) to 1 (perfect relationship). In behavioural data, one would not expect to observe either 0 or 1 (Hassard, 1991). In this study, for example, variability between the patients' memory recall and the difference in dynamics and internal validation involved between the two survey methods could have played a role in determining the strength of the relationship. The two influences that likely had an impact on the strength of the relationship are respondent behaviour and the survey method characteristics. Most of the 40 correlation coefficients have values between 0.6 and 0.7. Also, a correlation coefficient below 0.6 was considered inadequate in defining a

relationship, because the range of FFQ food consumption frequencies associated with any one FCM frequency would be too large to be meaningful. For these two reasons, the 0.6 correlation coefficient was used to separate relationships between FFQ and FCM frequencies that differed from those that were seen as the same.

This difference in food frequency of the same foods reported between the FFQ and the FCM might be due to various factors. First, findings could suggest that the FFQ might have definite limitations. The FFQ does not collect information for specific food items. Instead, foods are typically grouped into broad categories. Individual foods listed on the questionnaire are more likely to be remembered than foods grouped under such headings as "any other fruit," "any other vegetable," or "any other fish." Krall and Dwyer (1987) and Briefel et al. (1992) reported that unless a highly trained interviewer carefully probes the patient, grouping foods under broad categories precludes the ability to collect information about specific food items. Research also indicates that nutrient-related food groups are not well understood by most respondents because the patterns of questions and the food groups do not correspond to actual consumption patterns (Dwyer et al., 1989).

Since the foods listed in the FFQ were limited to approximately 101 foods and food groups, misrepresentation of even the most common foods as well as the less common foods consumed by patients in the study may have occurred. Extra probing maybe needed when food questionnaires include only simple meals and do not include mixed meals, prepared, and packaged foods. This extra probing can help validate the data obtained from the patients. The probing can indicate if changes in normal dietary patterns were made by patients reporting their food choices in order to easily record and complete the questionnaire. Although long questionnaires may do a better job of assessing food

intake, they also require patients to make an almost overwhelming number of decisions (Willett, 1994). Willett (1994) reported that although much has been accomplished in enhancing the assessment of diet using the FFQ, the questionnaires presently available are almost certainly still less than optimal.

In contrast, the FCM used questions about food and the context in which food is eaten, which elicited specific food substitutes or alternatives. These in turn prompted recall of other food selections in the patients' dietary patterns thus producing more complete recall. The FCM offered certain methodological advantages since patients had the chance to adjust their food intake response during the interview, and the picture format simplified the cognitive-response task. The use of food pictures in focusing and generating pertinent information allowed patients to describe their usual food intake in a comfortable manner.

In addition, the FCM provided patients' personal life experiences that could be relevant to the design and content of diabetes education programs. These life experiences were categorized into six transcript themes, which were consistent with previous findings for the same patients conducted by Hui (2002), validating the results of the phenomenological analysis in this study.

5.4 Phenomenological Analysis of Food Choice Map (FCM) Interview

A significant association between the overall themes of the transcripts and the food frequency groups (Similar Food Frequencies Group and Differing Food Frequencies Group) was established. The phenomenological analysis provided the explanation for

differences in the food frequency data obtained from the FCM and the food frequency data obtained from the FFQ. The differences suggest that the food pattern of Differing Food Frequencies Group was variable due to reasons involving variety of changes in food choices and physiological conditions.

Studies have found that varied diets are associated with higher levels of nutrient intake (Drewnowski, Henderson, Driscoll, & Rolls 1997; Kant, Schatzkin, & Block, 1991; Smiciklas-Wright, Krebs-Smith, & Krebs-Smith, 1986) and reduced risk of mortality (Kant, Schatzkin, & Harris, 1993). People who consume a greater variety of foods eat more food (Rolls, 1985; Smiciklas-Wright et al., 1986). However, variety is sometimes associated with increases in intake of energy, fat, sugar, sodium, or cholesterol (Nestle et al., 1998). Nestle et al. (1998) reported that in the narrower sense, increasing the variety of fruit and vegetable consumption may not reduce the consumption of high fat foods. For example, eating a variety of foods does not lead to reduced fat intake unless intake of higher-fat meat, dairy, and processed foods is also reduced (Kant et al., 1992). Similarly, with simple sugars, eating a variety of foods may not lead to a reduction in intake of simple sugars unless intake of sweets, pastries, desserts, sweetened beverages, and refined starchy foods is also reduced.

Different foods might be incorporated in patients' diets so that patients can enjoy life to the fullest or control the blood glucose levels. In addition, patients might be experiencing other potential risk factors that affect the stability of their food choices such as insulin sensitivity, advancing age, and diabetes complications. These factors might be causing the instability of patients' food choices, resulting in divergent food choices.

5.5 Meal Pattern Analysis of Food Choice Map (FCM)

Patients whose transcript theme reflected ability to follow recommendations from health practitioners reported stable food consumption patterns. Half of the patients who claimed to be following recommendations from health practitioners were identified in Hui's (2002) classification of an *appropriate diet* group. These patients reported a higher proportion of appropriate diets as compared to patients who did not claim to be following recommendations from health practitioners. This finding may imply that personal experience with dietary management associates with frequency of consuming an appropriate diet.

Human food choice is considered multi-factorial and context dependent (Rozin, 2000). Assessing patients' personal experience is valuable for individualizing diabetes management and dietary counseling. Knowledge of patients' personal experience is also valuable for selecting educational strategies consistent with patients' perspectives, resulting in effective diabetes management.

5.6 Conclusions

The findings of this study identify various factors influencing the food choices of patients with type 2 diabetes. Although recent reports provide many reasons for food choice, little is reported on the three reasons observed to be associated with the food choices of patients with type 2 diabetes in this study.

Of all the various determinants of food choice identified in this study, the three that showed the strongest relationships with food consumption are (a) diabetes knowledge, (b) preferences, and (c) physiology. Each factor was positively correlated with food choice. Following the advice of health practitioners and considering

physiological experience were important for many of these patients, but their own food preferences were also important.

Some reasons for food choice were reported frequently while others were reported less frequently. Examples of reasons for food choices that were reported frequently were: social relationships, social support, access, resources, habits, taste, food quality, convenience, cost/price, and traditions. These reasons for food choices were frequently reported but were not found to be not significantly associated with food choices. Examples of reasons for food choices that were reported less frequently were: preventive, medicinal/curative, health promotion, energy/boost, and emotion. These reasons for food choice were also found to be not significantly associated with food choices.

For each reason identified, sub-categories were identified namely: "positive" and "negative." The "positive" sub-category was used for each reason for food choice that promoted intake or consumption of the food and the "negative" sub-category was used for each reason for food choice that inhibited intake of the food. The influence of positive reasons on food choice was stronger than the influence of negative reasons on food choice. Negative reasons for food choice were frequently reported but were not found to be not significantly associated with food choices. When all negative reasons for food choice were examined statistically, no significant correlations were found.

Patients with type 2 diabetes can benefit from nutrition education designed to improve knowledge and skills necessary for diabetes management. The findings of this study indicate that the knowledge and skills obtained by the patients with type 2 diabetes from the Diabetes Education Centre (DEC) at Health Sciences Centre, Winnipeg, Manitoba were being applied by patients in their daily food choices. This finding

supports the use of positive communication strategies carried out by DEC regarding diabetes management.

Although no significant differences were found between reported food items in the FCM and reported food items in the FFQ ($t = 0.9286$, $df = 39$, $p > 0.05$), some patients tended to report higher numbers of food items on the FCM when compared to their responses on the FFQ. The most common number of foods reported on the FCM was between 29-33 while the most common number of foods reported on the FFQ was between 20-24. This difference in number of food items has practical significance. The FCM may provide easy reference points for the patients to recall their detailed usual food intake and therefore generate more complete responses.

The reported food frequencies for each patient obtained from the FFQ and the FCM were compared. The results indicated that the reported food frequencies obtained from each survey method were not consistent for all patients in the study. By observation, these inconsistencies maybe explained by the overall theme of the transcripts influenced by the personal life experience of the patient. Of all six transcript themes identified, three themes, namely (a) variety, (b) unstable blood sugar, and (c) following recommendations from health practitioners were found to influence the difference in reported frequencies of consumption.

The food patterns, measured by the choice of food and the food frequencies, of patients who reported consistent data on the FCM and the FFQ were stable due to reasons involving following recommendations from health practitioners. Following recommendations resulted in consistent food choices reported by patients with type 2 diabetes on both survey methods. In addition to this ability to be consistent in their food

consumption patterns (types and frequency of foods), some of these patients were categorized as consuming an appropriate diet. This study showed that patients with type 2 diabetes who claimed to be following a structured dietary education program on diabetes management might make more stable food choices, which may further contribute to effective and favorable health outcomes.

5.7 Implications

This research study contributes to the existing body of knowledge on food choice by its discovery of a positive relationship between three reasons for food choices and patterns of food consumption by patients with type 2 diabetes. The analysis revealed that food choices of patients were influenced by three factors: diabetes knowledge, preferences, and physiology. Health practitioners can use this information to implement diabetes nutrition education programs in service settings aimed at promoting dietary compliance.

Diabetes knowledge, preferences, and physiology can help provide valuable information to health educators on personal food beliefs of patients with type 2 diabetes. For example, if diabetes knowledge promoting intake influences the patient's food choice, basing diet plans on foods associated with this construct would likely lead to more effective diabetes management than other diet plans. Similarly, if preference influences the patient's food choice, accommodating or including of foods preferred by the patient in the meal plan would likely be more effective in promoting dietary compliance. Moreover, to educate people that are influenced by physiology promoting intake, advice on how to cope with physical symptoms, how to adjust medications, and how to adjust meal portions might be helpful in improving dietary compliance.

Positive messages from health practitioners were valued by patients in this study as reflected in their reasons for food choice. This finding may provide useful information for planning innovative intervention programs for chronic diabetes complications, programs that emphasize positive messages and empowerment techniques that have a strong impact on health management. For example, during dietary counseling, health practitioners may discuss with the patient the advantages of making dietary changes, advantages such as improved quality of life, instead of mentioning all the possible chronic complications of diabetes.

5.8 Future Research

Results from this study have identified various reasons for food choices of patients with type 2 diabetes, providing a better understanding of the complexity of the reasons for food choice among this group, and showing similarities with results from other studies. However, additional studies are needed to confirm the findings of this study before extrapolating them to larger populations.

Future research with a larger number of participants with type 2 diabetes could offer more results or a larger number of food beliefs, thus helping diabetes health practitioners to identify the reasons for food choices among this group. Such studies may also determine whether intervention programs can be made more effective by applying the findings of this study. A larger sample size could provide more reliable conclusions in the distribution of demographic characteristic among patient groups. Results of future larger studies on food choice should have an impact on intervention messages of health practitioners.

Specific to patients with type 2 diabetes is the relationship between dietary food choices and metabolic control. Aside from determination of appropriate diet among this group, future research should also identify the potential relationship of dietary food choices to glycemic control. Assessment of glycemic control would be helpful in confirming patient's compliance with the dietary recommendations.

Future research on food frequency data may be used to assess nutritional health risks in populations by adequately assessing total nutrient intakes. Systematic estimation of nutrient intakes using median quantities of foods derived from national survey data for Canada could be a useful tool for health practitioners. For example, knowledge of total calcium, vitamin D, caffeine, and alcohol intakes among patients with type 2 diabetes might be helpful in recognizing the risk for osteoporosis. Calcium, vitamin D, caffeine, and alcohol intake data could provide useful preliminary estimates of dietary patterns to health promotion policy makers interested in developing a relevant nutrition education program. Identification of risks to patients when followed by goal setting and appropriate dietary counseling may result in behavioural change and improvement in health.

This study provides a better understanding of the complexity of the reasons for food choices among patients with type 2 diabetes. Diet advice is likely to be followed if it is personally meaningful and acceptable to the individual. An understanding of the potential contribution of various factors on food choice under different conditions can serve to explain many of the observed characteristics of food choice among people with type 2 diabetes, and can highlight potential avenues for intervention. This research has identified three of these factors, which can be used to tailor dietary advice to patients with type 2 diabetes.

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APPENDIX A

Introductory Letter to Patients

THE UNIVERSITY OF MANITOBA

FACULTY OF HUMAN ECOLOGY
Department of Foods and Nutrition

311 Human Ecology Building
Winnipeg, Manitoba
Canada R3T 2N2
(204) 474-7433 (Office)
(204) 889-2622 or 774-4674 or
269-7242 (Res.)

Dear Participant,

The Department of Foods and Nutrition at the University of Manitoba is carrying out a study to help patients with diabetes make life style changes. This study can help in choosing food according to personal preferences and a variety of other aspects important to managing diabetes. The results are also intended to help in designing and promoting better diabetes education programs in your community.

We hope to work with a representative group of patients who attend the Diabetes Education Centre. Your name has have been randomly chosen and we hope that you can agree to participate in the study.

The main activity is an interview, conducted at the Health Science Centre and scheduled at a time that is convenient for you. In the interview you will be asked to share your experiences about diabetes, general health and any action you take to maintain your health, including food choices. The interview will be a discussion and will take approximately 45 minutes. The interview will be audio taped.

The second activity is for you to complete a personal background information after the interview. On this background information you will provide information such as age, weight, height, gender, marital status, family origin, type of transport used on daily basis, date of last visit to physician, level of education, language most frequently spoken at home, number of people living at your home, employment status, and income category.

The final activity will be the completion of food frequency questionnaire in your own time. You will receive the questionnaires after the interview and you are expected to complete the food frequency questionnaire and mail it back within one week, using a stamped envelope included with the questionnaire. On this questionnaire you will record your usual intake of specific foods.

All of the information you provide, either on tape or any other way, is kept entirely confidential. None of the information will have your name attached to it and no reports will identify individuals in any way. Your participation is voluntary and choosing not to participate does not affect any services, or access to services, at the Diabetes Education Centre or any other health service.

/...

The staff from the Diabetes Education Centre will telephone you in a few days to ask you whether you can join the study. In the meantime, please let us know if we can answer any questions you have. You can contact us at the above address or telephone number.

Thank you for your assistance.

Sincerely,

Amy Leung Hui and Rhiza Cruz Regalado
Researchers
Department of Foods and Nutrition
Faculty of Human Ecology
University of Manitoba

APPENDIX B

Consent Form

October 1998

CONSENT FORM – FOOD CHOICE STUDY REFERENCE NO.

I understand that the Department of Foods and Nutrition at the University of Manitoba is conducting a study on factors that determine food choices, and that the Diabetes Education Centre is assisting in this study. I understand that in participating in the study, I will be interviewed once at Health Sciences Centre and this interview will be audio taped.

I understand that I will complete demographic questionnaire and food frequency questionnaire after the interview and will hand the food frequency questionnaire to the interviewer within one week. I understand that I am free to withdraw from the study at any time and that I can choose not to respond to particular questions. My name, phone number and address will be deleted from the data records and audio tapes to ensure confidentiality.

I realize participation is voluntary and that there is no remuneration for my involvement.

I _____, the undersigned, agree to participate in the research study described above.

_____ _____

(Signature of Participant) (Date)

Address: _____ Phone Nos. _____

_____ _____

_____ _____

TO BE SIGNED BY THE INTERVIEWER:

To the best of my ability, I have fully explained to the participant the nature of this research study. I have invited questions and provided answers. I believe that the subject fully understands the implications and voluntary nature of the study.

_____ _____

(Signature of Interviewer) (Date)

APPENDIX C

Comparison of the Ten Construct Frequencies in the Data Set of Each Researcher

Ten Highest Frequency Ranks Among Constructs for Researcher # 1

Rank	Food Choice Construct	Construct Frequency
1	Diabetes Knowledge (+)	513
2	Preference	289
3	Physiology (+)	254
4	Access (+)	141
5	Social Relationship (+)	112
6	Taste (+)	74
7	Tradition (+)	72
8	Aversion	60
9	Food Quality (+)	58
10	Filling	56

Ten Highest Frequency Ranks Among Constructs for Researcher # 2

Rank	Food Choice Construct	Construct Frequency
1	Diabetes Knowledge (+)	352
2	Physiology (+)	242
3	Preference	218
4	Access (+)	127
5	Health Promotion	114
6	Food Quality (+)	101
7	Tradition (+)	81
8	Social Relationship (+)	65
9	Diabetes Knowledge (-)	63
10	Taste (+)	56

APPENDIX – D

Demographic Questionnaire

DEMOGRAPHIC INFORMATION: **Ref. No. _____**

Instructions: Please complete the following background information by filling in the blanks with words or numbers and where appropriate, encircle the best answer that describes your response.

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

Weight:_____ Height:_____

Gender: Male Female

Marital Status:
* Single (Never been married)
* Married (Excluding Separated) or Common Law
* Divorced/Separated
* Widowed

Family Origin:

Location of immediately related family/Relationship:

Type of transport used on a daily basis:

Date of last visit to physician:

Frequency of visits to any health service over the last 6 months:

Level of Education:
* Grade eight or less
* some high school
* completed high school
* some college training
* college certificate or diploma
* some university
* completed university
* post-graduate training
* Other (specify _____)
* no response

Language most frequently spoken at home:
* English
* French
* German
* Italian
* Ukrainian
* Other (specify _____)
* no response

Number of people living at your home, including yourself: /____/____/

Number of children under the age of 18 living at your home: /____/____/

Employment Status:
* Managerial/Professional
* Other White collar
* Blue collar
* Student
* Retired
* Home Maker
* Self employed
* Unemployed

Income category:
* under $12,000
* $12,000 to $24,999
* $25,000 to $49,999
* $50,000 to $74,999
* $75,000 and over

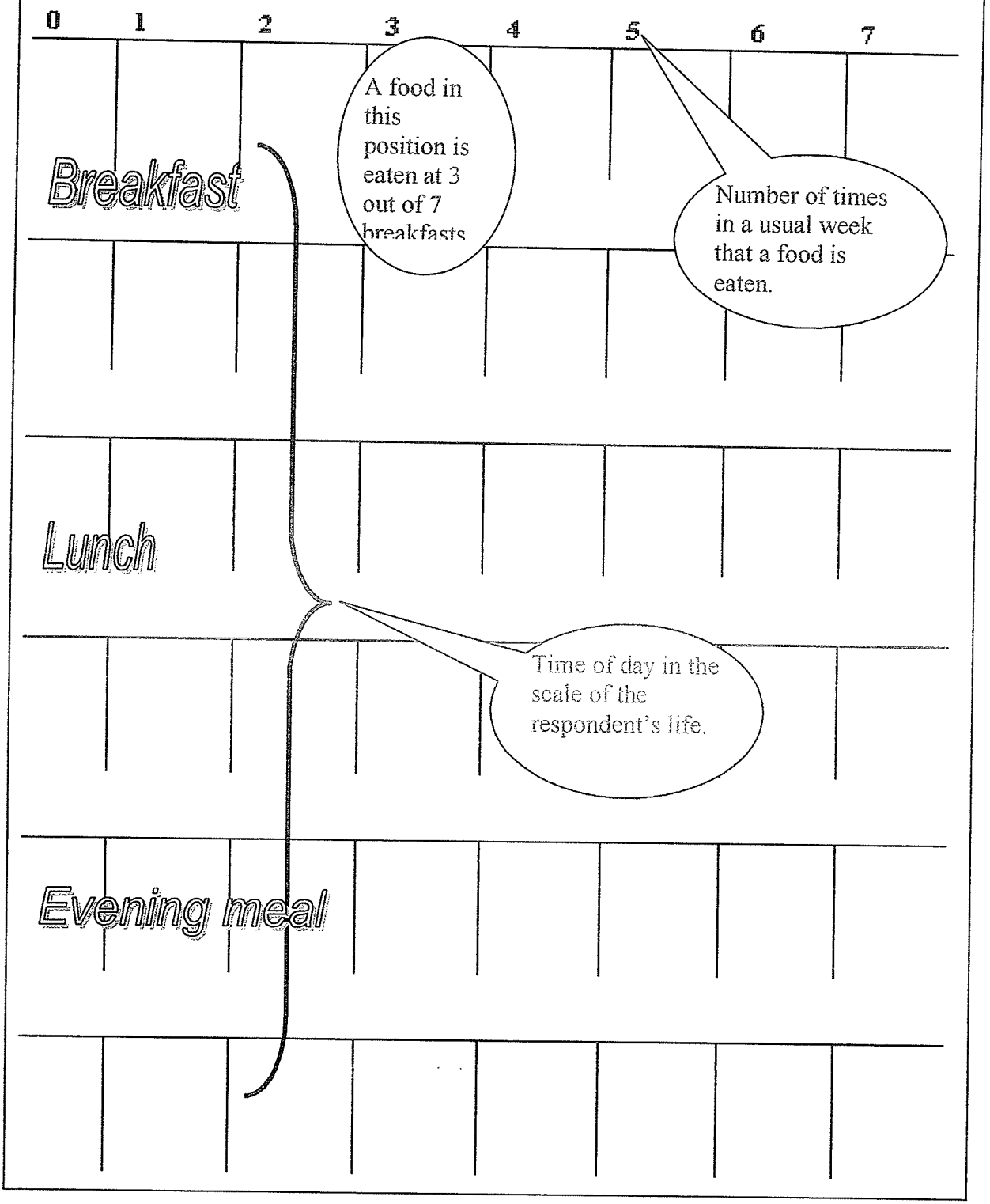
APPENDIX – E

Food Choice Map (FCM) – Generic

Food Choice Map

Respondent number .....

Interviewer ..... Date ..... Location .....



APPENDIX – F

Food Choice Map (FCM) Interview Guide

Food Choice Map Question Guide

FOOD FREQUENCY/CONSUMPTION:

1. What food do you eat most often?

2. When in the day do you usually eat this (mentioned) food?

3. Which meal(s) or snack(s) does this food usually belong to?

4. Which other foods do you usually eat at this meal or snack?

5. How often during a week do you eat these mentioned foods during this meal/snack - do you eat these foods more often, less often or the same number of times as the first one?

6. What other meals or snacks do you have during the day?

Repeat the next 2 questions for every meal and snack until the interviewed respondent agrees that this is the food pattern for one week.
For the mentioned foods ask why such foods are eaten.

7. What foods do you usually eat at this (newly mentioned) meal or snack?

8. How often during a week do you eat these mentioned foods during this meal or snack?

FOOD CHOICE/CONSUMPTION

9. What about the first food you mentioned, are there other foods that could take its place in that meal?

10. How often do you eat the(se) alternative food(s) - more often, less often, or as frequent as the food you first mentioned?

11. Are there alternative choices for each of the foods in their respective meals?

12. How often do you have these alternative foods - more often, less often, or as frequent as the food you first mentioned?

13. Why do you actually choose the first mentioned food more often than the alternative food(s) (taste, price, less effort, availability, etc.)?

14. The foods you eat most often are very important for you. Why?

15. Which meals or snacks do you eat alone or with others?

16. Who are the persons?

17. What relationship are the people to you? (specifying whether family members, friends, professional relationships, etc.)

18. How often do you eat this meal (snack) with these persons?

19. Do you share the money for the foods/meal? With whom/who contributes?

20. Who decides whether to buy cheap or expensive items in the shop/restaurant/vendor?

21. Who chooses which foods you eat?

22. How do you get your food?

23. Who purchases the food? Where?

24. On what occasions do you spend more money on food that usual? Which foods are these?

FOOD PREPARATION

22. Where is the meal prepared? (asking for every meal of the day)

23. Do you prepare meals alone or do you have help?

24. How often do you prepare meals each day?

25. Where do you buy your food?

26. Have you recently changed the amount or type of food(s) you eat? Why?

27. Are there any food(s) that you will add or delete from your usual diet? If so, what is that? Why?

28. Where do you get food information from?

DIABETES CONTROL/GENERAL HEALTH CHOICES

1. What information do you hear from DEC?

2. Do you use the information in your daily life?

3. Can you follow the nutrition recommendations you received at the DEC? If so, in what way? If not, why not?

4. Do you receive nutrition and health information from anyone else? If so, what do you hear?

5. Do you actually follow the(se) nutrition and health information you hear from others? If so, why is that?

6. In diabetes management, do you believe in any "food traditions" that may affect your blood sugar level? If so, what are they?

7. Do you follow the(se) "traditions" in your daily life? If so, in what way? How often? If not, why not?

8. Who tells you about the(se) "traditions"?
9. What relationship are the people to you? (specifying whether family members, friends, professional relationships, etc.)
10. Are some foods more important for you?
11. Should you be afraid of any foods?
12. Are there any physical activity do you usually do? If so, what type? How many times per week? Time of the day? Why?
13. Medicine?
14. Treatment?

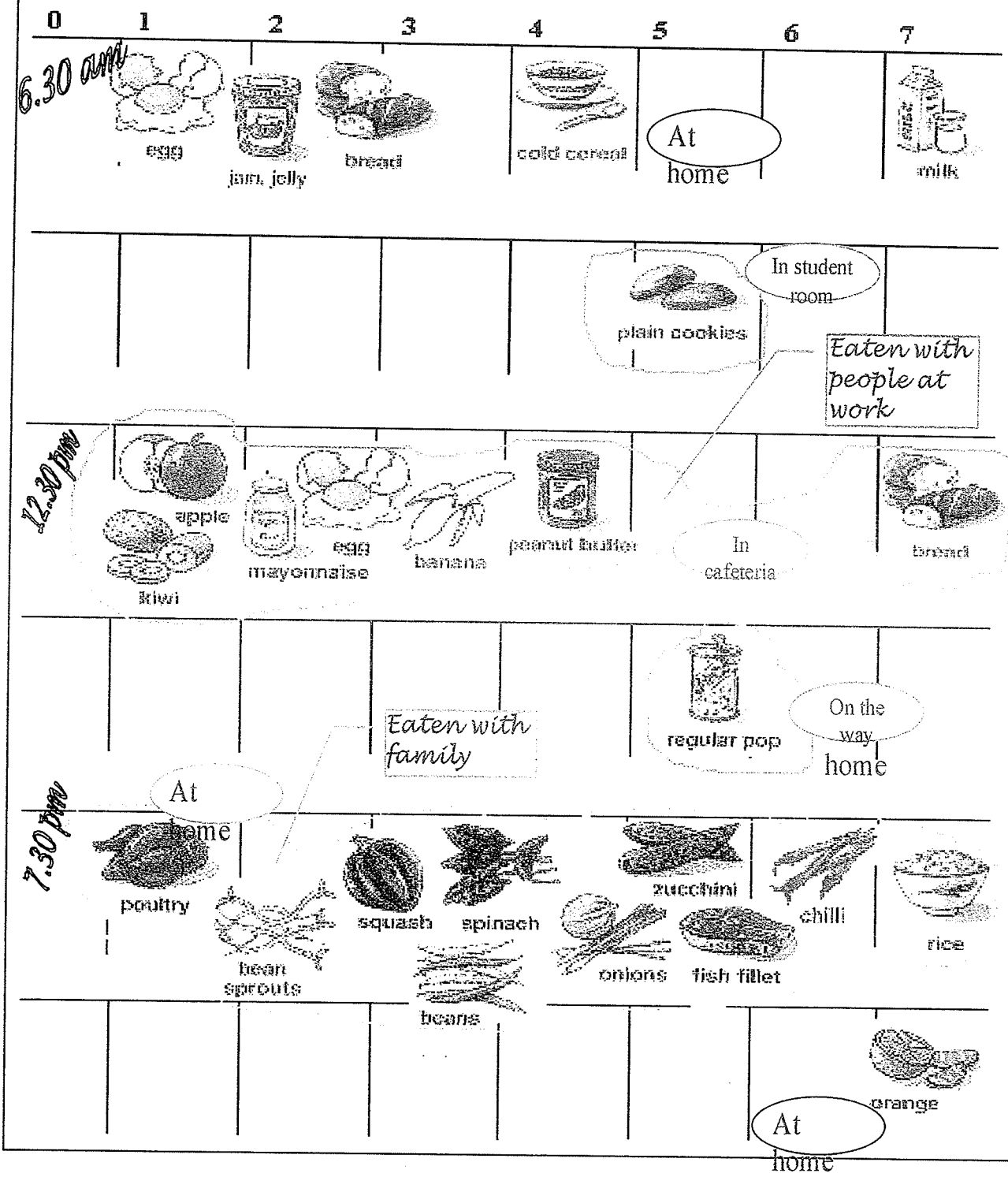
APPENDIX – G

Completed Food Choice Map (FCM)

Food Choice Map

Respondent number .....

Interviewer ..... Date ..... Location .....



APPENDIX – H

Construct Definition List

Construct/Definition	Application	Example
Access availability of food and the ability to acquire available food (Campbell, 1991)	food security, accessibility, availability, as well as service accessibility	*It's just what's there in the basket to eat. Sometimes there's apples, and bananas, sometimes there's oranges and then apples. So whatever is there like you know.*
Aversions avoidance of certain food items due to a belief system (correct or incorrect facts about food) (FCM working group, 2001)	classifying some foods to have properties of 'wet' or irritating' or 'poisonous' food restriction in expediting restoration to health	*I don't drink juices because it produces toxins in my blood* *Because even though if it's unsweetened it's ah... so has natural sugar and that brings up my blood sugars way up and ah... Even cutting on the orange juice will brought it down significantly*
Convenience use of convenient items such as: dried, frozen, tinned foods that can be used quickly (FCM working group, 2001)	fast foods ease in actual purchasing, preparation and consumption of foods (FCM working group, 2001)	*It's quick to cook when we come home ahm... we're tired. My husband works and never sits it's a hard job when one keeps be standing for hours cooking and this stuff you know. So we're both tired by the time we get home we get supper going to eat 6 - 7*
Cost/Price availability of food markets, quantity and quality of food present in food markets related to financial ability to acquire food that is available (Campbell, 1991)	limitations or restrictions to food and services due to finances abilities to command resources	*Well certainly every other day. Sometimes every day but ah it depends on…sometimes grapefruit are very expensive because the grapefruit here all come from either Florida or Texas.*
Diabetes Knowledge correct facts from Diabetes Education Centre that explain the prevention/ treatment of possible diabetes complications(FCM working group, 2001) information/advised received from Diabetes Education Centre (FCM working group, 2001)	a person's understanding of the risk factors for diabetes mellitus and the application of Canadian guidelines for healthy eating and lifestyle changes: *enjoy a variety of foods. *emphasize cereals, breads and other whole grain products, vegetables and fruit. *choose lower-fat dairy products, leaner meats and food prepared with little or no fat.	*It's just this low fat.* *Well, yeah I'd like the brochures where heart smart and the foods and what foods to eat belonging in it. Basically, like I guess you can almost eat anything if you don't eat much of it. Like even meat you know you got your meats got to be fairly lean so you got to trim them eh, so that's no problem. I don't take any milk or sugar or anything I drink coffee tea black I drink 2% milk and eat 2% cottage cheese what you have or bread whenever like ah lot of my baking at home was done with a Sucrel sugar replacement. I drink diet pop.* *Well, we are trying to eat balanced meals. I always eat vegetable and protein and starches at every meal. That's what my dietitian…*

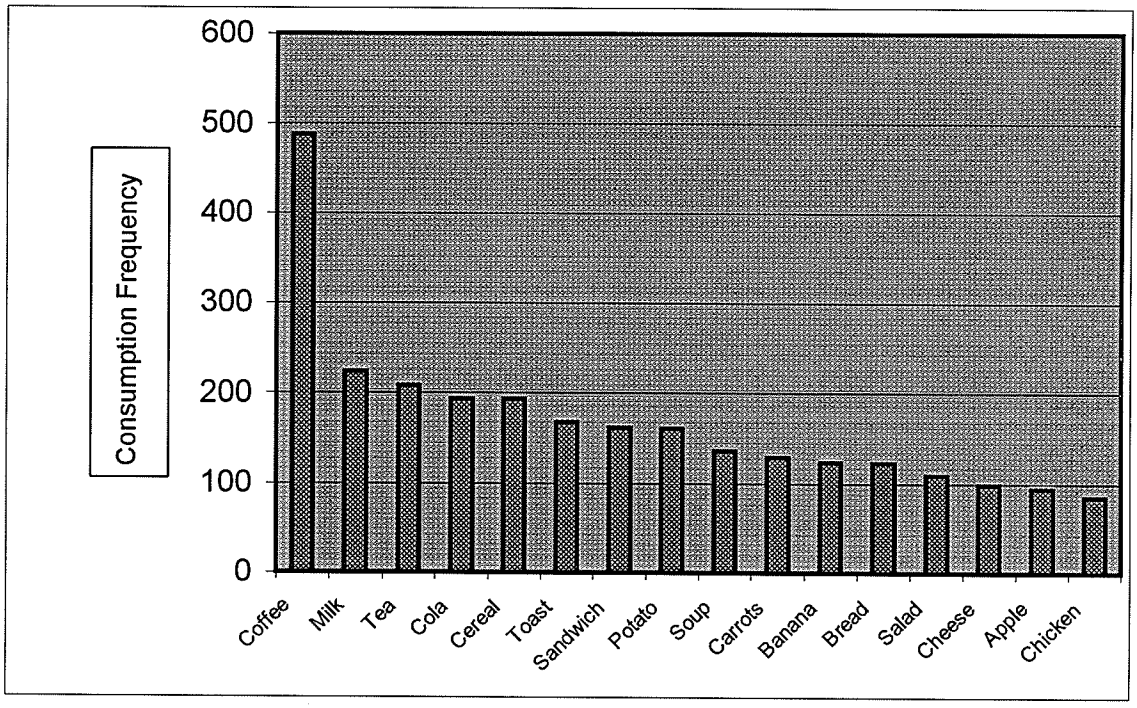
Construct/Definition	Application	Example
Diabetes Knowledge (continued)	*achieve and maintain a healthy body weight by enjoying regular activity and healthy eating. *limit salt, alcohol and caffeine.	*Who recommend this milk?* *The ... what do you call that? The endocri...,* *the guy that does the scopic.*
Emotion expressing a feeling towards an action, person, thought or object (FCM working group, 1996)	food may be used as a way of demonstrating mood and emotions (Counihan, 1999; Oliver & Wardle, 1999 & Oliver et al., 2000)	*Ahm…my way of dealing with it is to eat more. Ah…and it's like a punishment and a reward at the same time for me.* *I haven't figure it out why that is but whenever I get ahm very angry or frustrated, I will just sit down with a big meal or junk food*
Energy	foods which are believed to have special properties which can be imparted to those who eat them	*It helps me to have more energy and stamina*
Filling foods or drink regarded as being safe and or suitable for consumption when blood glucose level is a concern (FCM working group, 2001)	often low calorie, low sugar , easy to digest foods regarded suitable for weight loss (FCM working group, 2001)	*I realize that you know I start to realize that. So some days like I don't I don't have that snack. I can wait for supper out.*
Food Quality desired appearance, palatability, and wholesomeness of foods (FCM working group, 2001)	degree of perfection in shape, uniformity of size, leanness, texture, tenderness, color and maturity can be denoted by grade, brand, or condition	*A little bit of butter so it doesn't burn or margarine I guess, Becel margarine.* *Ah... it doesn't ahm... go bad as fast as lettuce fluid in a ref or mushrooms or peppers. It stays longer and same as broccoli raw broccoli.*
Habit something that a person do often or regularly (FCM working group, 2001)	doing the same thing (or activity) at the same time rather than doing or choosing new and different things	*Yeah. I like to have my coffee before I eat my breakfast. [Laugh...] I don't know, that's a habit.* *It just become habit for me and I'm eating it and I'm not really hungry.*
Health Promotion	*Seasonal adjustment of diet for health maintenance	**I drink hot tea because it is good for my health during this time of the year*
Medicinal/Curative	*Foods or herbs to counter the debilitating side effects of Western drugs	**That is the kind of herbs given by my aunt to cure... And she says garlic is very good for you, for some kind of some kind of sickness eh. You know things like that she says.*

Construct/Definition	Application	Example
Medicinal/Curative (continued)	*Suitability of foods consumed during or after illness to facilitate recovery from illness	**because it is good for you* *you have fever…*
Physiology physiological factors that affect intake (FCM working group, 1996)	a person's subjective probability judgment concerning some aspect (i.e. any physiological responses) of their world (Ajzen & Fishbein, 1980) adjusting food intake to suit body constitution	*Some days I'm hungry so I eat it.* *It changes off and on because milk tends to make me gassy.* *Because it keeps me regular.* *So, if I'm very hungry I have trouble falling back to sleep again but that's the only reason why I snack in the evening is so that I won't wake up so terribly hungry and that.*
Preference to choose a food or other activity over another designated food or other activity (Rozin, 1990)		*And tomato, I love those tomatoes!* *My favorite taco salad.*
Preventive	Regular use of herbs can prevent illness foods used for certain disease prevention (Chan, Ho, 1985)	**I drink herbal tea because of its medicinal value* *And it says there when you have it, it avoids cancer, you know more soya sauce it avoids all kinds of things there eh. If you eat soya sauce and ah... and ah, you're a... ah..your lungs your lungs water lungs you know it avoid your cancer. You know so all kinds of things in it.*
Resources household resources (money and time) and proportion of resources available for food acquisition	limitations or restrictions to food and services due to finances	*We don't have income, we can only afford to get these foods* *My husband and I are both on welfare we don't have enough* *I don't work, I have no fix income* *I'm retired now my money is limited*
Social Function foods used for certain social functions or gatherings (FCM, 2001)		*And the rest of the week I'm out having coffee and you know toast and coffee sort of things.*
Social Relationship positive or negative perception of social pressure to situations considered socially significant (Ajzen & Fishbein, 1980).	social consequence of actions social influence of affect toward behavior	*My wife thinks it's better. [Laugh...] When she goes out she drinks decaf and I drink regular.* *Because of my wife, I got high cholesterol too and my wife likes it and she has high cholesterol too so we use skimmed milk.*
Social Support the emotional, instrumental and	physical, emotional and spiritual support/assistance	*Ah, whenever Tammy is off. Ah, once or twice I guess maybe when the day she's off then maybe on a weekend we'll have it on*

Construct/Definition	Application	Example
Social Support (continued) financial aid that is obtained from one's social network (Berkman, 1984)	categories of: spouse/significant others, relatives, friends, siblings, co-workers, community and others	*Sunday or something or something special.*
Taste food acceptance or rejection on the basis of their oral sensory properties such as taste,smell, etc. (Rozin, 1990)	accepting primarily on the grounds of good tastes and those rejected distastes (Rozin & Vollmecke, 1986 & Rozin & Fallon, 1980) food choices and eating habits largely influenced by how food taste (Drewnowski, 2001)	*I'm the boss! I'm the boss! That's the one I'm , I got to satisfy my, my bud taste buds you know. That ah... I got to...it's me that's eating it. [laugh...]* *I thought it's because of the taste [laughing...]*
Traditional a custom or beliefs that have been practiced or held for a long time and are not expected to be changed (FCM working group, 2001)	beliefs that are referenced external to the individual foods obtained directly from the land, such as wild game, wild birds, local species of fish and wild berries (Gittelsohn et al., 1996 & Wein et al., 1989)	*I mean ah, I, I used to have soup all the time eh, but this is a kind of soup like ah... us Native people always used to have like we used to cut up our meat put carrots and vegetables in it. And ah, put flour in to thicken it a little bit eh. This is the way we used to make our soup before.* *It's the way we were... it's the way we used to do, Native people. Like the fish, the moose meat. That's the way the people used to eat all the time, with bannock, meat, ducks, fish, smoked fish, you know. This is our this is the way we eat Native people.*
Treat specially pleasant or enjoyable food/s for the individual and definitely not everyday foods (FCM working group, 2001)	to help relieve stress mostly restricted, limited or foods that are prohibited something they fancy cakes & pies figured prominently (Schutz et al., 1975)	*You know... nobody else is ah... No, it's what I fancy and ah... something I fancy I'll buy it you know that ah you know.* *That ah provided it's in my range of diet you know.*

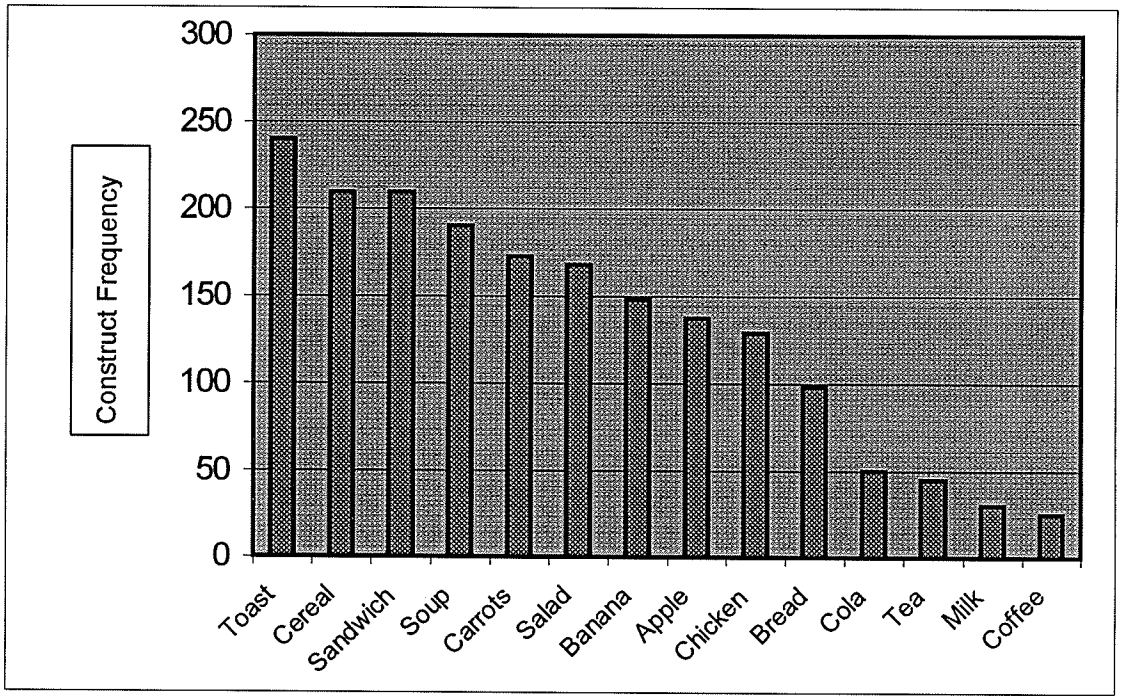
APPENDIX – I

Consumption Frequency and Common Foods Consumed by All Patients


Consumption Frequency
600
500
400
300
200
100
0
Coffee
Milk
Tea
Cola
Cereal
Toast
Sandwich
Potato
Soup
Carrots
Banana
Bread
Salad
Cheese
Apple
Chicken

APPENDIX – J

Construct Frequency and Common Foods Consumed by All Patients


Construct Frequency
300
250
200
150
100
50
0
Toast
Cereal
Sandwich
Soup
Carrots
Salad
Banana
Apple
Chicken
Bread
Cola
Tea
Milk
Coffee

APPENDIX – K

Construct Validation Table

INTERNAL VALIDATION #105

Construct	Example
Social support	My husband cooks it.
	know. He , he likes cooking that way because he gets chunks of
	Yeah, we together you know, sometimes ah... my husband does the wild cooking and I do the store cooking [laugh] you know. Every
	And he cooks the wild meat.
	know. He , he likes cooking that way because he gets chunks of
Tradition	as the... it's our...it's our... it's the way we eat.
	It's the way we were...
	it's the way we used to do, Native people.
	Like the fish, the moose meat.
	That's the way the people used to eat all the time, with bannock, meat, ducks, fish, smoked fish, you know.
	This is our this is the way we eat Native people.
	Native people eat.
	as the... it's our...it's our... it's the way we eat.
	It's the way we were...
	it's the way we used to do, Native people.
	Like the fish, the moose meat.
	That's the way the people used to eat all the time, with bannock, meat, ducks, fish, smoked fish, you know.
	This is our this is the way we eat Native people.
	Native people eat.
	as the... it's our...it's our... it's the way we eat.
	It's the way we were...
	it's the way we used to do, Native people.
	Like the fish, the moose meat.
	That's the way the people used to eat all the time, with bannock, meat, ducks, fish, smoked fish, you know.
	This is our this is the way we eat Native people.
	Native people eat.
	I'm talking to myself I'm not talking for anybody, just the way I eat.
	so this is the way we eat you know,
	So that is the way I...
	just the way I eat.
	Fish yeah, and the ducks, and the moose we have to go a long way
	so this is the way we eat you know,
	What I'll say is the way I want to cook it.
	So that is the way I... the only thing I don't do
	boil any fish and that's the way I do it moose meat. And I boil the
	Like the moose meat, and the... ducks, and ah... geese, fish you
	You know the way we are.
	You know, it's moose meat. It's from ah... we kill a moose eh and
	moose meat because ah, the moose eat everything wild a wild in
	the bush eh. He eats some stuff in the water, he eats little branches
	Fish yeah, and the ducks, and the moose we have to go a long way to kill it.
	Yeah! I mean ah, I, I used to have soup all the time eh, but this is a kind of soup like ah... us Native people always used to have like we
	used to cut up our meat put carrots and vegetables in it. And ah,
	put flour in to thicken it a little bit eh. This is the way we used to

Construct	Example
Tradition *(continued)*	make our soup before.
	Like the moose meat, and the... ducks, and ah... geese, fish you know
	Like we get those wild geese you know and
	You know, it's moose meat. It's from ah... we kill a moose eh and
	moose meat because ah, the moose eat everything wild a wild in
	boil any fish and that's the way I do it moose meat.
	You know the way we are.
	it's a... it's the way I like my food. I
	Yeah! I mean ah, I, I used to have soup all the time eh, but this is a
	kind of soup like ah... us Native people always used to have like we
	used to cut up our meat put carrots and vegetables in it. And ah,
	put flour in to thicken it a little bit eh. This is the way we used to make our soup before.
	These, these kinds of meats are... you know, it's not it's for us
	anyway it's not the kind of the meat that we have to eat everyday,
	know. You know the way we are.
Preference	I'd rather use this (pointing the map...) for breakfast to make toast.
	Yeah. It's a...you know boiled fish is better to have boiled potatoes for me anyway.
	And I like to eat because ah,
	don't like to put baked potato with it you know rather use my baked
	potato on roast fish you know baked fish I rather use but I can use
	I like to eat the fish with my with the gravy you
	Yeah. It's a...you know boiled fish is better to have boiled potatoes
	And I like to eat because ah,
	don't like to put baked potato with it you know rather use my baked
	potato on roast fish you know baked fish I rather use but I can use
	don't know just the way I feel like cooking when I do that eh. I don't
	doesn't match the baked potato with the boiled fish so I boiled the
	I like to put my baked potato with the fish roast when I roast my fish
	Better to have ah eat the fish
	appetite for the fish with the kind of fish I wanna like boiled fish eh.
	I have to I have to have a good appetite like I have to feel like I want to eat the fish. If I don't feel, if I have fish and I don't
	feel like eating fish eh I don't I don't very much.
	I don't usually cook vegetables when I have fish because I just want
	And when I have some meat moose meat I have I like to have two servings [laugh] you know. And ah sometimes yeah, I don't usually
	Because I like it.
	Yeah. I like to use, I like to use fresh garlic fresh onions instead of using the powder.
	I like it this way
	Yeah. I like to use, I like to use fresh garlic fresh onions instead of
	I like to cook my own fresh vegetables eh
	And so I like my fresh vegetables.
	I like carrots. I fried
	But I like it. It's not taste it's not very much taste eh. But
	because ah... I never used to like brown, wheat eh. I like it better over night.
	I like that I like to eat that

Construct	Example
Preference *(continued)*	Uhum. And I don't know I don't really care for a hamburgers too very much. Unless I have ah... a steak for my lunch for my dinner,
	I like to cook my own fresh vegetables eh
	I like to eat fresh vegetables eh
	And so I like my fresh vegetables.
	maybe. It depends what kind of a cookie and ... I like those ah I like those diet cookies diet eh.. know. I did like it very much, I don't know why
Access	we always have bannock biscuits so... you know all kinds of ah we have fish in the fall too. We have that every... all the time eh.
	But right now we don't eat as much fish as we used to before.
	Because ah... ah... water is kind of a ... polluted at the same time
	and the water is not ah comes up and down on a kind of hydro dam
	eh. It comes up and down and the water can down really down one
	time and destroyed all the fish, destroyed everything so we don't
	have any fishes good as we used to have before long time ago,
	10 years ago. 20-15 years ago. The water was so down you know
	and in the winter the water went down and the fish got... I don't
	know got squashed in the ice you know. That's at the Cross Lake,
	Fish yeah, and the ducks, and the moose we have to go a long way to kill it.
	Oh, sometimes if we have quite a few like we eat ah, we have boiled
	and we all eat 3x 2x a week it depends how much we have eh. You
	know. It depends what we have at home too eh. If we don't have any
	meat sometimes we live out of food eh and you only have the fish
	Yeah, whenever we have.
	Yup. Uhum. Yeah we always have fish for lunch you know. Like
	one day sometimes I don't even have to cook here because I have too much fish here at one time eh. But when I don't have any fish
	that's when I have chicken or beef because ah... but we don't cook
	You know not very many.
	Not very much.
	We don't eat as much ducks as ah moose meat and fish.
	And if we have fish we'll eat fish.
	We want to eat as much fish as we have fish eh. Because if the if
	if I get myself a one piece of fish eh I eat it all eh about this long.
	meat eh, you get chunks of ah stuff eh. It's a, it's a lot of work to do
	all these eh, I try and cook it as much as I can eh. But sometimes
	in the middle of the month sometimes or at the end of the month we hardly barely have anything but I always have the vegetables. That's
	when we start eating our fish there and ah...
	Like we get those wild geese you know and
	like this. We have some in the fall eh and
	and we have fish in the fall too.
	We have that every... all the time eh.
	You have it and make it ready
	moose meat if we have a moose meat if we have moose meat we
	can eat that when we don't want and run of short of stuff here you know
	And we always have these wild meats and fish.
	Like we get those wild geese you know and

Construct	Example
Access *(continued)*	We never have these in our stores.
	I never see them eh [laugh], like that mint,
	you know I never see them around.
	Whatever we see in the store eh.
	make a big pot of it. I put vegetables add a little vegetables and I put
	Sometimes I get mar... mar...marmalade. I don't get it very often
	but I get when I get it I take a little jar. Once in a while I eat it. I
	as I go. I just take it as I see it you know. If I see apple juice in the front here in the fridge I use it
Diabetes knowledge	I used to use lard but now I don't. It's too heavy.
	It's too... it's greasy. Not good according to my dietitian at DEC
	I used to use lots but now I don't.
	I think that's good for me because there's some ah there's some things there I bought for with herbs eh. All different kind of herbs.
	And I put that in a you can put it when you eat eh. But I cook it with
	I put it when I cook it in my pot. Instead of in my plate I put it in my
	cooking. It's good! You know and I think it helps.
	You know I tried to cook good, I tried to eat these kind
	It's healthy you know. My dietitian told me to eat that
	know. It comes in every so often. And I saw this thing on the book
	And we ordered this medical books like ah like the, the something
	now I read it you know, the more I'm gonna use it now!
	way I should. Like ah, like these kind of ah meals eh. Like soup
	But what I know is ah don't eat too much fat.
	Okay, that's the main thing I keep. To keep your diet down and ah...
	But what I know is ah don't eat too much fat.
	I force myself to eat it because I'm on a diet [laugh...].
	Eh, it's lighter.
	I take out all the skin because it's too much fat on it.
	I want to I just want to use it for my diet.
	I take out all the skin because it's too much fat on it.
	week I guess. Say once a week. I force myself to eat it because I'm on a diet [laugh...].
	eat healthy they said at DEC
	You know I tried to cook good, eat healthy. I tried to eat these kind
	Okay, that's the main thing I keep. To keep your diet down and ah...
Food quality	because it's dry eh.
	the... you don't want it happen like freezer burnt. You know, it's
	better to have fish fresh fish you know.
	Fresh fish, fresh meat, fresh thing.
	Yeah. I like to use, I like to use fresh garlic fresh onions instead of using the powder.
	together the fresh and the dry.
	know I put them together the fresh and the dry.
	I like to cook my own fresh vegetables eh
	time I use I don't really care for frozen vegetables.
	own fresh vegetables eh.
	And so I like my fresh vegetables.
	soya sauce too eh to color my soup eh.
	But now I want to make my soup ah, ah more liquid. More liquid.

Construct	Example
Food quality *(continued)*	soup you know. It's very watery [laughing...] just a it's just a like a
	broth eh. Like a broth or a consomme.
	time I use I don't really care for frozen vegetables.
Taste	to eat enjoy the flavor of the fish you know, only.
	to keep it long. It's gonna be taste different. Uhum. But I never tried
	And the flavor I don't want to loose the flavor of the moose.
	How can I put that now... It's a different flavor.
	It's not a flavor that beef has eh.
	Beef meat doesn't does not any does have hardly any flavor like the moose me
	There's more flavor in the
	And ah, there's not as much flavor in a cow in a beef than in moose meat.
	I don't usually cook vegetables when I have fish because I just want to eat enjoy the flavor of the fish you know, only. So I don't usually
	you kill the smell and sometimes you... the flavored you know the
	flavor is in goes in the meat and that. On everything you eat eh,
	It's the smell. The smell is good. And sometimes Because there's more flavor in the in the fresh vegetables.
	Because ah, it's the taste,
	never... I just started using garlic not very long ago. I, my thought it was very strong and you know the smell of it you wouldn't want to
	eat it. But I, I realize that ahm... the garlic is not as strong when
	you cook it you know as the smell [laugh...] you know. So it taste it
	taste better in your cooking when you put garlic. I put garlic on
	Because there's more flavor in the in the fresh vegetables.
	They are tastier.
	times and it's more it taste better when you have it overnight you
	It taste so good and it taste so it smells so good. You know, smell
	Uhum. I don't very well use juice because it's too sweet sour
	Uhum. I don't very well use juice because it's too sweet sour
	they're not sweet,
	not very sweet that's
Physiology	fish. You know you get so hungry
	and when you when I have fish I eat as much as I can eh until ah... until I cannot ah, you know. Well
	Yeah. When I eat beef and the chicken you know, it's not as a it doesn't keep you as long as you the moose meat keeps you or the
	fish. You know you get so hungry
	for you, that you think helps your blood sugar? I put also herbs, yeah. Spices and herbs.
	When it comes to the food that you eat, are there any special food for you, that you think helps your blood sugar? I put a little bit of her...spices you know.
	you eat soya sauce and ah... and ah, you're a... ah... your lungs
	I started that just recently after I had my sugar and since I am a
	for you, that you think helps your blood sugar? Ahm... like I say, like I say when I'm making my own soup, my own
	I put a little bit of her...spices you know.
	We get hungry so much eh and we
	get hungry so much with beef. I notice it since eh, my own.
	Yeah. When I eat beef and the chicken you know, it's not as a it

Construct	Example
Physiology *(continued)*	doesn't keep you as long as you the moose meat keeps you or the
	You know you get so hungry and when you when I have fish I
	eat as much as I can eh until ah...until I cannot ah, you know. Well
	They've nothing to chew,
	diabetic eh I start using. That's why, that's where I learn to cook
	very much chicken you know. We get hungry so much eh and we
	get hungry so much with beef. I notice it since eh, my own. This is
	Yeah. When I eat beef and the chicken you know, it's not as a it doesn't keep you as long as you the moose meat keeps you or the
	fish. You know you get so hungry and when you when I have fish I
	eat as much as I can eh until ah...until I cannot ah, you know. Well
	I don't use I don't..for me I don't eat very much rice. Because my teeth
	I don't have any teeth inside in front here now anymore.
	I want to you know. I'm gonna choke on my rice [laugh...]
	There's no I have no teeth and a
	when I suck my meat you know.
	very much chicken you know. We get hungry so much eh and we
	get hungry so much with beef. I notice it since eh, my own. This is
	Yeah. When I eat beef and the chicken you know, it's not as a it doesn't keep you as long as you the moose meat keeps you or the
	fish. You know you get so hungry and when you when I have fish I
	eat as much as I can eh until ah...until I cannot ah, you know. Well
	two little glasses of milk right away when i don't feel right eh.
	It was too heavy [laugh...] too. (brown bread)
	Since my diabetes, my diabetes I want to I want to try and eat the
Convenience	but these ones here they're all ready. They're all ready to be...
	here they're all ready to eat.
	Very easy!
	Very easy to prepare!
	Easy fixing it.
	I think that's the easiest thing to cook. Which one? Ref: Rice.
Aversion	because ah... I never used to like brown, wheat eh.
	I didn't like it.
Cost/Price	meat is very expensive.
	lean meats are too expensive for us to afford
	fresh fruits and veggies are very costly up there
	moose meats because chicken is costly
Resources	Sometimes we don't have ah, enough money to buy some meat here.
	we don't have enough money to buy some beef and pork
	Sometimes when I have when I have some eh I have money I buy a whole stuff, awhole bunch of meat you know.
	my pension is not enough to buy all these foods
	we are both on disability, it's hard to afford this supplements
Social relationship	There was this woman here, she's sick in a hospital eh.
	And I saw this thing there. And this woman is dying of cancer in a...
	doctor said that this woman she said, your wife she's got a lot of
	sicknesses, you know, right now she's got lots of sickness about 5
	her, she's got a liver... ah water in her lungs, heart failure, cancer,
	Yeah. That's why I'm talking I'm telling you about this woman. So
	I'm kind of worried about this woman eh.

Construct	Example
Social relationship *(continued)*	Kind of related my, my her husband was my cousin.
	so good you want to eat it eh. And it's... my girls like it. I always
	myself but when I cook for my kids or visitors eh, I want to cook the way they want it like ah like a fried meat eh. That's the way I cook the meat. Usually I cook it like that and when I don't cook meat I
	My girls, my granddaughters they cook rice at my place eh. They
	always use the soya sauce. They like rice.
	have hamburger but the kids I cook hamburger, I cook beef all the
Preventive	And? Ref: And it says there when you have it, it avoids cancer,
	you know more soya sauce it avoids all kinds of things there eh. If
	your lungs water lungs you know it avoid your cancer. You know so
	for some kind of some kind of sickness eh. You know things like
Habit	I don't know. I... I think it's a habit

APPENDIX – L

Manitoba Heart Health Food Frequency Questionnaire (FFQ)

THE MANITOBA HEART HEALTH PROJECT

MANITOBA HEART HEALTH PROJECT

NUTRITION SURVEY

Introduction

The University of Manitoba and Manitoba Health are conducting an important health study in the province. The questions on this form are about food and your health. This information will be used for planning programs in the province. Please take time to answer all questions carefully. This will ensure that the survey will be useful for improving the health of Manitobans.

When answering place an "X" to indicate your response..

eg. ⊗ Yes
○ No

Write numbers in the boxes provided filling all the boxes.

e.g. 0 3

Reference No. V1 □□□ (1 2 3 Cluster) V2 □□□□ (4 5 6 7 Sample) V3 □ (8 Group) V4 □□ (9 10 Interviewer)

MANITOBA HEALTH - UNIVERSITY OF MANITOBA - HEART AND STROKE FOUNDATION OF MANITOBA - HEALTH AND WELFARE CANADA

The questions below are about:
- the **kinds** of foods and beverages you eat and drink regularly and
- the **amounts** of foods and beverages you eat and drink regularly.

Complete the chart on the next pages, thinking back over the past year. Include everything you eat and drink at home and away from home.

For every food, mark Yes or No.

If Yes:
- write number of times
- mark Day or Week or Month
- mark one of the three serving sizes.

Here are some examples showing how to complete the chart...

Bob drinks homo milk three times a day - about 1 cup each time.
This is how he would show that on the chart.

		Do you have this food or beverage at least once a month?	About how many *times* per day or week or month?		About how much do you have *each tir*		
2.	Homo (whole) milk and beverages made with it	⊗Yes → ○No	0 3	⊗Day ○Week ○Month	⊗ 1 cup	○ more than 1 cup	○ less tha 1 cup

Sue eats shreddies for breakfast five times a week, 3/4 cup each time.
She would record her cereal this way.

14.	Bran Flakes, Corn Bran, Muffets, Shredded Wheat, Shreddies, Weetabix	⊗Yes → ○No	0 5	○Day ⊗Week ○Month	⊗ 3/4 cup	○ more than 3/4 cup	○ less th 3/4 cu

	Do you have this food or beverage at least once a month?	About how many *times* per day or week or month?		About how much do you have *each time*?		
Bob eats steak once a week, 8 ounces each time. *He would show that on the food chart like this.*						
25. Roast beef and steak	⊗Yes → ○No	0 1	○Day ⊗Week ○Month	○ 4 ounces	⊗ more than 4 ounces	○ less than 4 ounces
Sue eats spaghetti and meatballs once a month, 1 1/2 cups each time. *She would show that on the chart like this.*						
44. Spaghetti, lasagna, other pasta with meat-tomato sauce	⊗Yes → ○No	0 1	○Day ○Week ⊗Month	○ 2 cups	○ more than 2 cups	⊗ less than 2cups
Bob eats green peas 2 times a week, 1/2 cup each time. *He would record his green peas like this.*						
56. Green peas	⊗Yes → ○No	0 2	○Day ⊗Week ○Month	⊗ 1/2 cup	○ more than 1/2 cup	○ less than 1/2 cup
Sue drinks tomato juice twice a week, 1/2 cup each time. *This is how she would show that on the chart.*						
74. Tomato, mixed vegetable juices	⊗Yes → ○No	0 2	○Day ⊗Week ○Month	⊗ 1/2 cup	○ 1 cup	○ more than 1 cup
Bob drinks tomato juice once every 3 or 4 months. *He would show that on the chart like this.*						
74. Tomato, mixed vegetable juices	○Yes → ⊗No		○Day ○Week ○Month	○ 1/2 cup	○ 1 cup	○ more than 1 cup

Nutrition

Nutrition

Start Here

	Do you have this food or beverage at least once a month?	About how many *times* per day or week or month?		About how much do you have *each time*?		
White or Chocolate Milk to Drink						
1. 2% milk and beverages made with it	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 cup	○ more than 1 cup	○ less than 1 cup
2. Homo (whole) milk and beverages made with it	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 cup	○ more than 1 cup	○ less than 1 cup
3. 1% milk and beverages made with it	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 cup	○ more than 1 cup	○ less than 1 cup
4. Skim milk and beverages made with it	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 cup	○ more than 1 cup	○ less than 1 cup
5. Milkshakes	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ small	○ regular	○ large
Cheese, Yogurt and Eggs						
6. Hard cheeses such as cheddar	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 inch cube	○ more than 1 inch cube	○ less than 1 inch cube
7. Processed cheese slices (including on sandwiches and hamburgers)	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 slice	○ 2 slices	○ less than 2 slices
8. Cottage Cheese	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1/2 cup	○ more than 1/2 cup	○ less than 1/2 cup
9. Cheese spreads	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 tbsp.	○ more than 1 tbsp.	○ less than 1 tbsp.
10. Yogurt	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ small container	○ 1/2 cup	○ more than 1/2 cup
11. Eggs	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 egg	○ 2 eggs	○ 3 or more eggs

Nutrition

	Do you have this food or beverage at least once a month?	About how many *times* per day or week or month?		About how much do you have *each ti*		
Breakfast cereals						
12. Oatmeal porridge, oat bran	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 3/4 cup	○ more than 3/4 cup	○ less th 3/4 c
13. All-bran, 100% Bran, Fibre-One, Fibre Plus Bran Buds, Fibre Up, Fruit and Fibre	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 3/4 cup	○ more than 3/4 cup	○ less th 3/4 c
14. Bran Flakes, Corn Bran, Muffets, Shredded Wheat Shreddies, Weetabix	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 3/4 cup	○ more than 3/4 cup	○ less th 3/4 c
15. Any other cooked or dry cereal such as Cream of Wheat, Corn Flakes, Rice Krispies	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 3/4 cup	○ more than 3/4 cup	○ less t 3/4 c

16. If you eat cereal, do you usually add sugar? ○Yes ○No

17. Which ONE of the following do you use most often on your cereal?

○Cream/Half & Half ○Homo (whole) milk ○2% milk ○1% milk ○Skim m

Nutrition

	Do you have this food or beverage at least once a month?	About how many *times* per day or week or month?		About how much do you have *each time*?		
Bread, Rolls and Muffins						
18. Whole wheat or light rye bread and rolls	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 1-2 slices	○ 3-4 slices	○ 5 or more slices
19. Dark rye, pumpernickel, fibre-enriched bread and rolls	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 1-2 slices	○ 3-4 slices	○ 5 or more slices
20. White, Italian, French, egg, raisin bread and rolls	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 1-2 slices	○ 3-4 slices	○ 5 or more slices
21. Bran or corn muffins	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 1 muffin	○ 2 muffins	○ 3 or more muffins
22. Any other muffins such as blueberry, plain, chocolate chip	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 1 muffin	○ 2 muffins	○ 3 or more muffins
23. Bannock	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 1 biscuit size	○ 2 biscuit size	○ 3 or more biscuit size

	Always	Usually	Sometimes	Rarely,Never
24. **If you eat bannock,do you...**				
– fry it	○	○	○	○
– bake it	○	○	○	○
25. **If you eat bread or bannock do you add ...**				
– butter, margarine or lard	○	○	○	○
– mayonnaise, salad dressing or cheese spread	○	○	○	○
– peanut butter	○	○	○	○
– jelly, jam, honey or other sweet spread	○	○	○	○
26. **If you eat muffins, do you add**				
– butter, margarine or cream cheese	○	○	○	○
– mayonnaise, salad dressing or cheese spread	○	○	○	○
– peanut butter	○	○	○	○
– jelly, jam, honey or other sweet spread	○	○	○	○

Nutrition

	Do you have this food or beverage at least once a month?	About how many *times* per day or week or month?		About how much do you have *each tim*		
Meat, Poultry and Fish						
27. Roast beef and steak	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 4 ounces	○ more than 4 ounces	○ less tha 4 ounce
28. Roast pork and pork chops	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 4 ounces	○ more than 4 ounces	○ less tha 4 ounce
29. Liver, any type	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 4 ounces	○ more than 4 ounces	○ less tha 4 ounce
30. Fried chicken, nuggets, chicken sandwiches	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 2 pieces/ 6 nuggets/ 1 s'wich	○ 4 pieces/ 9 nuggets/ 2 s'wich	○ more th 4 piece 9 nugge 2 s'wic
31. Barbecued chicken	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ quarter chicken	○ half chicken	○ 2 piece or slice
32. Any other chicken, turkey or other poultry	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 1-2 slices	○ 3-4 slices	○ 5 or mo slices
33. Fried fish, fried fish sandwiches	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 1 piece/ sandwich	○ 2 pieces/ sandwich	○ 3 or more pi sandwich
34. Any other fish, canned, fresh or frozen, such as tuna	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ 1 piece/ 1/4 cup	○ 2 pieces/ 1/2 cup	○ 3 or more pi 3/4 cup
35. Hamburgers and cheeseburgers	○Yes → ○No	⌊⌊	○Day ○Week ○Month	○ single pattie	○ double pattie	○ more th 3 singl or 2 dou pattie

	Always	Usually	Sometimes	Rarely,Nev
36. If you eat meat or chicken do you add gravy?	○	○	○	○
37. If you eat meat, do you eat the fat on it?	○	○	○	○
38. If you eat chicken do you eat the skin?	○	○	○	○
39. If you eat fish do you have tartar sauce or mayonnaise with it?	○	○	○	○

	Do you have this food or beverage at least once a month?	About how many *times per day or week or month?*		About how much do you have *each time?*		
40. Wieners, hot dogs	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1 regular	○ 1 large/ 2 regular	○ more than 1 large/2 regular
41. Bacon	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1-2 slices	○ 3-4 slices	○ 5 or more slices
42. Sausage	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1/2 links	○ 3-4 links	○ 1-2 large sausages
43. Cold cuts, luncheon meats such as bologna, salami, chicken loaf, ham	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1-2 slices	○ 3-4 slices	○ 5 or more slices
Other Meals						
44. Meat and chicken pies	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1 slice/ small pie	○ 2 slices/ small pies	○ 3 or more slices/sm pies
45. Meat and fish stews	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1 cup	○ more than 1 cup	○ less than 1 cup
46. Spaghetti, lasagna, other pasta with meat- tomato sauce	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 2 cups	○ more than 2 cups	○ less than 2 cups
47. Macaroni and cheese, other pasta dishes with cheese	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 2 cups	○ more than 2 cups	○ less than 2 cups
48. Pizza	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1-2 slices	○ 3-4 slices	○ 5 or more slices
49. Any other mixed dishes made with ground meat, fish or chicken	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1 cup	○ more than 1 cup	○ less than 1 cup
50. Any other pasta, such as noodles	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1 cup	○ more than 1 cup	○ less than 1 cup
51. Perogies	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 4-6	○ more than 4-6	○ less than 4-6
52. Rice, any type	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1 cup	○ more than 1 cup	○ less than 1 cup

	Do you have this food or beverage at least once a month?	About how many *times per day or week or month?*		About how much do you have *eac*		
Vegetables						
53. French fries, home fries, pan fried potatoes	○Yes → ○No	☐☐	○Day ○Week ○Month	○ Regular fries	○ large fries	○ 1
54. Any other potatoes - baked, boiled, salad	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1 cup	○ more than 1 cup	○ less 1
55. Broccoli	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1/2 cup	○ more than 1/2 cup	○ less 1/
56. Carrots, raw and cooked	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1/2 cup	○ more than 1/2 cup	○ less 1/
57. Corn	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1/2 cup/ small cob	○ more than 1/2 cup	○ less 1/
58. Green peas	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1/2 cup	○ more than 1/2 cup	○ less 1/
59. Green beans, string beans, yellow beans	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1/2 cup	○ more than 1/2 cup	○ les 1/
60. Any other beans, peas, lentils - lima, navy baked, pork and beans	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1/2 cup	○ more than 1/2 cup	○ les 1/
61. Squash, all types	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1/2 cup	○ more than 1/2 cup	○ les 1/
62. Salad - combination lettuce and tomato	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1 cup	○ more than 1/2 cup	○ les 1/
63. Any other salads such as coleslaw, carrot, bean, spinach	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1 cup	○ more than 1 cup	○ les 1
64. Any other vegetables such as cabbage brussel sprouts	○Yes → ○No	☐☐	○Day ○Week ○Month	○ 1/2 cup	○ more than 1/2 cup	○ les 1/

	Always	Usually	Sometimes	Rarely,Never
65. If you eat potatoes or rice do you add butter, margarine, gravy or sour cream?	○	○	○	○
66. If you eat vegetables, do you add butter, margarine, cheese or other sauce	○	○	○	○
67. If you eat salads, do you add – diet, low fat, low calorie dressings or mayonnaise, – or regular mayonnaise, salad dressing, or salad oil?	○ ○	○ ○	○ ○	○ ○

	Do you have this food or beverage at least once a month?	About how many *times* per day or week or month?		About how much do you have *each time?*		
Fruit						
68. Apples, applesauce	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 apple/ 1/2 cup	○ 2 apples/ 1 cup	○ more than 2 apples/1cup
69. Bananas	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 banana	○ 2 bananas	○ 3 or more bananas
70. Oranges, nectarines	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 orange/ nectarine	○ 2 oranges nectarines	○ 3 or more oranges/ nectarines
71. Pears, peaches fresh or canned	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 fruit/ 1/2 cup	○ 2 fruit 1 cup	○ more than 2 fruit/1 cup
72. Raisins, prunes, other dried fruit	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1/2 cup	○ 1 cup	○ more than 1 cup
73. Any other fruit, including berries and fruit cocktail and salad	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 fruit/ 1/2 cup	○ 2 fruit/ 1 cup	○ more than 2 fruit/1 cup

	Do you have this food or beverage at least once a month?	About how many *times* per day or week or month?		About how much do you have *each time?*		
Beverages						
74. Orange juice	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1/2 cup	○ 1 cup	○ more than 1 cup
75. Apple, other citrus juices	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1/2 cup	○ 1 cup	○ more than 1 cup
76. Tomato, mixed vegetable juices	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1/2 cup	○ 1 cup	○ more than 1 cup
77. Fruit drinks such as Tang, Kool-Aid	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1/2 cup	○ 1 cup	○ more than 1 cup
78. Regular soft drinks not diet	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ small/ 1 can	○ medium	○ large
79. Coffee	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 small cup	○ 2 small cups	○ 3 or more small cups
80. Tea	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 small cup	○ 2 small cups	○ 3 or more small cups

81. If you drink coffee... -do you add sugar? ○Yes ○No

82. - which ONE of the following do you use most often?

○No milk or cream ○Cream or evaporated whole milk ○Homo(whole) milk or evaporated 2% milk ○2% milk ○1% milk ○Skim milk

83. If you drink tea... -do you add sugar? ○Yes ○No

84. - which ONE of the following do you use most often?

○No milk or cream ○Cream or evaporated whole milk ○Homo (whole) milk evaporated 2% milk ○2% milk ○1% milk ○Skim milk

	Do you have this food or beverage at least once a month?	About how many *times* per day or week or month?		About how much do you have *each time*?		
Desserts and Snacks						
85. Ice cream, ice milk, sherbet	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 scoop	○ 2 scoops	○ 3 or more scoops
86. Cake	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 slice	○ 2 slices	○ 3 or more slices
87. Pie	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1 slice	○ 2 slices	○ 3 or more slices
88. Cookies, crackers	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1-5	○ 5-10	○ More than 10
89. Doughnut, danish, croissant	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1	○ 2	○ 3 or more
90. Potato chips	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ small bag	○ more than small bag	○ less than small bag
91. Popcorn	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 2 cups	○ more than 2 cups	○ less than 2 cups
92. Peanuts, other nuts, seeds	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 1/2 cup	○ more than 1/2 cup	○ less than 1/2 cup
93. Chocolate	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ regular bar	○ large bar	○ 2 pieces

94. **Any other food or beverage you have at least once a month?**
If so, please give the *name, number of times eaten,* and *amounts each time.*

_____	⌊⌋⌊⌋ ○Day ○Week ○Month	_____
_____	⌊⌋⌊⌋ ○Day ○Week ○Month	_____
_____	⌊⌋⌊⌋ ○Day ○Week ○Month	_____

	Do you use them at least once a month	About how many *capsules or tablets* per day or week or month		How much calcium in each capsule or tablet?		
95. Calcium supplements	○Yes → ○No	⌊⌋⌊⌋	○Day ○Week ○Month	○ 50-300 mg	○ 301 - 900 mg	○ More than 900 mg

96. Are you presently following a special diet?

○Yes ○No

97. Was this diet prescribed by a doctor or any other person who gives treatments or advice?

○Yes ○No

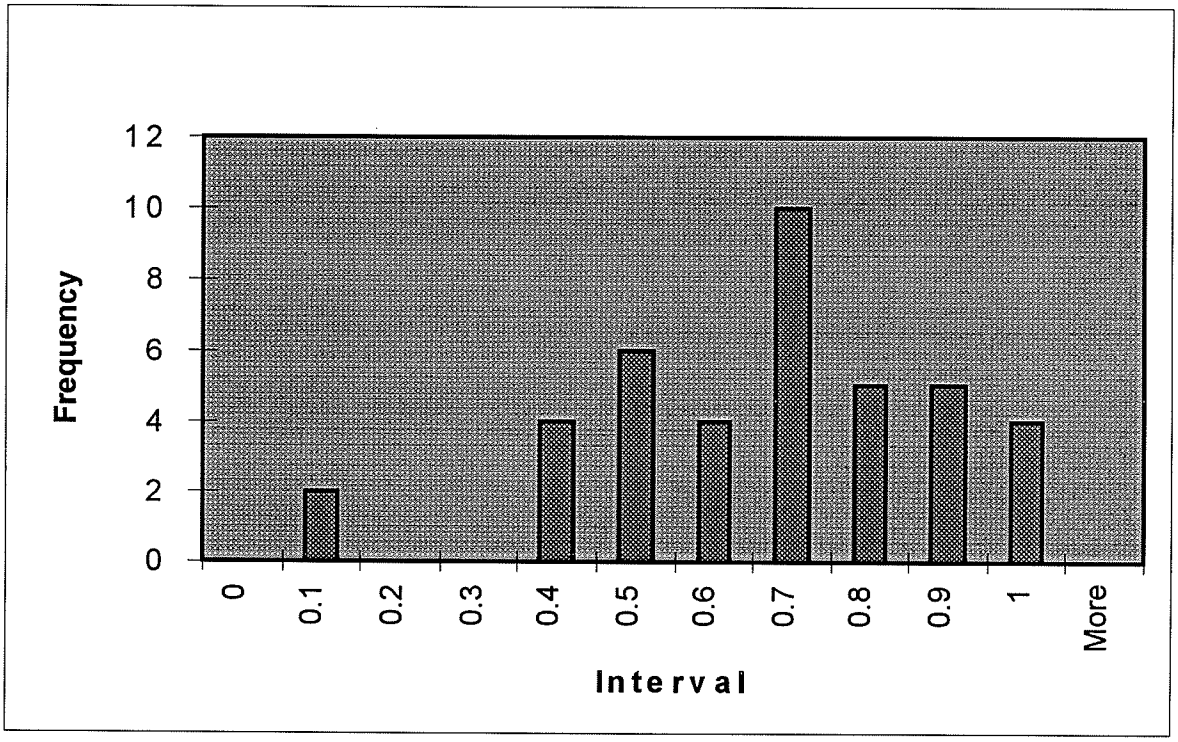
- Who?

○Doctor
○Nutritionist or dietitian
○Other _____ (specify)

Please use the space below for any comments which you would like to add.

APPENDIX – M

Distribution of the Correlation Coefficients from All 40 Patients


12
10
8
6
4
2
0
Frequency
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
More
Interval

APPENDIX – N

Food Consumption Frequencies and Construct Frequencies for 40 Patients

Food Consumption Frequencies and Construct Frequencies for 40 Patients

Food Items	Freq	ACC+	ACC-	AVN	CNV+	CNV-	C/P+	C/P-	DMK+	DMK-	EM
Cereal	192.5	4	3	6	4	2	1	0	74	3	0
Toast	167.5	7	1	5	9	0	2	0	73	2	0
Potato	160.5	6	0	3	1	0	0	1	18	4	0
Sandwich	155	24	4	8	9	0	4	8	39	3	0
Soup	136	10	0	0	10	0	0	0	42	0	0
Carrots	130	16	0	0	4	0	0	1	41	7	0
Banana	123.5	18	3	4	1	0	5	0	27	2	0
Bread	123	5	1	2	1	0	0	0	32	0	0
Salad	108.5	17	4	5	5	0	7	5	35	0	0
Cheese	97.5	5	0	0	2	0	1	0	32	2	0
Apple	94	11	3	3	0	0	1	0	21	10	0
Chicken	85	5	0	4	4	0	2	3	37	0	0
Crackers	83.5	5	0	0	0	0	0	0	20	2	0
Orange	67.5	10	2	0	0	0	2	0	25	1	0
Grapefruit	56.5	7	2	1	0	0	6	4	19	0	0
Peas	53.5	3	0	0	3	0	0	0	7	0	0
Cauliflower	52	6	0	0	4	0	0	1	11	0	0
Broccoli	51	7	0	0	4	0	0	1	12	0	0
Fish	49	40	7	4	3	0	1	4	8	0	0
Pasta	44	10	2	4	3	0	1	0	9	3	0
Tomato	42	6	0	0	1	0	0	0	16	0	0
Bannock	42	4	0	0	4	0	0	0	4	0	0
Chips	38.5	2	0	0	0	0	0	0	0	4	5
Eggs	38	0	0	0	2	0	0	0	8	9	0
Beans	37.5	6	0	0	4	0	0	0	6	2	0
Rice	37.5	2	3	1	0	0	0	0	9	2	0
Celery	36	4	0	0	4	0	0	0	14	1	0
Roast/Steak	35	0	0	4	1	0	0	2	17	5	0
Muffins	33.5	2	0	5	1	0	0	0	12	1	0
Cottage Cheese	32	0	0	0	0	0	0	0	17	0	0
Peppers	31	6	0	0	3	0	0	1	1	0	0
Burger	30.5	3	2	6	5	0	0	0	3	3	0
Mixed Vegetables	26	0	0	0	1	0	0	0	5	1	0
Cookies	26	2	0	0	0	0	0	0	7	9	0
Corn	26	0	1	0	0	0	0	0	8	4	0
Yogurt	25	0	0	0	0	0	0	0	16	0	0
Bacon	24	0	0	0	0	0	1	0	4	9	0
Fruit Cocktail	21.5	4	3	0	0	0	1	0	1	4	0
Beef	21.5	7	0	2	1	0	5	2	6	0	0
Cream Cheese	20	1	1	5	0	0	0	0	15	2	0
Grapes	19	0	0	0	0	0	0	0	2	4	0
Mushroom	19	1	0	0	0	0	0	1	0	0	0
Pork Chop	17.5	0	0	6	0	0	0	2	15	3	0
Cucumber	16	4	0	2	1	0	1	1	9	0	0
Green Onions	15	3	0	0	3	0	0	0	1	0	0
Sausage	14	5	0	0	0	0	0	0	4	0	0
Strawberry	13	6	4	2	0	0	0	0	3	4	0
Ice cream	11.5	3	0	0	0	0	0	0	1	1	0
Pear	11	0	1	0	0	0	0	0	1	1	0
Moose Meat	11	11	2	0	0	0	0	0	6	0	0
Fries	11	2	0	1	4	0	0	1	3	1	0
Cantaloupe	9	1	0	0	1	0	0	0	1	0	0
Biscuits	9	0	0	0	0	0	0	0	5	0	0
Ham	7.5	7	0	0	0	0	0	0	4	0	0
Asparagus	7	1	0	0	0	0	0	0	5	0	0
Ground Meat	7	0	0	0	0	0	0	2	4	0	0

Food Consumption Frequencies and Construct Frequencies for 40 Patients *(continued)*

Food Items	Freq	EB+	EB-	FIL	FQ+	FQ-	HBT	HP	MC	PHY+	PHY-
Cereal	192.5	0	0	2	2	0	0	0	0	45	5
Toast	167.5	0	0	16	5	0	3	0	0	42	6
Potato	160.5	0	0	1	0	0	0	0	0	0	1
Sandwich	155	0	0	5	3	2	2	4	0	36	8
Soup	136	0	0	4	4	0	1	11	0	38	6
Carrots	130	0	0	3	5	0	2	15	0	20	4
Banana	123.5	0	0	7	14	2	5	7	0	16	3
Bread	123	0	0	4	10	0	2	4	0	6	1
Salad	108.5	0	0	2	1	0	1	1	0	14	0
Cheese	97.5	0	0	0	1	0	1	10	0	23	1
Apple	94	0	0	1	19	0	1	8	0	13	5
Chicken	85	0	0	0	10	1	0	2	0	5	6
Crackers	83.5	0	0	9	0	0	1	4	0	31	0
Orange	67.5	0	0	1	1	1	0	4	0	8	0
Grapefruit	56.5	0	0	0	12	2	0	1	0	3	0
Peas	53.5	0	0	1	1	0	2	1	0	3	0
Cauliflower	52	0	0	3	6	0	2	4	0	7	0
Broccoli	51	0	0	3	7	0	2	4	0	7	0
Fish	49	0	0	0	6	0	0	3	0	7	3
Pasta	44	0	0	1	1	0	0	0	0	0	5
Tomato	42	0	0	2	5	0	1	9	0	10	0
Bannock	42	0	0	0	1	0	0	0	0	0	0
Chips	38.5	0	0	0	0	0	0	0	0	7	0
Eggs	38	0	0	0	0	0	0	2	0	8	4
Beans	37.5	0	0	2	4	0	1	4	0	8	1
Rice	37.5	0	0	1	0	0	0	1	0	2	3
Celery	36	0	0	2	4	0	1	8	0	8	0
Roast/Steak	35	0	0	0	7	2	1	1	0	1	10
Muffins	33.5	0	0	7	1	0	3	7	0	14	3
Cottage Cheese	32	0	0	2	0	0	1	0	0	1	0
Peppers	31	0	0	0	2	0	1	0	0	3	0
Burger	30.5	0	0	0	2	0	0	0	0	9	2
Mixed Vegetables	26	0	0	1	0	0	0	0	0	1	0
Cookies	26	0	0	6	0	0	0	0	0	2	0
Corn	26	0	0	0	0	0	1	0	0	2	1
Yogurt	25	0	0	1	0	0	0	2	0	14	0
Bacon	24	0	0	0	3	0	0	1	0	4	4
Fruit Cocktail	21.5	0	0	0	0	0	0	0	0	0	2
Beef	21.5	0	0	0	6	0	0	0	0	0	4
Cream Cheese	20	0	0	0	0	0	2	3	0	7	3
Grapes	19	0	0	0	0	0	0	0	0	0	0
Mushroom	19	0	0	1	0	0	0	0	0	0	0
Pork Chop	17.5	0	0	0	0	0	0	1	0	2	0
Cucumber	16	0	0	2	3	0	0	7	0	6	3
Green Onions	15	0	0	0	1	0	1	0	0	2	0
Sausage	14	0	0	0	0	0	0	0	0	3	0
Strawberry	13	0	0	0	3	0	0	4	0	4	0
Ice cream	11.5	1	0	2	0	0	4	0	0	1	0
Pear	11	0	0	1	0	1	0	0	0	0	0
Moose Meat	11	1	0	0	0	0	0	3	1	5	0
Fries	11	0	0	0	0	0	0	1	0	3	0
Cantaloupe	9	0	0	0	0	0	0	0	0	0	0
Biscuits	9	0	0	0	0	0	1	3	0	3	0
Ham	7.5	0	0	0	0	0	0	0	0	0	0
Asparagus	7	0	0	0	1	0	0	3	0	1	0
Ground Meat	7	0	1	0	1	0	0	0	0	0	0

Food Consumption Frequencies and Construct Frequencies for 40 Patients *(continued)*

Food Items	Freq	PRF	PRV	RES+	RES-	SOC+	SOC-	SR+	SR-	SS+	SS-
Cereal	192.5	12	1	0	1	0	0	1	1	6	0
Toast	167.5	28	1	0	0	0	0	1	0	4	0
Potato	160.5	23	0	0	0	0	0	9	0	3	0
Sandwich	155	23	0	0	1	1	0	7	4	2	0
Soup	136	26	0	0	0	0	0	14	0	0	0
Carrots	130	28	0	0	0	0	0	6	0	4	0
Banana	123.5	30	0	0	0	0	0	1	0	0	0
Bread	123	13	0	0	0	0	0	1	0	1	0
Salad	108.5	34	0	1	1	1	0	16	0	0	0
Cheese	97.5	15	1	0	0	0	0	2	0	0	0
Apple	94	29	0	0	0	0	0	5	0	0	0
Chicken	85	22	0	0	1	0	0	13	0	1	0
Crackers	83.5	2	0	0	0	0	0	2	0	1	0
Orange	67.5	16	0	0	0	0	0	0	0	0	0
Grapefruit	56.5	19	0	0	0	0	0	0	0	9	0
Peas	53.5	9	0	0	0	0	0	3	0	1	0
Cauliflower	52	5	0	0	0	0	0	7	0	4	0
Broccoli	51	7	0	0	0	0	0	2	0	4	0
Fish	49	14	0	0	1	0	0	7	7	2	0
Pasta	44	14	0	0	1	0	0	16	4	0	0
Tomato	42	16	0	0	0	0	0	2	0	3	0
Bannock	42	1	0	0	0	0	0	0	0	1	0
Chips	38.5	1	0	0	0	0	0	11	0	0	0
Eggs	38	7	0	0	0	0	0	2	0	0	0
Beans	37.5	16	0	0	0	0	0	0	1	4	0
Rice	37.5	6	0	0	0	0	0	0	2	0	0
Celery	36	5	0	0	1	0	0	0	0	3	0
Roast/Steak	35	8	0	0	2	0	0	2	0	0	0
Muffins	33.5	1	0	0	0	0	0	0	0	2	0
Cottage Cheese	32	4	0	0	0	0	0	0	0	0	0
Peppers	31	4	0	0	0	0	0	0	0	1	0
Burger	30.5	6	0	0	0	0	0	11	0	1	0
Mixed Vegetables	26	2	0	0	0	0	0	1	0	5	0
Cookies	26	1	0	0	0	0	0	0	0	0	0
Corn	26	5	0	0	0	0	0	2	1	0	0
Yogurt	25	1	1	0	0	0	0	0	0	0	0
Bacon	24	2	0	0	0	0	0	0	0	0	0
Fruit Cocktail	21.5	0	0	0	0	0	0	0	0	0	0
Beef	21.5	4	0	0	2	0	0	13	0	0	0
Cream Cheese	20	0	0	0	0	0	0	5	0	0	0
Grapes	19	9	0	0	0	0	0	6	0	0	0
Mushroom	19	5	0	0	0	0	0	0	0	0	0
Pork Chop	17.5	0	0	0	0	0	0	1	0	1	0
Cucumber	16	3	0	0	0	0	0	0	0	3	0
Green Onions	15	0	0	0	0	0	1	0	0	1	0
Sausage	14	0	0	0	0	0	0	0	0	0	0
Strawberry	13	10	0	0	0	0	0	0	0	0	0
Ice cream	11.5	0	0	0	0	0	0	0	0	0	0
Pear	11	5	0	0	0	0	0	0	0	0	0
Moose Meat	11	2	0	0	8	0	0	0	0	5	1
Fries	11	1	0	0	0	0	0	4	0	0	0
Cantaloupe	9	7	0	0	0	0	0	3	0	0	0
Biscuits	9	0	0	0	0	0	0	0	0	0	0
Ham	7.5	1	0	0	0	0	0	1	0	0	0
Asparagus	7	0	0	0	0	0	0	0	0	0	0
Ground Meat	7	0	0	0	1	0	0	1	0	0	0

Food Consumption Frequencies and Construct Frequencies for 40 Patients *(continued)*

Food Items	Freq	TSE+	TSE-	TRD+	TRD-	TRT
Cereal	192.5	9	0	0	0	0
Toast	167.5	0	0	6	0	0
Potato	160.5	0	0	18	0	0
Sandwich	155	11	0	1	0	0
Soup	136	13	0	11	0	0
Carrots	130	4	0	13	0	0
Banana	123.5	2	0	0	0	1
Bread	123	14	0	1	0	0
Salad	108.5	4	0	13	1	0
Cheese	97.5	0	0	0	0	0
Apple	94	6	0	0	0	1
Chicken	85	9	0	2	2	0
Crackers	83.5	2	0	0	0	0
Orange	67.5	1	0	0	0	1
Grapefruit	56.5	0	0	2	0	0
Peas	53.5	0	0	8	0	0
Cauliflower	52	0	0	4	0	0
Broccoli	51	0	0	4	0	0
Fish	49	5	0	23	0	0
Pasta	44	0	0	17	0	0
Tomato	42	1	0	9	0	0
Bannock	42	0	0	9	0	0
Chips	38.5	3	0	0	0	0
Eggs	38	0	0	0	0	1
Beans	37.5	1	0	3	0	0
Rice	37.5	1	0	0	0	0
Celery	36	0	0	3	0	0
Roast/Steak	35	1	0	0	0	1
Muffins	33.5	0	0	0	0	0
Cottage Cheese	32	2	0	0	0	0
Peppers	31	2	0	0	0	0
Burger	30.5	0	0	0	0	0
Mixed Vegetables	26	3	0	0	0	0
Cookies	26	0	0	0	0	1
Corn	26	1	0	5	0	0
Yogurt	25	1	0	0	0	0
Bacon	24	4	0	0	0	0
Fruit Cocktail	21.5	2	0	0	0	0
Beef	21.5	1	2	6	0	0
Cream Cheese	20	0	0	0	0	0
Grapes	19	1	0	0	0	1
Mushroom	19	1	0	0	0	0
Pork Chop	17.5	1	0	0	0	0
Cucumber	16	0	0	3	0	0
Green Onions	15	1	0	0	0	0
Sausage	14	0	0	0	0	0
Strawberry	13	1	0	0	0	1
Ice cream	11.5	0	0	0	0	0
Pear	11	0	1	0	0	0
Moose Meat	11	10	0	22	0	0
Fries	11	0	0	0	0	0
Cantaloupe	9	1	0	0	0	1
Biscuits	9	0	0	0	0	0
Ham	7.5	0	0	0	0	0
Asparagus	7	0	0	3	0	0
Ground Meat	7	1	0	0	0	0

Note:
All foods eaten at least once a week are included.

Abbreviations:

Freq frequencies of foods consumed by all 40 patients

ACC+ access positive
ACC- access negative
AVN aversion
CNV+ convenience positive
CNV- convenience negative
C/P+ cost/price positive
C/P- cost/price negative
DMK+ diabetes knowledge positive
DMK- diabetes knowledge negative
EM emotion
EB+ energy/boost positive
EB- energy/boost negative
FIL filling
FQ+ food quality positive
FQ- food quality negative
HBT habit
HP health promotion
MC medicinal/curative
PHY+ physiology positive
PHY- physiology negative
PRF preference
PRV preventive
RES+ resources positive
RES- resources negative
SOC+ social function positive
SOC- social function negative
SR+ social relationship positive
SR- social relationship negative
SS+ social support positive
SS- social support negative
TSE+ taste positive
TSE- taste negative
TRD+ tradition positive
TRD- tradition negative
TRT treat

APPENDIX – O

Correlation Coefficient Values and Probability Values of 35 Constructs Associated with Frequency of Consumption for All 40 Patients

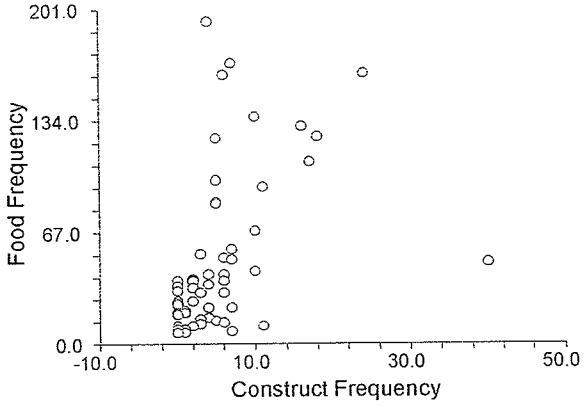
Correlation Coefficient Values and Probability Values of 35 Constructs Associated with Frequency of Consumption for All 40 Patients

Construct	r-value	p-value
Diabetes knowledge positive	0.883146	0
Preference	0.781984	0
Physiology positive	0.775397	0
Convenience positive	0.580806	0.000003
Filling	0.535281	0.000021
Taste positive	0.526408	0.000031
Physiology negative	0.482318	0.000167
Aversion	0.465876	0.000296
Access positive	0.435033	0.000806
Preventive	0.4123	0.001591
Convenience negative	0.407111	0.001846
Food quality positive	0.386632	0.003246
Cost/Price positive	0.368298	0.005225
Habit	0.355738	0.00713
Health promotion	0.343721	0.009495
Social function positive	0.331745	0.012499
Social support positive	0.324217	0.014779
Social relationship positive	0.317683	0.017039
Access negative	0.28847	0.031077
Cost/Price negative	0.268571	0.045349
Tradition positive	0.253393	0.05952
Food quality negative	0.238513	0.076684
Resources positive	0.165586	0.222607
Tradition negative	0.16291	0.230277
Energy/Boost positive	0.162758	0.230719
Diabetes knowledge negative	0.150503	0.268217
Social relationship negative	0.143167	0.292509
Taste negative	0.12789	0.347565
Energy/Boost negative	0.126256	0.353811
Medicinal/Curative	0.114755	0.399695
Social support negative	0.114755	0.399695
Social function negative	0.103254	0.448882
Resources negative	0.046809	0.731921
Emotion	0.035684	0.794017
Treat	0.034418	0.801176

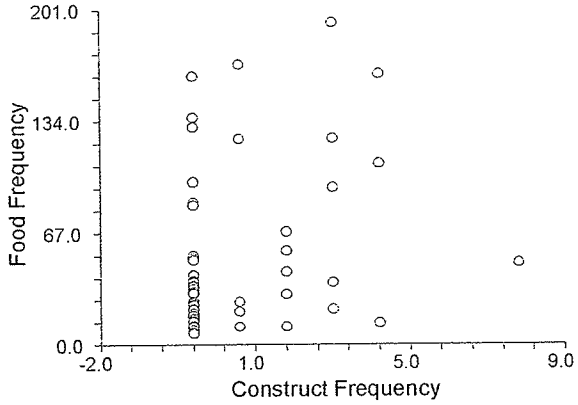
APPENDIX – P

Scatter Plots of Sums of Frequencies Reported by 40 Patients of the Construct [see graph title] and the Consumption of the Food Items Associated with the Construct

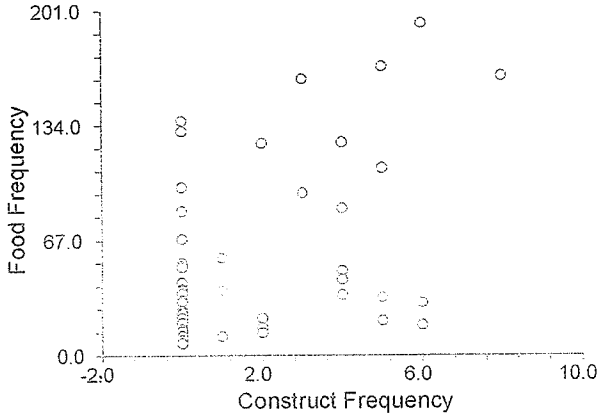
ACCESS POSITIVE



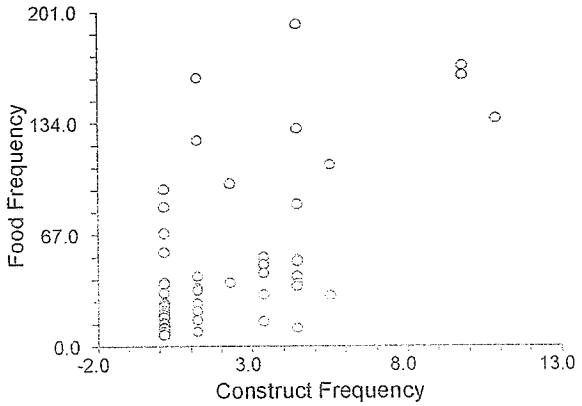
ACCESS NEGATIVE



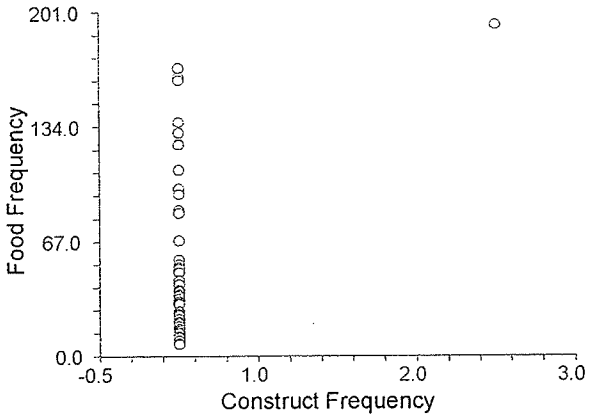
AVERSION



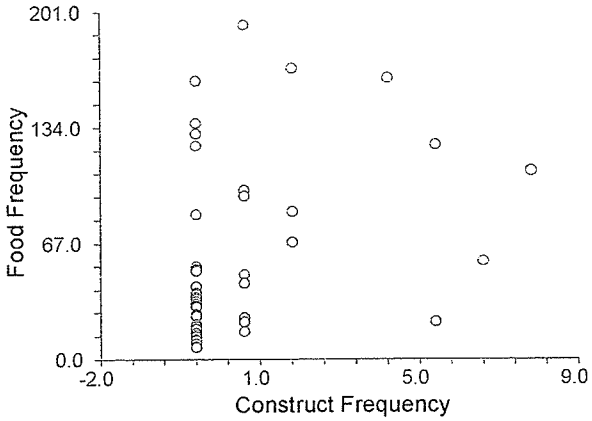
CONVENIENCE POSITIVE



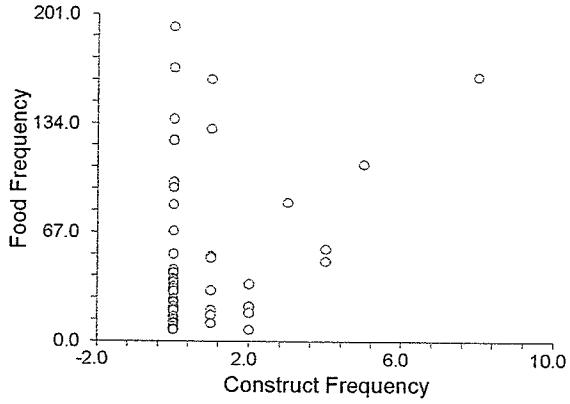
CONVENIENCE NEGATIVE



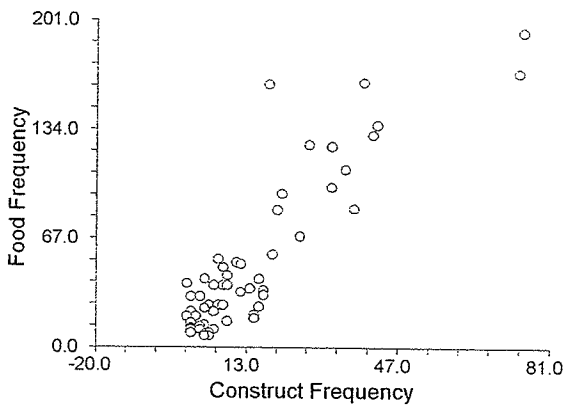
COST/PRICE POSITIVE



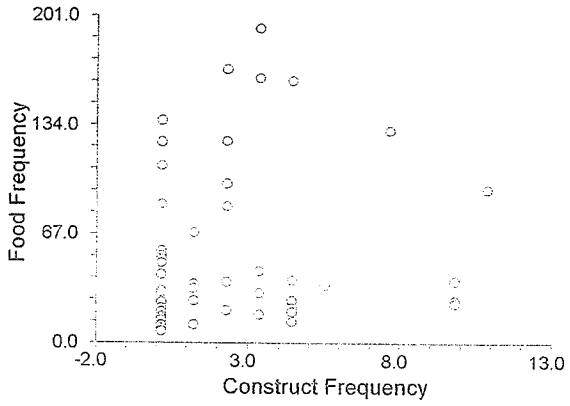
COST/PRICE NEGATIVE



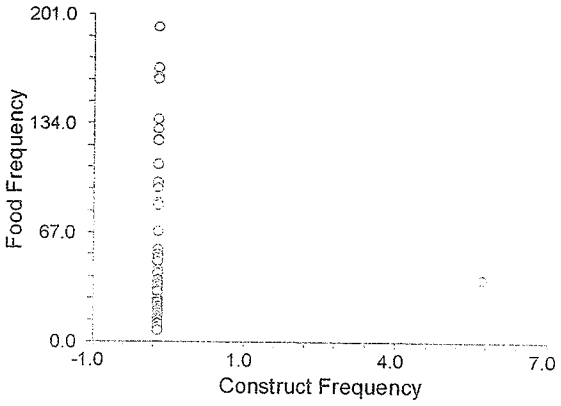
DIABETES KNOWLEDGE POSITIVE



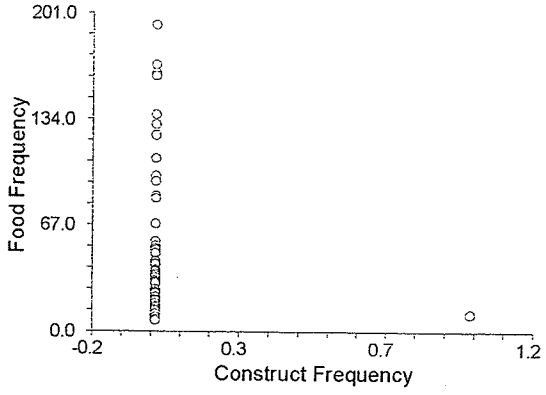
DIABETES KNOWLEDGE NEGATIVE



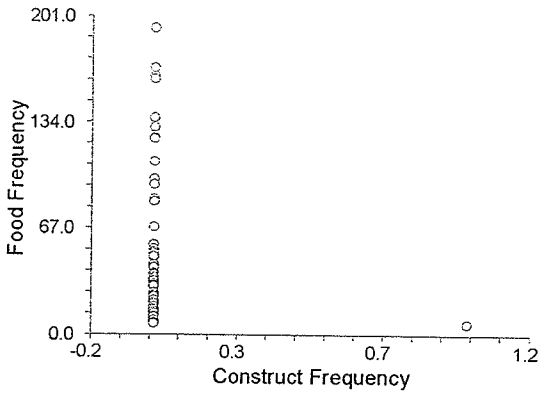
EMOTION



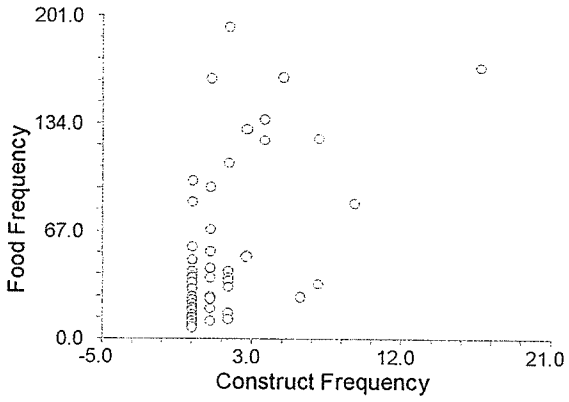
ENERGY/BOOST POSITIVE



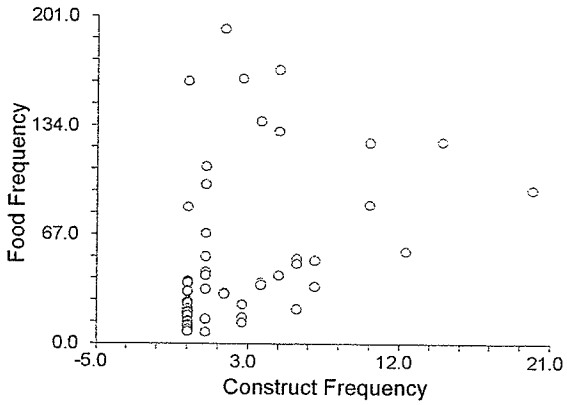
ENERGY/BOOST NEGATIVE



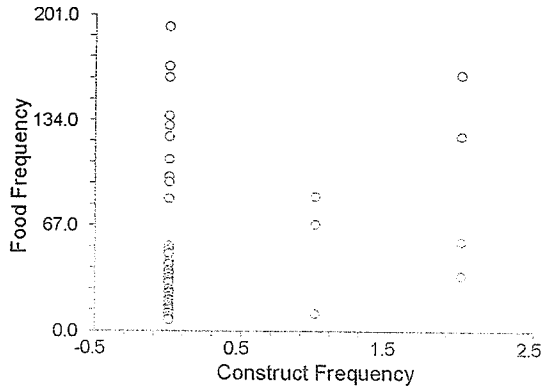
FILLING



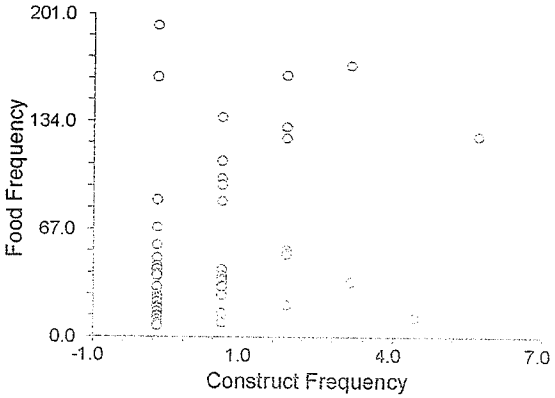
FOOD QUALITY POSITIVE



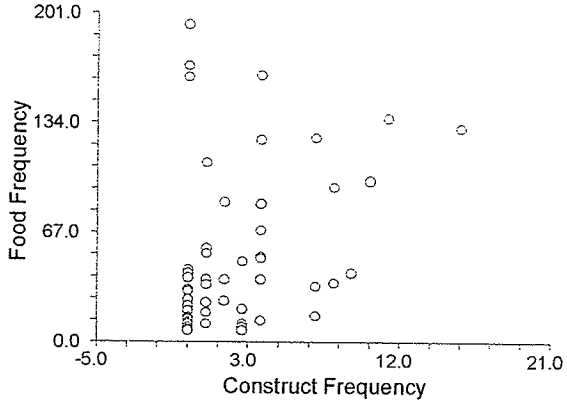
FOOD QUALITY NEGATIVE



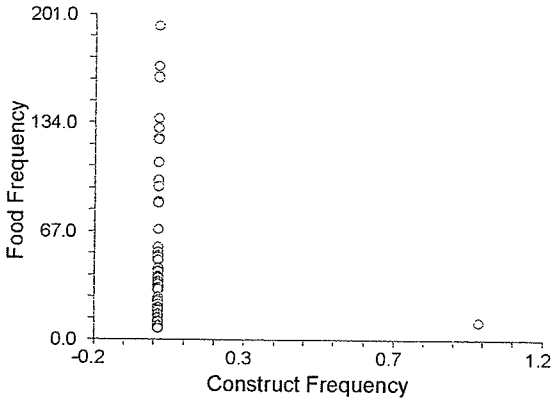
HABIT



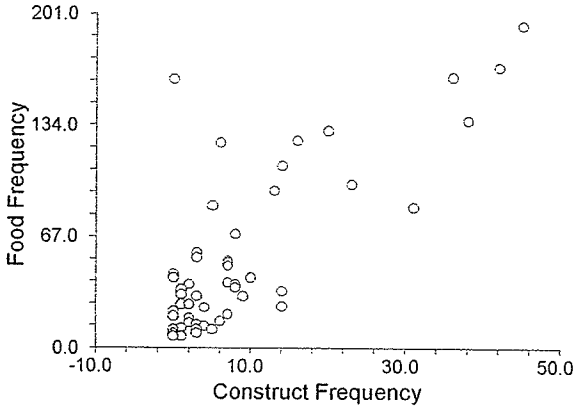
HEALTH PROMOTION



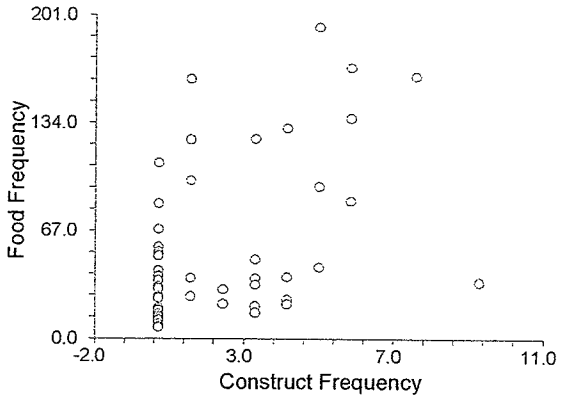
MEDICINAL/CURATIVE



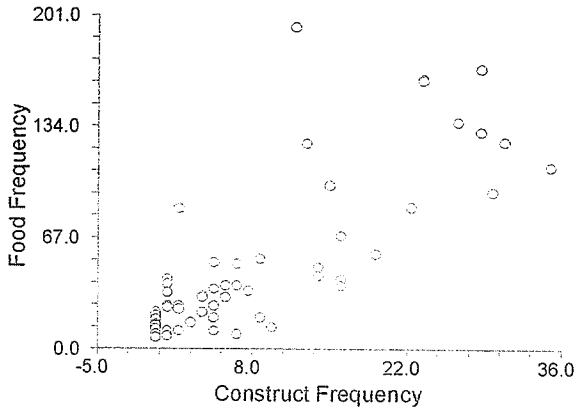
PHYSIOLOGY POSITIVE



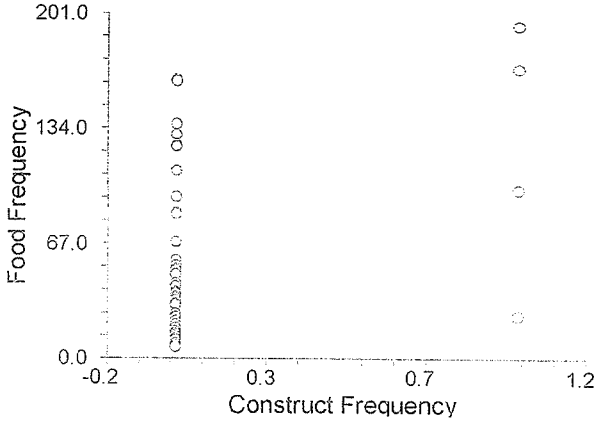
PHYSIOLOGY NEGATIVE



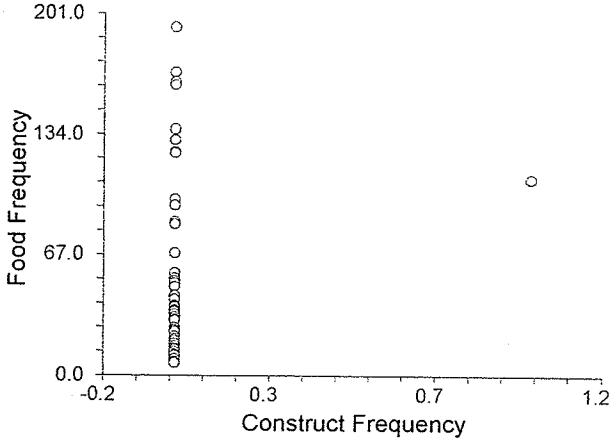
PREFERENCE



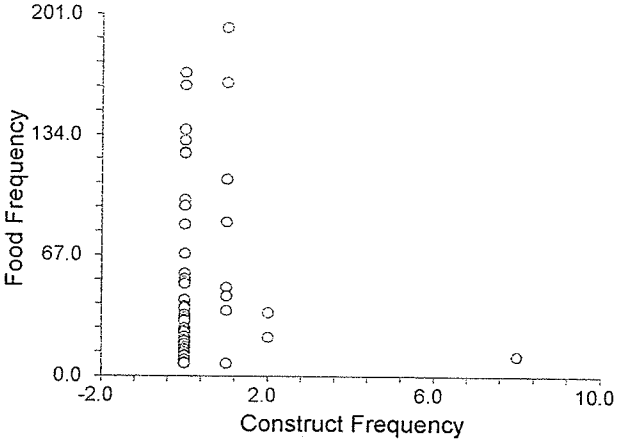
PREVENTIVE



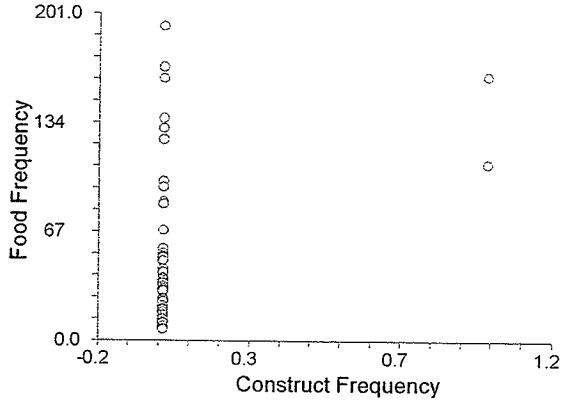
RESOURCES POSITIVE



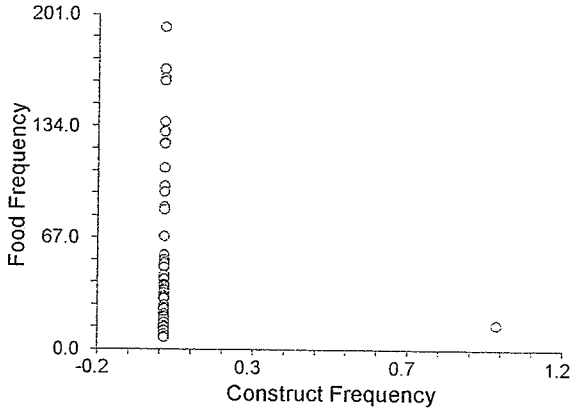
RESOURCES NEGATIVE



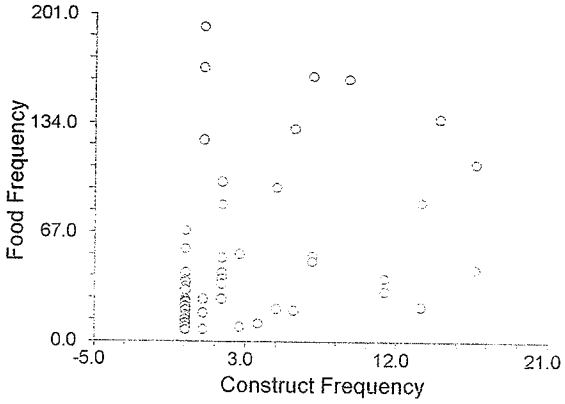
SOCIAL FUNCTION POSITIVE



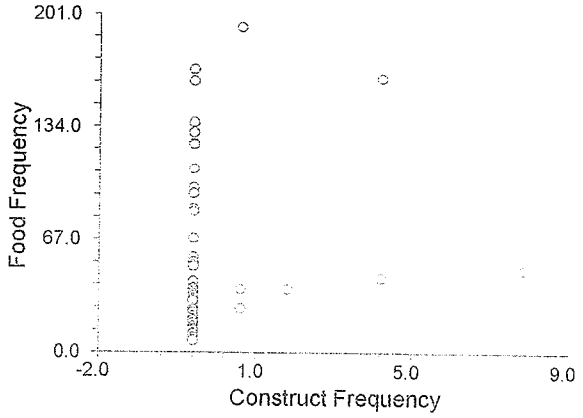
SOCIAL FUNCTION NEGATIVE



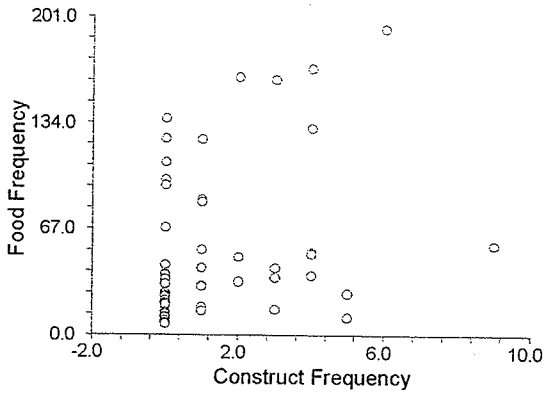
SOCIAL RELATIONSHIP POSITIVE



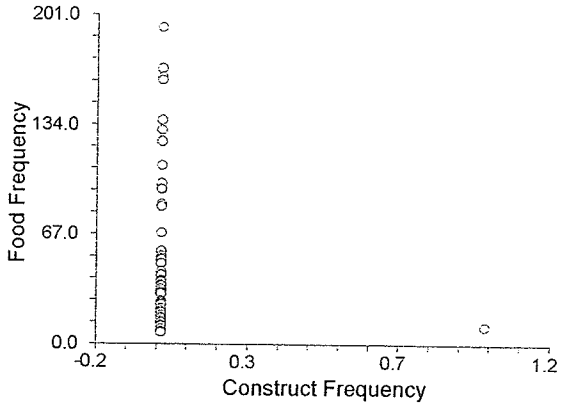
SOCIAL RELATIONSHIP NEGATIVE



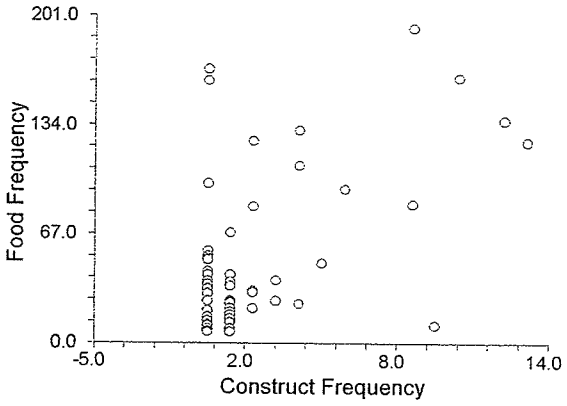
SOCIAL SUPPORT POSITIVE



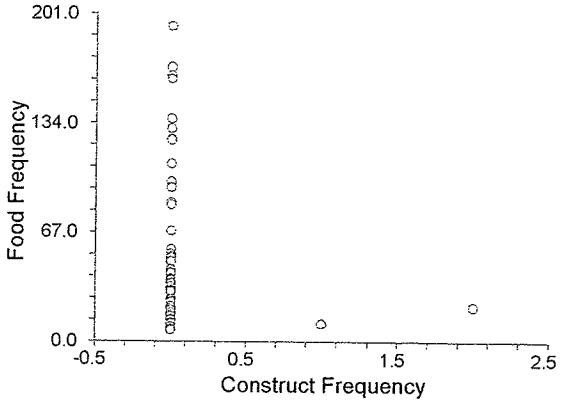
SOCIAL SUPPORT NEGATIVE



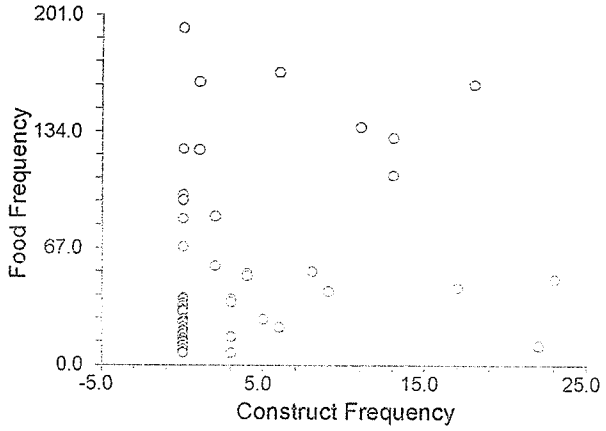
TASTE POSITIVE



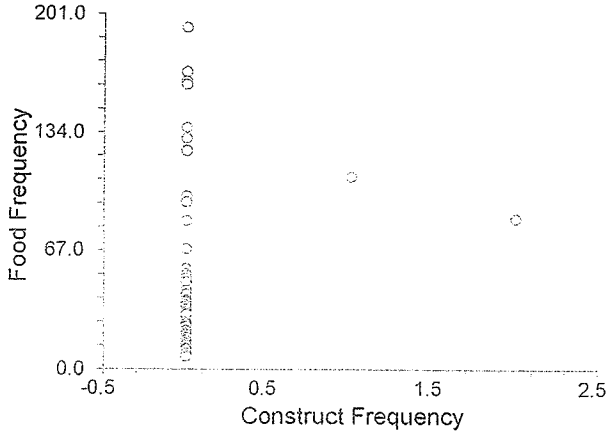
TASTE NEGATIVE



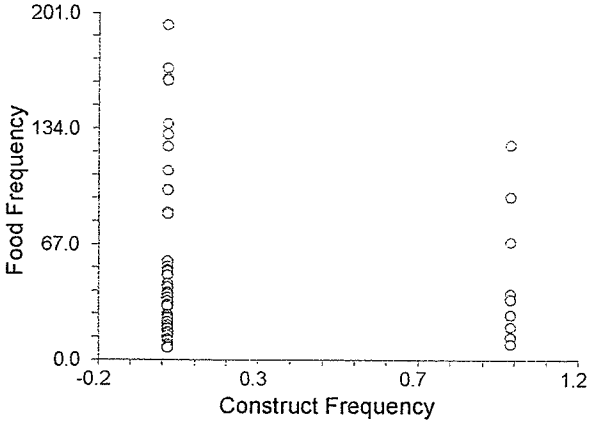
TRADITION POSITIVE



TRADITION NEGATIVE



TREAT



APPENDIX – Q

Correlation Coefficients between the Food Frequencies Reported by Each Patient in Two Records, FCM and FFQ

Correlation Coefficients between the Food Frequencies Reported by Each Patient in Two Records, FCM and FFQ

Patient #	Correlation Coefficient Value	p-value	Conclusion
104	0.989159335	1.96479E-32	Not Significantly Different
213	0.923008598	1.66427E-16	Not Significantly Different
114	0.91808981	1.53242E-11	Not Significantly Different
117	0.910083384	7.02826E-10	Not Significantly Different
102	0.86560291	1.14631E-12	Not Significantly Different
211	0.856363364	7.09181E-12	Not Significantly Different
116	0.838249193	4.3208E-12	Not Significantly Different
216	0.837942626	4.08347E-09	Not Significantly Different
219	0.833195898	2.0334E-08	Not Significantly Different
217	0.82908917	1.66514E-07	Not Significantly Different
101	0.804840955	7.15897E-07	Not Significantly Different
202	0.754689219	1.63046E-07	Not Significantly Different
206	0.750401137	2.40744E-05	Not Significantly Different
112	0.743806375	1.38433E-09	Not Significantly Different
115	0.735295573	9.74804E-08	Not Significantly Different
208	0.698882688	1.22452E-05	Not Significantly Different
119	0.679172017	2.76002E-06	Not Significantly Different
207	0.675491518	8.50345E-06	Not Significantly Different
110	0.668010845	7.26452E-07	Not Significantly Different
204	0.65993135	8.85472E-06	Not Significantly Different
107	0.631451943	1.62875E-05	Not Significantly Different
111	0.627334249	6.73452E-06	Not Significantly Different
201	0.610198715	2.27703E-05	Not Significantly Different
220	0.603185311	9.86684E-05	Not Significantly Different
109	0.565191704	0.000144773	Significantly Different
222	0.543203493	0.004134285	Significantly Different
103	0.530052264	0.000180554	Significantly Different
113	0.52791188	0.002714862	Significantly Different
218	0.490287425	0.003773077	Significantly Different
209	0.489991538	0.00208136	Significantly Different
203	0.468007205	0.001775276	Significantly Different
205	0.445215511	0.007361043	Significantly Different
105	0.440235944	0.001090988	Significantly Different
108	0.42426667	0.038801353	Significantly Different
214	0.383139729	0.033377516	Significantly Different
210	0.330722989	0.018437126	Significantly Different
106	0.324336023	0.031721248	Significantly Different
215	0.321437252	0.046002621	Significantly Different
118	0.066799123	0.750691186	Not Significantly Different
120	0.013439232	0.931836964	Not Significantly Different