NUTRITION RELATED KNOWLEDGE, ATTITUDES, PRACTICES AND NEEDS OF INDIAN IMMIGRANTS AND FAMILY MEMBERS IN NEWFOUNDLAND

SUJA VARGHESE

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Nutrition Related Knowledge, Attitudes, Practices And Needs of Indian Immigrants and Family Members in Newfoundland

by

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Abstract

This study was a comprehensive nutrition related needs assessment of Indian immigrants and family members in Newfoundland. It was also designed to answer questions such as whether this ethnic group had acculturated to Canadian food habits and whether their dietary practices were influenced by their knowledge, attitudes and demographic characteristics. A cross sectional survey utilizing a self administered mailed questionnaire was conducted. A random sample of 132 subjects, both males and females, aged 10-65+ took part in the study.

It was found that the respondents were fairly knowledgeable about healthy eating guidelines in Canada. Regarding attitudes toward food selection, they were frugal, non-food explorative, but sociable/ hospitable with a strong concern for social status. They valued nutrition as fundamental to good health. The food consumption pattern revealed that they were somewhat acculturated to Canadian food habits. Although the overall likelihood of following healthy life style practices was good, consumption of grains and vegetables /fruits was not at par with the recommendations of Canada's Food Guide. It was observed that healthy lifestyle practices were more consistently associated with the attitude to 'nutrition is important' rather than with nutrition related knowledge. The demographic characteristics revealed that this ethnic group was highly educated with higher than average income, well established in Newfoundland and had few language problems. In spite of these unique characteristics, the majority of respondents rated nutrition services available in

Newfoundland as culturally inappropriate. The desire to know more about the nutritional quality of their traditional diet, provision of ethnic foods regularly in hospitals and availability of ethnically tailored nutrition education materials were some of the expressed needs of this ethnic group.

The findings of this study reinforce the need for more culturally appropriate nutrition services in Newfoundland hospitals and communities. The finding that knowledge was not sufficient in inducing healthy eating practices calls for new strategies for dietary modifications. Because of the unique characteristics of this study population, results are not generalizable to other immigrants in Newfoundland or to Indian immigrants in other parts of Canada. More studies on other immigrants are needed to understand the impact of culture on nutrition related issues.

I dedicate my thesis to all immigrant women who had weathered the storms of adjustment to a new culture with patience and perseverance.

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Preface

As an immigrant woman born and brought up in a traditional Indian orthodox society, settling down in St.John's and attempting to adjust to the Newfound culture was a tremendous challenge. It took several years for me to get accustomed to the way Newfoundlanders speak, to the way they dress, to the wide variety of Newfoundland foods and, not to mention, to the weather in St.John's.

One of the experiences during the early stages of my life in St.John's that still lingers in my mind is getting admitted to a Hospital. I had to face many problems such as not knowing what the appropriate food combinations are and what to order from the menu sheets distributed by the dietary staff. I felt that there was a lack of understanding on the part of the dietary staff about the cultural differences in food habits and food preferences. Eating improper combinations or hesitation to eat unfamiliar food resulted in stomach ailments and hunger. This experience sparked an interest in me to study more about nutrition related issues of immigrants. I have now lived in St.John's for more than two decades. I have a wide circle of friends from different nationalities and have worked extensively with immigrants. My decision to choose a thesis on nutrition related issues of a group of immigrants arose from my own and other immigrants' experiences.

I believe this research has shed light to some of the relevant issues related to immigrant nutrition. As a practicing registered dietitian I benefitted immensely from this research. I now have a better appreciation of the fact that food is a source of one's identity

reflecting one's preferences, cultural traditions, religion and social life. I now understand better the complexities of eating behavior. This research reinforced in me the importance of considering the relevant needs of each individual when providing nutritional care and counseling.

I would like to see more research in this area in future.

1.0 Introduction

Canada is a land of immigrants where multiculturalism flourishes. According to Statistics Canada (1996) reports, immigrants constitute 17.6% of the Canadian population and this share had remained at around 15% to 16% between 1951 and 1991. While the ratio of foreign born to Canadian born has remained constant at about one to six, countries of origin of recent immigrants have changed. The proportion of immigrants coming to Canada from Europe has shrunk and most immigrants now originate from Asia, Latin America, Africa and the Caribbean (Badet 1993). These immigrants have brought with them their diverse cultures, languages and food habits. According to one report from Statistics Canada (1989), there are 80 different cultural groups and at least 100 different languages spoken by various ethnic groups in Canada. The wide variety of ethnic foods now readily available across Canada are legacies of immigrants.

Immigrants who come to Canada with their established cultural, linguistic, religious and dietary norms might face many challenges when they attempt to adjust to a new culture. They are in a new food environment bombarded with many new foods and different food customs. Unfamiliarity with Canadian supermarkets and foods, unavailability of traditional foods, and lack of knowledge about the nutritional value of foods available in Canada could impose added stresses on immigrants (Yeung 1995). Food is part of one's cultural heritage. It is vital to one's physical and mental health. Nutrition educators have a responsibility in encouraging immigrants to keep their traditional eating patterns if they are nutritionally

sound and in enabling them to make informed decisions about the wide variety of new foods.

The increasing ethnic diversity imposes additional challenges on nutrition educators when they attempt to promote healthy eating habits or when they try to change or modify eating behavior. If nutrition education programs are to be effective and meaningful to immigrants, such programs should be culturally sensitive and should take into consideration the diversity in cultural, linguistic and dietary characteristics in Canada.

Despite the major population changes and the consequent cultural differences in food patterns, studies on issues related to immigrant nutrition are sparse. A preliminary study conducted in St. John's among a group of ethnic seniors revealed that nutrition services available there were not culturally appropriate (Varghese 1995). Nutrition educators' inadequate information related to the cultural determinants of food habits may be one reason for this lack of culturally appropriate services. Another reason may be that, compared to other cities in Canada, St. John's has few immigrants; these immigrants are marginalized outside the mainstream culture and invisible to service providers (Auger, 1993).

The present study was undertaken to assess the dietary practices and nutrition related needs of Indian immigrants and their family members in Newfoundland. Possible predictors of dietary practices such as nutrition knowledge, attitudes, and demographic characteristics were also examined. The Indian ethnic group was selected for this study because they were the largest segment of the immigrant population in Newfoundland (Nakenoczmy, 1996).

The objectives of this study were:

1) to assess the eating patterns of Indian immigrants and family members

2) to determine their level of nutrition knowledge

3) to identify their attitudes toward food selection

4) to determine if there are differences in their dietary practices based on their nutrition related knowledge and attitudes

5) to identify their nutrition related needs

2.0 Literature Review

A review of literature related to 1) nutritional consequences of migration 2) factors determining food related behavior and the rationale for choosing psychosocial determinants (knowledge and attitudes) and 3) relevant previous research will be discussed in this section.

2.1. Nutritional Consequences of Migration

2.1.1 Impact of culture on food related behavior

When studying issues related to immigrant nutrition, an understanding of the impact of culture on food related behavior is essential. According to Tylor (1871) "Culture is that complex whole which includes knowledge, belief, art, morals, law, customs, and any other capabilities and habits acquired by man as a member of the society." Or as Fieldhouse (1995) has described, culture is "the sum total of a group's learned, shared behavior".

Although different cultures have different characteristics, some common characteristics are applicable to all cultures (Fieldhouse, 1995, Axelson 1986, Foster, 1962). First, culture is learned. People acquire cultural traits early in their life and they transmit them from one generation to another through the process of socialization. The primary channel through which socialization occurs is the immediate family which reinforces appropriate behaviors and sanctions the undesired.

Secondly, culture is not static. Although habits acquired early in life are on the whole stable and long-lasting, they are nevertheless subject to change. Changes in the physical or social environment, educational programs, medical inventions, mass media and advertising,

migration and urbanization are some factors that could induce changes in cultural traits.

Thirdly, people internalize cultural traditions so that they become an inseparable part of their identity. People are unconscious of their culture and routinely do things without being even aware that there are rules and regulations governing many aspects of their behavior; people are creatures of the cultural traditions in which they are raised.

Fourthly, individuals or groups of individuals might participate differently within one culture. In this respect, Broom et al., (1977) have coined the concept of a subculture. They have defined a subculture as a "pattern that is in significant respects distinctive but that has important continuities with a host or dominant culture." A subculture may be based on occupation, area of residence, ethnic origin, religion, social class, age, language, diet or other variables. Therefore, one may be a participant in several subcultures at one time. Several subcultures may exist within a given locality.

How could these characteristics of a culture or subculture relate to the food habits of immigrants in Canada? If food habits are acquired early in life and, on the whole, are stable and long lasting; if knowledge, attitudes and customs surrounding food are passed on to succeeding generations; if changes in food habits could occur over time because of changes in social and physical environment, food availability, mass media advertising or migration; what happens to the dietary habits of immigrants when they attempt to adjust to another culture? Would they follow their traditional eating patterns and cooking methods? Are all the ingredients required to follow their traditional dietary patterns available in their location? Do they have to make substitutions to the available varieties in their new country? Or do

they acculturate to the food habits of the new culture? If they acculturate to the new food habits, would there be any nutritional consequences? These are some questions related to immigrant nutrition that require more recognition from nutrition educators.

2.1.2 Dietary practices of immigrants

Several studies have looked at dietary patterns of immigrant groups. Shultz et al., (1994) used a four day written food record (3 weekdays and one weekend) to study the dietary patterns of a group of Chinese women in San Diego. It was found that US born Chinese American women were more acculturated to North American food habits than those who were born in China.

Chau et al., (1990) studied the food habits of 45 Chinese elderly (over 60 years old) living in the San Francisco Bay area utilizing a 24 hour dietary recall method as well as a food frequency list. The food frequency list consisted of 34 food items arbitrarily selected to represent typical American foods and Chinese foods. He found that 95% of respondents were mostly eating Chinese staple foods for lunch and supper.

Hrboticky et al., (1984) studied changes in the perceived qualities of food such as flavor, health value and prestige perception among a group of first and second generation Chinese adolescents living in the Metropolitan Toronto Area. Using a 5 point Likert type scales and 46 typical Canadian foods this study documented higher hedonic flavor and prestige ratings to desserts, snacks and fast foods and concluded that immigrants could acculturate to food habits that have nutritionally undesirable effects.

Grivetti et al., (1978) found a decreased use of traditional foods by first generation

Chinese immigrants in California even when those foods were readily available. The researchers utilized a food frequency questionnaire (often, infrequent and never) and 77 traditional 'Chinese' and nontraditional 'American foods' which were readily available in California.

Story et al., (1989) studied food habits and changes in food consumption patterns of 60 South Asian refugee families (Cambodian and Hmong) living in United States. Frequency of consumption of a food item from a list of foods (protein foods, dairy foods, grains, fruits/vegetables, fats, sweets and miscellaneous) was collected using a scale 'daily', '1-4 times a month' and 'rarely'. Also, food preferences for 31 selected items were assessed using a scale 'most preferred', 'least preferred' and 'unfamiliar food'. It was found that fresh fruits, meats, and soft drinks which were considered high status foods in their home country were highly preferred and frequently consumed.

Crane et al., (1980) used a food frequency questionnaire (the average number of days each week such as twice a week, 5-6 times a week etc.) to study the food habits of Vietnamese refugees living in Northern Florida. Changes in food habits were determined by comparing frequency of consumption of a food item in the United States with that in Vietnam. He also used a food preference check list ('like', 'accept', 'dislike', 'never eaten') to collect information on the degree of liking for specific American and Vietnamese foods. These Vietnamese refugees were found to prefer their traditional Vietnamese foods over North American foods. In the same study it was found that steak, infrequently eaten in their homeland, was one of the most preferred foods.

From the above mentioned studies and other studies reviewed (Hrboticky et al.,1984, Queen, 1957, Adamson et al., 1945, Grivetti et al., 1978, Story et al., 1989, Chau et al., 1990, Yang et al., 1996, Crane et al., 1980), it was difficult to generalize the dietary patterns of immigrants, even among one specific group. It appeared that, in a cross section of immigrants, some might follow their traditional food habits, staples, recipes and cooking methods whereas some others might gradually adopt the Canadian food habits.

What are the nutritional consequences of such dietary patterns? If immigrants follow their traditional food habits completely, unavailability of traditional ingredients or inability to follow traditional cooking methods could result in nutritional deficiencies. Immigrants who completely follow their traditional food habits are also found to have difficulties when they seek hospital and community nutrition services, if those services are not culturally appropriate (Varghese, 1995). On the other hand, acculturation to the typical North American diet could result in an increased use of animal protein, total saturated fat and sugar along with decreased use of fiber. Such dietary patterns have proven to have potential health risks. Tillotson (1973) studied coronary disease, heart disease, and stroke among Japanese living in Japan, Hawaii and California and found higher incidences of these diseases in those who adopted a North American diet. McKeigue et al., (1991) has documented higher blood pressure, fasting and post glucose serum insulin concentration, central obesity, higher plasma triglycerides and lower HDL cholesterol among South Asian immigrants in London compared to the native European group. In England and Wales mortality from ischemic heart diseases is found to be the highest among men and women who immigrated from the

Indian subcontinent (Balarajan, 1991). Bhatnagar et al., (1995) compared the coronary risk factors in 247 migrants from the Indian subcontinent living in West London and 117 of their siblings living in India. It was found that the West London cohort had a higher body mass index, systolic blood pressure, total serum cholesterol level, higher fasting blood glucose level and lower high density lipoprotein cholesterol.

2.1.3 Sociodemographic factors and dietary patterns

The type, extent and progression of changes in dietary patterns are dependent on many sociodemographic factors and a few studies have looked at the relationship between the two among immigrants. Length of exposure to the new cultural environment (Chavez et al., 1994), ability to speak English (Yang et al., 1979), ability to read English (Chau et al., 1990), education level (Chau et al.,1990), age (Tillotson et al.,1973), and generation level (Freedman et al.,1984) are some of the factors identified. It has also been pointed out that the dietary change process is easier for males than females (Katona-Apte et al.,1980) and that acculturation proceeds more rapidly in families with children (Story et al.,1989).

Studies on non-immigrant populations had identified other sociodemographic characteristics that could influence dietary patterns. For Calasanti (1986), the three interrelated variables which could have a major influence on dietary behavior were income, education level and occupational status. These variables could influence a whole range of nutrition related factors from food preferences and habits to the ability to purchase what one wants, to the likelihood of having proper storage facilities. Davis et al., (1982) reviewed 18 published articles on linkage between sociodemographic characteristics and dietary behavior

and found that education level (especially the general education level of the homemaker), household size and residential location were important determinants of nutritional status. Another characteristic that has an effect on food consumption patterns is ethnic background. In spite of significant blending of foods from various cultures it is known that there are distinct dietary practices among various ethnic groups. Cronin et al., (1982), in an examination of food consumption data from the USDA 1977-1978 National Food Consumption Survey, found that non- whites, relative to whites, ate more rice, legumes, pork, fish, poultry and eggs and less dairy products and beef.

2.1.4 Role of nutrition educators

The effects of immigration and acculturation on dietary patterns and disease risks have important implications for nutrition educators in Canada. Some of the problems that immigrants might face when attempting to secure adequate nutritious food are unfamiliarity with Canadian supermarkets, foods and food storage facilities, lack of knowledge about nutrition, high cost of their traditional foods and concerns about food safety (Yeung 1995). In Canada "convenience foods" (easy to cook, packaged, processed foods), "fast foods" (ready made foods from fast food restaurants) and "rich foods" (foods high in total fat and simple sugars such as pastries, pies and rich sauces) are easily available. Advertising usually promotes these foods which are high in fat, sugar and salt. It is possible that immigrants, without being aware of the health risks associated with such foods, could choose them quite often (Yeung, 1995). Also, the practice of vitamin supplementation is very common in Canada. Despite recommendations (Health and Welfare Canada, 1990) that healthy

individuals should be able to meet all of their nutrient needs from diet, vitamin supplements are becoming very popular. Studies show that this practice is not limited to the elderly, even young adults and college students take vitamin and mineral supplements regularly in an effort to assure themselves of good health (Garry et al., 1982, Wardlaw et al., 1993, Elridge et al., 1994). Would there be a tendency among immigrants to adopt such practices because of misleading information or advertisement?

Understanding the special nutritional needs of immigrants, enabling them to select nutritious foods from the wide variety of new foods and encouraging them to adopt healthy eating patterns are responsibilities of nutrition educators. Recently there has been increasing interest in translating Canada's Food Guide into different languages and in developing language and ethnic specific nutrition education materials. However, cultural sensitivity in nutrition must go beyond this. According to Guthrie (1994), understanding the factors influencing dietary practices, or why people eat what they eat should be first step when attempting to promote healthy eating habits. Another important factor to be considered when developing nutrition education programs is that people readily internalize concepts and ideas which are relevant to their needs and interests. This makes a comprehensive needs assessment an important component of developing nutrition education programs.

Therefore, two essential components of effective nutrition education programs are:

1. a study of factors determining food related behavior or why people eat what they eat
2. a comprehensive needs assessment of the target population

2.2 Factors Determining Food Related Behavior

The study of determinants of food related behavior or why people eat what they eat and ways to help people change and improve their eating patterns has been termed "quantitative nutrition education research" (Gillespie et al., 1992). Nutrition education research helps to answer questions such as "what are likely to be the most successful approaches?" and "what guidelines should be followed for developing and evaluating nutrition education programs?" (Gillespie et al., 1992). Guthrie (1994) has categorized factors influencing dietary behavior into four broad groups, namely physiological, sociodemographic, behavioral and psychosocial factors.

Primary physiological determinants of food choices are taste, smell and appearance. Although good nutrition is essential for survival, people might not eat even the best nutritious food if they don't like the taste. Preferences for certain taste and specific combinations of food are influenced by previous experiences (Shannon,1990) and are shaped during the early socialization period and are thus a product of culture (Fieldhouse, 1995). Sensory evaluation of foods and taste testing with consumer panels have become a major area of interest of researchers, with the goal being to get a balance between health and taste.

Sociodemographic factors have varying impact on individual's dietary behavior (See section 2.1.3). Identification of differences in nutrient intakes among different socioeconomic groups is an important part of nutrition education research. Results can be used to identify vulnerable groups and to develop programs appropriate to the needs of a given group.

Those who promote a behavioral approach believe that behavior is readily influenced

by the physical and social environment in which people live. Shannon et al., (1991) and Rodin (1980) had identified environmental influences such as television watching and eating at "all you can eat" restaurants as factors that could trigger overeating. Some of the strategies that could enable behavior modification are identifying environmental factors which could trigger overeating, attempting to modify these environmental factors or changing one's response to environmental factors (Guthrie, 1994).

Those who take the psycho-social approach view behavior as mediated through the individual's cognitions such as knowledge, attitudes, beliefs and expectations (Guthrie, 1994, Axelson 1986). Or, how people behave (what they eat) is influenced by what they think (knowledge) and how they feel (attitudes). The rationale behind this approach is that if individuals increase their knowledge and change their attitudes, desirable changes in food related behavior would result. To increase knowledge and to change attitudes through nutrition education programs, information related to individual's eating patterns, their knowledge and attitudes are required.

No single theory or approach could encompass a complex behavior such as eating. As Hochbaum (1981) has pointed out, these theories are useful in the understanding of only some of the vast array of factors and forces that may shape eating behavior and its manifestations under certain conditions or in certain populations. Pioneers in nutrition education research encourage nutrition intervention programs to be based on established theory and research (Gillespie, 1994). Since there are several well established psychosocial theoretical frameworks such as Consumer Information Processing Theory, Stages of Change

Theory and Relapse Prevention which have been successfully used in explaining dietary behavior and since knowledge, beliefs and attitudes are culturally embedded traits, for the purpose of the present study psychosocial factors (knowledge and attitudes) are explored.

2.3 Relevant previous research

2.3.1 Nutrition knowledge

Nutrition knowledge is a scientific construct that represents individuals's cognitive processes related to food and nutrition. This construct has an important role in nutrition education because of the assumption that increasing individuals knowledge about food and nutrition will bring about desired changes in their food related behavior.

2.3.1.1 Nutrition knowledge and dietary behavior

To date, no studies have been published that examined the relationship between nutrition related knowledge and dietary patterns of immigrants. However, many investigators have examined this relationship among non-immigrant populations. Using meta-analytic techniques, Axelson et al., (1985) reviewed nine studies and found a positive and significant relationship between dietary practices (as measured by an overall dietary quality score) and nutrition knowledge. Kristal et al., (1990) observed similar results when she studied the relationship between knowledge about low fat diet and food selection behavior in 97 women aged 45-59 years. Conversely, no significant relationship between nutrition knowledge and nutrient intake was found in a senior citizen's group (Grotkowski et al., 1978). Bergman et al., (1992) found no relationship between caffeine knowledge and consumption in a group of 47 women between 45 and 80 years of age.

2.3.1.2 Sociodemographic correlates of nutrition knowledge

Sociodemographic factors have an influence on the level of nutrition knowledge. In a sample of male life insurance company employees Woolcott et al., (1981) found that higher level of nutrition knowledge was significantly correlated with higher socioeconomic status, higher income and increasing age. Fusillo (1977) in a sample of 1664 adult U.S. consumers found that those with low level of knowledge tend to have less education, lower income and less prestigious occupation. It was also found in this study that those with low nutrition knowledge tended to be older rather than younger and to be men rather than women. Rahn et al., (1984) undertook a study to predict the level of nutrition knowledge in a random sample of 210 urban women in the city of Guelph. They found that age, education level and socioeconomic status were the predictor variables. Mansour et al.,(1994) in their study of the nutrition knowledge of 150 pregnant women in Saudi Arabia found a positive relationship between knowledge score and educational level. Sims (1976) studied the nutrition knowledge of mothers of 163 preschool children and found that socioeconomic status, younger age and small family size differentiated the level of knowledge level. Snider (1980) identified education and age as predictors of nutrition knowledge in a survey of health related needs of noninstitutionalized elderly. Wade (1970) conducted an analysis of knowledge surveys completed between 1941 and 1962 and concluded that education and sex were the best predictors of health related knowledge.

2.3.1.3 Measurement of nutrition knowledge

There was little standardization in the nutrition knowledge instruments found in the

literature. Instruments varied depending on the purpose of the study and the target population. Most of them were composed of a series of multiple choice or true or false questions that the respondents were asked to answer. Answers to each items were scored for correctness and then summed. These scores were used to represent the respondent's nutrition knowledge.

Nevertheless, Axelson et al (1992) had given some recommendations to prevent threats to the validity of a nutrition knowledge instrument. These recommendations are:

- Reliability

The instrument that measures nutrition knowledge should meet a minimum standard of reliability- that is, the same results should be obtained if the test was taken again by the respondents. Reliability increases the predictive validity of an instrument. Also, a good estimate of the relationship between nutrition related knowledge and dietary practices could be accomplished only with a reliable instrument. Axelson et al., (1992) reviewed 19 studies and found that common measures of reliability are reliability coefficients such as coefficient alpha for ordinal variables or its variation K-R 20 for nominal, dichotomous variables. Coefficient alpha or K-R 20 is the appropriate statistic for determining reliability based on internal consistency. Internal consistency estimates to what extent various items measure the same concept. A modest reliability coefficient of 0.70 is suggested by Nunnally (1978).

- Discrimination

When using a nutrition knowledge test, the difference in scores should reflect real

differences in knowledge among individuals. The less discriminatory the measure, the less sensitive it is.

●Dimensionality

Items used to measure knowledge should be one dimensional- that is, a total score derived from summing scores from several questions should assess a single underlying construct. This is because knowledge of one topic would not necessarily mean knowledge of another. For example, if the purpose of a study is to assess the relationship between knowledge and consumption of low fat foods, the knowledge instrument should include questions about fat content of foods or knowledge about the adverse health effects of excessive fat. The use of one score to represent a variety of topics such as fat, fiber or general healthy eating guidelines would cause the effect size estimate or the strength of the relationship between knowledge and behavior to be smaller than expected (Axelson et al., 1992).

● Correspondence

Items used to measure knowledge should reflect the information required by the individual to make food choices and should correspond to the dietary behavior that is investigated. For example, "if the researcher is interested in using knowledge to predict some dietary behavior, then the knowledge measure should represent the knowledge required to perform that behavior" (Axelson et al., 1992).

● Representativeness

Nutrition knowledge construct should be defined explicitly and the items on the test

should represent the specified domain.

- **Convergence**

Axelson et al., (1992) have also called for convergence validity, to ensure that commonly used nutrition knowledge tests converge. For this, a comparison of one test of nutrition knowledge with other tests is needed. If the tests are measuring the same construct, then the scores representing the individual's knowledge should be highly correlated.

2.3.2 Attitude towards food selection

The concept of attitude, like many abstract concepts, is a construct used as a tool to describe what people say, think, and do with some order and consistency (Henerson et al., 1987). Rokeach (1968) has defined attitude as a " relatively enduring organization of beliefs around an object or situation predisposing one to respond in some preferential manner". According to him behavior is a function of at least two attitudes: attitude toward the object and attitude toward the situation within which the object is encountered. For example, food selection could vary according to the situation at a given time. As Steelman (1976), has pointed out, a homemaker may be more concerned with convenience than with economy on a given occasion. At another time, she may be trying to impress guests with food and food service. The possibility that multiple situational attitudes exist in addition to an attitude toward the object means that in one situation a given attitude may prevail while on another occasion a different attitude prevails. Although many possible behavior patterns may exist for a given person, attitudes are patterned to a great extent (Steelman, 1976). For example,

the attitude to frugality may prevail not only in selecting food items, but also in selecting several other non-food items.

2.3.2.1 Attitudes and dietary behavior

Among researchers who studied the role of attitudes in determining food choice Medaugh-Abernethy et al., (1994) observed a significant relationship between attitudes and the amount/type of foods consumed in a group of 36 women aged 65 and over. Similarly, Bergman et al., (1992) found that caffeine related attitudes were the strongest predictor of caffeine intake. Positive and significant relationships between attitudes and behavior were reported by Axelson (1985) in a meta-analysis and by Kristal et al., (1990) in a group of independently living elderly women.

2.3.2.2 Immigrants' attitudes toward food selection

Immigrants come to Canada with established food habits, food customs and underlying attitudes. An examination of different aspects of their attitudes toward food selection would enable better understanding of their consumption patterns and facilitate more effective intervention strategies. A literature search on MEDLINE, Current Contents and CINHAL on 'culture' or "immigrants" and "attitudes toward food selection" failed to identify any studies specifically on immigrants' attitudes toward food selection. The literature search identified only the study by Steelman (1976). She used principal component factor analysis and identified the following attitudes in a group of homemakers belonging to different religious subcultures in Northern Louisiana: propensity to change, convenience, frugality, health, social status, and sociability aspects. No studies were found specifically

on immigrants.

Similar attitude categories had been identified by several researchers among non-immigrant groups. For example, Hollis et al., (1986) had identified attitudes to 'health consciousness' and 'food exploration' in a group of 179 men and 178 women in Portland Oregon. Axelson et al., (1983) explored food and nutrition related attitudes of elderly living alone and identified four attitude categories, namely, 'nutritious-healthful', 'frugal-utilitarian', 'social-adventuresome' and 'qualitative pleasurable'. Kristal et.,(1990) examined attitudes toward selecting low fat diets in 97 women in Washington state and identified both positive and negative attitudes about diet and health.

It should be pointed out that food consumption has always been linked to social prestige and status in all cultures. As Jeliffe (1967) has pointed out "all cultures have prestige foods which are reserved for important occasions or even more for the illustrious of the community". Some foods reflect financial stress; others symbolize affluence. Some foods are meant to be eaten within the family circle, only some are openly offered to guests (de Garine,1976).

Would immigrants continue to maintain their 'concern for social status' in a new culture or food environment by expressing themselves in the type of foods chosen and customs followed? According to de Garine (1976) keeping cultural authenticity is the first step through which social prestige and status may be observed; it is by consuming the group's staple foods that its members display their sense of belonging to the society. On the other hand, Katona-Apte et al., (1980) who examined food habits and acculturation of East

Indians in the United States had hypothesized that there is a direct relationship between the Indians' desire to gain status among, and, acceptance by Americans and the extent and speed of the acculturation to American food habits.

Similarly, do they have a favorable attitude toward 'food exploration'? Food explorative attitude would be suggestive of flexibility in trying new foods or recipes and willingness to change food habits. This could also mean lower adjustment problems in a new food environment.

2.3.2.3 Sociodemographic correlates of attitudes

Very few studies have looked at the impact of sociodemographic factors on nutrition related attitudes. Kinsey (1994) has identified income and sex as predictors of nutrition related attitudes whereas Jalso et al., (1965) found that age was inversely related to nutrition related attitudes. In a study among the elderly Grotkowski et al., (1978) found that socioeconomic status computed on the basis of educational level, former occupation and source of income was strongly related to the attitude to 'nutrition is important'.

2.3.2.4 Measurement of attitudes

As for the nutrition knowledge measure there was little standardization in the attitude measuring instruments. Instruments varied depending on the purpose of the study, types of attitudes studied and the target population. The majority of instruments utilized a survey method with a Likert type format, although semantic differential scales (a series of specific bipolar scales such as good-bad, strong-weak and passive-active) were not uncommon.

To demonstrate validity and reliability of attitude measures Henerson et al., (1987)

and Sims (1981) have provided several recommendations. Different types of validity measures such as construct validity, content validity, and predictive validity could be used to establish the validity of an attitude measurement. Construct validity refers to how well the instrument measures what it claims to. Demonstrating construct validity demands clear definition of the construct, administering the survey in a fair setting (enough time allowed and respondents are not rushed or pressured to respond in a particular way), seeking credible opinions from experts, and evidence from correlational or criterion group studies, all aimed at ruling out alternative explanations of the instrument's results (Hemerson et al.,1987). Content validity is the degree to which the statements used in the questionnaire represent the construct under investigation. Concurrent validity is calculated when the results of one measure are used to predict the results of an alternate, contemporary measure. According to Sims (1981), what evidence is used to establish the instrument's validity depends on the objectives of the study. For example, if the investigator wishes to predict some kind of behavior on the part of the respondent in the future, then predictive validity become a crucial issue. If the purpose of the research is to interrelate attitudes with other aspects of personality or to integrate and organize some kind of behavioral outcomes, construct validity must be considered.

Formulation of characteristic behavior statements from which inferences could be made on respondents' attitudes is another critical step in the measurement of attitudes (Sims, 1981). According to her the "success and failure of attitude scale construction may depend upon the specific collection of items" and has called for stating the items in simple and clear

language, each item being unambiguous containing only a single idea and avoiding items which are irrelevant to the attitude construct or are likely to be answered in exactly the same way by persons having both favorable and unfavorable attitudes. Also, randomizing the order of presentation of items in the instrument would prevent developing a response set on the part of the respondent (Sims, 1981).

Henerson (1987) has suggested using several converging questions rather than a single statement to detect the presence or extent of an attitude. This is because a single item is open to different interpretations. A questionnaire which asks about slightly different aspects of the same thing several times and uses a combination of the results from these questions to indicate the presence of an attitude is less likely to be affected by random error and will be more reliable.

Henerson et al., (1987) has reinforced that only a reliable attitude instrument can support a strong case for validity and therefore credibility. Reliability or the consistency of the measurement could be measured with a reliability coefficient. A reliability coefficient of 0.7 is usually considered respectable for an attitude instrument, even though lower coefficients are some times tolerated (Henerson et al., 1987).

2.3.3 Nutrition related knowledge, attitudes and behavior

It should be pointed out that even in studies that found positive and significant relationships among knowledge, attitudes and behaviors, the strength of association was small, r=0.10 and r=0.17, for knowledge-behavior and attitude- behavior respectively (Axelson et al., 1985). Shannon et al., (1988) in a three year nutrition education study done

in Pennsylvania found only small changes in dietary behavior brought about by nutrition education programs. Similarly, Ikeda et al., (1982) in a weight control program observed that weight changes achieved were not stable over time. There are several possible explanations for these results. One explanation is that nutrition knowledge is probably necessary, but not a sufficient condition for healthful dietary behavior. Other factors such as self-efficacy, peer or family influences or environmental factors could intervene between knowledge and behavior. For example, Sapp (1991) studied the relative impact of nutrition knowledge and attitudes on intentions to eat beef and the frequency of consumption of beef with social support systems. He found out that although nutrition knowledge was not directly related to intentions, behavior or attitudes, it was significantly related to social support systems that influenced intentions and behavior.

Kristal et al., (1990) and Axelson et al., (1985) have pointed out methodological explanations for the poor correlation between knowledge and behavior. According to them, most studies on 'nutrition knowledge, attitudes and dietary practices' had not defined explicitly the constructs measured and as such lack specificity and validity in measurement. Also, researchers often did not assess those aspects of nutrition knowledge and attitudes which were necessary for the performance of the target behavior of interest. The weak associations between knowledge-behavior and attitude-behavior reflect the poor correspondence between the measures of dietary intake and knowledge or attitudes (Axelson, 1985). Clarifying and defining domains of knowledge and attitude constructs and ensuring that these measures correspond with the dietary behavior studied would improve the effect

size estimate of the relationship (Axelson et al., 1992, Axelson et al., 1985).

2.3.4 Needs assessment

The goal of any nutrition related needs assessment is to obtain quantitative and qualitative information that will identify nutrition related problems and opportunities for reducing those problems. Owen (1993) had recommended three types of variables for a culturally sensitive, valid needs assessment. These variables are 'client variables' (demographic characteristics, knowledge, attitudes, dietary practices etc), 'environmental variables' (availability of necessary services, prevalence of social and health problems, ethnic food availability etc.) and 'program and provider variables' (accessibility to available services, cultural appropriateness etc). All these variables could vary depending on the ethnic group and locality. The investigator could not locate any studies in the literature that explored the needs of Indian immigrants or that met Owen's (1993) criteria.

Summary

This literature review identified some of the nutrition related issues facing immigrants and pinpointed the need for cultural sensitivity in nutrition education strategies. Two essential components of effective and meaningful nutrition education are an understanding of the factors influencing dietary practices and developing programs relevant to the needs of the target population. Of the various approaches used in studying factors influencing dietary practices, psychosocial approach is widely used. The rationale behind this approach is that if individuals increase their knowledge and change their attitudes,

desirable changes in food related behavior would result. Since knowledge, beliefs and attitudes are culturally embedded traits, for the purpose of the proposed research psychosocial factors were explored. The review also provided background information on how to conceptualize nutrition related knowledge, attitudes, behaviors and needs of a group of immigrants and how to measure these variables with moderate validity and reliability.

3.0 Methodology

3.1 Objectives

The objectives of this study were:

1. To assess the eating patterns of Indian immigrants and family members
2. To determine their level of nutrition knowledge
3. To identify their attitudes toward food selection
4. To determine if there are differences in their dietary practices based on their nutrition related knowledge and attitudes
5. To identify their nutrition related needs

3.2 Design

A cross sectional survey using a self-administered mailed questionnaire was conducted for this study.

3.3 Setting of the study

Indian immigrants started settling in Newfoundland approximately 40 years ago. They are distributed throughout the province, even though the majority live in St. John's. Most of these immigrants are professionals employed by hospitals across the province and by Memorial University of Newfoundland.

Indian immigrants in Newfoundland constitute a closely knit society. The Friends of India Association represents the Indian community in Newfoundland. The majority of

Indian immigrants practice Hinduism, their native religion. The Hindus have built a "Hindu Temple" in St. John's for conducting their worship and ceremonies. A number of cultural and religious festivities are organized by Indian immigrants throughout the year in different parts of Newfoundland.

Language is a source of heterogeneity among Indian immigrants. This is because different provinces in India have their own mother tongues. Although Hindi is the designated national language of India, the official language is still English, a legacy left by the British who ruled India for more than 300 years. The medium of instruction in universities and interprovincial/intergovernmental communications is still continued in English. Most Indian immigrants frequently speak their mother tongue in their homes as a way to keep their language heritage or to pass it along to younger generations.

Vegetarianism is a common practice among Indian immigrants. The majority of vegetarians are lacto-ovo vegetarians (people who eat plant products, dairy products and eggs) or lacto-vegetarians (people who eat plant products and dairy products), although pure vegans (people who eat plant products only) are not uncommon.

Early Indian immigrants who came to Newfoundland 35 or 40 years ago, were unable to get Indian groceries necessary for their traditional cooking. They had to import groceries from England or other cities in Canada. Presently, a few Indian restaurants and ethnic speciality food stores are located in St. John's. Authentic Indian dishes and groceries are readily available in these restaurants and stores. However, the varieties of fruits, vegetables, dhals, pickles and sweets available are a bare minimum compared to the number

of varieties available in other cities of Canada. Also, the quality of these foods may not be at par with what is available in India and prices are fairly high. It should be pointed out that the foods and facilities available in St. John's are not found outside St. John's.

Compared to Canadian cooking, Indian cooking is time consuming. Many Indian cuisines require elaborate preparations such as soaking overnight, grinding and fermenting. Special cooking equipment is also necessary. In India, it is a common practice to prepare foods freshly every day. People purchase groceries such as fresh fruits, meats, sea foods, vegetables and dairy products daily. Refrigerating foods, cooking ahead, or freezing left over foods are not usual practices. Canned and processed foods are not readily available and not generally used.

3.4 Study population

All Indian immigrants and family members living in Newfoundland, both males and females over the age of 10 who were born in India or whose parents were born in India, constituted the study population.

3.5 Sample frame

The Friends of India Association (FIA), which is a provincial organization representing the Indian community in Newfoundland, was contacted prior to the study. They supported the project and gave permission to use their membership list for this research. Potential names were also selected from the Chinmaya Mission Association (CMA) directory, a directory of the people of East Indian origin. This directory is made available

to all members of the Indian Community by the Hindu Temple in St. John's. The International Students' Association (ISA) at the Memorial University provided names of all students from India who were then attending the University. The Senior Bridging Cultures Club (SBC), which is an association of ethnic elderly in St. John's, provided names of Indian origins who were 65+ years and attending the club.

People with Indian surnames from FIA, CMA, ISA and SBC were contacted to determine their place of birth. Only those who were born in India or whose parents were born in India were included in the study.

3.6 Sample size

There were 27 independent variables in the questionnaire. In order to get valid information on these 27 variables with a 5% level of significance, a sample size of 135 was needed. To cover for an estimated 30% refusal rate an additional 40 subjects were included. The total sample size was 175.

3.7 Sample selection

From the FIA, CMA, ISA and SBC membership lists, 377 persons who were born in India and/or whose parents were born in India were identified and listed. This list was then arranged into four sections as follows:

Single and family household units (FIA and CMA)

Children, 10-19 years of age from family households (FIA and CMA)

Students (ISA)

Seniors (SBC).

The final list consisted of 137 adult males, 123 adult females, 72 children (72 households had children in 10-19 age group), 30 students and 15 seniors for a total of 377. To achieve the calculated sample size of about 175, a proportionate sample of approximately 50% (See Table 3.1) consisting of 60 males, 60 females, 30 children and 15 students was selected. Application of this criterion would achieve the calculated sample size and allow a distribution of the study sample comparable to the population. Since seniors were relatively

Table 3.1
Sample Size and Selection

	Single & Family Households			Students	Seniors	Total
	Males	Females	Children			
Total Sample	137	123	72	30	15	377
Proportionate Sample	60	60	30	15	15	180

small in numbers, it was decided to take all 15 seniors who were 65+ into the study. Samples were selected in such a way that in each household one child and either husband or wife would receive the questionnaire. To accomplish this, 60 males were taken randomly from the 137 names; wives of those selected were eliminated from the list of females. From the remaining list of females, a random sample of 60 was selected. This procedure also decreased the chance of getting more than two questionnaires in one family unit. However, households with a senior could receive three questionnaires.

3.8 Instrument development

Since there were no standardized existing instruments that met the purpose and objectives of this study, it was necessary to develop an instrument specific to the project. Information was gathered in five content areas; demographic characteristics, dietary practices, nutrition related knowledge, attitude towards food selection and needs. The draft instrument was reviewed by a group of experts. These experts included a sociology professor who had worked among immigrants, a Ph.D candidate in Psychology and dietitians from different parts of Canada who had worked among immigrants and/or had previous research experience.

3.8.1. Questions on sociodemographic characteristics

Demographic characteristics that could influence knowledge, attitudes and needs were identified through literature search. The expert group facilitated the final selection of variables. A series of multiple choice and open ended questions was developed by the investigator to collect information (See Appendix 1- Section A, A1 to A11). The information collected included:

Sex
Country of birth
Parent's country of birth
Number of years of stay in Canada
Age group
Type of household
Current employment status
Level of education (year and country of completion)
Language most commonly used at home
Language preferred to explain health conditions to a doctor or dietitian

Income range
Religion

3.8.2. Questions on dietary practices

Since an understanding of the dynamics of dietary change and life style practices would facilitate development of culturally specific nutrition education programs, for the purpose of this study characteristic eating patterns, extent of dietary changes, nutritional quality of diet and lifestyle practices were assessed. When choosing a method for collecting dietary data for this study, the goal was to develop a short diet assessment method that is easy and cost effective to administer, that could describe the dietary pattern and dietary quality, but nevertheless have validity. Analyzing dietary intake by nutrients or calories was not an objective of this study. Therefore, a detailed dietary recall method or food frequency method was not used. Block (1982), Roe et al., (1994) and Rimm et al, (1992) have established that short questionnaires which ask only the frequency with which specific foods are consumed and usual intake could be administered quickly and have good correlation with more extensive diet histories.

To assess characteristic eating patterns such as the prevalence of vegetarianism and recent changes made in the diet and to find out reasons for following such practices "yes" or "no" questions and ranking type questions were used (Appendix 2, Section B, B1 & B2). A short questionnaire centered around the frequency with which specific foods were consumed was developed to assess their level of acculturation to Canadian food habits and their level of acquisition of food habits which have adverse health effects (Appendix 2-

Section B, B3, B4 & B5). The frequency scale ranged from "often" (score of 1), "sometimes" (score of 2), rarely (score of 3) and "never" (score of 4).

For assessing the nutritional quality of diet and life style practices , adherence to the recommended serving guidelines of Canada's Food Guide to Healthy Eating (CFGHE) and likelihood of following Canada's Guidelines to Healthy Eating (CGHE) were examined (See section 3.8.4 and Appendices 6 and 7 for explanation of CFGHE and CGHE). To evaluate adherence to CFGHE and to facilitate categorizing subjects as either consuming or not consuming the recommended number of servings, the questionnaire incorporated four food groups and five serving sizes (more than 11 servings, 5-10 servings, 2-4 servings, one serving and none) to choose from (Appendix 2-Section B, B6). These serving sizes were similar to the serving sizes of the CFGHE (Appendix 6). Examples of approximate volume per serving for various Indian foods were also provided: 'one large chappathi = 2 servings'; '½ cup to 3/4 cup cooked dhal = 1 serving'; (See Appendix 8).

To estimate the likelihood of adherence to CGHE, a number of questions on healthy lifestyle practices were developed by the investigator (Appendix 2-Section B, B7). Some items in this section are adapted from a previous study done by Market Facts of Canada (1979). Respondents were asked to indicate their likelihood of following healthy life style practices by using a rating scale "very likely" (score of 1), "somewhat likely" (score of 2), "not very likely" (score of 3), and "not at all likely" (score of 4). The practice of vitamin supplementation was estimated using the same scale and scoring system (Appendix 2-Section B, B7-e).

When developing questions to assess the dietary practices, effort was made to select variables in such a way that they would correspond to selected attitude categories and knowledge items. For example, for the question in the knowledge section "what does enjoy a variety of foods mean?", there was a corresponding question in the dietary practices section to find out whether they include a variety of foods in their diet every day. Information collected on dietary/lifestyle practices were:

Practice of vegetarianism and reasons for following vegetarianism
Recent changes made in the diet and reasons for making such changes
Food acculturation pattern
Acquisition of food habits which have adverse nutritional effects
Adherence to CFGHE serving guidelines
Likelihood of following CGHE guidelines

3.8.3 Questions on attitudes toward food selection

Personal interviews and a focus group discussion at the Senior Bridging Cultures Club helped to confirm the different attitude categories identified through literature search. Notes from the discussion and personal interviews indicated that they were hesitant to try unfamiliar foods and that they enjoyed the convenience of modern cooking equipments and semiprocessed foods easily available in Canada. It was evident that they valued good nutrition as fundamental to maintaining health. They also brought up a strong desire to eat meals in the company of family or friends. Participants reported that they and their families regularly took advantage of sale flyers and bought foods on sale. Thus from the group discussion and literature review, it was decided to measure the following attitude categories; importance of nutrition, frugality, food exploration, sociability/hospitality, convenience and

concern for social status.

The next step in the development of this instrument was translating the six attitude categories into six sets of characteristic behavior statements, so that inferences could be made on respondents' attitudes. Some of the behavior statements were adapted from other studies (Axelson, 1983, Steelman, 1976) to suit ethnic single and family households. In addition, a set of statements was created by the investigator. The guidelines given by Sims (1981) and Henerson et al., (1987) were followed for formulating attitude statements. These statements were then reviewed by the graduate students at the division of Community Health for clarity and representativeness. The resulting statements were then reviewed by the expert group and pretested among a convenience sample of 10 (two from each age group category used in the study, 10-19, 20-29, 30-34, 45-64 and 65+). Changes were made as per their suggestions. The final instrument contained 18 items, three converging statements for each of the six attitude categories (See Table 3.2). For estimating the internal consistency of the three statements, coefficient alpha was used. On the advice of the statistical consultant it was set at 0.5. The order of presentation of items in the instrument was randomized in order to prevent developing a response set on the part of the respondent (Appendix 3-Section C).

A Likert type format using "strongly agree" (score of 1), "agree" (score of 2), "disagree" (score of 3), to "strongly disagree" (score of 4) was used to assess participants' level of agreement with each behavior statement.

Table 3.2

Perceived Attitude Indexes and Statements

Nutrition is Important

1. Good eating habits are important to maintain health
2. I would like to learn more about what to eat/how to eat healthy
3. Learning more about nutrition might help me to improve my eating habits

Sociability/Hospitality

1. My family likes to eat meal together
2. I enjoy eating out where my friends eat
3. I like to serve refreshments to friends when they drop in

Concern for Social Status

1. My family serves fancier foods when we have company
2. We use our best linens and dishes when we have company
3. I would not consider serving certain foods for company dinners

Convenience

1. My family often buys convenience foods from the grocery stores
2. I enjoy frozen ready made foods such as T.V. Dinners
3. I like learning how to fix quick meals that take less time to prepare

Non-frugal

1. I buy any food I want whenever I want, no matter what it costs
2. I enjoy eating out even though I know it is expensive
3. Brand name products are always better than store brand products

Food Explorative

1 I seldom try foods from other countries or explore new restaurants
2. I like to eat foods that I am used to
3. Before eating a new food, I like to know whether it contains any religiously forbidden ingredients

3.8.4 Questions on nutrition knowledge

For this study, Indian immigrants' knowledge of the concepts mandated by Canada's Food Guide to Healthy Eating (CFGHE) and Canada's Guidelines to Healthy Eating (CGHE) were assessed (See Appendix 6 and 7). Both CFGHE and CGHE are widely promoted as basics of healthy eating. They are also used as the basis for evaluating the nutritional adequacy of food intake of Canadians.

Canada's Guidelines to Healthy Eating (CGHE) provide a dietary pattern that will supply recommended amounts of all essential nutrients while reducing the risk of chronic diseases (Appendix 7). These guidelines are based on Nutrition Recommendations, a report of the Scientific Review Committee (Health and Welfare Canada, 1990).

Canada's Food Guide to Healthy Eating (CFGHE) was developed from Canada's Guidelines to Healthy Eating (CGHE) and Nutrition Recommendations as a basic nutrition education tool that could be easily understood by the general public. The rainbow design, with the larger bands shown for grain products and fruits and vegetables and fruits, indicate that these foods should be consumed in larger quantities than the foods in the smaller bands of the rainbow. Key statements are found on the front page, "Enjoy a variety of foods from each food group every day," and "Choose lower-fat foods more often."

When developing a knowledge measure (Appendix 4-section D, D1 to D8), effort was made to include items that adequately represent Canada's Guidelines to Healthy Eating and Canada's Food Guide to Heathy Eating. The investigator developed seven items, whereas one item (D1) was adapted from another study (Melby et al., 1986). The expert

group's opinions were sought to ensure that items were representative of the chosen domain. Multiple choices with one correct answer and "yes" or "no" questions were used to gather information. To ensure that the difference in scores would reflect the real differences in the knowledge among individuals, the discriminant validity was checked. Three groups of people, who were assumed to have high and low levels of nutrition knowledge, were selected. These were 1) a group of practicing dietitians/dietetic interns, 2) a group of second year nutrition students and 3) a group of new immigrants at the Association of New Canadians. The scores were 10/10, 6.5/10 and 1.8/10 respectively which indicated that differences in nutrition knowledge score would likely reflect a real difference in knowledge. To achieve a minimum standard of reliability, a reliability coefficient (K-R 20) of 0.7 was aimed. As for the attitude measure, the questionnaire was pretested among a convenience sample and changes were made as per their suggestions.

The following questions were used to assess their knowledge level:

How to maintain a healthy weight?
How to reduce diet related diseases?
What are the substitutes for meat products?
What is the highest calorie food?
What does "enjoy a variety of foods" mean?
Which food should constitute the highest number of servings?
Are you aware of existence of Canada's food guide to healthy eating? If aware, have you read it? Do you use it regularly in your food choices?
Does eating according CFGHE would provide all the vitamins and minerals you need?

3.8.5 Questions on nutrition related needs

Personal interviews, key informant interviews and focus group discussions helped

to identify pertinent nutrition related issues and concerns. A series of closed ended, open ended, ranking, "yes"or "no" and food frequency type questions were used to identify the nutritional issues and health concerns of these immigrants. The expert group's review facilitated the final selection of variables. The information gathered (Appendix 5-Section E) included:

Widely used nutrition information sources
Suggestions for better sources of nutrition information
Immigrant's awareness, utilization and perceived appropriateness of services available in the community, hospitals and outpatient clinics
Local ethnic food availability and the need for substitution
General health condition/problems of these immigrants
Changes made in cooking methods since coming to Canada
Specific nutritional concerns
Comments and suggestions for the improvement of existing nutrition services

3.9 Reliability and Validity

To ensure the instrument's reliability and to minimize threats to validity, relevant suggestions/recommendations given by various researchers were followed (Sims, 1981 and Henerson et al.,1987 for attitude measurement, Axelson et al.,1992 for knowledge measurement, Block 1982, Roe et al., 1994, Rimm et al., 1992 for dietary assessment and Owen 1993 for needs assessment). In general, all constructs were clearly defined and an expert group was asked to review the questionnaire. The final questionnaire was pretested on a convenience sample of ten, (two from each age category used in the study, 10-19, 20-29, 30-34, 45-64 and 65+) for readability, clarity of instructions, ease of administration and time for completion. Necessary changes were made as per their suggestions.

Using a questionnaire that required no names and permitted anonymity minimized

response bias due to social desirability. Generally, people have an idea of which answers are socially desirable. Many questions in the survey such as income, heathy eating and life style practices and certain attitudes would have prompted respondents to bend their answers to what is socially desirable. Choosing the mail questionnaire method provided an ample amount of time for respondents to complete the questionnaire and greater uniformity across measurement situations. Other steps taken to minimize threats to validity are already discussed in section 3.8, Instrument development.

3.10 Data collection

Questionnaires were sent to selected households, students and seniors. Respondents were instructed to return their completed questionnaire in a self-addressed stamped envelope. There was one telephone follow up at two weeks and a second questionnaire with a reminder after four weeks.

Of the 180 questionnaires mailed, five were returned as non-deliverable. Before the first reminder, 115 responses were returned. After the second reminder, an additional 17 responses were received making the total number of responses 132. Overall, the response rate was 73%. The number and percentage of responses is tabulated in Table 3.3

3.11 Data analysis

Upon completion of data collection, data were coded and entered into the SPSS statistical package, version 7.5 for analysis. Descriptive statistics was used mainly to

Table 3.3
Response Rate

	Single & Family Households			Students	Seniors	Total
	Males	Females	Children			
# Sent	60	60	30	15	15	180
# Responded	42	42	21	15	12	132
% Responded	70%	70%	70%	100%	80%	73%

summarize the data. To assess the reliability of knowledge and attitude measures a reliability coefficient was calculated; coefficient alpha for the attitude measure (ordinal data) and K-R 20 for the knowledge measure (dichotomous, nominal data). Chi-square statistic was used to determine the presence of associations between categorical variables where as correlation analysis was used for ordinal variables. When using chi-square analysis, if the expected frequency was less than five for a cell in a 2×2 table Fisher's exact test was used to determine associations (Dawson-Saunders et al., 1994). A detailed description of the data analysis and procedures carried out for each section is described below.

3.11.1 Demographic characteristics

Descriptive statistics including frequency and percentage distributions were used to organize and summarize the demographic characteristics.

3.11.2 Dietary practices

Descriptive statistics including frequency and percentage distributions were used to assess the prevalence of vegetarianism, recent changes made and reasons for following such

practices. To estimate the level of acculturation and acquisition of food habits which have adverse nutritional effects the mean score and grand mean were calculated using the frequency and appropriate scores within each category.

To evaluate the nutritional adequacy of their diet, reported intake for each of the four food groups was compared with the recommended serving guidelines (5-12 for grain products, 5-10 for vegetables/fruits, 2-4 for milk/milk products, and 2-4 for meat/meat alternates). For each food group, subjects were divided into three categories, as having consumed minimum suggested serving guidelines, more than suggested guidelines and less than suggested serving guidelines. In addition, the modal class of servings for each food group and the percentage of immigrants meeting minimum requirements for at least three of the four food groups were also calculated.

To estimate the likelihood of healthy eating and life style practices mean and grand mean were calculated using frequency and appropriate likelihood scores.

3.11.3 Attitudes

Respondents indicated their level of agreement to the various statements using a Likert type format which ranged from 'strongly agree' (score of 1) to 'strongly disagree' (score of 4). For each respondent the coded scores were summed which ranged from three to 12 (score of three indicating perfect agreement and 12 indicating strong disagreement). The mid point of these scores was 7.5 (midpoint between 3 and 12).

For each attitude category the coefficient alpha of the three statements was calculated to determine reliability. Coefficient alpha determines reliability based on internal

consistency in ordinal data and estimates to what extent the three statements measure the same concept. If the coefficient alpha was greater than or equal to 0.5, the mean (±standard deviation) was calculated to yield an index.

If the mean score was less than the midpoint (7.5), it was gathered that the respondent either agreed or strongly agreed with the statements and had the relevant attitude.

3.11.4 Nutrition knowledge

Each item answered correctly in the knowledge assessment section was given a score of one and these scores were summed for each respondent. Descriptive statistics were used to determine the level of knowledge in terms of the percentage of total knowledge score. A reliability coefficient K-R 20 was calculated to determine reliability based on internal consistency in these nominal, dichotomous data.

3.11.5 Demographic characteristics versus knowledge, attitudes and practices

The response options for demographic characteristics were categorical in nature. As such, cross tabulations and chi square test for independence were used to determine the influence of demographic characteristics on knowledge, attitudes and dietary practices. When calculating the chi square statistic, if the expected value of a cell was less than two or if more than 20% or the expected frequencies were less than 5, some categories were pooled to generate expected cell values greater than or equal to five (Dawson-Saunders et al., 1994).

If the expected frequency was less than five for a cell in a 2×2 table, Fisher's exact test was used to determine any association (Dawson-Saunders et al., 1994).

3.11.6 Interrelationships among knowledge, attitudes and dietary practices

When analyzing interrelationships among variables, it was necessary to use mainly chi-square tests. This was either because the majority of the response options were categorical in nature or were coded as categorical variables into the SPSS. A correlation analysis was used to assess the relationship between selected attitude categories and dietary practices where response options were ordinal in nature.

Because of the interdependency of the variables used in this study (knowledge, attitude and behavior), the McNemar chi square statistic was used to determine relationships among knowledge, attitudes and nutrition related practices. The McNemar chi square test is a modified version of the general chi square analysis which is used to assess the relationship between two correlated groups (Dawson-Saunders et al., 1994). When using this statistic, it was necessary to further collapse items to dichotomous categories. For example, for the knowledge section, respondents were categorized as those with good level of knowledge (total score 4/7 and above) and those with poor level of knowledge (total score 3/7 and below).

The following hypotheses were tested to assess the interrelationship among nutrition knowledge, attitudes and dietary practices.

1. The higher the level of knowledge, the more favorable the attitude toward 'nutrition is important'
2. The more favorable the attitude toward 'nutrition is important', the healthier the eating/lifestyle practices

3. The higher the level of knowledge, the healthier the eating/lifestyle practices
4. The more favorable the attitude toward 'food exploration', the higher the frequency of consumption of Canadian foods
5. The more favorable the attitude toward 'sociability/hospitality', the higher the frequency of consumption of Canadian foods
6. The more favorable the attitude toward 'concern for social status', the higher the frequency of consumption of traditional Indian foods

3.11.7 Needs assessment

Various quantitative (e.g. descriptive statistics) and qualitative (e.g. themes and quotes) analyses were conducted to summarize the nutritional needs of these immigrants

3.12 Ethical considerations

Preliminary discussions were conducted with FIA, CMA and SBC and ISA. Approval to conduct the study was requested from FIA and granted. The Human Investigation Committee of Memorial University of Newfoundland reviewed the study and approval was granted (See Appendix 15). All questionnaires were coded, no names were used. The master list linking names and identification numbers was accessible only to the investigator and was kept in locked storage. Participation in this study was voluntary. Since minors were also included in the study, letters were sent to parents asking permission for their child to participate in the study. Once the study is complete, a synopsis will be sent to the community through the Friends of India Association Newsletter.

4.0 Results

Findings of the research are organized in the following sections:

- Sample characteristics
- Dietary practices
- Attitudes towards food selection
- Nutrition knowledge
- Impact of demographic characteristics on knowledge, attitudes and dietary/lifestyle practices
- Relationships among knowledge, attitudes and nutrition related behaviors
- Needs assessment

4.1 Sample characteristics

Table 4.1 summarizes characteristics of respondents. The sample consisted of 132 persons, who ranged in age from 10-65+ years with 62.6% in the age group between 30-64 years. The female-male distribution of the sample was 50-50. Subjects were predominantly Indian born (84.8%) and practicing Hinduism (63.3%). Nearly two-thirds of the participants had lived in Canada for more than 11 years and were well established. Subjects were well educated (68.4% completed university or technical training) and had higher than average income (50.0% of the subjects reported annual household incomes over $70,000). One-half of the subjects had completed their education in Canada, England or United States whereas 34.8% completed their education in India. Only 2.3 % reported that they were unemployed.

Table 4.1
Sample Characteristics

Category	Number of Respondents
Total	**132**
Gender:	
Male	66
Female	66
	Total 132
Length of Stay in Canada:	
Less than one year	3
1-3 years	12
4-5 years	18
6-10 years	11
11-15 years	10
More than 15 years	77
	*Total 131
Education:	
Elementary/Junior high	9
Some high school	12
Completed high school	10
Some university	7
Completed university/Technical Training	77
	*Total 115
Year of completion of education:	
1960 and before	9
1961-1970	20
1971-1980	23
1981-1990	14
1991-present	40
	*Total 106
Country of education:	
Canada	34
India	46
Other	32
	*Total 112
Religion:	
Hinduism	81
Christianity	34
Islam	2
Other	11
	*Total 128
Age:	
10-19	22
20-29	16
30-44	30
45-64	52
65+	11
	*Total 131

Category	Number of Respondents
Total	**132**
Country of Birth:	
India	112
Canada	16
Other	4
	Total 132
Income:	
Less than 10,000	6
10,000-19,999	8
20,000-29,999	10
30,000-39,999	4
40,000-49,999	8
50,000-59,999	12
60,000-69,999	6
70,000+	54
	*Total 108
Language usually spoken at home:	
Native language only	31
Native language and English	69
English only	29
	*Total 129
Language (preferred) to converse with health professionals	
Native language only	4
Native language & English	51
English only	77
	Total 132
Employment status:	
Student	42
Retired	17
Employed full time	41
Employed part time	7
Homemaker	13
Self employed	8
Unemployed	3
	*Total 131
Type of household:	
With spouse and children	61
With parents and siblings	26
With spouse	14
With spouse, children & family members	11
With friends	11
With relatives	7
Alone	2
	Total 132

***Not all respondents answered all questions**

The majority of respondents (90.1%) lived in family households, 8.3%, who were students lived with friends and only 1.5% lived alone. There were very few language problems for these immigrants. Nearly three-quarters of subjects (76.0%) included English as a language most often spoken at home and nearly all (95.5%) included English as a preferred language to communicate with health professionals.

It was assumed that respondents who were born in India with an education level of high school or above would be able to comprehend and answer the questionnaire. This is because in India English is generally introduced to school systems at the Junior high levels, and in some provinces at the elementary levels. Interpreter services were arranged through SBC for all members who required assistance in completing the questionnaire or who had language problems. From the language section of the questionnaire (A9- a & b) it was gathered that 31 respondents spoke native language most often at home and 4 respondents preferred native language to converse with the health professionals. Responses to the employment status question (A7) indicated that 42.7% were employed, 32.1% were students and 12.9% were retired in Newfoundland. Language problems, if any, would then be faced only by home makers or the unemployed who were not working outside their homes. They constituted 12.2% of the respondent. Cross tabulating employment status with education, it was found that the three unemployed had completed their university degree and that among the home makers one had education below high school diploma (some high school). This respondent belonged to the 65+ age group and as such received interpreter services. This ensured that almost all respondents were able to comprehend the questionnaire.

4.2 Dietary Practices

4.2.1 Vegetarianism

More than one quarter of the respondents (28.5%) were vegetarians. Through a ranking type question (B1-b), three main reasons for following vegetarianism were identified. The main reason given for being a vegetarian was that they were following family traditions. The results of B1-b are tabulated in Table 4.2.

Table 4.2
Percentage of Respondents Identifying Reasons for Practicing Vegetarianism

Reasons	Main Reason rank =1 (N=37)	2nd Main Reason rank =2 (N=19)	3rd Main Reason rank =3 (N=15)
Against religion and philosophy	24.3%	26.3%	13.3%
Better for health	27.0%	36.8%	20.0%
Follow parents' tradition	37.6%	21.1%	46.7%
Meat is expensive	-	5.3%	-
Natural way to be healthy	-	5.3%	20.3%
Friends are vegetarians	-	-	-
Other	13.2%	5.3%	-

4.2.2 Recent changes made in the diet

Recent changes made in the diet (B2-b), were categorized into three groups and entered into the SPSS. These categories were: (1) healthy changes (eat more grain products, eats fewer sweets and less sugar, eat fewer fats or fried foods, eat less salty food, eat more

fruits and vegetables, (2) unhealthy changes (eat more snacks and less regular meals) and (3) neutral changes (both healthy and unhealthy changes). Of these, healthy changes were reported by 82.5%. Through a ranking type question, the three main reasons for making recent changes in the diet were gathered. These were: 1) being more health conscious, 2) for reducing weight and 3) having more knowledge about nutrition and health. Results of B2-b & c are tabulated in Tables 4.3 and 4.4.

4.2.3 Food acculturation

The level of food acculturation is shown in Figures 4.1 to 4.4 and Table 4.5. The results revealed that these immigrants were somewhat acculturated to Canadian food habits. But, the food consumption pattern of individual meals revealed that they had strongly maintained their traditional eating patterns for supper, whereas, for breakfast, lunch and snacks they had acculturated to Canadian foods.

4.2.4 Food habits which have adverse nutritional effects

Table 4.6 depicts frequency of consumption of foods which have potential adverse nutritional effects. The results revealed that over half of the respondents rarely or never ate convenience foods (processed, easy to cook, packaged foods) or rich foods (foods high in fat and sugar such as pastries, pies and rich sauces) or drank alcohol whereas more than three-quarters of the respondents (77.0%) ate more meat products since coming to Canada. Approximately half of the respondents (52.2%) reported consuming more soft drinks in Canada compared to when they were in India and less than half (40.0%) reported eating at fast food restaurants more often. Overall, for Indian immigrants and their family members

in Newfoundland, acquisition of food habits which have adverse nutritional effects was moderate and not excessive.

Table 4.3

Percentage of Respondents Who Made Recent Changes in the Diet

Type of Changes	Percentage of Respondents Who Made Changes (N=40)
Healthy Changes	82.5%
Unhealthy Changes	7.5%
Healthy and Unhealthy Changes	10.0%

Table 4.4

Percentage of Respondents Identifying Reasons for Making Changes in the Diet

Reasons	Main Reason rank=1 (N=39)	2nd Main Reason rank=2 (N=25)	3rd Main Reason rank =3 (N=19)
For health reasons	59.0%	4.0%	5.3%
To improve appearance	-	24.0%	21.1%
To reduce weight	10.3%	44.0%	31.6%
Peer pressure	5.1%	4.0%	-
More knowledge about nutrition and health	12.8%	24.0%	42.1%
Other	12.8%	-	-

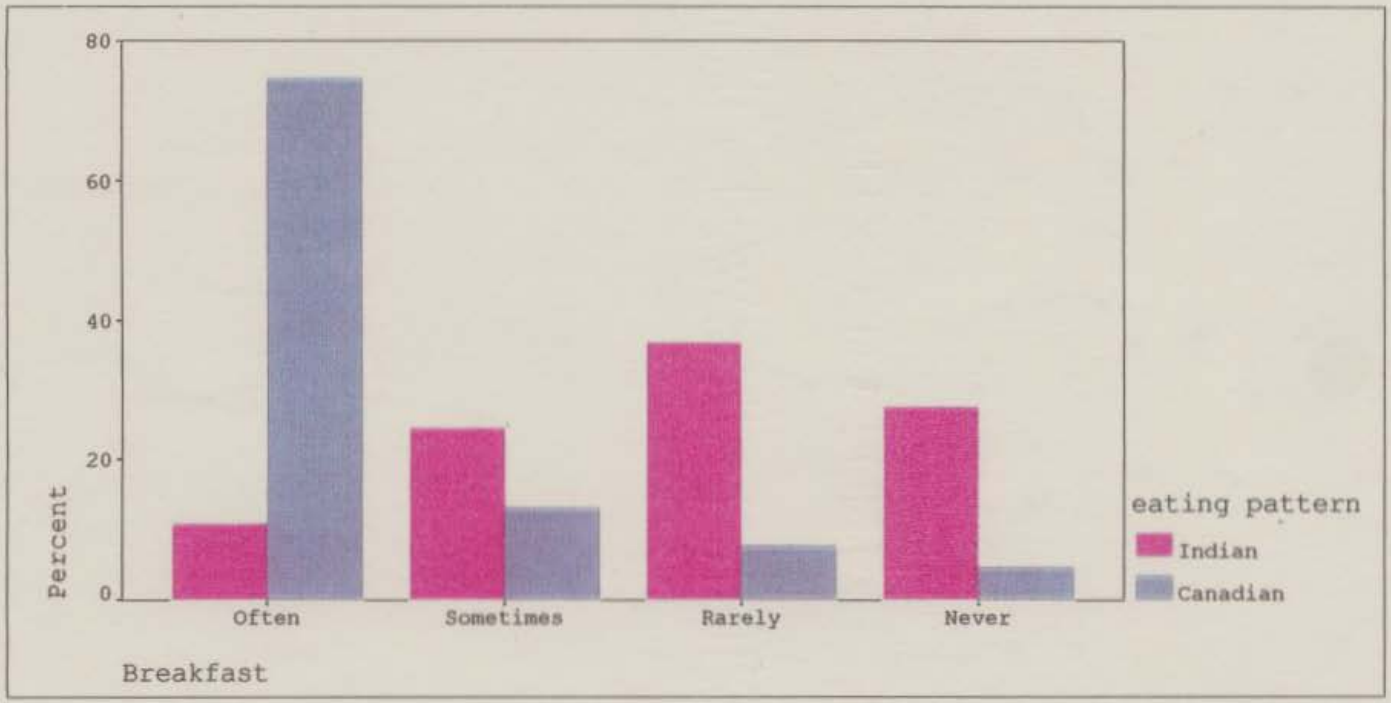

Figure 4.1 Breakfast Acculturation Pattern

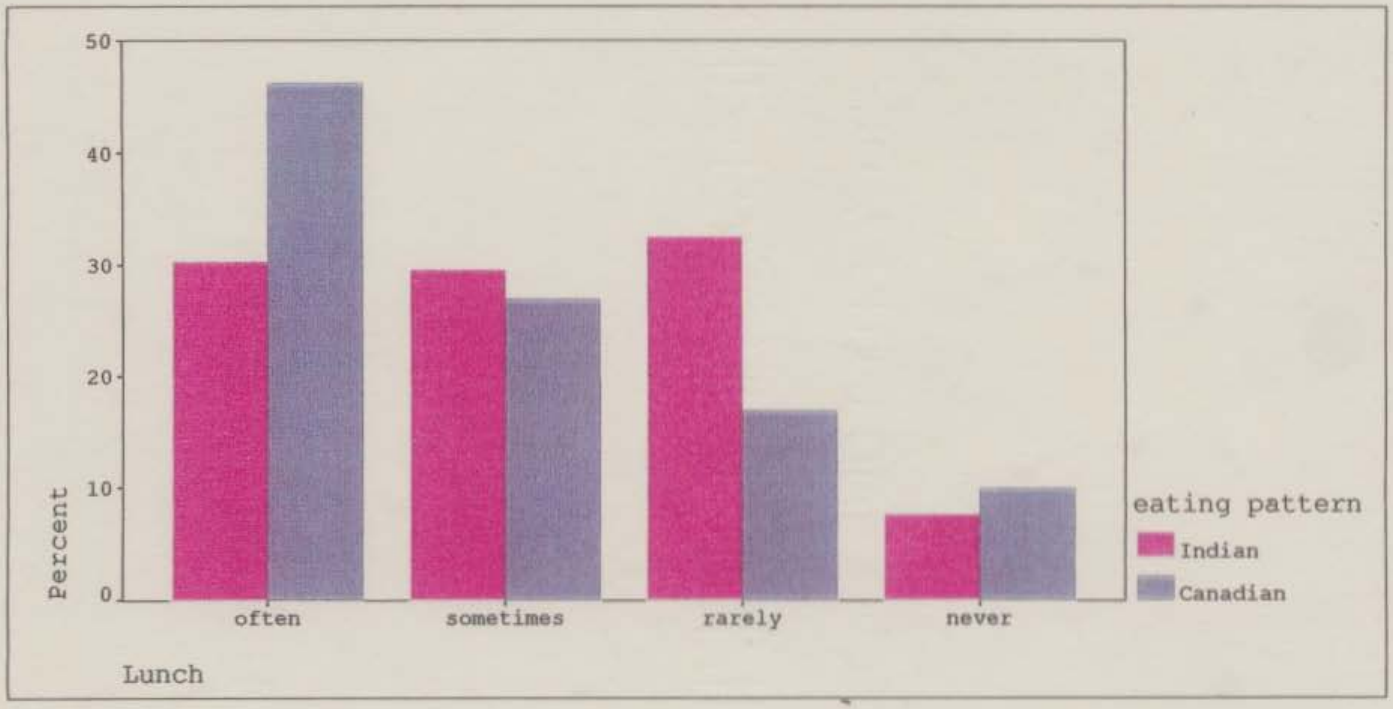

Figure 4.2 Lunch Acculturation Pattern

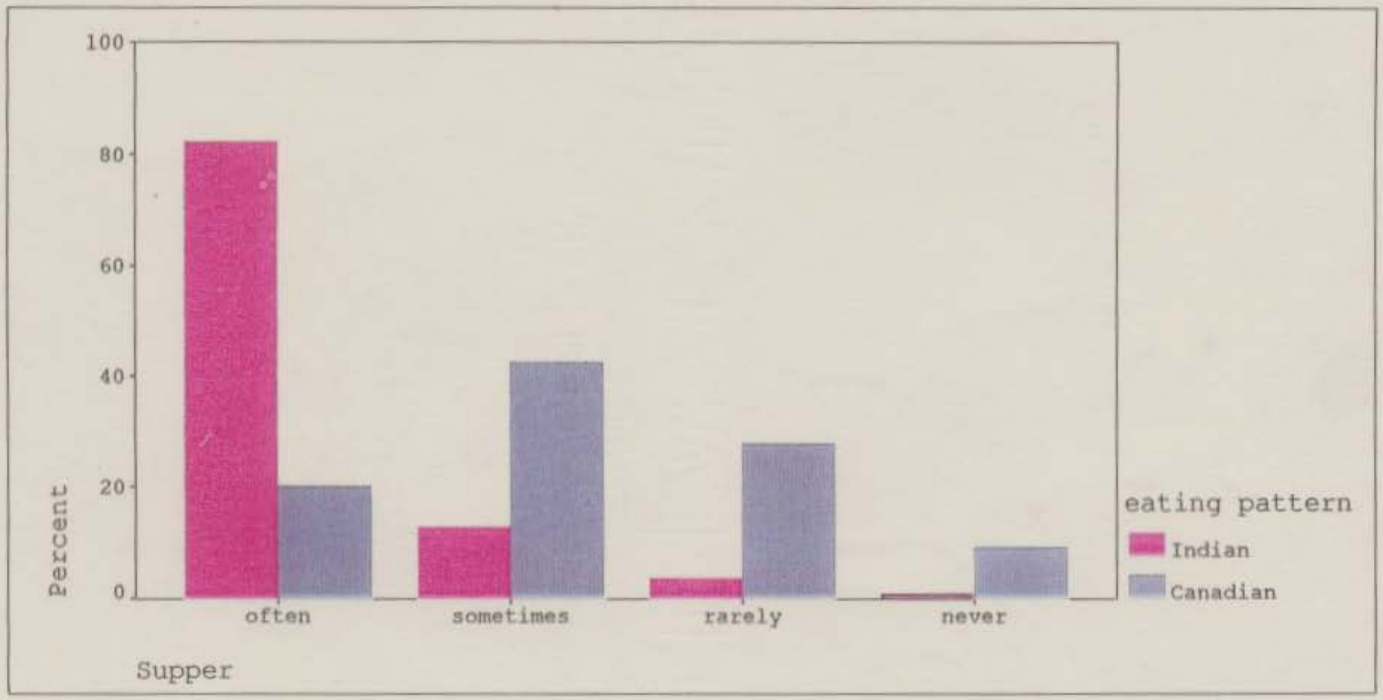

Figure 4.3 Supper Acculturation Pattern

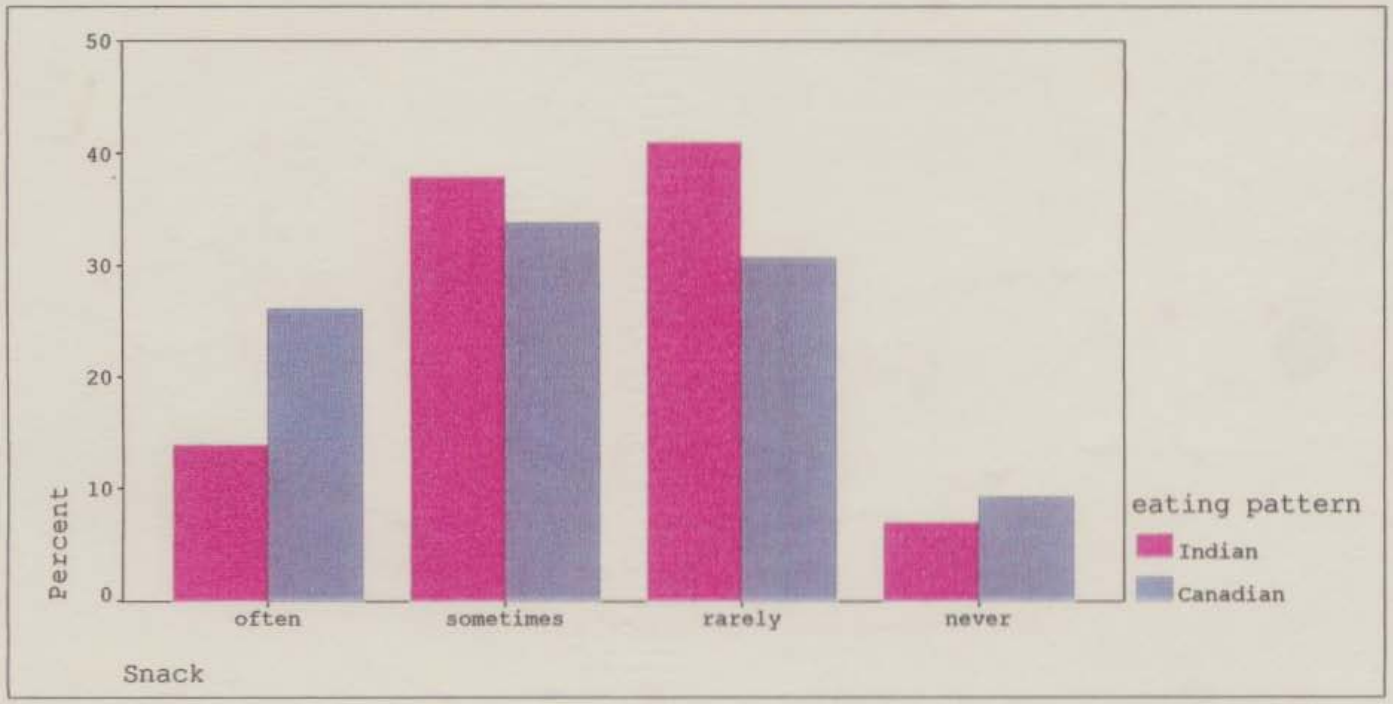

Figure 4.4 Snack Acculturation Pattern

Table 4.5
Food Acculturation Pattern of Indian Immigrants

	Indian Foods				Canadian Foods			
Frequency	Indian Breakfast (N=130)	Indian Lunch (N=132)	Indian Supper (N=131)	Indian Snacks (N=129)	Canadian Breakfast (N=130)	Canadian Lunch (N=130)	Canadian Supper (N=129)	Canadian Snacks (N=130)
Often	10.8%	30.3%	82.4%	14.0%	74.6%	46.2%	20.2%	26.2%
Sometimes	24.6%	29.5%	13.0%	38.0%	13.1%	26.8%	42.6%	33.8%
Rarely	36.9%	32.6%	3.8%	41.1%	7.7%	16.9%	27.9%	30.8%
Never	27.7%	7.6%	0.8%	7.0%	4.6%	10%	9.3%	9.2%
Mean Score	2.81	2.17	1.23	2.41	1.42	1.91	2.57	2.23
Grand Mean	2.15				2.03			

Scale used: Often =1, Sometimes =2, Rarely =3, Never =4

Table 4.6

Consumption of Foods Which have Adverse Nutritional Effects [1]

Frequency	Convenience Foods N=92	Rich Foods N=93	Fast Food Restaurants N=91	Soft Drinks N=92	Alcohol N=92	Meat/Meat Products N=74
Often	6.6%	6.5%	11.1%	23.9%	5.5%	48.6%
Sometimes	34.1%	26.1%	28.9%	28.3%	25.3%	28.4%
Rarely	39.6%	52.2%	50.0%	35.9%	19.8%	9.5%
Never	19.8%	15.2%	10.0%	12.0%	49.5%	13.5%
Mean Frequency	2.73	2.76	2.59	2.36	3.13	1.88
Grand Mean	2.57					

*** Scale used: Often =1, Sometimes =2, Rarely =3, Never =4**
1- This question was not applicable to respondents who were born in Canada

4.2.5 Adherence to Canada's Food Guide to Healthy Eating

Nutritional quality of the diet and adherence to CFGHE guidelines are depicted in Tables 4.7 and 4.8. Minimum suggested serving guidelines for grain products and fruits as recommended by CFGHE (See Appendix 6) were met by only about one quarter of the participants (27.8% and 25.6% respectively). Three-quarters of the subjects (75.0%) met recommendations for meat/ meat alternatives and 72.6% for milk /milk products.

Typical Indian diets are high in grain products, fruits and vegetables and low in meat products, as recommended by CFGHE. These immigrants have shifted away from their traditional diet toward a more western diet. It was also found that only about one in three (32.3%) was meeting the minimum recommended intake for 3 or more food groups. Sixty

eight percent met minimum requirements for at least two food groups.

Table 4.7
Distribution of Respondents by Reported Number of Servings From Each Food Group

Number of Servings	Grain products N=126	Fruits/ vegetables N=125	Milk/milk products N=124	Meat/meat alternatives N=124
> 11 servings	4.8%	2.4%	1.6%	2.4%
5-10 servings	23.0%	23.2%	11.3%	14.5%
2-4 servings	54.0%	60.0%	59.7%	58.1%
one serving	17.5%	14.4%	25.8%	24.2%
none	0.8%	-	1.6%	0.8%
Mode	3	3	3	3

Table 4.8
Distribution of Respondents by Adherence to Canada's Food Guide

Food Groups	Meet Minimum Requirements	Eat more than Suggested Requirements	Eat Less than Suggested Requirements
Grain Products (N=126)	27.8%	-	72.2%
Fruits/Vegetables (N= 125)	25.6%	2.4%	74.4%
Milk Products (N=124)	72.6%	12.9%	27.4%
Meat/Meat Alternates (N=124)	75.0%	16.9%	25.0%

4.2.6 Likelihood of Following CGHE guidelines

Table 4.9 shows the likelihood of following healthy eating and life style practices as recommended by Canada's Guidelines to Healthy Eating. It was found that the likelihood of including a variety of foods every day in diet was between "very likely and somewhat likely". Likewise, it was between "very likely" and "somewhat likely" that these immigrants would do exercise and avoid vitamin supplementation daily. (Canada's Guidelines to Healthy Eating encourage to get all essential nutrients from foods, rather than from vitamin supplements). However, the extent to which they followed lower fat dietary guidelines varied. The likelihood of trimming the fat off the meat and reading labels was between "very likely" and "somewhat likely", whereas the likelihood of avoiding deep frying and spreads such as butter and margarine was between "not very likely" and "somewhat likely".

4.3 Attitudes toward food selection

Attitudinal responses of participants are summarized in Table 4.10. The mean score, standard deviation, coefficient alpha, and percentage of respondents who strongly agreed or agreed with each one the 18 statements (three statements for each of the six attitude categories) are tabulated. For the attitude to 'nutrition is important' the mean score was 4.77 (SD =1.64) out of a possible range of 3 to 12 (score of 3 indicating perfect agreement with the statements and 12 indicating strong disagreement). Almost 94% of the respondents had scores below the midpoint (7.5) indicating that they either agreed or strongly agreed with the statements and had the positive attitude to 'nutrition is important'.

Table 4.9

Distribution of Respondents By Likelihood of Following Canada's Guidelines to Healthy Eating

	Likelihood of Including a Variety of foods				Likelihood of Following Healthy Lifestyle Practices					
Likelihood	Grain Products (N=130)	Fruits/ Vegetables (N=130)	Milk Products (N=130)	Meat & Alternates (N=130)	Exercise (N=130)	Read Label (N=130	Avoid Added Fat (N=130)	Avoid Deep Frying (N=130)	Trim Fat Off the Meat (N=93)	Avoid Vitamin Supplements (N=128)
Very Likely	90.7%	84.7%	77.7%	63.8%	45.4%	32.3%	21.5%	23.8%	82.8%	50.0%
Somewhat Likely	5.4%	13.8%	17.7%	24.6%	36.2%	28.5%	33.8%	48.5%	10.8%	21.9%
Not very Likely	3.9%	1.5%	3.8%	8.5%	14.6%	17.7%	34.6%	21.5%	3.2%	10.9%
Not at all Likely	-	-	0.8%	3.1%	3.8%	21.5%	10.0%	6.2%	3.2%	17.2%
Mean Likelihood	1.13	1.16	1.28	1.51	1.62	1.62	2.33	2.1	1.2	1.8

***Scale used: Very likely =1, Somewhat likely =2, Not very likely =3, Not at all likely =4.**

Table 4.10
Summary of Attitudinal Responses

Statements	Respondents who Strongly Agree/Agree (%)	Mean Score± Standard Deviation	Coefficient Alpha
Nutrition is important			
1. Good eating habits are important to maintain health	97. 7		
2. I would like to learn more about what to eat/how to eat healthy	82.0	4.77±1.64	0.68
3. Learning more about nutrition might help to improve my eating habits	86.2		
Sociability/Hospitality			
1. My family likes to eat meals together	93.1		
2. I enjoy eating out where my friends eat	52.3	5.59±1.34	0.65
3. I like to serve refreshments to friends when they drop in	97.0		
Concern for Social Status			
1. My family serves fancier foods when we have company	72.0		
2. We use our best linens and dishes when we have company	83.3	5.89±1.69	0.72
3. I would not consider serving certain foods for company dinners	75.8		
Attitude to Convenience			
1. My family often buys convenience foods from grocery stores	40.2		
2. I enjoy frozen ready made such as T.V. dinners	53.8	7.92±1.64	0.57
3. I like learning how to fix quick meals that take less time to prepare	75.8		
Food Explorative			
1. I seldom try foods from other countries or explore new restaurants	40.2		
2. I like to eat foods that I am used to	84.8	1.82±1.14	*0.32
3. Before eating a new food, I like to know whether it contains any religiously forbidden ingredients	48.5		
Non-frugal			
1. I buy any food I want, whenever I want, no matter what it costs	43.2		
2. I enjoy eating out even though I know it is expensive	51.5	7.60±1.93	0.52
3. Brand name products are always better than store brand products	37.1		

* Alpha coefficient <0.5. Only statement # 2 was used to infer the attitude

The mean score for the attitude to 'sociability/hospitality' was 5.59 (SD=1.34). Most of the respondents (93%) had scores below the midpoint indicating that they had a favorable attitude to sociability/hospitality.

Likewise, for the attitude to 'concern for social status' mean score was 5.89(SD=1.69). Nearly 86% of the respondents scored below the midpoint suggesting that a 'concern for social status' was prevalent among these immigrants.

A mean score of 7.92 (SD=1.64) for the attitude to 'convenience', which is above the midpoint, implied that the participants were not swayed by convenience when selecting foods. More than half (57%) of the respondents disagreed with these statements.

For the statements used to test attitude to 'food exploration' the alpha coefficient was less than 0.5. This indicated that the statements lacked internal consistency. Therefore, attitude to 'food exploration' was inferred from one statement, " I like to eat foods that I am used to", to which 85% of the subjects agreed. Since only one statement was used, the possible scores ranged from 1-4. The mean score 1.82(SD=1.14) was below mid point (2.5) and hence it was inferred that these immigrants were not food explorative.

For the attitude to being "non-frugal" over half of the subjects disagreed with the statements and the mean score 7.60 (SD=1.93) was above the midpoint. This indicated that these immigrants are frugal when selecting foods.

4.4 Knowledge level

From respondent's comments written on the questionnaire it was gathered that Question D8, "Eating according to Canada's Food Guide will provide all the vitamins and

minerals I need" confused people who are vegans (people who eat only plant based foods). Since pure vegans' nutritional needs would not be met by CFGHE, it was decided to drop this question when assessing the level of knowledge. Also, an inter-item analysis using K-R20 revealed that maximum reliability coefficient could be obtained by reducing the number of items to 7. The K-R 20 for the nutrition knowledge measure (with the 7 questions given on Table 4.11) was 0.58.

The level of nutrition knowledge of the subjects is depicted in Figure 4.5. Scores ranged from a low of zero to a high of 7 out of a possible 7. The mean score, 4.1, indicated a desirable level of nutrition knowledge. About one-half of the subjects (44.7%) answered five or more questions correctly. Distribution of respondents by knowledge category is presented in Table 4.11. The question " which food has the most calories per gram?" was answered correctly by 81.1% of the respondents. This was not surprising, considering the recent publicity given to choosing lower fat products to reduce diet related chronic diseases. Almost 71.5% of the respondents had heard about Canada's Food Guide to Healthy Eating Guidelines and 63.6% recognized foods which had to be limited to reduce diet related diseases.

Respondents had minimal knowledge about "substitutes for meat products" and the food group from which "every day the highest number of servings should come from" for healthy eating. Only 23.5 % of the respondents knew the correct answer for meat substitutes and 36.4% correctly identified grain products as the food group that should constitute the highest number of servings every day.

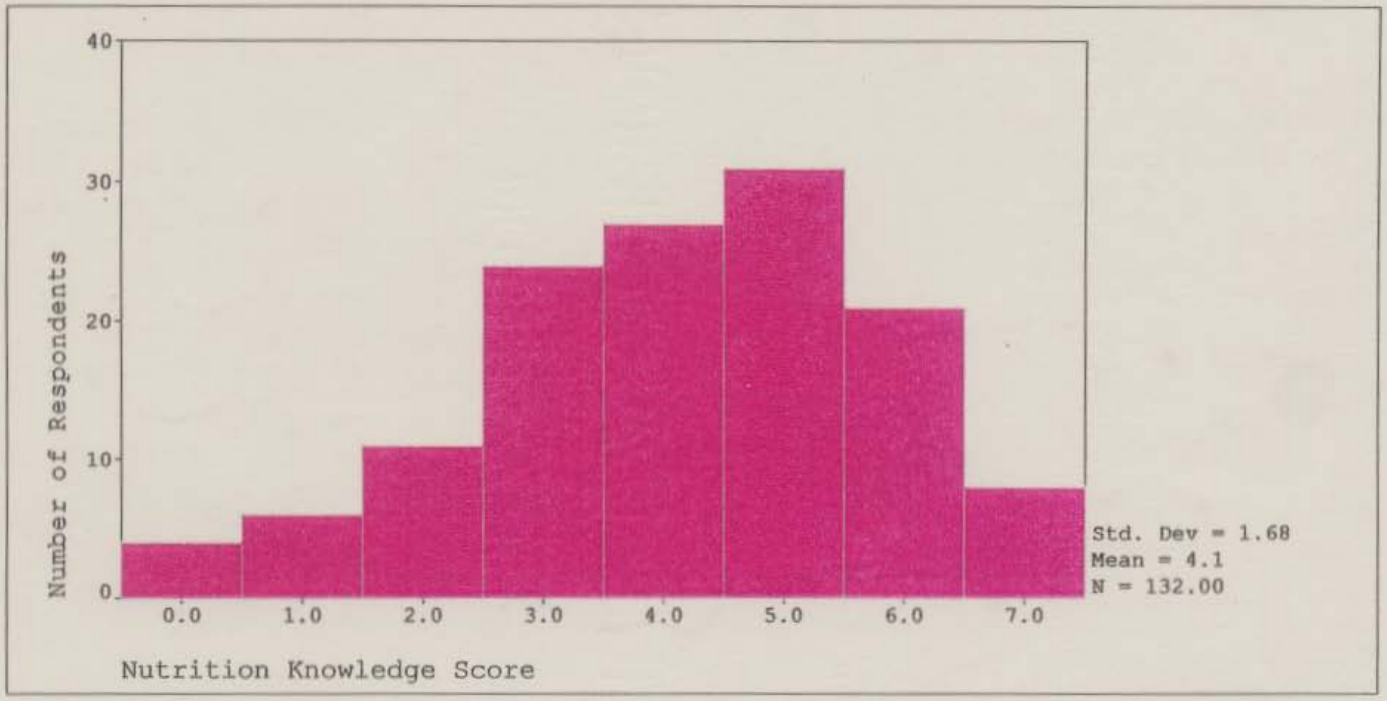

Figure 4.5 Knowledge Level

Table 4.11
Distribution of Respondents by Nutrition Knowledge Score

Knowledge Category	Correct Response	
	N	%
Best method for reducing body weight	104	78.8
Ways to reduce diet related diseases	84	63.6
Substitutes for meat products	31	23.5
Food with most calories	107	81.1
Meaning of enjoy a variety of foods	73	55.3
Food group that should constitute the highest # of servings	48	36.4
Awareness of Canada's Food Guide to Healthy Eating	93	71.5

The nutrition knowledge questions in Section D which were not used in determining the level of knowledge were whether the respondents had read CFGHE, whether they had used it as a general guide to their daily eating plan and whether they believed that eating according to CFGHE would provide all the vitamins and minerals they needed. It was found that of the 77.1% of the respondents who have seen or heard about CFGHE ,77.1% have read the guide and 62.7% used it as a guide to their meal planning. Approximately two thirds (68%) of the subjects responded to the question about vitamins and mineral adequacy of CFGHE. Of these, 56.1% agreed that eating according to CFGHE provided all the vitamins and minerals they need.

4.5. Impact of Sociodemographic Characteristics on Nutrition Related Knowledge, Attitudes and Practices

A subset from Table 4.1 namely, age, gender, religion and length of stay, type of household, employment status was selected to assess the influence of demographic characteristics on knowledge, attitudes and dietary/lifestyle practices. Income, level of education and language were not used as explanatory variables. This was because a large proportion of the sample had high income, high education and few language problems.

4.5.1 Demographic Characteristics and Knowledge level

Among the selected demographic characteristics only length of stay in Canada was significantly associated ($p<0.01$) with the level of knowledge. Respondents were categorized as those with a good level of nutrition knowledge (total score 4/7 and above) and a poor level of knowledge (total score 3/7 and below). It was observed that the longer the length of stay, the better was the level of knowledge. Results are tabulated in Table 4.12.

4.5.2 Demographic Characteristics and Attitudes

No significant associations were found between any of the selected demographic characteristics and the five attitude categories identified. Full results of the chi-square tests are tabulated in Appendix 9, Table 1.

Table 4.12

Cross-Tabulations and Chi-Square Values Between Knowledge level and Selected Demographic Characteristics

Demographic Characteristics	Knowledge level: Good Poor		
	χ^2	p value	N
***Age:** 10-29 30-44 45-65+	**5.43**	**0.07**	**131**
Gender: Male Female	**0.13**	**0.72**	**132**
***Religion;** Hinduism Christianity Other	**2.05**	**0.36**	**128**
***Length of Stay in Canada:** <5 years 6-15 years >15 years	**17.61**	**0.00**	**131**
***Household type:** Households without children Households with children	**0.52**	**0.47**	**132**
***Employment status:** Student Retired Employed Unemployed/homemakers	**3.18**	**0.36**	**131**
*** Pooled Categories from Table 4.1 to make expected frequencies ≥ 5**			

4.5.3 Demographic characteristics and nutrition related behaviors

The following nutrition related behaviors were assessed in relation to the selected demographic characteristics; questionnaire location is given in parenthesis.

1) Practice of vegetarianism (B1-a)

2) Recent changes made in the diet(B2-a)

3) Frequency of consumption of Indian foods (B3)

4) Frequency of consumption of Canadian foods (B4)

5) Frequency of food habits which have adverse nutritional effects (B5)

6) Adherence to Canada's Food Guide to Healthy Eating serving guidelines (B6)

7) Include a variety of foods every day (B7- a, b, c & d)

8) Practice of vitamin supplementation (B7-e)

9) Do some exercise every day (B7-f)

10)Follow lower fat dietary guidelines (B7- g, h, i & j)

For items 3-5, namely, frequency of consumption of Indian foods (B3), frequency of consumption of Canadian foods (B4) and frequency of food habits which have adverse nutritional effects (B5), scores were summed and respondents were divided into two categories, those who follow a dietary practice more frequently (often and sometimes) and those who follow less frequently (rarely or never). Similarly, for items 7 and 10, likelihood of including a variety of foods every day (B7-a,b,c and d) and likelihood of following lower fat dietary guidelines (B7- g,h and i), respondents were categorized into two groups, those who were more likely to follow a nutrition related practice (very likely and somewhat likely)

and those who were less likely (not very likely and not all likely) to follow. For example, for the question on "how often do you eat traditional Indian foods?", the scores ranged from 4-16. The midpoint was 10. It was taken that those who had scores below 10 ate traditional Indian foods more frequently and those who had scores above 10 ate Indian foods less frequently. For item 6, adherence to Canada's Food Guide to Healthy Eating serving guidelines (B6) respondents were divided into three categories, those who follow CFGHE serving guidelines for three or four food groups, for two food groups and for one or no food groups.

Summary of the results are tabulated in Table 4.13. Full results of the chi-square tests are tabulated in Appendix 10, Table 2. The practice of vegetarianism was higher among Hindus compared to those who practiced other religions. However, it was found that as the length of stay in Canada increased, significantly fewer respondents were following vegetarianism. This could be the reason for the observation that even though 68% practiced Hinduism only 28% were vegetarians.

Acculturation to Canadian food habits was significantly associated with employment status: it was higher among students and the employed than among the retired, homemakers and the unemployed.

Acquisition of food habits which have adverse nutritional effects was also significantly associated with employment status, but, it was lower among homemakers and the retired than among the students and the employed.

The likelihood of Including four food groups daily in the diet and following lower

TABLE 4.13
Association Between Demographic Characteristics and Nutrition Related Behaviors

Nutrition Related Behaviors [1]	Demographic Characteristics					
	Sex	Age	Length of stay	Religion	Household Type	Employment status
Practice of vegetarianism	NS	NS	S*	S*	NS	NS
Recent changes in diet	NS	NS	NS	NS	S	NS
Consumption of Indian foods	NS	NS	NS	NS	NS	NS
Consumption of Canadian foods	NS	NS	NS	NS	NS	S*
Follow low risk dietary practices	NS	NS	NS	NS	NS	S*
Follow CFGHE serving guidelines	NS	NS	NS	NS	NS	NS
Include 4 food groups every day	NS	S*	NS	NS	NS	NS
Take vitamin supplements	NS	S*	NS	NS	NS	S
Exercise every day	NS	NS	S	NS	NS	S
Practice lower fat dietary guidelines	NS	S*	S*	NS	NS	S*

1 Responses are taken from Section B-questions B1-B7

NS =Association not significant with $p>0.05$
S =Association significant with $p<0.05$
S* =Association significant with $p<0.01$

fat dietary guidelines was significantly higher among older age group. Practice of lower fat dietary guidelines was significantly higher among those with longer length of stay in Canada and those who were not employed outside their homes (home makers, unemployed and the retired). The likelihood of doing exercise was significantly associated with longer length of stay in Canada and employment status (higher among students and the employed). It was also observed that vitamin supplementation was significantly higher among the older age group and lower among students and the employed.

4.6. Relationships Among Nutrition Related Knowledge, Attitudes and Behaviors

4.6.1 Relationship between knowledge level and attitude to 'nutrition is important'

There was a significant association between nutrition related knowledge and the 'attitude to nutrition is important' ($p<0.01$). This supports the hypotheses that respondents who have higher level of knowledge tend to have a more favorable attitude to 'nutrition is important'. Results are tabulated in Table 4.14.

Table 4.14

Cross-tabulation and Chi-square Values Between Knowledge and Attitude to 'Nutrition is Important'

Nutrition related knowledge level 1.Good 2.Poor	Attitude to 'nutrition is important" 1.Agree/strongly agree 2. Disagree/strongly disagree		
	χ^2	p value	N
	25.52	0.00	130

4.6.2 Attitude to "nutrition is important", knowledge level and healthy behaviors

The following nutrition related healthy behaviors were assessed in relation to nutrition knowledge and the attitude to 'nutrition is important'; questionnaire location is given in parenthesis.

1) Recent changes made in the diet (B2-a)

2) Want to know more about nutrition (E2-a)

3)Follow suggested recommendation for grains (B6-a)

4)Follow minimum suggested serving guidelines for milk products (B6-b)

5)Follow minimum suggested serving guidelines for fruits/vegetables (B6-c)

6)Follow minimum suggested serving guidelines for meat/meat alternates (B6-d)

7)Include four food groups regularly (B7-a,b,c & d)

8)Follow lower fat dietary guidelines (B7- g,h& i)

9)Acquisition of food habits which have minimal adverse nutritional effects (B5)

10)Exercise every day (B7-f)

Of these, items 1 to 6 were categorical variables. Relationship of these variables with the level of knowledge and attitude to "nutrition is important" was analyzed using chi-square test. The rest, items 7 to 10, were ordinal variables. Relationship of these variables with nutrition knowledge (total knowledge score) and attitude to "nutrition is important" (sum of scores of the 3 statements) was analyzed using correlation analysis. A summary of the results are tabulated in Table 4.15. Full results of chi-square and correlation analyses are tabulated in Appendix 11, Tables 3(a) and 3(b).

There was significant relationship between the attitude to 'nutrition is important' and seven of the chosen nutrition related healthy practices, namely, recent changes made in the diet (B2-a), desire to know more about nutrition (E2-a), follow lower fat dietary guidelines (B7-g, h & i), follow minimum suggested serving guidelines for grains (B6-a), follow minimum suggested serving guideline for milk products (B6-c), follow minimum suggested serving guidelines for fruits/vegetables (B6-c), and follow minimum suggested serving guidelines for meat/meat alternatives (B6-d).This supported the hypothesis that the respondents who have favorable attitude toward 'nutrition is important' tend to follow healthy lifestyle practices.

A higher level of nutrition knowledge was significantly associated with only five of the 10 selected nutrition related healthy practices (Table 4.15). In addition, the following associations were tested to determine whether respondents put their knowledge to use in their day-to-day food selection practice.

1. knowledge about diet related diseases (Appendix 4-D2) and acquisition of food habits which have adverse health effects (Appendix 2-B5)
2. knowledge of high calorie food (Appendix 4-D4) and the practice of choosing lower fat foods (Appendix 2-B7-g,h,i & j)
3. knowledge of what it means to "enjoy a variety of foods" (Appendix 4-D5) and the practice of including four food groups regularly in the diet (Appendix 2-B7-a,b,c &d)
4. knowledge about which food group should constitute the highest number of

servings (Appendix 4-D6) and the practice of following recommended serving guidelines for grain products (Appendix 2 -B6 a)

Associations were significant between item (1), correct knowledge about diet related diseases and the minimum acquisition of food habits that have adverse health effects ($p=<.05$), and between item (2), correct knowledge about high calorie foods and the practice of choosing lower fat foods ($p<0.01$). Associations between item (3), correct knowledge about which food group should constitute the highest number of servings and consuming the recommended number of servings for grain products every day and between (4), correct knowledge about what it means to enjoy a variety of foods and the practice of including a variety of foods in the diet was not significant. Full results of these chi-square tests are tabulated in appendix 12- Table 4.

Overall, the analysis revealed that knowledge by itself was not an important predictor of healthy eating or lifestyle practices and did not support the hypothesis that the higher the level of knowledge, the better the healthy eating/lifestyle practices.

4.6.3 Attitudes and food selection behavior

A correlation analysis was carried out to assess relationships between selected attitude categories and food selection behavior. It was found that respondents who had a favorable attitude towards food exploration tend to consume Canadian foods frequently ($r=0.22$, $p<0.01$). This supports the hypotheses that the more favorable the attitude to 'food exploration', the higher the frequency of consumption of Canadian foods.

Table 4.15
Interrelationships Among Knowledge, Attitude to 'Nutrition is Important' And Healthy Nutrition Related Practices

Healthy Nutrition Related Practices	Nutrition Knowledge	Attitude to 'Nutrition is Important'
1. Recent changes made in the diet	*S	*S
2. Want to know more about nutrition	NS	*S
3.Follow suggested recommendations for grains	NS	*S
4. Follow minimum suggested serving guidelines for milk products	*S	*S
5.Follow minimum suggested serving guidelines for fruits/vegetables	NS	*S
6. Follow minimum suggested serving guidelines for meat/meat alternatives	*S	*S
7. Include four food groups regularly	*S	NS
8. Follow lower fat dietary guidelines	*S	S
9. Acquisition of food habits which have adverse nutritional effects	NS	NS
10. Exercise every day	NS	NS

NS Association not significant with $P > 0.05$
S Association significant with $P < 0.05$
*S Association significant with $P < 0.01$

Attitude to 'sociability/hospitality' was assessed in relation to frequency of consumption of Canadian foods. The significant association found between these variables ($r=0.28$, $p<0.01$) supports the hypothesis that respondents who have a favorable attitude to sociability/hospitality tend to choose Canadian foods more frequently.

Attitude to 'concern for social status' was assessed in relation to frequency of consumption of Indian foods. Although 77.7% of the respondents who had a favorable attitude towards 'concern for social status' consumed Indian foods more frequently, the association was not significant. As such the hypothesis that those who have a favorable attitude towards 'concern for social status', tend to consume Indian foods more frequently is not supported.

The results of these analyses supported all hypotheses except two, the higher the level of knowledge the healthier the eating or lifestyle practices and the more favorable the attitude to 'social status' the higher the consumption of Indian foods.

4.7 Needs Assessment

4.7.1 Nutrition information needs

One-half of the respondents had sought nutrition information. Through a ranking type question, (E1.b), three most frequently used sources were gathered. They were health professionals (dietitians, doctors and nurses), magazines/cook books and personal sources (friends, mother etc). Results are tabulated in Table 4.16

Nearly three-fourths (72.7%) of the respondents expressed their desire to know more about nutrition. Through the ranking type question (E2.b), nutrition related topics of interest were collected and they were (1) general nutrition and its implications for diseases (2) nutritional quality of their traditional diet and 3) cooking classes on low cost nutritious recipes. Results are tabulated in Table 4.17.

Table 4.16

Distribution of Respondents Who identified Frequently Used Sources of Nutrition Information

Sources	Most Frequently used rank=1 N=63	2nd most frequently used rank =2 N=47	3rd most frequently used rank =3 (N=41)
Health professionals	52.4%	10.6%	4.9%
Magazines/ cookbooks	15.9%	36.2%	19.5%
Personal sources	11.1%	17.0%	26.8%
Media	3.2%	17.0%	31.7%
Commonsense	9.5%	17.0%	12.2%
Other	7.9%	2.1%	4.9%

4.7.2 Awareness, utilization and perceived appropriateness of nutrition related services

4.7.2.1 Community Services

About one-half (48.5%) of the subjects were aware of the availability of community nutrition services like "Meals on Wheels". Although less than 2% of the respondents had utilized these services, those who had, rated these services as culturally appropriate.

Table 4.17
Distribution of Respondents Who Identified Nutrition Related Topics of Interest

Nutrition Related Topics	1st Choice rank=1 (N=94)	2nd Choice rank=2 (N=65)	3rd Choice rank =3 (N=60)
Supermarket tours	17.0%	9.2%	11.7%
Cooking classes on low cost nutritious foods	14.9%	26.2%	18.3%
General nutrition and implication on diseases	33.0%	18.5%	28.3%
Nutritional quality of their traditional diet	24.5%	35.4%	16.7%
Ethnic newsletters and magazines	8.5%	10.8%	23.3%
Other	2.1%	-	1.7%

4.7.2.2 Hospital nutrition services

Nearly three-fourths (73.5%) of the subjects and /or their family members reported that they had eaten hospital food in Canada; only 24% reported that those services were culturally appropriate. Through a ranking type questions, three main suggestions given for improvement of hospital food services were sought. They were 1) choice of more ethnic foods on a regular basis, 2) availability of hospital approved catering services, and 3) service providers' understanding and appreciation of the food habits of immigrants. Results are tabulated in Table 4.18.

While outpatient nutrition counseling services in the hospitals were utilized by 11.4% of the respondents, very few (2.3%) found these services culturally appropriate. The ranking type question (E4-c), identified the changes they wanted to see. These suggestions were;

1) dietitians' having an understanding of the various food habits of immigrants, 2) education materials with food exchanges from different cultures and 3) language and culturally specific instruction materials. Actual frequencies and percentages are tabulated in Table 4.19.

4.7.3 General health condition/problems

Nearly three-fourths of the respondents (69.5%) did not report any health problems. The various health problems reported by 30% of respondents included hypercholesterolemia (12%), hypertension (11%), diabetes (10%), elevated triglycerides (5%), coronary artery diseases (2.3%), gall bladder diseases (2.3 %), lactose intolerance (1.5%) and myocardial infarction (0.8%). Actual frequencies are tabulated in Appendix 13, table 5.

Table 4.18
Distribution of Respondents Who Suggested Changes For Improvement of Hospital Food Services

Suggested Changes	Main Suggestion Rank=1 (N=71)	2nd Suggestion Rank=2 (N=47)	3rd Suggestion Rank=3 (N=46)
Choice of ethnic foods regularly in hospitals	45.1%	23.4%	15.2%
Availability of hospital approved catering services	22.5%	38.3%	21.7%
Service providers willingness to understand and appreciate diverse food habits of immigrants	21.1%	31.9%	45.7%
Interpreter services	2.8%	2.1%	17.4%
Other	7.0%	4.3%	-

Table 4.19
Distribution Respondents Who Suggested Changes for Improvement of Outpatient Nutrition Clinics

Suggestions	Main Suggestion Rank =1 (N=26)	2nd Suggestion Rank = 2 (N=21)	3rd Suggestion Rank=3 (18)
language and culturally specific instruction and resource material	26.9%	14.3%	55.6%
Dietitians understanding of the various food habits of immigrants	57.7%	28.6%	5.6%
Instructional materials and resource materials with food exchanges from different cultures	15.5%	57.1%	38.9%
Other	-	-	-

4.7.4 Ethnic food availability

Nearly two-thirds (65.1%) of the participants reported that ethnic foods were not readily available in Newfoundland. The need to substitute to the available variety in St. John's was reported by 69.6% of subjects. The percentage of immigrants who substitute various foods 'often' and 'sometimes' are as follows; 83% (vegetables), 80% (fish), 80% (grains), 75%(spices), 75% (fruits),73% (beans and dhals), 65% (meat products), 64% (milk products), 60% (cakes and cookies) 53% (pickles) and 49% (candies and nuts). Actual frequencies are included in appendix 14, Table 6.

4.7.5 Changes in food preparation practices

Changes in food preparation practices were reported by 72% of the respondents. Types of changes reported included frequent baking, frequent use of microwave, bulk cooking, freezing left over foods, spending less time on cooking, switching away from pure Indian cooking, trying a variety of international dishes, eating more canned foods, eating more meat and cheese based dishes and preparing more processed foods. Some of the reasons given for making such changes were lack of time to cook Indian dishes, lack of availability of proper ingredients for traditional cooking, and cooking becoming more interesting with the modern equipment available in Canada.

4.7.6 Nutrition related concerns

Several nutrition related concerns were raised by respondents through the open ended question, " Do you or any of your family members have specific nutritional concerns? Please explain". Nutrition related concerns identified included: having no transportation to buy Indian groceries, lack of cooking skills, international students requiring more nutrition education, tendency to eat high fat foods because of the easy availability of fast foods, most Canadian dishes being dairy based and hence inappropriate for those who were lactose intolerant, tendency to overeat in Canada, dietitians' inadequate knowledge about East Indian cooking and eating patterns and inadequate knowledge about the nutritional value of their traditional foods. Other concerns ranged from being overweight to underweight and having severe constipation. One interesting comment in this section was "my children are doctors, I don't have any nutrition concerns".

4.7.7 Comments and suggestions for better nutrition services

Suggestions for the improving the present system were sought through the open ended question, " What comments and suggestions do you have for the existing dietary services system in the community or in the hospitals?" The following were some of the needs identified:

- more culturally trained service providers who can facilitate adjustment to the food habits in a new culture
- family physicians better able to help with a patient's diet
- more choice of culturally appropriate food, especially vegetarian food in hospitals
- more choices of vegetarian foods, not necessarily ethnic foods, in hospitals
- knowing how to use the best of both countries' eating habits
- more information on low cost, nutritious cooking methods/recipes
- more recognition for the unique problems of immigrants living in rural areas
- culturally appropriate dietary services for long term stay in hospitals
- greater awareness of the needs of ethnic minorities and appropriate changes
- more ethnic nutritional newsletters, cookbooks, and immigrant oriented supermarket tours
- samples of menus instead of CFGHE tear sheets
- more ethnic grocery stores with at least one near the University
- more workshops with invited speakers be arranged for the immigrant

population

Two other interesting comments that came up in this section are quoted below.

"Use common sense and be adaptable. Generally services are excellent. I don't like to whine".

A loyal vegan commented:

"I think that most people, even the professionals are hopelessly under informed on the extent to which their reliance on animal based foods is detrimental to their health. I would like to see a movement towards plant based foods as means of reducing death rates related to diseases of affluence (heart diseases, stroke, cancer, diabetes etc.). I think that we should begin to acknowledge that the perceived "health care crisis" in our country perhaps originates from a "diet crisis".

5.0 Discussion

While a modest amount of literature exists on characteristic ethnic foods and the food acculturation pattern of immigrants, little research had been conducted on factors influencing their food choices. To the investigator's knowledge, the present study is the first survey that assessed the nutrition related knowledge, attitudes and needs of an immigrant group in Canada. Since no validated instruments were readily available, this research was also a preliminary exploration of how the level of knowledge about healthy eating guidelines in Canada and attitudes towards food selection of a group of immigrants could be conceptualized and measured. Much work remains, however, to better understand the dimensions of attitudes and knowledge related to food selection of immigrants and to validate the measures.

The data presented in this study were obtained from a predominantly Indian-born population who were well educated and well established in Canada with higher than average income. The good response rate of this mail survey (70-100% from each of the five subgroups) is suggestive of this ethnic group's interest in nutrition related issues.

5.1 Nutrition knowledge

Respondents were fairly knowledgeable about the healthy eating guidelines in Canada. The only demographic characteristic that was significantly associated with the level of nutrition knowledge was the length of stay in Canada. Since the study was testing the level of knowledge about Canadian nutrition guidelines, it was reasonable to assume that the

longer the length of stay in Canada, the more knowledgeable they would be about Canadian healthy eating guidelines. Unlike other studies (Rahn et al., 1984, Wade 1970, Fusillo et al., 1977) there were no significant differences in the levels of knowledge of this ethnic group based on age and sex.

Of the five potential sources of nutrition information, respondents most frequently selected doctors, dietitians and nurses. Rahn et al.,(1984) found similar results in a sample of 210 urban women in the city of Guelph. As he had pointed out, this result might be suggestive of the study population's recognition of nutrition as a "component of specialized professional knowledge". A significant association was found between higher level of knowledge and the source of their nutrition information ($p < 0.01$). This made source of nutrition information another predictor of their level of knowledge.

The significant association found between attitude to 'nutrition is important' and the level of knowledge ($p<0.01$) made attitude to 'nutrition is important' also a predictor of the level of knowledge of this ethnic group. This result was similar to the finding of Sims (1976) who found that nutrition knowledge scores of mothers of preschool children was significantly associated with their attitude to "nutrition is important".

No contemporary studies were found in the literature that used the same variables as this study to determine the level of knowledge, and, as such, a comparison was not possible. The internal consistency/reliability of this nutrition knowledge test using K-R 20 was found to be 0.58, even though the goal was to achieve a reliability coefficient of 0.7. Since the reliability coefficient is based on both the number of items and the average consistency

among items (Nunnally, 1978), including additional items in the test instrument might greatly increase the internal consistency/ reliability.

5.2 Attitudes

This study revealed that when selecting foods, this ethnic group was not swayed by the attitude to 'convenience'. They were found to be frugal and non-food explorative, but sociable/ hospitable with a strong concern for social status. They also valued nutrition as very important for their health. These findings have practical applications in the area of nutrition education. Nutritionally well balanced, cost effective ethnically tailored dishes within their family budget would be valuable to this ethnic group rather than foods that are simple and fast to prepare. The attitude to 'sociability/hospitality' could be a reflection of this ethnic group's emphasis on social relationships centered around foods and the value they would place on preparation and service of foods. With the exception of attitude to'frugality'(no corresponding dietary behavior was included in Section B to test the correspondence between attitude to 'frugality' and dietary behavior) there was a clear demonstration of association between attitudes and eating behavior.

As for the knowledge measure, age and sex were not significantly associated with attitudes. This is in contrast to the study by Kinsey (1994) which found that age and sex were predictors of attitude towards food selection. This pinpoints the fact that categorizing this ethnic group by age or sex is probably not a necessary approach when developing food and nutrition education programs.

The reliability coefficient for this attitude measure varied from 0.32 to 0.72. Since

the reliability coefficient is based on both the number of items and the average correlation among items (Nunnally, 1978), as with the knowledge measure, including additional items in the test instrument might greatly increase the internal consistency/ reliability of this measure.

5.3 Dietary practices

Results of the present study illustrated several trends in the dietary practices of Indian immigrants and their family members.

First, it was found that they have somewhat acculturated to Canadian food habits. This finding supported previous research findings that dietary acculturation was an inevitable consequence of migration (Chau et al., 1990, Crane et al., 1980, Hrboticky et al., 1984) and underscores the importance of taking into consideration the level of acculturation as a modifying factor when developing nutrition education programs for immigrants. As Grivetti et al., (1978) had pointed out " let us not be surprised when we encounter and counsel Asians who do not eat rice, Hispanics who do not eat Tacos or American Indians of California who have never eaten acorn flour bread. We can be better nutrition educators when we examine what our clients actually eat". Dietitians who serve immigrant clients should be conscious of these modifying factors when assessing, evaluating and prescribing diets.

The food consumption pattern of individual meals revealed that this ethnic group had strongly maintained their traditional eating patterns for supper, whereas, for breakfast, lunch and snacks they had acculturated to Canadian foods. What could be the reason for such a

shift from their traditional food habits? Hrboticky (1984) studied Chinese adolescent boys and found that foods typically consumed in the company of friends were considered more prestigious among the more acculturated boys. Hrboticky (1994) measured the prestige construct as the degree to which foods were appropriate to be eaten with friends. The demographic characteristic which was associated with the frequency of consumption of Canadian foods was employment status. Attitudinal factors related to the frequency of consumption of Canadian foods were attitude to 'sociability/hospitality' and 'food exploration'. From these associations, it could be assumed that those who interact extensively with mainstream Canadians eat Canadian lunch and snacks, meals usually eaten outside home. If so, what could be the reason for the strong acculturation pattern to Canadian breakfast, a meal usually eaten at home? The needs assessment section revealed that "lack of availability of traditional foods, cooking becoming more interesting with modern equipment available in Canada and lack of time were some of the reasons" for changing the food preparation/eating practices. Strong acculturation to the Canadian breakfast could be attributed to the time consuming nature of Indian cooking, ease of preparation of Canadian foods and the high employment level of this sample. What could be the reason for strongly maintaining the traditional eating patterns for supper? No association was found between any of the demographic characteristics and the frequency of consumption of Indian foods. Among the attitudinal factors, attitude to 'food exploration' (less favorable attitude towards 'food exploration', the higher the frequency of consumption of Indian foods) was significantly associated with the frequency of consumption of Indian

foods ($r=0.30$, $p<0.01$). As discussed elsewhere in the paper, eating authentic traditional dishes could be a channel through which 'concern for social status' would be demonstrated. Although the association was not significant, the frequency of consumption of Indian foods was higher among those who had a favorable attitude toward concern for social status. The evening meal being the main meal and perhaps the only meal with the family in a day, it is reasonable to assume that this ethnic group wants to maintain a minimum level of cultural authenticity. Lack of availability of ethnic foods, quality of the available ethnic foods and higher prices etc. could also facilitate acculturation. More studies are needed in this area.

Second, acculturation to food habits which have adverse nutritional effects was moderate (sometimes to rarely) and not minimal (rarely to never). However, no major health problems were reported by this ethnic group as opposed to other studies (McKeigue et al., 1991, McKeigue et al., 1989, Balarajan,1991) which have identified higher incidences of circulatory diseases among Indian immigrants in England. The majority of the respondents (70%) in this survey reported a clean bill of health. Overall, they followed lower fat dietary guidelines, exercised daily and included the four food groups daily in their diet as recommended by CGHE

Third, only one- quarter of the subjects (28% and 26% respectively) were following the minimum suggested guidelines for grain products and fruits/vegetables. The low grain product consumption of this study group was similar to the results found among a group of Chinese immigrants (Schultz et al., 1994). This should be an area of concern for nutritionists. Using data from the Ontario Health Survey, Pomerleau et al., (1997) analyzed

the likelihood of meeting the CFGHE guidelines in immigrants in Ontario. In this study Pomerleau et al., (1997) reported that the percentage of Asian immigrants consuming minimum recommended number servings was 52% for grain products, 60% for fruits/vegetables, 47% for milk products and 68% for meat/meat alternates. Among Indian immigrants and their family members in Newfoundland, these percentages were 28%, 26%, 73% and 75% respectively indicating that the consumption of grain products and fruits/vegetables was much lower and consumption of milk products and meat alternatives higher than the other immigrants in Canada. Also, Pomerleau et al., (1997) found that among Indian immigrants in Ontario, the average number of servings for grain products, fruits and vegetables, milk products and meat/meat alternates were 3.4, 5.5, 2.3, and 1.8 respectively. Among Indian immigrants and their family members in Newfoundland, the modal class of servings from each food group was 2 to 4 servings. Again, this suggests that compared to the consumption pattern of other Indian immigrants in Canada, consumption of meat/meat alternatives is higher, that of fruits/vegetables is lower, and those of grain products and milk products is similar. Compared to the recommendations of CFGHE guidelines (Appendix 6), which is 5-12 for grain products, 5-10 for fruits and vegetables, 2-4 for milk products and 2- 4 for meat/meat alternates, the consumption pattern is adequate for milk products and meat alternatives, but low for grain products and fruits/vegetables. One reason for the low consumption of grain products could be respondents' lack of knowledge about the importance of grains. It should be pointed out that in the knowledge section, one of the areas that respondents knew least about was which food group should constitute the highest

number of servings in a healthy diet. Another reason might be the increased the consumption of meat products by this ethnic group. The study revealed that 76% of the respondents were consuming more meat/meat products since coming to Canada. The greater availability and lower prices of meat products in North America might have prompted them to shift their eating habits to more meat products.

5.4 Nutrition related knowledge, attitudes anddietary practices: Interrelationships

The study revealed that attitude to 'nutrition is important' was more significantly associated with healthy life style practices than nutrition related knowledge. It was also found that the attitude to 'nutrition is important' was significantly associated with the level of nutrition knowledge. Similar results were observed by Grotkowski et al.,(1978), Bergman et al., (1992), and Medaugh-Abernethy et al.,(1994). The explanation given by Kristal et al., (1990) for the poor association between knowledge and behavior is that nutrition related knowledge is probably necessary, but not a sufficient condition for inducing healthy eating practices. According to Grotkowski et al.,(1978), attitudes could intervene between knowledge and behavior. Medaugh-Abernathy et al., (1994) bring forth the same idea when they suggest that understanding the attitudinal influences on food related behavior may clarify some of the psychological underpinnings of eating pattern and might help in developing effective nutrition education programs.

Considering the complex nature of eating behavior, the results are not surprising. Cultural traditions, religious restrictions, social meanings of food, individual preferences and

geographic availability have effects on food related behavior. The results pinpoint an important aspect of nutrition education: information dissemination on its own is not a sufficient strategy to promote healthy eating. New strategies for developing healthy eating habits should look at how to translate knowledge into appropriate practices. According to Vaandrager et al., (1997) community participation and multi-sectoral collaboration (collaboration among consumers, supermarket mangers, social workers, school teachers, restaurant keepers and health service workers) might be key elements in promoting healthy eating behavior. More research is needed in this area, especially when trying to develop nutrition education programs for immigrant populations.

5.5 Needs assessment

Generally, nutrition education programs and counseling are based on nutritional deficiencies and nutrition related health problems. Little attention has been given to the expressed needs of the target population. The findings of the needs assessment are summarized in seven separate sections (section 4.7.1 to section 4.7.7), ranging from nutrition information needs to suggestions for better nutrition related services. No studies were found in the literature that used similar variables used in this study to assess nutrition related needs of immigrants. As such, a comparison with other studies was not possible.

The sample in this study had high socioeconomic characteristics and were well established in Canada with very few language problems. In spite of these unique characteristics, nearly three-fourths of subjects, who had utilized hospital services, rated services available in Newfoundland as culturally inappropriate. New immigrants with

different linguistic and dietary norms might face more problems when they seek nutrition services. Lack of availability of culturally appropriate services requires more recognition from nutrition service providers and program coordinators.

The respondents provided a number of excellent comments and suggestions for improving nutrition services. The desire to know more about the nutritional quality of their traditional diet, provision of more ethnic foods and vegetarian foods regularly in hospitals and need for more ethnically tailored education materials were some of the most prominent suggestions.

5.6 Limitations

The limitations of this study are as follows:

1. Participants in this study were not necessarily representatives of other immigrants in Newfoundland or Indian immigrants in other parts of Canada. They were highly educated, with higher than average income and well established in Newfoundland.

2. The recruitment scheme, identifying the Indian population from different associations by surname, may have missed persons of Indian origin, even though the close knit nature of this immigrant society makes it highly unlikely.

3. In spite of using several recommended tactics such as preliminary notification through FIA newsletter, follow up, return postage and anonymity to stimulate participation, the response rate was only 73%. Although response rates of 50% or lower are fairly common for mail surveys, Singleton et al., (1993) have quoted several studies with 80% response rate. This lower than expected participation rate could be attributed to the sparse East Indian

population in Newfoundland. In spite of taking several precautions to decrease the chance of getting more than two questionnaires in one family unit, households with a senior (65+ in age), could have received three questionnaires. This could have discouraged some people.

4. The survey relied on self-reports. Many questions in the survey such as income level, good eating habits and healthy life style practices might have prompted respondents to choose answers which are socially desirable. To limit response bias due to social desirability, questionnaires permitted anonymity. Confidentiality of information was guaranteed. Overall, the results provided consistent results. There was agreement between reported healthy dietary practices and the general health condition of these immigrants: 70% indicated a clean bill of health.

5. The reported number of servings and food groups may be underestimated or overestimated. This is because the serving guidelines provided with the questionnaire did not accommodate many of the mixed dishes used by this ethnic population.

6.0 Summary and Conclusions

This cross sectional survey identified the nutrition related knowledge, attitudes, practices and needs of Indian immigrants and their family members in Newfoundland. This research was also designed to answer questions such as whether this ethnic group had acculturated to Canadian food habits and whether their dietary practices were influenced by their knowledge, attitudes and demographic characteristics.

The demographic characteristics revealed that this predominantly Indian-born study group were highly educated, had higher than average income and were well established in Newfoundland. The majority practiced Hinduism, even though other religions such as Christianity, Islam, Zoroastrianism and Sikhism were also prevalent. Results revealed that this ethnic group was somewhat acculturated to Canadian food habits.

The likelihood of following CGHE guidelines was good and the acquisition of food habits which had adverse nutritional effects was moderate. An area of concern for nutritionists should be this ethnic group's poor adherence to suggested serving guidelines for grain products and fruits and vegetables. Only one-quarter of the respondents followed minimum suggested guidelines for grains and fruits and vegetables.

Respondents had a fairly good knowledge about healthy eating guidelines in Canada and they had favorable attitudes towards food selection. Results also demonstrated significant association between nutrition knowledge and attitude to 'nutrition is important', but did not support consistent association between knowledge and practices. This gives

some food for thought for nutrition educators when developing strategies for dietary modifications.

Because of the unique characteristics of this population, results are not generalizable to other immigrants in Newfoundland or other Indian immigrants in other parts of Canada. More studies on other groups of immigrants are needed to understand the impact of culture on food habits and to develop culturally sensitive, effective nutrition education programs.

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Appendices

Appendix - 1

Section A-Questions on Demographic Characteristics

Section A

A1. 1❑ Male 2❑ Female

A2. Country of Birth

1❑ Canada 2❑ Other **(Please specify)** _____

A3. Where were your parents born?

1❑ Canada 2❑ Other **(Please specify)** _____

A4. How long have you lived in Canada? **(Please specify)**

❑Years _____ ❑ Months _____

A5. To what age group do you belong?

1❑ 10-19
2❑ 20-29
3❑ 30-44
4❑ 45-64
5❑ 65+

A6. What type of household do you live in? **(Please check only one)**

1❑ Alone
2❑ With spouse/ partner
3❑ With spouse/partner and children
4❑ With spouse/partner, children and other family members
5❑ With parents and siblings
6❑ With relatives or family members
7❑ With friends

A7. From the following categories, **please check all that apply to your current status.**

1❑ Student

2❑ Retired

3❑ Employed full time

4❑ Employed part time

5❑ Unemployed

6❑ Homemaker/housewife

7❑ Self employed

A8. What is the highest level of education you have attained?

Level of Education	Year of Completion	Country of Completion
1❑ None		
2❑ Elementary/ junior high	_____	_____
3❑ Some high school	_____	_____
4❑ Completed high school	_____	_____
5❑ Some university	_____	_____
6❑ Completed university	_____	_____
7❑ Completed community college/ technical training	_____	_____
8❑ Other **(Please specify)**		
_____	_____	_____

A9. a. Language (s) most often spoken at home? **(Please specify)**

_____

_____

A9. b. What language (s) can you speak well enough to explain your health conditions to a doctor or a dietitian? **(Please check all that apply)**

1❑ English

2❑ French

3❑ Other **(Please specify)**_____

A10. What is the best estimate of your total income before taxes, of all household members for the year 1995?

1❑ Less than 10,000

2❑ 10,000 -19,999

3❑ 20,000-29,999

4❑ 30,000-39,999

5❑ 40,000- 49,999

6❑ 50,000-59,999

7❑ 60,000-69,999

8❑ 70,000+

A11. What religion do you belong to?

1❑ None

2❑ Christianity

3❑ Hinduism

4❑ Buddhism

5❑ Jainism

6❑ Islam

7❑ Other **(Please specify)** _____

Appendix- 2

Section B- Questions on Dietary Practices

Section B

B1. **a.** Are you a vegetarian?

1❑ Yes 2❑ No ⇨ **If No, go to question B2**

b. **If Yes,** why did you choose to be a vegetarian? *Please rank the following statements **1 to 7**, where 1 is the most important reason and 7 is the least important reason.*

❑ Eating meat is against my religion and philosophy
❑ Vegetarianism is better for my health
❑ I follow my parent's tradition
❑ Eating meat is too expensive
❑ Most of my friends are vegetarians
❑ Eating vegetables is the only natural way to get all the vitamins and minerals I need without taking supplement pills
❑Other **(Please specify)**_____

B2. **a.** Have you made any changes in your diet in the last 12 months?

1❑ Yes 2 ❑ No ⇨ **If No, go to question B3**

b. **If Yes**, what were the changes made? **(Please check all that apply)**

❑ Eat more grain products
❑ Eat fewer sweets, and less sugar
❑ Eat fewer fats, or fried foods
❑ Eat less salty food
❑ Eat more snacks and less regular meals
❑ Eat more fruits and vegetables
❑ Other (Please specify_____

B2. **c.** **If Yes**, why were these changes made? *Please rank the following **1 to 6** where 1 is the most important reason and 6 is the least important.*

- ❑ For health reasons
- ❑ To improve my appearance
- ❑ To reduce weight
- ❑ Because of peer pressure
- ❑ Because of more knowledge about nutrition and health
- ❑ Other **(Please specify)** _____

*Using the scale, **'Often'**, **'Sometimes'**, **'Rarely' or 'Never'** please respond to each of the statements given in questions B3, B4 and B5. Place an 'x' in the appropriate space.*

Please check only one scale for each row.

B3. How often do you eat traditional Indian foods for:

	Often	Sometimes	Rarely	Never
a. breakfast (dosai, powa, parathas etc.)?	1❑	2❑	3❑	4❑
b. lunch (dhal, rice, subji etc)?	1❑	2❑	3❑	4❑
c. supper (naan, rice, chappathi etc)?	1❑	2❑	3❑	4❑
d. snacks (samosas, pakoras, muruku etc)?	1❑	2❑	3❑	4❑

B4. How often do you eat foods common in Canada for:

a. breakfast (toast, cereal, bacon, egg) ?	1❑	2❑	3❑	4❑
b. lunch (hamburger, sandwich, soup etc)?	1❑	2❑	3❑	4❑
c. supper (pizza, spaghetti, roast beef, etc)	1❑	2❑	3❑	4❑
d. snacks (chips, doughnuts, cookies, etc) ?	1❑	2❑	3❑	4❑

B5. ***If you were born in Canada, please skip this question (B5) and go to question B6.***

Since coming to Canada, I find myself eating/drinking:

	Often	Sometimes	Rarely	Never
a. More easy-to-cook, packaged foods (Examples: Kraft dinner, Lipton cup-a-soup etc)	1❑	2❑	3❑	4❑
b. More pastries, pies and rich sauces	1❑	2❑	3❑	4❑
c. More often at fast food restaurants	1❑	2❑	3❑	4❑
d. More soft drinks	1❑	2❑	3❑	4❑
e. More alcoholic beverages such as wine, beer, spirit etc	1❑	2❑	3❑	4❑
f. More meat and meat products	1❑	2❑	3❑	4❑
(If you are a vegetarian please check [NA] for this category)			**[NA]**	

B6. *Approximately how many servings do you eat from each of the following foods every day?* ***(Please refer to the attached sheet on the back cover for more information about approximate volumes per serving)***

	More than 11 servings	5-10 servings	2-4 servings	One serving	None
a. Grain products such as puri, chappathi, rice etc	1❑	2❑	3❑	4❑	5❑
b. Vegetables and fruits	1❑	2❑	3❑	4❑	5❑
c. Milk and milk products	1❑	2❑	3❑	4❑	5❑
d. Beans, dhals, meat, fish, or eggs	1❑	2❑	3❑	4❑	5❑

B7. *Using the scale **'very likely', 'somewhat likely', 'not very likely',** or **'not at all likely',** please indicate how likely you follow the listed practices below by putting an "x" into the appropriate box.* ***Please check only one scale for each row***

		Very Likely	Somewhat Likely	Not Very Likely	Not At All Likely
a.	Eat rice, wheat or other grain products every day	1❑	2❑	3❑	4❑
b.	Eat some fruits and vegetables every day	1❑	2❑	3❑	4❑
c.	Have some milk or milk products such as cheese or yogurt every day	1❑	2❑	3❑	4❑
d.	Eat some dried beans, dhals, eggs, fish **or** meat every day	1❑	2❑	3❑	4❑
e.	Take vitamin supplements every day	1❑	2❑	3❑	4❑
f.	Do some exercise every day	1❑	2❑	3❑	4❑
g	Avoid eating or cooking deep-fried foods	1❑	2❑	3❑	4❑
h.	Avoid using butter, margarine and other spreads	1❑	2❑	3❑	4❑
i.	Read labels and buy lower fat food products from the store	1❑	2❑	3❑	4❑
j.	Trim the fat off the meat before cooking	1❑	2❑	3❑	4❑

(If you are a vegetarian, please check [NA] for this category **[NA]**

Appendix - 3

Section C- Questions on Attitudes Toward Food Selection

Section C

*This section contains a series of statements. Beside each statement is a scale which ranges from **strongly agree (1)** to **strongly disagree (4).** Please circle the number which corresponds to YOUR personal norms. There are no right or wrong answers.*

		Agree	Strongly Agree	Disagree	Strongly Disagree
C1.	Good eating habits are important to maintain my health.	1	2	3	4
C2.	My family likes to eat meals together.	1	2	3	4
C3.	I buy any food I want, whenever I want, no matter what it costs.	1	2	3	4
C4.	I seldom try food from other countries or explore new restaurants.	1	2	3	4
C5.	My family serves fancier foods when we have company.	1	2	3	4
C6.	My family often buys convenience foods from the grocery store.	1	2	3	4
C7.	I would like to learn more about what to eat and how to eat healthy.	1	2	3	4
C8.	I enjoy going out to eat where my friends eat.	1	2	3	4
C9.	I enjoy eating out even though I know it is expensive.	1	2	3	4
C10.	I like to eat foods that I am used to.	1	2	3	4

		Agree	Strongly Agree	Disagree	Strongly Disagree
C11.	We use our best linens and dishes when we have company.	1	2	3	4
C12.	I enjoy frozen, ready-made foods such as T.V dinners.	1	2	3	4
C13.	Learning more about nutrition might help me to improve my personal eating habits.	1	2	3	4
C14	I like to serve refreshments to friends when they drop in.	1	2	3	4
C15.	I would not consider serving certain foods for company dinners.	1	2	3	4
C16.	Before eating a new food, I like to know whether it contains any religiously forbidden ingredients.	1	2	3	4
C17.	Brand name products are nearly always better than store brand products.	1	2	3	4
C18.	I like learning how to fix quick meals that take less time to prepare.	1	2	3	4

Appendix 4

Section D- Questions on Nutrition Knowledge

Section D

D1. The best method of reducing body weight is to: **(Please check one)**

1❑ Skip breakfast

2❑ Increase exercise and decrease food intake

3❑ Reduce sweet and starchy foods in one's diet.

4❑ Eat plenty of grapefruit

D2. Of the following foods which are important to limit in our daily diet to reduce the risks of diet related diseases. **(Please check all that apply)**

1❑ High salt products

2❑ High fat products

3❑ High caffeine products

D3. Substitutes for meat products are: **(Please check all that apply)**

1❑ Dried peas, lentils and beans

2❑ Eggs

3❑ Fish

4❑ Peanut butter

5❑ Not sure

D4. The food with the most calories per gram is : **(Please check one)**

1❑ Beans and dhals

2❑ Rice and pasta

3❑ Butter and oil

4❑ Yogurt

5❑ Vitamin pills

D5. What does ' **enjoy a variety of foods'** mean to you? **(Please check all that apply)**

1 ❑ I have to include a variety of dark green and orange vegetables and fruits in my diet

2 ❑ I have to include a variety of grain products such as chappathi, rice and bakery products in my diet.

3 ❑ I have to eat a variety of meat, fish and poultry.

4 ❑ I have to include a variety of milk and yogurt products in my diet.

5 ❑ I have to include a variety of beans and dhals in my diet.

6 ❑ I am not sure.

D6. Every day the highest number of servings should come from: **(Please check one)**

1❑ Milk and milk products

2❑ Grain products such as chappathi, rice, bakery products etc

3❑ Meat and meat products

4❑ Vegetables and fruits

5❑ Beans and dhals

6❑ I am not sure

D7. **a.** Have you ever seen or heard about the "Canada Food Guide to Healthy Eating"?

1❑ Yes 2❑ No ⇨ **If No go to Section E**

b. **If Yes to question D7 (a),** have you read it?

1❑ Yes 2❑ No ⇨ **If No, go Section E**

c. **If Yes to question D7(b),** do you use it as a general guide to your daily eating plan?

1❑ Yes 2❑ No

D8. Eating according to Canada's Food Guide will provide all the vitamins and minerals I need.

1❑ Agree 2❑ Disagree 3❑ I don't know 4❑ Not sure

Appendix 5

Section E - Questions on Needs Assessment

Section E

E1. **a.** Have you ever sought nutrition information?

1❑ Yes 2❑ No ⇨**If No, go to question E2**

b. **If Yes**, where do you go to get nutrition information? ***(Please rank 1 to 6, where 1 is the most used source and 6 is the least used source)***

❑ Health professionals such dietitians, doctors, nurses

❑ Magazines, cook books

❑ Personal sources such as friends, mother etc

❑ Media, such as newspaper, T.V etc

❑ Common sense

❑ Other (Please Specify) _____

E2. **a.** Would you be interested in knowing more about nutrition?

1❑ Yes 2❑ No ⇨ **If No, go to question E3**

b. ***If Yes to question E2(a),*** *what would be your preferred way to get that information? Please* ***rank the following 1 to 6*** *where 1 is the most preferred and 6 is the least preferred way.*

❑ Supermarket tours by dietitians to show how to make healthy food choices

❑ Participate in cooking class sessions to learn how to prepare low-cost nutritious foods

❑ Learn more about general nutrition and its implication for diseases

❑ Understand more about the nutritional quality of my traditional diet, compared to "Canada's Guidelines to Healthy Eating"

❑ Availability of ethnic nutritional newsletters or magazines yearly or every six months

❑ Other **(Please specify)**_____

E3. **a.** Are you aware of the availability of community services such as Meals on Wheels?

1❑Yes 2❑ No ⇨ **If No, go to question E4**

b. **If Yes to question E3**(a), have you ever utilized those services?

1❑Yes 2❑ No ⇨ **If No, go to question E4**

c. **If Yes to question E3(b)**, were you able to get any culturally appropriate dishes? 1❑ Yes 2❑ No

E4. **a.** Have you or any of your family members ever eaten Hospital food in Canada?

1❑ Yes 2❑ No ⇨ **If No, go to question E5**

b. **If Yes, to question E4(a)**, were the foods culturally appropriate?

1❑ Yes 2❑ No ⇨ **If Yes, go to question E5**

c. **If No, to question E4(b)**, what changes would you like to see? (Please rank the following **1 to 5**, where 1 is the most important and 5 is the least important change you like to see.

❑ Choice of more ethnic foods on a regular basis

❑ Availability of hospital approved catering services which provide ethnic dishes

❑ Dietary service providers' willingness to appreciate and understand the diverse food habits of immigrants

❑ Interpreter services

❑ Other **(Please specify)**_____

E5. **a.** Have you ever utilized any nutrition counseling services such as overweight clinics or diabetic clinics.

1❑ Yes 2❑ No ⇨ **If No, go to question E6**

E5. **b.** **If Yes, to question E5(a),** were those counseling services adapted for cultural differences?

1❑ Yes 2❑ No ⇨ **If Yes, go to question E6**

c. **If No, to question E5(b),** then what changes would you like to see? (*Please rank the following 1 to 4 where 1 is the most important and 4 is the least important change you like to see.*

❑ Language and culturally specific instruction and resource materials

❑ Dietitians understanding of the various food habits of immigrants.

❑ Instructional materials and resource materials with food exchanges from different cultures.

❑ Other **(Please specify)** _____

E6 In the last 5 years have you been told by a doctor that you have any of the following conditions **(Please check all that apply)**

1❑ High blood pressure

2❑ Diabetes mellitus

3❑ Elevated cholesterol

4❑ Elevated triglycerides

5❑ Myocardial infarction

6❑ Coronary artery disease

7❑ Angina pectoris

8❑ Stroke

9❑ Gall bladder disease

10❑ Lactose intolerance

11❑ No

E7. **a.** Are all the foods needed to follow your family's traditional Indian eating or cooking patterns available in the local grocery stores?

1❑ No 2❑ Yes ⇨ **If Yes, go to question E8**

b. **If No to question E7(a),** do you or your family have to substitute locally available foods to follow your traditional Indian cooking and eating patterns?

1❑ Yes 2❑ No ⇨ **If No, go to question E8**

c. ***If Yes to question E7(b),*** *how often you substitute locally available foods for foods listed below? Please use the scale* ***'often'***, ***'sometimes'***, ***'rarely'*** *and* ***'never'*** *to indicate the frequency of substitution.* ***If you avoid any of the following foods for religious reasons or because you are a vegetarian, please check 'NA' for Not Applicable.***

	Often	Sometimes	Rarely	Never	NA
a. Variety of fruits available in India	1❑	2❑	3❑	4❑	5❑
b. Variety of vegetables available in India	1❑	2❑	3❑	4❑	5❑
c. Variety of beans and dhals in India	1❑	2❑	3❑	4❑	5❑
d. Variety of candies and nuts in India	1❑	2❑	3❑	4❑	5❑
e. Variety of pickles in India	1❑	2❑	3❑	4❑	5❑
f. Different varieties of milk products	1❑	2❑	3❑	4❑	5❑
g. Different varieties cakes and cookies	1❑	2❑	3❑	4❑	5❑
h. Different spices and herbs available in India	1❑	2❑	3❑	4❑	5❑
i Varieties of rice, wheat or other grain products such as flours	1❑	2❑	3❑	4❑	5❑
j. Different varieties of fresh fish	1❑	2❑	3❑	4❑	5❑
k. Different varieties of meat and meat products	1❑	2❑	3❑	4❑	5❑
l. Other **(Please specify)**_____	1❑	2❑	3❑	4❑	5❑

E8. **a.** Have your or your family's cooking or food preparation methods changed since coming to Canada? **(Examples: frequent baking, frequent use of microwave or other cooking equipments such as rice cooker, tortilla maker, chappathi maker, cooking different ethnic dishes etc)**

1❑ Yes 2❑ No ⇨ **If No, go to question E9**

b. If Yes to question E8(a), please explain the changes in the cooking methods in your family.

_____

_____

_____

_____

_____

E9. Do you or any of your family members have specific nutritional concerns? Please explain.

(Examples: not satisfied with the nutrition counseling services such as diabetic clinics because they are not culturally appropriate, not eating healthy for reasons such as living alone, lack of cooking skills, no transportation to buy groceries, inability to cook due to ill health, unavailability of traditional ingredients etc)

_____

_____

_____

_____

_____

E10. What comments and suggestions do you have for the existing dietary services system in the community or in the hospitals?

_____

_____

_____

_____

_____

Thank you very much!

Appendix 6

Canada's Food Guide to Healthy Eating

Healthy Canada

Health and Welfare Canada | Santé et Bien-être social Canada

CANADA'S

Food Guide

TO HEALTHY EATING

Enjoy a variety of foods from each group every day.

Choose lower-fat foods more often.

Grain Products
Choose whole grain and enriched products more often.

Vegetables & Fruit
Choose dark green and orange vegetables and orange fruit more often.

Milk Products
Choose lower-fat milk products more often.

Meat & Alternatives
Choose leaner meats, poultry and fish, as well as dried peas, beans and lentils more often.

Canada

CANADA'S

Food Guide

TO HEALTHY EATING

FOR PEOPLE FOUR YEARS AND OVER

Different People Need Different Amounts of Food

The amount of food you need every day from the 4 food groups and other foods depends on your age, body size, activity level, whether you are male or female and if you are pregnant or breast-feeding. That's why the Food Guide gives a lower and higher number of servings for each food group. For example, young children can choose the lower number of servings, while male teenagers can go to the higher number. Most other people can choose servings somewhere in between.

Grain Products

5–12

SERVINGS PER DAY

1 Serving

Hot Cereal
175 mL
3/4 cup

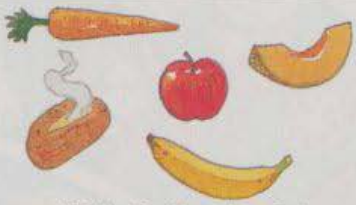
2 Servings

Vegetables & Fruit

5–10

SERVINGS PER DAY

1 Serving



Fresh, Frozen or Canned Vegetables or Fruit

Salad

Juice

Milk Products

SERVINGS PER DAY

Children 4–9 years: 2–3
Youth 10–16 years: 3–4
Adults: 2–4
Pregnant & Breast-feeding Women: 3–4

1 Serving

Cheese

Meat & Alternatives

2–3

SERVINGS PER DAY

1 Serving

Other Foods

Taste and enjoyment can also come from other foods and beverages that are not part of the 4 food groups. Some of these foods are higher in fat or Calories, so use these foods in moderation.

Enjoy eating well, being active and feeling good about yourself. That's VITALITÉ

ISBN 0-662-19648-1

Appendix 7

Canada's Guidelines to Healthy Eating

Canada's Guidelines to Healthy Eating

(Health and Welfare Canada, 1990)

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

Appendix 8

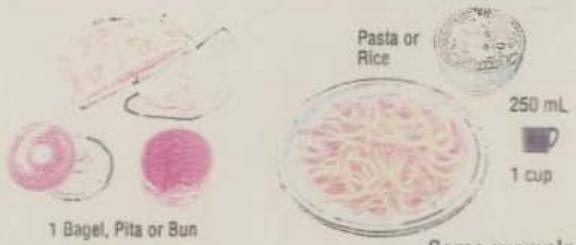
Examples of Approximate Volumes Per Serving

Approximate volume/serving

- One large Chappathi = 2 servings
- One cup cooked rice or pasta = 2 servings
- One bun, pita or bagel = 2 servings
- One cup milk = 1 serving
- 3/4 cup yogurt = 1 serving
- Two small puris = 1 serving
- One slice bread = 1 serving
- ½ -3/4 cup cooked dhal = 1 serving
- ½ cup juice = 1 serving
- 2 small idlis = 1 serving

Some examples of one serving

Some examples of two servings



Some examples of serving sizes are taken from CFG

Appendix 9 - Table 1
Cross-tabulation and Chi-Square Values between Attitudes and Selected Demographic Characteristics

Table 1
Demographic Characteristics and Attitudes

Demographic Characteristics	Attitude to Nutrition is Important: 1.Agree/ strongly agree 2.Disagree/strongly disagree			Attitude to Food Exploration: 1.Agree/ strongly agree 2.Disagree/strongly disagree		
	χ^2	p value	N	χ^2	p value	N
*Age: { 10-29 30-44 45-65+	** xx	0.15	129	0.15	0.93	129
Gender: Male Female	xx	1.00	130	0.33	0.56	130
***Religion** Hinduism {Christianity {Other	** xx	0.15	126	0.57 **	0.45	126
***Length of Stay in Canada:** { < 5 years { 6-15 years >15 years	** xx	0.47	129	0.63 **	0.43	129
***Household type:** Households without Children Household with Children	xx	0.20	130	xx	1.00	130
***Employment Status:** { Student { Employed {Retired {Unemployed/Homemakers	** xx	0.41	129	** xx	0.56	129
* Pooled categories from Table 4.1 to make expected frequencies be≥5						

**** If expected frequencies < 5, categories were further pooled to dichotomous categories. Pooled categories are grouped in brackets**

xx If expected frequency was <5 in a 2×2 table, Fisher's exact test was calculated

Table 1
Demographic Characteristics and Attitudes (Continued)

Demographic Characteristics	Attitude to frugality: 1.Agree/ strongly agree 2.Disagree/strongly disagree			Attitude to concern for social status: 1.Agree/ strongly agree 2.Disagree/strongly disagree			Attitude to sociability: 1.Agree/ strongly agree 2.Disagree/strongly disagree		
	χ^2	p value	N	χ^2	p value	N	χ^2	p value	N
Age: {10-29, 30-44} 45-65+	2.09	0.35	128	1.06	0.59	129	** xx	0.15	126
Gender: Male Female	0.99	0.32	129	0.19	0.66	130	** xx	0.49	127
Religion: Hinduism {Christianity, Other}	0.55	0.76	125	0.02	0.88	126	** xx	0.71	123
Length of Stay in Canada: {< 5 years, 6-15 years} >15 years	1.45	0.47	128	** xx	0.47	129	0.69 **	0.41	129
Household type: Households without Children Household with Children	0.09	0.76	129	xx	0.53	130	xx	0.65	127
Employment Status {Student, Employed} {Retired, Unemployed/ Homemakers}	1.78	0.62	128	** xx	1.00	129	** xx	0.65	127

** If expected frequencies < 5, categories were further pooled to dichotomous categories. Pooled categories are shown in brackets

xx If expected frequency was <5 in a 2×2 table, Fisher's exact test was calculated

Appendix 10 -Table 2
Cross-tabulation and Chi-Square Values between Nutrition Related Behaviors and Selected Demographic Characteristics

Table 2
Demographic Characteristics and Nutrition Related Behaviors

Demographic Characteristics	Recent Changes in the Diet: 1. Yes 2.No			Practice of Vegetarianism: 1.Yes 2. No		
	χ^2	p value	N	χ^2	p value	N
Age: 10-29 30-44 45-65+	2.71	0.26	126	8.56	0.07	129
Gender: Male Female	1.76	0.18	127	0.22	0.64	130
Religion: Hinduism Christianity Other	0.16	0.92	123	11.72	0.003	127
Length of Stay in Canada: <5 years 6-15 years >15 years	0.13	0.94	126	14.71	0.001	129
Household type: Households without children Households with children	5.18	0.02	127	0.39	0.53	130
Employment status: {Student Employed} {Retired Unemployed/homemaker}	5.67	0.13	126	0.67 **	0.412	129

** **If expected frequencies < 5, categories were further pooled to dichotomous categories. Pooled categories are shown in brackets**

Table 2
Demographic Characteristics and Nutrition Related Behaviors (Continued)

Demographic Characteristics	Consumption of Canadian foods: 1.Often/sometimes 2.Rarely/ never			Consumption of Indian foods: 1.Often/sometimes 2.Rarely/ never		
	χ^2	p value	N	χ^2	p value	N
Age: {10-29, 30-44} 45-65+	3.24 **	0.07	130	2.06	0.36	131
Gender: Male, Female	1.21	0.27	131	0.04	0.84	132
Religion: Hinduism, {Christianity, Other}	0.26 **	0.61	122	1.26	0.53	128
Length of Stay in Canada: {<5 years, 6-15 years} >15 years	3.30 **	0.07	130	0.01	0.99	131
Household type: Households without children, Households with children	** xx	0.32	131	3.46	0.06	132
Employment status: {Student, Employed} {Retired, Unemployed/homemakers}	** xx	0.004	130	** 1.77	0.18	131

** If expected frequencies were less than 5, categories were further pooled to dichotomous categories. Pooled categories are shown in brackets.

xx If expected frequency was <5 in a 2×2 table, Fisher's exact test was calculated.

Table 2
Demographic Characteristics and Nutrition Related Behaviors (Continued)

Demographic characteristics	Frequency of consumption of foods which have adverse nutritional effects: 1.Often to Sometimes 2.Rarely to Never		
	χ^2	p value	N
Age: 10-29 30-44 45-65+	0.05	0.59	93
Gender: Male Female	0.06	0.81	94
Religion: Hinduism Christianity Other	4.46	0.11	92
Length of Stay in Canada: <5 years 6-15 years >15 years	0.43	0.51	94
Household type: Households without children Households with children	3.21	0.07	94
Employment status: Student Retired Employed Unemployed/homemakers	7.38	0.007	93

Table 2
Demographic Characteristics and Nutrition Related Behaviors (Continued)

Demographic Characteristics	Adherence to the Recommended Serving Guidelines of CFGHE 1.Follow for 3 or 4 food groups 2.Follow for 2 food groups 3.Follow for only one or none of the food groups		
	χ^2	p value	N
Age: 10-29 30-44 45-65+	8.38	0.07	123
Gender: Male Female	0.46	0.07	123
Religion: Hinduism Christianity Other	3.94 **	0.14	120
Length of Stay in Canada: <5 years 6-15 years >15 years	4.06	0.39	123
Household type: Households without children Households with children	2.71	0.26	124
Employment status: Student Employed Retired Unemployed/homemakers	6.04	0.42	123

** If expected frequencies were less than 5, categories were further pooled to dichotomous categories. Pooled categories are shown in brackets.

Table 2
Demographic Characteristics and Nutrition Related Behaviors
(Continued)

Demographic Characteristics	Canada's Guidelines to Healthy Eating					
	Include Four Food Groups: **1.Very likely to somewhat likely** **2.Not very likely to not at all likely**			**Follow lower fat guidelines:** **1.Very likely to somewhat likely** **2.Not very likely to not at all likely**		
	χ^2	p value	N	χ^2	p value	N
Age: 10-29 30-44 45-65+	9.39	0.009	129	12.48	0.002	129
Gender: Male Female	0.19	0.66	129	0.55	0.46	130
Religion: Hinduism Christianity Other	0.15	0.93	125	0.13	0.94	126
Length of Stay in Canada: <5 years 6-15 years >15 years	1.51	0.47	128	12.77	0.002	129
Household type: Households without children Households with children	0.03	0.86	129	0.16	0.70	130
Employment status: Student Employed Retired Unemployed/ homemakers	4.11	0.25	128	13.36	0.004	129

Table 2
Demographic Characteristics and Nutrition Related Behaviors (Continued)

Demographic Characteristics	**Canada's Guidelines to Healthy Eating** **Do Exercise:** **1. Very likely/ somewhat likely** **2. Not very likely /not at all likely**			**Practice of Vitamin Supplementation:** **1. Very likely /somewhat likely** **2. Not very likely to not at all likely**		
	χ^2	p value	N	χ^2	p value	N
Age: 10-29 30-44 45-65+	4.29	0.12	129	13.11	0.001	127
Gender: Male Female	0.20	0.65	130	0.62	0.43	128
Religion: Hinduism Christianity Other	1.23	0.54	126	2.34	0.31	124
Length of Stay in Canada: <5 years 6-15 years >15 years	6.05	0.05	129	1.98	0.37	127
Household type: Households without children Households with children	xx	0.27	130	0.11	0.73	128
Employment status: {Student {Employed {Retired {Unemployed/homemakers	4.93 **	0.02	127	4.94 **	0.03	127

** **If expected frequencies were less than 5, categories were further pooled. Pooled categories are shown in brackets**

xx **If expected frequency was <5 in a 2×2 table, Fisher's exact test was calculated.**

Appendix 11 -Table 3 (a) and 3 (b)
Cross-tabulations and Chi-square values of Relationships among Knowledge, Attitude to 'Nutrition is Important' and Nutrition Related Practices

Table 3(a)
Chi-Square analysis of Knowledge, Attitude to 'Nutrition Is Important' and Nutrition Related Healthy Practices

Nutrition Related Healthy Behaviors	Nutrition Knowledge: 1.Good 2. Poor			Attitude to 'nutrition is important': 1.Agree/strongly agree 2.Disagree/strongly disagree		
	χ^2	p value	N	χ^2	p value	N
Recent Changes made in the diet: Yes No	25.56	0.00	127	20.89	0.00	125
Want to know more about nutrition: Yes No	1.45	0.23	130	25.03	0.00	128
Follow minimum suggested serving guidelines for grains: Follow minimum guidelines Does not follow	34.69	0.00	126	78.11	0.00	124
Follow minimum suggested serving guidelines for fruits: Follow minimum guidelines Does not follow	40.02	0.00	125	77.53	0.00	123
Follow minimum suggested serving guidelines for milk products: Follow minimum guidelines Does not follow	0.85	0.35	124	19.19	0.00	122
Follow minimum suggested serving guidelines for meat/meat alternatives: Follow minimum guidelines Does not follow	2.04	0.15	125	15.56	0.00	123

Table 3 (b)
Correlation Analysis

Nutrition Related Behavior	Nutrition Knowledge (Total Score)			Attitude to "nutrition is important" (Sum of Scores)		
	Spearman Correlation Value	p value	N	Spearman Correlation Value	p value	N
Eat four food groups	0.24	0.006	130	0.60	0.35	130
Follow lower fat dietary guidelines	0.35	0.00	130	0.18	0.04	130
Acquisition of food habits which have adverse nutritional effects	0.14	0.19	94	0.06	0.57	94
Exercise Every day	0.12	0.16	130	0.10	0.23	130

Appendix 12-Table 4
Cross-tabulation and Chi-square values of Relationship Between Knowledge and Behavior

Table 4
Relationship between knowledge and Behavior

Knowledge of diet related diseases: 1. Correct 2. Incorrect	Food practices which have adverse nutritional effect: 1. Often/sometimes 2. Rarely/never		
	χ^2	p value	N
	6.22	0.01	94

Knowledge of high calorie food: 1. Correct 2. Incorrect	Practice of following lower fat guidelines: 1. Very likely/somewhat likely 2. Not very likely/not at all likely		
	χ^2	p value	N
	7.53	0.01	130

Knowledge of which food group should constitute the highest number of serving: 1. Correct 2. Incorrect	Eating recommended number of grain products every day: 1. Eat minimum recommended servings 2. Eat less than recommended servings		
	χ^2	p value	N
	1.7	0.19	126

Knowledge about what it means to "enjoy a variety of foods": 1. Correct 2. Incorrect	Eating a variety of foods every day: 1. Very likely/somewhat likely 2. Not very likely/not at all likely		
	χ^2	p value	N
	0.94	0.33	129

Appendix 13 -Table 5
Distribution of Respondents by Reported General Health Conditions

Table 5

Distribution of Respondents by Reported General Health Conditions

Health Problems	N	Reported Health Problems (%)
High blood pressure	128	11.4%
Diabetes Mellitus	129	10.6%
Elevated cholesterol	129	12.1%
Elevated triglycerides	129	5.3%
Myocardial infarction	129	0.8%
Coronary artery diseases	129	2.3%
Angina pectoris	129	0%
Stroke	129	0%
Gall bladder disease	129	2.3%
Lactose intolerance	129	1.5%
None	129	69.5%

Appendix 14-Table 6
Distribution of Respondents by Reported Frequency of Ethnic Food substitutions

Table 6
Distribution of Respondents by Reported Frequency of Ethnic Food Substitution

Foods	N			Often %	Sometimes %	Rarely %	Never %
	valid	NA	Missing				
Fruits	73	53	6	31.5%	43.8%	20.5%	4.1%
Vegetables	74	7	51	44.6	39.2	14.9%	1.4%
Beans and Dhals	73	7	52	43.8	28.8	24.7	2.7
Candies and nuts	72	6	54	20.8	27.8	40.3	11.1
Variety of pickles	72	6	54	29.2	23.6	29.2	18.1
milk products	70	9	53	28.6	35.7	20.0	15.7
cakes and cookies	66	11	55	18.2	40.9	22.7	18.2
Spices and herbs	69	9	54	34.8	40.6	17.4	7.2
varieties of grains	72	7	53	41.7	38.9	13.9	5.6
fish	53	9	70	37.7	41.5	11.3	9.4
meat/meat products	54	8	70	25.9	38.9	25.9	9.3
Other	5	76	51	60%	-	40%	-

Appendix 15

Human Investigation Committee Approval

Memorial
University of Newfoundland

Office of Research and Graduate Studies (Medicine)
Faculty of Medicine
The Health Sciences Centre

6 August 1996

TO: Ms. Suja Varghese

FROM: Dr. Verna M. Skanes, Assistant Dean
Research & Graduate Studies (Medicine)

SUBJECT: Application to the Human Investigation Committee - #96.112

The Human Investigation Committee of the Faculty of Medicine has reviewed your proposal for the study entitled "Nutrition Knowledge, Attitudes, Needs and Dietary Practices of Indian Immigrants in Newfoundland".

Full approval has been granted for one year, from point of view of ethics as defined in the terms of reference of this Faculty Committee.

For a hospital-based study, it is **your responsibility to seek necessary approval from the Health Care Corporation of St. John's**.

Notwithstanding the approval of the HIC, the primary responsibility for the ethical conduct of the investigation remains with you.

Verna M. Skanes, Ph.D.
Assistant Dean

cc Dr. K.M.W. Keough, Vice-President (Research)
Dr. R. Moore-Orr, Supervisor

St. John's, NF, Canada A1B 3V6 • Tel.: (709) 737-6762 • Fax: (709) 737-5033 • email: rgs@morgan.ucs.mun.ca

Appendix 16

Sample of Cover Letter to Adults

Memorial
University of Newfoundland

Division of Community Health
Faculty of Medicine
The Health Sciences Centre

November 10, 1996

Dear _____

As a graduate student with the division of Community Medicine at Memorial University, I am currently conducting research on the nutritional issues and concerns of Indian immigrants in Newfoundland. You may already be aware of this study through the Friends of India Association newsletter. You have been selected to participate in this study. Potential participants were randomly selected from the Friends of India Association membership list and the Chinmaya Mission directory of East Indian origin.

Immigrants who come to Canada with their established dietary habits must face many challenges while adjusting to another culture. Some immigrants may continue their traditional food habits, while others may gradually adopt the dietary habits in Canada. Such behaviours have potential adverse nutritional effects. In the first case, unavailability of traditional ingredients or the inability to follow traditional cooking methods could cause nutritional deficiencies. They could also face difficulties when they seek hospital and community dietary services. In the second case, acculturation to the typical North American diet, which is high in animal protein, saturated fat, simple sugars and total calories can lead to potential health risks.

Nutritionists and dietitians have important responsibilities in helping immigrants to make nutritionally sound food choices in a new environment and in making culturally sensitive nutrition services readily available in the hospitals and in the community.

St. John's, NF, Canada A1B 3V6 • Tel.: (709) 737-6693/6652 • Fax: (709) 737-7382

A preliminary study done in St. John's revealed that dietary services are not culturally appropriate. Nutritionists' and dietitians' limited knowledge about the cultural factors of food habits may be one reason for this unavailability. Another reason may be that St. John's has fewer immigrants compared to other urban centres and they are invisible to the service providers.

I am requesting your help in identifying the nutritional issues and service needs of Indian immigrants. I have developed a questionnaire for this purpose. The questions on the enclosed questionnaire will take approximately 15 - 20 minutes to complete. I hope that you will complete it and return it to me in the enclosed self-addressed stamped envelope as early as possible. The information you provide will be invaluable in developing ethnically tailored nutrition intervention programs. The results of the study will be distributed through the Friends of India Association Newsletter.

All the information you provide will be strictly confidential. Each questionnaire has been given an identification number. This will be the only identification on the questionnaire; no names will be used. The master list linking names and identification on the questionnaire will be accessible only to the researcher and this list will be destroyed once the project is completed. Participation in this research is voluntary. You may decide not to participate or not to answer all the questions. I will be available during the study at all times at 364-1230 or at 737-7101, should you have any problems or questions.

Sincerely yours,

Suja Varghese

Appendix 17

Sample of Cover Letter to Minors

Memorial
University of Newfoundland

Division of Community Health
Faculty of Medicine
The Health Sciences Centre

November 10, 1996

Dear _____

As a graduate student with the division of Community Medicine at Memorial University, I am currently conducting research on the nutritional issues and concerns of Indian immigrants in Newfoundland. You may already be aware of this study through the Friends of India Association newsletter. Your child has been selected to participate in this study. Potential participants were randomly selected from the Friends of India Association membership list and the Chinmaya Mission directory of East Indian origin.

Immigrants who come to Canada with their established dietary habits must face many challenges while adjusting to another culture. Some immigrants may continue their traditional food habits, while others may gradually adopt the dietary habits in Canada. Such behaviours have potential adverse nutritional effects. In the first case, unavailability of traditional ingredients or the inability to follow traditional cooking methods could cause nutritional deficiencies. They could also face difficulties when they seek hospital and community dietary services. In the second case, acculturation to the typical North American diet, which is high in animal protein, saturated fat, simple sugars and total calories can lead to potential health risks.

Nutritionists and dietitians have important responsibilities in helping immigrants to make nutritionally sound food choices in a new environment and in making culturally sensitive nutrition services readily available in the hospitals and in the community.

St. John's, NF, Canada A1B 3V6 Tel: (709) 737-6650/6659 Fax: (709) 737-7000

A preliminary study done in St. John's revealed that dietary services are not culturally appropriate. Nutritionists' and dietitians' limited knowledge about the cultural factors of food habits may be one reason for this unavailability. Another reason may be that St. John's has fewer immigrants compared to other urban centres and they are invisible to the service providers.

I am requesting your child's help in identifying the nutritional issues and service needs of Indian immigrants. I have developed a questionnaire for this purpose. The questions on the enclosed questionnaire will take approximately 15 - 20 minutes to complete. I hope that you will allow your child to complete it and return it to me in the enclosed self-addressed stamped envelope as early as possible. The information you provide will be invaluable in developing ethnically tailored nutrition intervention programs. The results of the study will be distributed through the Friends of India Association Newsletter.

All the information you provide will be strictly confidential. Each questionnaire has been given an identification number. This will be the only identification on the questionnaire; no names will be used. The master list linking names and identification on the questionnaire will be accessible only to the researcher and this list will be destroyed once the project is completed. Participation in this research is voluntary. Your child may decide not to participate or not to answer all the questions. I will be available during the study at all times at 364-1230 or at 737-7101, should you have any problems or questions.

Sincerely yours,

Suja Varghese

Appendix 18

Letter to External Validators

Memorial
University of Newfoundland

Division of Community Health
Faculty of Medicine
The Health Sciences Centre

August 5, 1996

Dear _____

Further to our telephone conversation, I am sending you the questionnaire. I appreciate your kindness to evaluate the questionnaire.

The purpose of my research is to identify some of the nutritional needs and cultural determinants of food selection among immigrants in St. John's. Since the largest proportion of immigrants in St. John's are from India, this study will be concentrated on Indian immigrants.

The main objectives are:

1. To determine the level of understanding of the nutrition concepts as mandated by the Canada's Food Guide to Healthy Eating.
2. To find out their attitudes related to food selection
3. To determine their eating patterns and the level of acculturation.
4. To assess the nutritional needs of these immigrants

The questionnaire is divided into 5 sections:

Section A -Socio-demographic variables

Section B -Dietary Practices

Section C -Attitudes related to food selection. (Willingness to change, convenience, health consciousness, frugality, concern for social status and sociability are the attitude indexes I have selected for this study. The template used for the selection of these attitude indexes is the research done by Steelman on subcultural attitude towards food selection. These indexes closely resembled the attitudes that I gathered during a group discussion and in-depth interviews done among elderly immigrants.

Section D -Nutrition knowledge (their level of understanding of the concepts mandated by CFG

Section E -A nutritional needs assessment.

SUPPORT
THE OPPORTUNITY FUND

St. John's, NF, Canada A1B 3V6 • Tel.: (709) 737-6693/6652 • Fax: (709) 737-7382

Could you please check whether I have included all pertinent questions in the relevant sections. I am looking forward to your comments and suggestions. I could be contacted at 709-364-1230 or 709-737-7101. I would appreciate it very much if you could fax the questionnaire back to me. My fax number is 709-737-7382.

Thanking you in advance,

Suja Varghese

Appendix 19

Sample of a Nutrition Knowledge Questionnaire Used for Discriminant Validity

9/10

Section D

D1. The best method of reducing body weight is to: **(Please Check the most appropriate answer)**

1☐ Skip breakfast
2☐ Increase exercise and decrease food intake
3☑ Reduce sweet and starchy foods in one's diet.
4☐ Eat plenty of grapefruit

D2. Of the following foods which are important to limit in our daily diet to reduce the risks of diet related diseases. (**Please check all that apply)**

1☑ High salt products
2☐ Highfat products
3☐ High caffeine products

D3. A substitute for meat products is; **(Please check all that apply)**

1☐ Dried peas, lentils and beans
2☐ Eggs
3☐ Fish
4☐ Peanut butter
5☐ Not sure

D4. The food with the most calories/per serving is ; **(Please check one)**

1☑ Beans, peas and legumes
2☐ Rice and pasta
3☐ Butter and oil
4☐ Yogurt
5☐ vitamin pills

D5. To maintain good health it is recommended to **eat a variety of foods** . What does this mean to you?**(Please check all that apply)**

☑ I have to include a variety of dark green and orange vegetables and fruits in my diet.
☐ I have to include a variety of grain products such as wheat, rice and bakery products in my diet
☑ I have to eat a variety of meat, fish,and poultry
☐ I have to include a variety of milk and yogurt products in my diet.
☑ I have to include a variety of beans and legumes in my diet.
☐ I am not sure

D6. Every day the highest number of servings should come from; **(Please check one)**

1☐ Milk and milk products
2☐ Grain and grain products
3☐ Meat and meat products
4☑ Vegetables and fruits
5☐ Beans and legumes

D7. Have you ever heard about the Canada Food Guide for Healthy Eating?
1☐ Yes 2☑ No

D8. **If Yes to question D7,** have you read it?
1☐ Yes 2☒ No

D9. **If Yes to question D8,** do you use it as a guide to your daily eating plan?
1☐ Yes 2☐ No

D10. Eating according to Canada's Food Guide will provide all the vitamins and minerals I need.

1☐ Agree 2☐ Disagree 3☐ I don't know 4☑ Not sure

D11. To which age group do you belong?

1☐ 10-19
2☑ 20-29
3☐ 30-44
4☐ 45-64
5☐ 65+

D12. How long have you lived in Canada?(**Please Specify**) 译每这段

Years Eight Months _____

D13. Country of birth **(Please specify)**

china

D 14. What is the highest level of education you have attained? **(Please specify)**

college

Appendix 20

Previous Presentations

Presentation 1 (Abstract)

Dietary practices of Indian immigrants in Newfoundland

S. Varghese*, R.M.Orr, Division of Community Health, Faculty of Medicine, Health Sciences Centre, St. John's, Newfoundland.

A cross sectional survey utilizing a self administered mailed questionnaire was conducted to examine the dietary practices of Indian immigrants in Newfoundland. A random sample of 132 subjects, both males and females aged 10-65+, took part in the study. Only those who were born in India or whose parents were born in India were included in the study. Level of acculturation to Canadian dietary habits, acquisition of dietary practices that might have potential adverse nutritional effects, likelihood of following Canada's Food guide to Healthy Eating (CFGHE), practice of vegetarianism and recent changes made in the diet were assessed. It was found that these immigrants have accultured somewhat to the the Canadian food habits. The likelihood of following CFGHE was high and the acquisition of food habits which have potential adverse nutritional effects was minimal. Approximately one quarter (28%) were vegetarians mainly because they were following family traditions. Recent changes in diet were reported by 82% of the subjects for reasons such as being more health conscious, for reducing weight or because of having more knowledge about nutrition and health. Adherence to suggested CFGHE serving guidelines was found to be 55% for milk products, 54% for meat and meat alternatives, 23% for grain products and 21% for fruits and vegetables. The sociodemographic characteristics revealed that these immigrants were highly educated with higher than average income and well established in Newfoundland. As such, results are not generalizable to other immigrants in the province or Indian immigrants in other parts of Canada. More studies of other groups of immigrants are needed to understand the effect of culture on food habits and to develop culturally sensitive, effective nutrition education programs.

Presented at Dietitians of Canada National Conference in Wolfville,NS on June 12th 1998.

Presentation 2 (Abstract)

Nutrition related needs of Indian immigrants in Newfoundland

S.Varghese*, R.M. Orr, Division of Community Health, Faculty of Medicine, Health Sciences Centre, St. John's, Newfoundland.

A cross sectional survey using a self administered mailed questionnaire was conducted to assess nutrition related needs of Indian immigrants in Newfoundland. A random sample of 132 subjects, both males and females aged 10-65+, took part in the study. Nutrition information needs, ethnic food availability, health problems and cultural appropriateness of services were assessed. It was found that half of the respondents had sought nutrition information; the sources used most frequently were health professionals, magazines and the media. Approximately three-quarters of the participants (73%) expressed a desire to know more about the nutritional quality of their traditional diets and general nutrition and its implications for chronic diseases. Almost two-thirds of the sample (65%) reported that ethnic foods were not readily available; 70% stated that they needed to substitute foods available in Newfoundland for traditional foods. Seventy percent of the participants did not report any major health problems. The majority of those who have utilized hospital dietary and outpatient services (76% and 98% respectively) rated services as culturally inappropriate. Suggestions for improving nutrition services included: increasing dietitians' understanding of various ethnic food habits, provision of ethnic foods regularly in hospitals and distribution of ethnically tailored education materials and sample menus instead of Canada's Food Guide tear sheets. The sample in this study were well established in Newfoundland with few language problems, had high socioeconomic status and were some what acculturated to Canadian food habits. In spite of these unique sample characteristics, the majority stressed the need for more culturally appropriate services. Studies on other groups of immigrants, especially new immigrants with different linguistic and dietary norms, are needed to develop culturally sensitive, effective and meaningful nutrition services.

Presented at "Beyond Borders II" a joint conference of the American Dietetic Association and Dietitians of Canada in Vancouver, BC on June 14th, 1999.