

**Assessing the Validity of a Self-administered Food-Frequency
Questionnaire (FFQ) in the Adult Population of Newfoundland
and Labrador**

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EXECUTIVE SUMMARY

Background

The Food-Frequency Questionnaire (FFQ) is a dietary assessment tool frequently used in large-scale nutritional epidemiological studies. Investigators have recognized that nutritional data collected through self-administered FFQs are subject to substantial error, both systematic and random. For accurate interpretation of FFQ results that arise from epidemiological studies, it is necessary to determine the relationship between self-reported food intakes using the FFQ and true usual dietary intake.

Due to differences in food supply and dietary habits from one population to another, there is no universally accepted FFQ that can be used for all populations. The Newfoundland and Labrador (NL) diet is known to be different from the diets of other North American populations. The FFQ used in the NL Colorectal Cancer (CRC) Study, which was formulated with input from NL researchers, is a modified version of the well-known Hawaii FFQ. However, it has not been appropriately validated for a NL population making some of the findings of the CRC study difficult to interpret. Therefore, the goal of this study is to develop a validated NL based self-administrated FFQ for future nutritional research.

Methods

Using telephone recruitment, the study recruited NL residents, aged 35 to 70 years, from a list of landline telephone numbers provided by Canada Select. Participants were required to participate in three components of the study: (1) a weekday and a weekend 24-hour dietary recall (24-HDR) conducted during the winter and spring months, (2) a weekday and a weekend 24-HDR conducted during the summer and fall months, and (3) a mailed out FFQ. The 24-HDRs were telephone interviews which asked participants to report all of the food and beverages that they had consumed from the midnight to midnight of the previous day. The self-administered FFQ required participants to recall the frequency in which they consumed 169 food items, organized into 11 categories, over the past 12 months.

Data analyses attempted to (1) assess completeness of the responses and (2) examine potential errors and outliers. These two aspects are directly related to overall validity assessment. Estimates of energy and specific nutrients derived from the 24-HDRs and the FFQs were compared. The nutrients that were analyzed include: protein, carbohydrate, fibre, total fat, vitamin A, carotene, vitamin D, and calcium. Data were analyzed using the cross-classification method, Pearson's correlation coefficients, and Bland–Altman plots.

Results

Over a one year period, 195 eligible subjects (153 females, 42 males) were included in the final analysis. The mean nutrient values of the 24-HDRs were lower than those of the FFQs, except for protein in males. Gender and energy-adjusted de-attenuated Pearson correlation coefficients for each nutrient varied from 0.13 to 0.61. Except for protein in males, all correlations were statistically significant with $p < 0.05$. Cross-classification analysis revealed that on average, 74% females and 78% males were classified in the same or adjacent quartile of nutrient intake when comparing data from the FFQ and 24-HDRs.

Conclusions

This 169-item FFQ developed specifically for the NL population had moderate relative validity and therefore can be used in studies to assess food consumption in the general adult population of NL. This tool can be used to classify individual energy and nutrient intakes into quartiles, which is useful in examining relationships between diet and chronic disease.

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1 INTRODUCTION

1.1 Background

Food-Frequency Questionnaires (FFQ) are designed to assess dietary patterns by collecting information regarding the frequency with which specific food items are consumed over a specified reference period [1, 2]. This tool has been the most commonly used dietary assessment method in large-scale epidemiological studies and other nutritional research. Compared to other dietary assessment methods, the FFQ is easy to administer, has relatively low cost, and provides a rapid estimate of usual food intake [3]. However, investigators have recognized that nutritional values resulting from FFQ data are subject to substantial error, both systematic and random [4, 5]. Therefore, to properly interpret the results of epidemiological studies that use FFQs, it is necessary to know the relationship between reported intakes from the FFQ and true usual intakes [6]. Multiple dietary recalls [6-8], food records [9], and biomarkers [10] are generally considered to be more accurate reference measures of intake, and thus can be used in measuring the validity of FFQs. Validation correlations vary with the nutrient, but typically range from 0.40 to 0.70 [8, 11, 12].

FFQs are widely used throughout the world for epidemiologic nutrition surveys. However, due to differences in food supply and dietary habits from one population to another, there is no universally accepted FFQ that can be used for all populations. The Newfoundland and Labrador diet is known to be different from the diets of other North American populations. Specifically, as reflected in the name, the province is made up of two geographical parts: Newfoundland, which is an island surrounded by the Atlantic Ocean, and Labrador, which is a large land mass connected to mainland Canada. Since Newfoundland is an island, the population is dependent upon imported foods from other provinces and countries. Many residents, however, grow their own vegetables, pick berries, hunt, and fish to supplement their diet. In addition, most residents of Newfoundland are of English or Irish descent which greatly influences the culture and food choices in the province. Overall, Newfoundlanders experience a unique food consumption pattern compared with people in other North American regions.

A self-administrated FFQ, used for assessing the relationship between habitual diet and Colorectal Cancer (CRC) in adult residents of Newfoundland and Labrador (NL), was developed from the well-known Hawaii FFQ [13, 14] and modified by NL researchers. Investigation of CRC in this population is warranted as NL has the highest CRC incidence rate in the country, when compared to other Canadian provinces [15]. The diets of residents of this province have been described as 'unique' due to the geography, economics, culture and population demographics [16], and thus an investigation into the possible relationship between dietary factors and CRC is especially warranted in NL. It has been suggested that

elucidation of diet–disease relationships requires dietary assessment methods which can adequately describe and quantify intakes, minimize systematic errors and provide reasonably precise estimates of variability between individuals and/or groups [17]. However, the developed FFQ has not yet been appropriately validated for a NL population and making some of the findings of the CRC study difficult to interpret.

Thus, the objective of the present study is twofold - to address whether this self-administered FFQ is valid in the NL general adult population by comparison with the results of multiple 24-hour dietary recalls (24-HDRs) and to provide a validated NL based self-administrated FFQ for future use.

1.2 Significance

Such a validation will not only immediately assist the analyses and interpretation of data collected by the CRC study, but contribute greatly to future epidemiological studies and other nutritional studies in NL. It will also be of great practical significance to future NL researchers as there is growing evidence to suggest that environmental factors, such as dietary intake and physical inactivity, are of primary importance in the development of chronic illnesses such as cardiovascular disease, diabetes, and certain cancers. Thus, a valid tool to collect dietary intake data from residents of NL has significant public health implications.

1.3 Objectives

The purpose of this study was to develop an NL based FFQ which is valid and can be self-administered.

The specific objectives are as follows:

- 1) to examine and revise the existing FFQ based on the experience gained from the NL component of a large national colorectal cancer study;
- 2) to validate the revised FFQ against two separate repeated 24-hour recalls conducted during the winter and summer among NL adults aged 35 to 70 years; and ultimately
- 3) to produce a self-administered FFQ that can be understood and completed by an adult resident of the province with less than a high school education.

2. METHODS

2.1 Sample recruitment

Recruitment of participants and data collection was conducted by the Health Research Unit (HRU) of Memorial University. The HRU has a reputation for quality health research with many years of experience conducting telephone, mail-out, and face-to-face surveys.

2.1.1 Sample size calculation

The sample size calculation for this study was based on the means and standard deviations of various nutrient values derived from the FFQ data of the on-going CRC project [18-20] and the generally acceptable correlation coefficient value of 0.6. The minimum sample size that was calculated for this study was 98 participants. This validation study would last one year and each subject would be contacted a minimum of three times. A 30% attrition rate per step was expected. Therefore, an initial random sample of 450 participants from the general population was recruited by telephone using a list of landline telephone numbers purchased from Canada Select [21].

2.1.2 Inclusion and exclusion criteria

With the intention of measuring food and beverage intake for the general NL population, the following inclusion criteria were used. An eligible participant should be:

- 1) a non-institutionalized adult resident of NL who has lived in NL for at least two years at the time of the study and is not expected to move within the next 12 months;
- 2) 35-70 years of age; and
- 3) able to speak and read English at a grade 8 level.

For several reasons, we did not exclude people with chronic conditions, such as diabetes, heart disease, or cancer. Firstly, the NL FFQ is expected to be used for the general population which is comprised of individuals with and without chronic diseases. Secondly, as this study is intended to assess intra-reliability between the FFQ and 24-HDR, inter-variations among individuals are not of primary concern. However, we did not include individuals with cognitive impairment, psychological conditions, or who are pregnant, as information collected from these individuals may not be reliable or may not represent their normal dietary pattern.

2.2 Data collection

There were three major components of data collection during this study: (1) a weekday and a weekend 24-HDR conducted during the winter and spring months, (2) a weekday and a weekend 24-HDR conducted during the summer and fall months, and (3) a mailed out FFQ.

Baseline demographic information was collected through the initial telephone interview, and included the following: age, gender, size of the participant's community, marital status, employment status, level of education, and smoking habits.

The 24-HDRs were unannounced and conducted by telephone by trained interviewers. During the 24-HDRs, each subject recalled and described in detail all types and amounts of food and beverages consumed in the previous 24 hours on two separate occasions, a weekday and a weekend day. Weekend days included Saturday and Sunday to capture food and

beverage consumption patterns which may be different from those on weekdays (Monday to Friday) [8, 22, 23]. Such differences may include increased intake of fast food, restaurant foods, “junk” foods, and alcohol. The 24-hour period specified for the dietary recall was defined as the 24 consecutive hours between midnight on day one and midnight on the following day. To assist in estimating portion sizes of consumed foods, respondents were encouraged to view a measuring cup and measuring spoons as they completed their 24-HDR by telephone. The first round of 24-HDRs was conducted from February to April 2011, and the second round was conducted from September to November 2011. There were a total of four completed 24-HDRs for each participant at the end of this study.

An FFQ survey was mailed out to all study participants six months after the completion of the second round of 24-HDRs, specifically, in March 2012. The original Hawaii FFQ was designed to assess the typical food intake of individual males and females in a multi-ethnic Hawaiian/ Southern Californian population [14]; it has been validated and widely used in the United States [24-26]. The FFQ administered in NL was modified to account for the unique food consumption patterns in NL. Food items considered unusual in NL (e.g. tamales, ham hocks) were deleted or altered while some items commonly consumed in NL (e.g. moose meat, pickled meat) were added. This resulted in a list of 169 food and beverage items in the final FFQ tool. The FFQ required participants to recall the number of times each food item was consumed either per day, per week, per month, or rarely/never during the past 12 months. It also required participants to recall how many months of the year the food was consumed to account for seasonal variation in intake. Portion size options were given using standard measuring units (e.g. cups, tablespoons, slices) or by referring to photographs provided representing small, medium, and large portion sizes of certain food items.

2.3 *Statistical analysis*

Data analyses were focused on (1) assessing completeness of the responses and (2) examining potential errors and/or outliers. These two aspects are directly related to overall validity assessment.

2.3.1 *Data entry*

Amounts and specific types/brands of foods and beverages consumed were entered into ESHA Food Processor SQL, version 10.8, nutrient analysis software (ESHA Research Inc, 2010, Salem, Oregon) [27] under the guidance of a professional Registered Dietitian and dietetic graduate students. This software contains more than 35,000 food and beverage items. When an exact match was not available between a food consumed and an item offered in the ESHA database, a group decision was made pertaining to the proper categorization of the item in question. The group always included at least two dietetic professionals/students.

2.3.2 *Calculation of nutrient intake*

The nutrient composition of each item was obtained using the ESHA Food Processor

software. The nutrient composition data in the ESHA database is compiled from a variety of sources including the USDA Nutrient Database for Standard Reference, the USDA Database for the Continuing Survey of Food Intake by Individuals, the Canadian Nutrient File, manufacturers' nutrient information, and over 1,000 additional sources of data.

Estimation of specific nutrient intake was conducted as follows:

- 1) Within each round of 24-HDRs, each day was weighted appropriately to produce a synthetic week with the following formula:

$$\text{Mean Daily Nutrient Estimate} = \frac{(\text{Weekend Intake} \times 2) + (\text{Weekday Intake} \times 5)}{7}$$

- 2) Nutrient estimates from the FFQ data were calculated using the product-sum method [1, 28]. Thus,

Daily nutrient intake

$$= \sum [(\text{reported consumption frequency of a food item, converted to times per day}) \times (\text{portion size consumed of that food}) \times (\text{amount of that nutrient in a standard serving size of that food})]$$

2.3.3 Validation study

Subjects were excluded if total energy intake from the FFQ fell outside the range of 500-5,000 kcal per day [1] (n=4) or if more than one 24-HDR (n=2) was rated as unreliable. We also excluded subjects with missing information (n=4) from the analyses.

Means and standard deviations (SD) were calculated for nutrient intakes assessed by the 24-HDRs and FFQs. For the purpose of this study, the following nutrient intakes derived from the FFQ and 24-HDRs were compared: energy (kcal), protein, total fat, saturated fat, monounsaturated fat, polyunsaturated fat, carbohydrate, dietary fibre, cholesterol, carotene, calcium, vitamin A, and vitamin D. Paired-sample t-tests were used to determine differences between the means for energy and the specified nutrients derived from the two dietary tools. All nutrient variables were log-transformed to improve normality and reduce skewness, and then were energy-adjusted using the residual method [29].

The relationship between the nutrient values from FFQ, both the unadjusted and the energy-adjusted nutrient estimates, and averages of the two synthetic weeks of 24-HDRs were estimated using Pearson correlation coefficients. We also calculated de-attenuated correlations to remove the within-person variability found in the 24-HDRs [30] by using the following formula:

$$r_t = r_0 \sqrt{1 + r/n}$$

Here r_t is the corrected correlation between the energy-adjusted nutrient derived from the FFQ and 24-HDRs, r_0 is the observed correlation, r is the ratio of the within-person and

between-person variance measured from the 24-HDRs, and n is the number of replicated recalls ($n=4$).

Furthermore, we categorized the distribution of energy-adjusted nutrient intakes into quartiles, and estimated the percentage of subjects classified into same, adjacent and extreme quartiles [10, 31, 32]. The Bland–Altman method [33] was also used to assess the agreement between the mean energy and nutrient intake values obtained using the two different dietary instruments.

All analyses were conducted using the SAS statistical software package version 9.2 (SAS Institute Inc., Cary, NC, USA) and Statistical Package for Social Science (SPSS) software version 9.0 (SPSS, Inc., Chicago, IL, USA).

2.4 Ethical consideration

This research was approved by the Interdisciplinary Committee on Ethics in Human Research (ICEHR) [34], Memorial University.

3. RESULTS

3.1 Demographic information

During the first round of 24-HDRs, a total of 1834 telephone numbers were initially identified. After screening for eligibility, 683 eligible participants were contacted to retrieve further information. At the end of the first round of 24-HDRs, 400 participants were selected for further telephone interviews and FFQ surveys; of these, 306 (77%) completed the second round 24-HDR and 210 (49%) completed their FFQs (Figure 1).

After excluding those with unreliable data, 195 subjects (153 females, 42 males) were included in the final analysis. Table 1 presents the demographic information of subjects who had complete data from the first round 24-HDR interview (baseline visit) and FFQs (1-year follow-up visit). The demographic characteristics of the subsample of participants in the final analyses did not differ from those of subjects at baseline. Of the baseline population, the majority of participants were 41-50 years of age (29.0%) and 51-60 years of age (36.5%); the average age was 53.5 years. In the subsample, the mean (SD) age was 55.03 (8.75) years of age. There were significantly more females than males who participated in this study; 74.3% were females and 25.7% were males. In addition, individuals with a higher education level and those who were non-smokers were more likely to participate in the study. Approximately half of the participants were employed (53.3%), rural residents (56.9%), and the majority had a post-secondary education (60.5%), was a non-smoker (82.6%) and was married (78.5%).

3.2 Nutrient intakes

Table 2 presents the means and respective standard deviations for energy and specific nutrients, derived from the FFQ and 24-HDRs. Values for energy and nutrients estimated by the FFQ were higher than those obtained using the 24-HDR, except for protein in males. Evaluation of the differences between these means showed significant differences ($p < 0.05$) for all the nutrient estimates in females and some nutrient estimates in men (dietary fibre, vitamin A, vitamin D, and calcium).

Correlations between nutrient intakes estimates by the FFQs and the 24-HDRs are shown in Table 3 for males and females. The Pearson correlation coefficient for crude data varied from 0.17 (carbohydrate) to 0.40 (carotene) in females and 0.07 (protein) to 0.56 (carbohydrate) in males. In both genders, adjusting for total energy intake improved the correlations in some nutrients, such as protein, but decreased the values in the other nutrients, such as polyunsaturated fat. However, adjustment for residual measurement error (de-attenuation) increased all correlations, ranging from 0.20 (polyunsaturated fat) to 0.52 (dietary fibre) in females and 0.13 (protein) to 0.61 (carbohydrate, dietary fibre) in males, with a median correlation value of 0.38 in females and 0.42 in males. Except for that of protein in males, all correlations were statistically significant with $p < 0.05$.

Data for energy-adjusted nutrient intakes estimated from the FFQs and 24-HDRs were distributed into quartiles of intake and cross-classified. A subject would be correctly classified if his/her energy or nutrient intakes were ranked into the same or an adjacent quartile by both methods. Table 4 presents the summary of cross-classification analysis. For females, classification of subjects into the same and adjacent quartiles ranged from 66.7% (polyunsaturated fat) to 79.1% (dietary fibre), while grossly misclassified individuals varied from 3.3% (carbohydrate, dietary fibre) to 9.1% (polyunsaturated fat). For males, the mean proportion of individuals correctly classified was 78.0%, while on average only 5.85% fell into the extreme quartile. Bland–Altman plots showed no serious systematic bias between administrations of the two dietary instruments over the range of mean intakes (data not shown).

4. DISCUSSIONS

A valid, comprehensive tool to measure nutrient intake is essential to health research involving humans, especially when it is aimed at investigating the relationship between diet and disease [35, 36]. The present study demonstrated that a previously developed 169-item self-administered FFQ is reasonably valid for the assessment of dietary intake in the general adult population of NL. We observed high agreement between the two methods investigated in quartile categorization, as more than 74% of females and 78% of males were correctly classified into the same or adjacent quartiles for energy and twelve specified nutrients. Bland-Altman plots also indicated an acceptable level of agreement between the two methods of nutrient data collection.

A major component of the validation process is the selection of an appropriate reference tool in order to test the target instrument; however no perfect tool exists for dietary intake measurements. It is crucial for the errors of both of the tools used in the current study to be as independent of each other as possible [37]. In a review that studied the validation of FFQs, Cade *et.al* (2002) found that 75% of the studies validated FFQs against repeated 24-HDRs [3]. The FFQ and the 24-HDRs have some similar error sources, such as the reliance on memory and the varying perception of portion sizes [1, 3]; however, the FFQ stresses long-term memory while the 24-HDR relies on short-term memory. In addition, the 24-HDR method was interviewer-based using open-ended questions, whereas the FFQ was self-administered with close-ended questions. Such differences let us assume that the errors are sufficiently independent and that the 24-HDR method is an adequate comparison method for this target instrument [38].

As expected, the absolute nutrient values derived from the FFQ tended to be higher than those derived from the 24-HDRs, which is a common issue reported in previous research [17, 28, 35, 39]. A possible explanation is that people tend to overestimate their actual intake when they are asked to recall the frequency of a large number of foods consumed in an FFQ [1, 28]. According to nutrient intakes of NL adults estimated in 2004 by the Canadian Community Health Survey (CCHS Cycle 2.2) [40], all nutrient intakes estimated by the current study were within the acceptable range ($\pm 20\%$) of the mean values. Correlation coefficients were used to assess the association between the FFQs and the 24-HDRs as well as to measure the relative validity. In females, there were weak (0.17) to moderate (0.40) crude correlations between the FFQs and the 24-HDRs. Similar correlation coefficients have been reported in another cohort of Canadian females [6]. In men, crude correlations varied from weak (0.07) to high (0.56).

For both genders, energy adjustment improved the correlations for the majority of nutrients. According to Willett [29], energy adjustment increases correlation coefficients when the variability of nutrient consumption is related to energy intake, however, decreases correlation coefficients when the variability depends on systematic errors of overestimation and underestimation. In the present study, the lower correlation values found in some nutrient categories may indicate that the FFQ may systemically over or under estimate intake of these nutrients; however, error in over or under estimation by the FFQ is expected. Likewise, Dehghan *et.al* (2012), Wang *et.al* (2008), and Cardoso *et.al* (2010) found that energy adjustment did not improve the crude correlation in their studies [41-43].

Due to correction for the day-to-day variation in nutrient intake, the de-attenuated energy-adjusted correlations were usually higher than their original values. On average, the correlation values were approximately 0.40 when males and females were combined. For females, values ranged from 0.20 to 0.52. Energy, protein, carbohydrate, total fat, saturated fat, monounsaturated fat, polyunsaturated fat, and vitamin A had correlations below 0.40. Males had higher values ranging from 0.13 to 0.61 with protein, total fat, saturated fat, polyunsaturated fat, and carotene having correlations less than 0.40. These values are lower than some reported by previous validation studies [6, 10, 14] but comparable to others [8, 11,

44-46].

In regards to energy, lower concordance coefficients have been reported in the Willett FFQ (0.16 for females and 0.18 for males) and the Block FFQ (0.37 for females and 0.41 for males) [11] as compared with 0.26 (females) and 0.44 (males) derived from the current study. It was particularly noticeable that our correlations for protein were unfavourable, especially in males (0.13), however, our findings were similar to those obtained from a Brazilian cohort (0.20) [43]. For carbohydrate in females, our study yielded a coefficient of 0.38, which compares favourably with the Jackson Heart Study (0.32) [44]. Our low correlations for polyunsaturated fat (0.20 for females and 0.26 for males) were very similar to the results of most other FFQ studies [11, 44-46]. This could be a result of the irregular distribution of oils used in food preparation. In terms of micronutrients, it has been suggested that the number of days which must be monitored to allow a true estimation of average daily intake is greater for micronutrients than for macronutrients and exceeds the four days investigated in this study [47]. Although our correlations for vitamin A in females (0.38) and carotene in males (0.28) were low, they were significant with *p-value* <0.05, suggesting reasonably good agreement between the two instruments. Other studies have also reported poor correlations for micronutrients [6, 42, 43], including vitamin A and carotene.

The use of correlation analysis for assessing validity has often been questioned on the basis that it does not measure agreement but only measures the strength of association between two variables [48, 49]. Cross-classification into quartiles of nutrient intake and Bland–Altman plots were therefore used to achieve a measure of the agreement between the two dietary assessment tools. In terms of total energy and the nutrients analyzed, this FFQ shows a relatively high proportion of subjects being correctly classified (into same or adjacent category) and only a small number of grossly misclassified individuals (less than 10%). As a result, we demonstrated stronger between-method agreement than other studies [50, 51]. This may reflect a high sensitivity for this instrument. Bland–Altman plots showed no systematic bias for most of the nutrients evaluated by the FFQ and the dispersion between the mean intakes estimated by the two instruments suggest a good concordance trend for some nutrients, such as dietary fibre.

Although we have demonstrated acceptable validity of the existing FFQ, some work was conducted to revise this instrument in order to make it more suitable for the NL population. First, those items that were rarely consumed (<5%) by the sample were removed, including veal (#84), smoked fish/lox (#100), papaya (#135), and tofu/tempeh (#152). Next, the basic list was appropriately extended to improve the comprehensiveness of the questionnaire. Popular food items that had been reported more than 20 times in the 24-HDRs and contribute to the total energy intake among NL residents were added into the food list of the FFQ. For example, low fat salad dressing, extra lean ground beef, homemade bread, pineapple, sweets (such as toffees and mints), and bagels were added to the food list. Furthermore, some items in the list were too general and contained numerous foods with significant different nutrient compositions. These needed to be more specific whereas others with similar nutrient compositions needed to be combined. For instance, cantaloupe, watermelon, and honeydew

are conceptually similar foods in the sense that they have similar nutrient content, are all served in the same manner, and are scored by item in the FFQ. As a result, they would be under the same category of melons after revision. Conversely, whole grain cereals (such as Shredded Wheat and multigrain Cherrios), sugar coated ready-to-eat cereals (such as Honey Nut Cherrios and Lucky Charms), and non-sugar coated ready-to-eat cereals (such as Special K) are conceptually dissimilar foods despite their nearly identical nutrient content. Finally, in order to clarify the confusion in some specific categories, accurate descriptions and additional notes were identified. For example, “Tea (not herbal)” (#8) was changed to “Tea (black)” and #69, “SWEET PEPPER”, is now referred to as “SWEET/HOT PEPPER (green, red, yellow)”. The revised FFQ appears in the Appendix.

Several limitations of this study must be considered. First, we did not administer an FFQ at the onset of the study; therefore we cannot assess the reproducibility of the instrument. Future work needs to be completed to evaluate the reproducibility (reliability) of this FFQ. Furthermore, relevant information pertaining to the use of dietary supplements was not collected during the 24-HDRs. Therefore, we do not know the true nutrient intake of this population. Finally, as in most research, the general limitations of dietary assessment instruments cannot be ignored. Both the FFQ and 24-HDR methods rely on memory and may be biased due to under- or over-estimation. It has been suggested by others that multiple reference methods, including dietary methods and biochemical analyses, be used in validation studies [3, 36] to increase the accuracy of the results. Future studies may benefit by including biomarker reference methods such as urinary nitrogen and doubly labeled water; however, using a biomarker will certainly add to the participant burden and costs associated with the study. As well, it is noteworthy that use of the FFQ remains the most cost-effective way to rank usual nutrient intakes in population studies.

5. SUBSIDIARY STUDIES

There are three subsidiary studies using the data collected through this project. The first two studies aimed to determine the level of certain nutrients that were being consumed by the adult NL population and to compare these to the current dietary recommendations. The third study was to evaluate the patterns of food consumption in the general adult population of NL as well as to assess whether these patterns vary according to demographic characteristics.

The first study, entitled “*Should the Fortification of Foods with B vitamins be Revisited? A pilot study to estimate the adequacy of recent intakes of niacin, folate, and vitamin B₁₂ from foods by a sample of adults residing in Newfoundland and Labrador,*” is currently under review for publication. The purpose of this study was to estimate the adequacy or inadequacy of niacin, folate, and vitamin B₁₂ intakes through foods consumed by the adult population of NL. An additional objective was to consider whether these findings support current Canadian food fortification policies. Secondary analysis was performed on two separate 24-HDR for each of the four hundred participants. Mean daily intakes of niacin, folate, and vitamin B₁₂ were estimated and compared by age-sex group. Adequacy of intake was estimated by

comparing the values to the Dietary Reference Intake (DRIs) recommendations. Contributions of folate by ready-to-eat cereals and bread products were also estimated. The results showed that intake of all three of these nutrients were higher in males. Daily intakes of the nutrients compared to the recommendations were calculated as follows: 18.1% of participants consumed folate within the recommended range, 81.9% consuming less than the recommended amount per day; 73.6% of participants consumed niacin within the recommended range, 21.9% in excess of the recommended amount per day; and 63.7% of participants consumed vitamin B₁₂ within the recommended range, 36.3% consuming less than the recommended amount per day. 41.6 % of males and 15.2% of females consumed an average daily intake of niacin from foods above the Tolerable Upper Intake Level (UL). Despite fortification, NL adults may be consuming inadequate amounts of folate from foods. However, one in every five surveyed was consuming niacin at levels above the maximum recommended value from foods alone. Closer monitoring of food fortification may be warranted.

The second study, entitled “*Fibre Consumption in an Adult Population of Newfoundland and Labrador: How much is being consumed and which food groups are contributing to the intake?*” is currently in progress. The purpose of this study was to determine the total fibre that adult residents of NL are consuming and the contribution of foods from the four *Canada’s Food Guide* (CFG) food groups to the total fibre intake. Analysis was completed on 389 participants, 291 females and 98 males. Each food, and its corresponding fibre content, was organized and coded into CFG groups. The resulting mean fibre intakes were as follows: 13.56 g/day for females aged 31-50 years and 15.13 g/day for females 51-70 years; 16.28 g/day for males aged 31-50 years and 17.25 g/day for males aged 51-70 years. The majority of mean values were below the recommended Adequate Intake (AI), however, 7.14% of females aged 31-50 years, 19.55% of females aged 51-70 years, and 6.45% of males aged 51-70 years met or exceeded the appropriate AI for their age-sex group. No conclusions of inadequacy could be made because the AI is not set using the mean/median of a healthy population. The majority of fibre consumed came from foods of the fruits and vegetables group, followed by grain products. The greatest fibre intake came from grain products consumed by females aged 51-70 years. The dietary data collected were not normally distributed and showed a high degree of inter-individual variability which makes comparisons and conclusions difficult to interpret. However, it is important to investigate the eating behaviours of the NL population so health care professionals, educators, and policy makers can use these results to develop strategies and educational tools to improve health.

The third study, entitled “*Food consumption patterns in the general adult population of Newfoundland and Labrador, Canada*”, was conducted using the data collected through the FFQ survey. The 169 food items in the FFQ were grouped into 36 predefined categories according to their nutritional characteristics and the usual frequency of consumption in this population, where several foods (e.g. eggs, beer) composed their own groups. Exploratory factor analysis of the reported number of servings of the various food groups was used to define the patterns of food consumption within the population. Univariate analyses and Multivariable Linear Regression Models were used to assess the relationship between

participants' food consumption patterns and demographic variables, with factor scores being the dependent variable. A total of 192 eligible participants (43 males and 149 females) were included in the present analysis. Through the analysis of the factor loadings of food, four major food consumption patterns, "vegetables", "red meat", "fish" and "whole grains" were identified. We named the first pattern Vegetables, as it has an emphasis on foods on several vegetable groups, fruits, nuts, poultry, and added fat rather than on cured/processed meat. The Red Meat pattern was characterized by a high consumption of red meat, cured/processed meat, soft drinks, added fat (vegetable oil), poultry and mixed dishes with high energy but by low consumption of dark yellow vegetables or legumes. The Fish pattern had a preference for fish, processed fish, tea, game meat (such as moose, sea-birds meat), low-fat sweets, soups, potatoes, pickled vegetables, some vegetables (legumes and dark yellow vegetables), refined grains — but not coffee, soft drinks, and alcohol. The final pattern was labeled Whole Grains because of the high positive loadings in whole grains, cereals, low-fat dairy products, and fruits, but negative loadings in the groups of refined grains/white bread, beer, sweets, potatoes and game meat. Independent of other demographic factors, scores for those in the Red Meat pattern were positively associated with smoking habits, while the opposite was found for the Whole Grains pattern. There was a strong positive association between the scores of the Fish pattern and participants' ages. Our findings may contribute to the development of public health interventions through dietary modifications for the NL population.

5. FINDINGS DISSEMINATION

An essential part of knowledge transfer associated with this project was to promote the validated FFQ in future research and practice in NL, and thus we have concentrated our knowledge translation efforts on our primary audiences in this province. To date, preliminary findings of this study have been presented at various provincial, national, and international scientific conferences and distributed to all the participants through mail-packages

1. **Lin L**, Wang P. P, Roebathan B, Ryan A. Dietary intake and eating patterns of elderly people in Newfoundland and Labrador. *Aging Research in Newfoundland & Labrador: Achievements and Prospects*. September 24-25, 2012, Corner Brook, NL, Canada.
2. **Colbourne J**, Baker N, Roebathan B, and Wang, P.P. Consumption of Foods with Folate, Niacin, and Vitamin B12: Inadequate and Excessive Nutrient Intakes by an Adult Population of Newfoundland and Labrador. *PriFor 2011 preliminary conference*. December 1-2, 2011, St. John's, NL, Canada.
3. **Baker N**, Colbourne J, Roebathan B, Valcour J and Wang, P.P. Fibre Consumption in an Adult Population of Newfoundland and Labrador: How much is being consumed and which food groups are contributing to the intake? *PriFor 2011 preliminary conference*. December 1-2, 2011, St. John's, NL, Canada.

4. **Liu L**, Baker N, Colbourne J, Roebbothan B, Ryan A and Wang, P.P. Food consumption patterns in Newfoundland and Labrador, Canada: a cross-sectional telephone survey. *2011 American Institute for Cancer Research Annual Research Conference on Food, Nutrition, Physical Activity, and Cancer*. November 3-4, 2011, Washington, DC, US. (Poster)
5. **Liu L**, Roebbothan B and Peizhong Wang. Assessing the validity of a self-administered food-frequency questionnaire (FFQ) in the adult population of Newfoundland and Labrador. *CANCER RESEARCH SYMPOSIUM 2010*, November 8-9, 2010, Halifax, Canada.

In the next few months, we will publish the findings in peer-reviewed journals. Each participant in our project can receive a copy of the full report upon request; the public also have the access to the report from the website of the Memorial University of Newfoundland.

7. CONCLUSION

In conclusion, this 169-item FFQ developed specifically for the NL population had moderate relative validity and therefore can be used in studies to assess food consumption in the NL adult population. In addition, this FFQ is capable of classifying an individual's intake into quartiles, which is useful in examining the relationships between diet and chronic disease, including CRC. Such a validation is not only immediately assisting the analyses and interpretation of data collected during the CRC study, but also contributes greatly to future epidemiological studies and other nutritional studies in NL. Further efforts should be made to evaluate the reproducibility of the present FFQ.

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Figure 1: Flow Diagram of Sample Selection

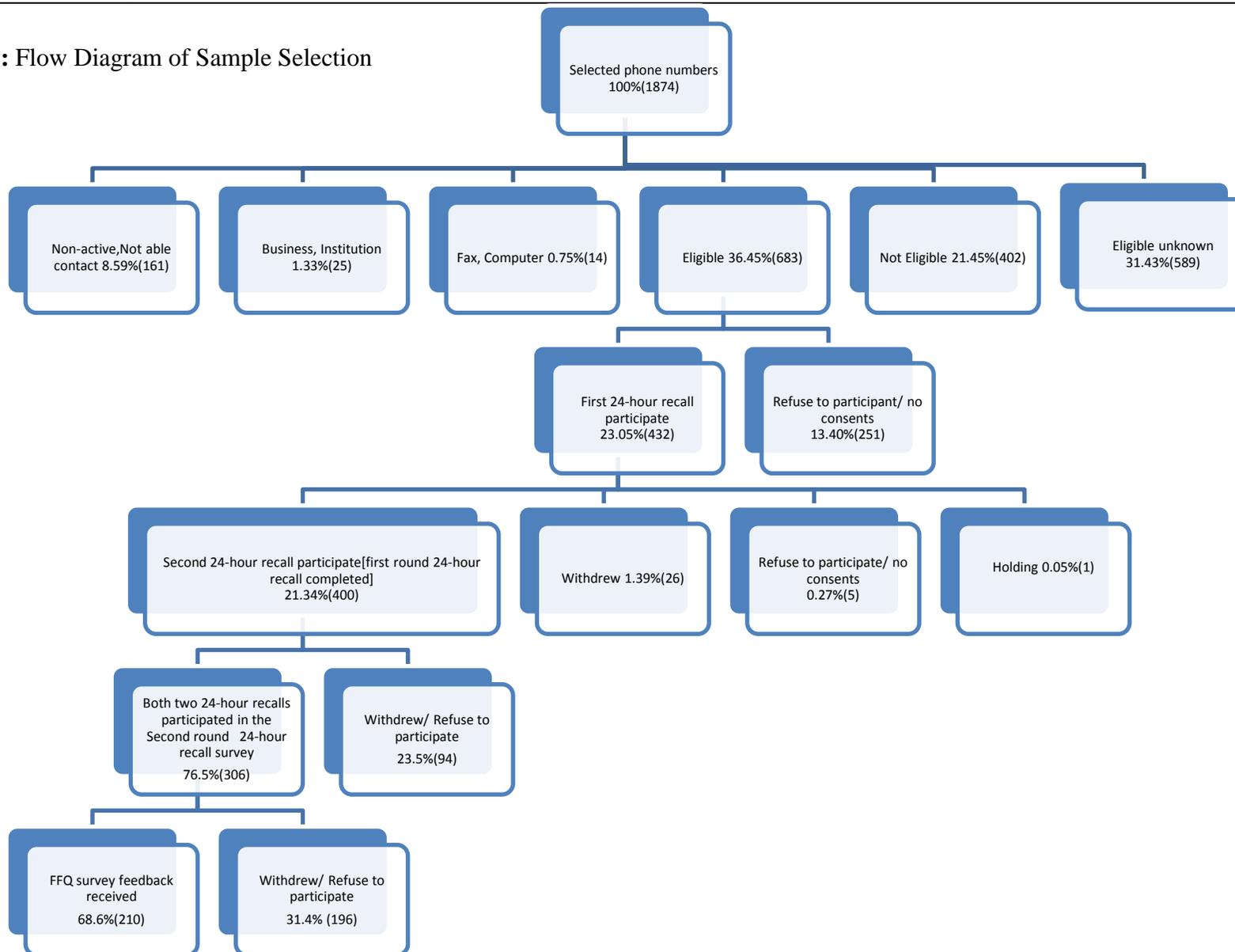


Table 1: Demographic Characteristics of the Participants with Completed Dietary Information at Baseline and the 1-year Follow-up Visit

Characteristic	n (%) (n=400)	n (%) (n=195)
Age Range (years)		
35-40	50 (12.5)	17 (8.7)
41-50	116 (29.0)	46 (23.6)
51-60	146 (36.5)	81 (41.5)
61-70	88 (22.0)	51 (26.2)
Gender		
Male	103 (25.8)	42 (21.5)
Female	297 (74.3)	153 (78.5)
Living Area		
Rural area	217 (54.3)	111 (56.9)
Urban area	182 (45.5)	84 (43.1)
No answer provided	1 (0.3)	0 (0)
Education Attainment		
Some school but no high school certificate	57 (14.3)	26 (13.3)
High school certificate	97 (24.3)	51 (26.15)
Post-secondary education	246 (61.5)	118 (60.5)
Marital status		
Single	29 (7.3)	15 (7.7)
Separated/Divorced	41 (10.3)	18 (9.2)
Widowed	16 (4.0)	9 (4.6)
Married/Living together	314 (78.5)	113 (78.5)
Current Employment		
Part-time	29 (7.3)	16 (8.2)
Full-time	162 (40.5)	75 (38.5)
Seasonal	31 (7.8)	13 (6.7)
No	171 (42.8)	88 (45.1)
<i>retired</i>	115 (27.9)	64 (32.8)
<i>Not retired</i>	52 (12.6)	22 (11.3)
<i>No answer provided</i>	4 (1.0)	2 (1.0)
Unusable data	1 (0.3)	1 (0.5)
Yes	6 (1.5)	2 (1.0)
Current Daily Smoker		
Yes	80 (20)	34 (17.4)
No	320 (80)	161 (82.6)
Previous Daily Smoker		
Yes	165 (41.3)	85 (43.6)
No	155 (38.8)	76 (39.0)
N/A	80 (20)	34 (17.4)

Table 2: Comparison of Nutrient Intakes per day by Food Frequency Questionnaire (FFQ) and 24-Hour Recall (24-HDR)

	Females			Males		
	FFQ	24-HDRs ^a	<i>p-value</i>	FFQ	24-HDRs ^a	<i>p-value</i>
Energy (kcal)	2130.93(751.47) ^b	1505.33(496.50)	0.00*	2138.52(737.47)	2001.68(604.74)	0.26
Protein (g)	86.83(30.81)	63.58(19.81)	0.00*	89.01(36.35)	89.95(26.13)	0.89
Carbohydrate (g)	265.12(106.35)	188.88(66.55)	0.00*	256.27(100.97)	240.80(85.38)	0.24
Dietary Fibre (g)	22.56(11.68)	14.33(5.93)	0.00*	20.12(10.39)	16.49(6.14)	0.02*
Total Fat (g)	83.62(35.79)	55.42(23.84)	0.00*	80.87(31.71)	73.74(26.98)	0.24
Saturated Fat (g)	26.75(12.25)	16.91(8.15)	0.00*	26.48(11.85)	22.90(9.05)	0.10
Monounsaturated Fat (g)	30.52(14.39)	17.91(8.76)	0.00*	28.34(11.90)	25.65(11.30)	0.27
Polyunsaturated Fat (g)	15.26(7.64)	10.09(4.86)	0.00*	14.59(6.20)	12.89(5.06)	0.15
Cholesterol (mg)	288.00(193.69)	214.44(104.62)	0.00*	299.12(155.72)	282.91(105.23)	0.56
Vitamin A (RAE)	1133.14(622.12)	490.21(260.20)	0.00*	1050.41(897.80)	623.66(357.54)	0.01*
Carotene (RE)	624.33(699.23)	338.61(354.25)	0.00*	499.81(272.40)	416.53(417.71)	0.27
Vitamin D (IU)	275.42(162.57)	137.39(79.26)	0.00*	287.69(178.28)	192.32(100.24)	0.00*
Calcium (mg)	1073.17(561.17)	561.37(240.67)	0.00*	1043.57(615.55)	710.97(328.90)	0.00*

^a Average of two rounds of weighted 24-HDR

^b Values are provided as Mean (Standard Deviation)

* Significance of the difference between mean 24-HDR and FFQ estimates (p-value<0.05)

Table 3: Pearson Correlations between Food Frequency Questionnaire (FFQ) Estimates and Weighted 24-Hour Recall (24-HDR) Estimates.

Nutrient ^a	Females			Males		
	Unadjusted	Adjusted ^b	De-attenuated	Unadjusted	Adjusted ^b	De-attenuated
Energy (kcal)	0.23	—	0.26	0.39	—	0.44
Protein (g)	0.25	0.30	0.36	0.07	0.11	0.13
Carbohydrate (g)	0.17	0.34	0.38	0.56	0.54	0.61
Dietary Fibre (g)	0.32	0.47	0.52	0.55	0.54	0.61
Total Fat (g)	0.33	0.32	0.37	0.24	0.32	0.38
Saturated Fat (g)	0.27	0.28	0.33	0.28	0.26	0.31
Monounsaturated Fat (g)	0.36	0.29	0.34	0.23	0.41	0.51
Polyunsaturated Fat (g)	0.29	0.17	0.20	0.23	0.20	0.26
Cholesterol (mg)	0.25	0.34	0.44	0.10	0.33	0.42
Vitamin A(RAE)	0.26	0.32	0.38	0.23	0.35	0.42
Carotene (RE)	0.40	0.38	0.50	0.13	0.19	0.28
Vitamin D (IU)	0.32	0.37	0.45	0.41	0.45	0.55
Calcium (mg)	0.32	0.43	0.50	0.50	0.45	0.51

^a All nutrients were log-transformed to improve normality.

^b Nutrient intakes were adjusted for total energy intake by residual method.

*Correlations of 0.16 and higher have a p-value less than 0.05.

Table 4: Percentage for Cross-Classification of Energy-Adjusted Nutrient Intakes into Quartiles Estimated from the Food Frequency Questionnaire (FFQ) and 24-Hour Recalls (24-HDRs)

Nutrient ^a	Females				Males			
	Same quartile (%)	Adjacent quartile (%)	One quartile apart (%)	Grossly misclassified (%)	Same quartile (%)	Adjacent quartile (%)	One quartile apart (%)	Grossly misclassified (%)
Energy (kcal)	24.8	43.1	24.2	7.8	40.5	33.3	21.4	4.8
Protein (g)	33.3	41.2	18.3	7.2	23.8	45.2	23.8	7.1
Carbohydrate (g)	32.7	45.1	19.0	3.3	40.5	45.2	12.0	2.3
Dietary Fibre (g)	40.5	38.6	17.6	3.3	38.1	42.9	19.0	0.0
Total Fat (g)	34.6	35.3	23.5	6.5	31.0	42.9	16.6	9.5
Saturated Fat (g)	32.7	42.5	17.6	7.2	28.6	50.0	14.3	7.1
Monounsaturated Fat (g)	37.9	33.3	20.3	8.5	38.1	45.2	9.5	7.1
Polyunsaturated Fat (g)	34.0	32.7	24.2	9.1	33.3	42.9	14.3	9.5

Fat (g)									
Cholesterol (mg)	32.7	36.6	24.2	6.5	40.5	40.5	11.9	7.1	
Vitamin A(RAE)	30.1	42.5	20.3	7.2	26.2	47.6	21.4	4.8	
Carotene (RE)	37.9	39.2	16.3	6.5	31.0	40.5	21.4	7.1	
Vitamin D (IU)	38.6	39.2	18.3	3.9	23.8	57.1	14.3	4.8	
Calcium (mg)	31.4	45.8	19.0	3.9	33.3	52.4	9.5	4.8	

a Classification was performed using log-transformed nutrient values

Appendices

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Telephone Recruiting Script

Hello, my name is _____. I am calling for Memorial University Medical School about a study looking at the type of foods we eat. We would like to speak to a person in the household who is over 19 years of age. Is there anyone in your household that fits this description?

If someone says no

Thank you for your time. Goodbye

If someone says yes

Yes, person you are talking to is 19 or over.

Go to *Telephone Consent Form*

Yes, one person but this is NOT the person you are talking to: *Could you ask her/him to come to the telephone?*

If unavailable: *When would be a good time to call her/him*

If available: *Hello my name is _____*

Go to *Telephone Consent Form*

FOLLOW-UP/REMINDER CALL:

Hi <insert name>, this is <insert your name> about the Nutrition study. Just touching base with you to remind you that it's time to complete the second 24-hour recall.

IF YOU FEEL THE PERSON WOULD NOT BE ABLE TO COMPLETE THE TASK:

Thank you for your willingness to participate in our study.

FFQ Validation Telephone Consent Form

We are conducting a study to test an instrument called the Food Frequency Questionnaire. A food frequency questionnaire is a useful instrument when you want to examine a person's diet. Food frequency questionnaires are most often health studies such as the Colorectal Cancer Study. However, because the way people eat differs from one population to the next there is no one food frequency questionnaire that is right for everyone. The Newfoundland and Labrador (NL) diet is known to be different from other North American populations. So, it's really important that we have an instrument that can be used on the Newfoundland and Labrador population. A food frequency questionnaire has been developed by people at MUN for the Newfoundland and Labrador population. But we don't know it really captures the Newfoundland and Labrador diet, so we'd like to test it.

If you agree to help us out, here's what we'll be asking you to do:

- At two different times of the year, roughly 6 months apart, we'll call you twice within a 7-day period.
 - During those two calls we'll ask you what you ate in the previous 24-hours.
- Then, one year after the first phone call, we'll send you a copy of the food frequency questionnaire to complete and send back to us.
- The total time commitment on your part is about 3 hours over the course of one year.

Would you be willing to participate in this study?

Yes

No

↪ Go to PARTICIPANT INFO

↪ Go to CLOSE

PARTICIPANT INFO:

Thank you very much for agreeing to participate in this study. Before we continue, there are just a few points that I would like to bring to your attention.

- You will be asked for some demographic information later in the study
- You may decide NOT to answer any questions
- You may withdraw from the study at any time without consequences

I have one more thing to ask of you before we conclude today. Because this survey consists of mail-out and telephone surveys, I will need to have your full name and mailing address.

I can assure you that any information you send us will be kept confidential. After you complete the telephone and mail-out surveys, your responses will be kept in locked filing cabinets and password-protected computer files accessible only to the researchers involved in this study. All data will be reported in aggregate form only, and no information identifying

you as an individual will be used.

Name:	
Mailing Address:	

The proposal for this research has received ethical approval.

Do you have any questions?

CLOSE:

Thank you again. Goodbye.

Some possible FAQ's:

1. Why do you need to do two 24-hour recalls?

The Newfoundland and Labrador diet is known to change at different times of the year. So, we want to make sure that our food frequency questionnaire will capture all the possibilities of the NL diet.

2. So, you'll be looking at my diet, right?

Not quite. Yes, we'll be analyzing your diet but not in terms of telling if it's a good diet or not. Rather, we'll look at your nutritional intake as noted in the 24-hour recalls and then looking at your nutritional intake as noted on the food frequency questionnaire you complete. Hopefully, what you say in the phone call and indicate on the survey will tell us same thing. That way we'll know if our survey is valid.

3. Can I have a copy of the final report?

Sure. I can send it to your mailing or email address.

Name: _____

Mailing See above.

address: _____

Email: _____

4. Can I have more information about the ethical approval of this study?

The proposal for this research has been reviewed by the Interdisciplinary Committee on Ethics in Human Research and found to be in compliance with Memorial University's ethics policy. If you have ethical concerns about the research (such as the way you have been treated or your rights as a participant), you may contact the Chairperson of the ICEHR at icehr@mun.ca or by telephone at (709) 864-2861.

Telephone Reminder Script

FOLLOW-UP/REMINDER CALL:

Hi <insert name>, this is <insert your name> about the Nutrition study. You completed a food recall for us last winter (a year ago) and again in late summer/early fall. Just touching base with you now to remind you that it's time to complete the Food Frequency Questionnaire survey. It will be sent to your mailing address within the next couple of weeks.

Has your mailing address changed in the last year?

Yes

↪ Record below

No

↪ Thanks, you will receive the package in a few weeks.

And if you have any questions or problems completing the survey you can call **709-777-2043**. Leave your question when the answering machine indicates and someone will get back to you within the day.

(The following is just a short reminder of what the study is about if you need it):

The Food-Frequency Questionnaire is a primary tool for measuring dietary intake in various studies. However, because the way people eat differs from one population to the next there is no one food frequency questionnaire that is right for everyone. The Newfoundland and Labrador (NL) diet is known to be different from other North American populations. So, it's really important that we have an instrument that can be used on the Newfoundland and Labrador population. A food frequency questionnaire has been developed by people at MUN for the Newfoundland and Labrador population. But we don't know it really captures the Newfoundland and Labrador diet, so we'd like to test it.

Thanks so much for all your participation in this project!!

Participants' Information

Name:

Study ID

**Mailing
address:**

FFQ Validation Study

Demographic Survey

1. In what year were you born? 19 __ __
2. What is your sex?
 - Female
 - Male
3. What is your highest level of education? Please stop me when I get to the correct level.
 - Some school but no high school certificate
 - High school certificate
 - Post-secondary education
4. How many people live in your community?
 - Less than 10,00 people
 - More than 10,000 people
5. What is your marital status?
 - Single
 - Separated/Divorced
 - Married/Living together
 - Widowed
6. Are you currently employed?
 - Yes
 - Part-time
 - Full-time
 - Seasonal
 - No

6a. Are you retired?

Yes

No

What is/was your occupation? _____

7. Do you currently smoke cigarettes daily?

Yes

No

7a. Did you ever smoke cigarettes daily?

Yes

No

This completes our survey. Thank you very much for your
time and comments!

Letter to the Participants

Dear Participant,

You are taking part in a study titled: ‘Assessing the Validity of a Self-administered Food Frequency Questionnaire (FFQ) in the Adult Population of Newfoundland and Labrador’. We want to thank you for your participation in the 24-hour dietary recalls that you have completed. We are now reaching the final phase for this study – the FFQ survey.

The FFQ survey is a tool for measuring dietary intake. Dietary intake is an important factor in the development of chronic illnesses such as cardiovascular disease, diabetes, and certain cancers. The Newfoundland and Labrador (NL) diet is known to be different from the diets of other North American populations. Currently, there is no validated tool for measuring dietary intake in NL. This research project is designed to help us create an FFQ that is accurate for the NL population. Having an accurate tool for assessing dietary intake in NL will be beneficial for many areas of health research.

Please take a few moments to read through and complete the questionnaire based on what you were eating **OVER THE PAST 12 MONTHS**. Once the survey is completed, please return it using the enclosed pre-stamped envelope. No identifying information will be used in any report of the study data. All data will be reported in aggregate form only.

Please note that we have included a number of research abstracts with this package for your possible interest. Each of these pertains to work which has already been done with some of the information that you have provided to this project.

On behalf of the research team, I would like to take this opportunity to express a sincere thank-you for your valuable input to this important project. If you have any questions about the study or any concerns after taking part, please feel free to contact me directly.

Sincerely,

Dr. Peter Wang
Principal Investigator
NL Food Frequency Questionnaire Validation Study
Telephone: 709-777-8571
E-mails: peter.wang@med.mun.ca

Canadian Study of Diet and Health



Memorial University of Newfoundland

Who this questionnaire is for and what it asks about:

This questionnaire is to be completed by the person taking part in this study:

Part I asks about the foods you ate **OVER THE PAST 12 MONTHS.**

Part II asks about vitamins and other dietary supplements that you may have used.

If possible, please return this questionnaire within two weeks.

The completed questionnaire should be sealed in the pre-paid envelope and mailed back to:

**Health Research Unit,
Room 2801A, Division of Community Health & Humanities,
Medicine, Health Science Centre,
300 Prince Phillip Drive,
St. John's, NL, Canada, A1B 3V6**

If you have any questions about this form or the study, please do not hesitate to contact with us with **709-777-2043**; leave your question when the answering machine indicates and someone will get back to you within the day.

The information given to us in this questionnaire will be kept confidential.

Thank you for your time and assistance

HOW TO COMPLETE THIS QUESTIONNAIRE

We would like to know how often you ate certain foods **OVER THE PAST 12 MONTHS**, and their amounts.

Section A (lists foods and portion sizes)

Amounts are described in various ways, including the number of:

cups, teaspoons (tsp), ounces (oz), inches ("), pieces (e.g., 1 apple)
grams (gm), tablespoons (tbsp), millilitres (ml), centimetres (cm).

We want to know the **Portion Size** of your **USUAL SERVING**. We have given an example of an average portion size in the attached pamphlet. If your portion size was different than the average, you can indicate this by putting an **X** or **✓** in the circles for **Smaller** or **Larger** portion sizes. **Smaller** than average is about 25% or less than the average portion size, while **Larger** than average is about 25% or more than the average size. Leave the circle blank if your typical portion size was average.

One part of the attached pamphlet shows small, medium and large portion sizes for vegetables, meat and chicken. Some questions ask you to refer to the photos to help you figure out correct **Food Portion Size**.

Section B (asks about how often you ate certain foods OVER THE PAST 12 MONTHS)

For each food item listed, choose **one** column (Per Day, Per Week, Per Month, or Never / Rarely) that best describes **HOW OFTEN** you ate or drank that item. For example, if you ate CREAM CHEESE 3 times a month during the year of interest, you would write (3) in the **PER MONTH** column. If you ate SWEET POTATOES only 2 times during the year of interest, you can place a checkmark (✓) in the **NEVER OR RARELY** column.

Section C (To be completed only for seasonal foods)

Some foods (for example fresh fruit and vegetables) are not available throughout the year. **For foods that you do not eat all year round** (i.e. in season only), indicate the number of months of the year that you ate them.

Please complete each question as best you can. We know that it is difficult to recall exactly how often you ate something. If you are not certain, try to give your best estimate. If you need help completing the FFQ please call **(709)-777-2043**. If the call is outside the St. John's area you can call collect.

Section A				Section B OVER THE PAST 12 MONTHS				Section C
FOOD	Average Portion Size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food in Season Only enter Months per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
1 CREAM CHEESE	2 tbsp/30 ml/ 1 oz	<input type="radio"/>	<input type="radio"/>			3		
2 CANTELOUPE	1/8 or 1 slice	<input type="radio"/>	<input type="radio"/>		1			4
3 SWEET POTATOES	1 medium/ 1/2 cup	<input type="radio"/>	<input type="radio"/>				✓	

Section A				Section B OVER THE PAST 12 MONTHS				Section C
FOOD	Average Portion Size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
Beverages								
1	WHOLE MILK <i>(any, include if in cereal & drinks)</i>	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
2	2% MILK, 2% Evaporated milk <i>(any, if in cereal & drinks)</i>	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
3	SKIM MILK, 1% MILK <i>(any, include if in cereal & drinks)</i>	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
4	MILK SHAKE	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
5	YOGURT DRINK	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
6	COFFEE <i>(not decaffeinated)</i>	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
7	COFFEE <i>(decaffeinated)</i>	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
8	TEA <i>(not herbal)</i>	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
9	TEA <i>(herbal)</i>	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
10	SUGAR <i>(in tea and coffee)</i>	1tsp or 1 cube	<input type="radio"/>	<input type="radio"/>				
11	COCA COLA, PEPSI, OTHER COLA	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
12	DIET SOFT DRINKS	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
13	OTHER SOFT DRINKS <i>(not dietetic or cola)</i>	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
14	ORANGE or GRAPEFRUIT JUICE	$\frac{1}{2}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
15	APPLE or GRAPE JUICE	$\frac{1}{2}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
16	OTHER FRUIT JUICES <i>(pineapple, cranberry, etc)</i>	$\frac{1}{2}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
17	FRUIT DRINK/ LEMONADE	$\frac{1}{2}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
18	FRUIT DRINKS, ICED TEA	$\frac{1}{2}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
19	VEGETABLE JUICES	$\frac{1}{2}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
20	BEER or ALE	335 ml/ 1 bottle	<input type="radio"/>	<input type="radio"/>				
21	WHITE WINE	150 ml / 5 oz	<input type="radio"/>	<input type="radio"/>				
22	RED WINE, SHERRY, PORT <i>(or other fortified wine)</i>	150 ml / 5 oz	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
FOOD	Average Portion Size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
23	LIQUOR (for example, whiskey, rum etc)	45 ml/ 1.5 oz	<input type="radio"/>	<input type="radio"/>				
Dairy Products								
24	EGG (boiled, poached)	1 medium	<input type="radio"/>	<input type="radio"/>				
25	EGG (fried, scrambled, omelette)	1 medium	<input type="radio"/>	<input type="radio"/>				
26	CREAM CHEESE, Regular fat	2 tbsp/ 30 ml/ 1 oz	<input type="radio"/>	<input type="radio"/>				
27	CHEESE, Regular fat (such as cheddar, Swiss, processed)	1 slice/ 30 g/ 1oz	<input type="radio"/>	<input type="radio"/>				
28	CHEESE, Light (6-15% fat, such as cream cheese, cheddar)	1 slice/ 30 g/ 1oz	<input type="radio"/>	<input type="radio"/>				
29	CHEESE, Ultra Light (5% fat or less, such as cheddar)	1 slice/ 30 g/ 1oz	<input type="radio"/>	<input type="radio"/>				
30	COTTAGE or RICOTTA CHEESE	125 ml/ ½ cup	<input type="radio"/>	<input type="radio"/>				
31	CREAM (coffee, whipping, sour or regular)	1 tbsp/ 15 ml	<input type="radio"/>	<input type="radio"/>				
32	CREAM (half and half, light sour cream)	1 tbsp/ 15 ml	<input type="radio"/>	<input type="radio"/>				
33	COFFEE WHITENER (non-dairy)	1 tbsp/ 15 ml	<input type="radio"/>	<input type="radio"/>				
34	YOGURT, Regular (plain, 2.4% fat or more)	6 oz/ 170 g	<input type="radio"/>	<input type="radio"/>				
35	YOGURT, Light (plain, less than 2.4% fat)	6 oz/ 170 g	<input type="radio"/>	<input type="radio"/>				
36	YOGURT, Regular (fruit flavoured or frozen, 2.4% fat or more)	6 oz/ 170 g	<input type="radio"/>	<input type="radio"/>				
37	YOGURT, Light (fruit flavoured or frozen, less than 2.4% fat)	6 oz/ 170 g	<input type="radio"/>	<input type="radio"/>				
Mixed Dishes								
38	SOUPS (creamed)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
39	SOUPS (non-creamed)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
40	PEA SOUP	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
41	PASTA with meat sauce (spaghetti, lasagna)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
42	PASTA with tomato sauce (spaghetti)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
43	MIXED DISHES with cheese or cheese sauce (macaroni and cheese)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
44	PIZZA with meat	1 medium slice	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
FOOD	Average Portion Size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
45	PIZZA with vegetable only	1 medium slice	<input type="radio"/>	<input type="radio"/>				
46	MEAT STEW with carrots, other vegetables	1 cup/ 250 ml/ photo A, medium	<input type="radio"/>	<input type="radio"/>				
47	CHILI with meat or Con Carne	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
Vegetables								
48	POTATOES (mashed, boiled, baked etc)	1 medium/ 1/2 cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
49	FRENCH FRIES or FRIED POTATOES	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
50	CARROTS (raw or cooked)	1 medium/ 1/2 cup /125 ml	<input type="radio"/>	<input type="radio"/>				
51	BROCCOLI	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
52	CABBAGE, COLESLAW	1/2 cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
53	CAULIFLOWER	1/2 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
54	CORN	1 ear / 1/2 cup	<input type="radio"/>	<input type="radio"/>				
55	PEAS or LIMA BEANS	1/2 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
56	GREEN or YELLOW BEANS	1/2 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
57	BEANS or LENTILS (baked or boiled beans, kidney beans, chickpeas)	1/2 cup/125 ml cooked	<input type="radio"/>	<input type="radio"/>				
58	SPINACH and other green leafy vegetables (greens, collards, kale, mustard greens etc)	1/2 cup cooked or 1 cup raw	<input type="radio"/>	<input type="radio"/>				
59	GREEN SALAD (with lettuce)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
60	CUCUMBER	1/2 cup/ 125 ml sliced	<input type="radio"/>	<input type="radio"/>				
61	TOMATOES (fresh)	1 medium/ 1/2 cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
62	TOMATOES (canned, pureed or sauce)	1/2 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
63	ONIONS (raw or cooked)	1/2 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
64	BEETS (boiled or pickled)	1/2 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
65	TURNIPS or RUTABAGAS	1 medium/ 1/2 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
66	OTHER ROOT VEGETABLES (sweet potatoes, yams, radish, etc)	1/2 cup/125 ml	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
FOOD	Average Portion Size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
67	YELLOW SQUASH (winter type)	1/4 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
68	ZUCCHINI or EGGPLANT	1/4 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
69	SWEET PEPPER (green, red or yellow)	1/4 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
70	ASPARAGUS or BRUSSEL SPROUTS	1/4 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
71	BEAN SPROUTS, ALFALFA SPROUTS	1/4 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
72	PICKLES, RELISH	1 dill/ 2 tbsp	<input type="radio"/>	<input type="radio"/>				
73	AVOCADO	1/4 medium	<input type="radio"/>	<input type="radio"/>				
74	OTHER VEGETABLES (celery, mushrooms, etc., raw or cooked)	1/4 cup/125 ml	<input type="radio"/>	<input type="radio"/>				
Meats and Fish								
75	GROUND BEEF, Regular (hamburger, meat loaf, in casseroles etc)	85 g/ 3 oz/ 3" patty	<input type="radio"/>	<input type="radio"/>				
			2 oz	4 oz				
76	GROUND BEEF, Medium (hamburger, meat loaf, in casseroles etc)	85 g/ 3 oz/ 3" patty	<input type="radio"/>	<input type="radio"/>				
			2 oz	4 oz				
77	GROUND BEEF, Lean (hamburger, meat loaf, in casseroles etc)	85 g/ 3 oz/ 3" patty	<input type="radio"/>	<input type="radio"/>				
			2 oz	4 oz				
78	ROAST BEEF	photo B, medium	<input type="radio"/>	<input type="radio"/>				
79	STEAK	photo B, medium	<input type="radio"/>	<input type="radio"/>				
80	PORK CHOP	photo B, medium	<input type="radio"/>	<input type="radio"/>				
81	ROAST PORK	photo B, medium	<input type="radio"/>	<input type="radio"/>				
82	BAKED HAM	photo B, medium	<input type="radio"/>	<input type="radio"/>				
83	BACON	2 slices	<input type="radio"/>	<input type="radio"/>				
84	VEAL	photo B, medium	<input type="radio"/>	<input type="radio"/>				
85	LAMB	photo B, medium	<input type="radio"/>	<input type="radio"/>				
86	HOT DOG or WIENER (Enter buns/rolls under item 116)	1 hot dog/ 2 oz	<input type="radio"/>	<input type="radio"/>				
87	SAUSAGE	85 g/ 3 oz	<input type="radio"/>	<input type="radio"/>				
88	CORNEB BEEF	1 slice	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
FOOD	Average Portion Size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
89	COLDCUTS (ham, salami, bologna, etc)	1 medium slice/ 30g/ 1 oz	<input type="radio"/>	<input type="radio"/>				
90	LIVER	85 g/ 3 oz	<input type="radio"/>	<input type="radio"/>				
91	FRIED CHICKEN	photo C, medium	<input type="radio"/>	<input type="radio"/>				
92	CHICKEN / TURKEY (roasted or stewed)	photo C, medium	<input type="radio"/>	<input type="radio"/>				
93	CHICKEN / TURKEY, SKIN REMOVED	photo C, medium	<input type="radio"/>	<input type="radio"/>				
94	SALTED/ DRIED MEAT	photo C, small	<input type="radio"/>	<input type="radio"/>				
95	PICKLED MEAT (brined)	photo C, small	<input type="radio"/>	<input type="radio"/>				
96	SHELLFISH (shrimp, lobster, crab)	85 g/ 3 oz/ photo C, small	<input type="radio"/>	<input type="radio"/>				
97	FRIED FISH	170 g/ 6 oz/ photo B, medium	<input type="radio"/>	<input type="radio"/>				
98	FISH (baked or broiled)	170 g/ 6 oz/ photo B, medium	<input type="radio"/>	<input type="radio"/>				
99	CANNED FISH (tuna, salmon)	1/2 can/ 48 ml/ 1.7 oz	<input type="radio"/>	<input type="radio"/>				
100	SMOKED FISH or LOX	85 g/ 3 oz/ photo C, small	<input type="radio"/>	<input type="radio"/>				
101	SALTED/ DRIED FISH	85 g/ 3 oz/ photo C, small	<input type="radio"/>	<input type="radio"/>				
102	PICKLED FISH	85 g/ 3 oz/ photo C, small	<input type="radio"/>	<input type="radio"/>				
103	SEA-BIRDS, SEAL	85 g/ 3 oz/ photo C, small	<input type="radio"/>	<input type="radio"/>				
104	CARIBOU, MOOSE	85 g/ 3 oz/ photo C, small	<input type="radio"/>	<input type="radio"/>				
105	PARTRIDGE, OTHER WILD BIRDS	85 g/ 3 oz/ photo C, small	<input type="radio"/>	<input type="radio"/>				
Cereals and Grains								
106	BRAN or GRANOLA CEREALS (including All Bran)	1/2 cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
107	WHOLE WHEAT CEREALS (such as shredded wheat)	1/2 cup/ 125 ml/ 1 biscuit	<input type="radio"/>	<input type="radio"/>				
108	CEREALS, NOT SUGAR COATED (such as Special K)	1/2 cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
109	HOT CEREALS (for example: oatmeal)	1/2 cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
110	SUGAR COATED CEREALS	1/2 cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
111	OTHER BREAKFAST CEREALS	1/2 cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
FOOD	Average Portion Size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
112	SUGAR ON CEREAL	1 tsp	<input type="radio"/>	<input type="radio"/>				
113	100% WHOLE GRAIN or DARK BREAD	1 slice	<input type="radio"/>	<input type="radio"/>				
114	80% WHOLE GRAIN, LIGHT RYE	1 slice	<input type="radio"/>	<input type="radio"/>				
115	WHITE BREAD	1 slice	<input type="radio"/>	<input type="radio"/>				
116	WHITE BREAD ROLLS (including hot dog buns etc)	1 roll	<input type="radio"/>	<input type="radio"/>				
117	WHOLE WHEAT ROLLS	1 roll	<input type="radio"/>	<input type="radio"/>				
118	CRACKERS (snack or soda type)	5	<input type="radio"/>	<input type="radio"/>				
119	BRAN/OAT MUFFIN	1 medium, ½ extra large	<input type="radio"/>	<input type="radio"/>				
120	OTHER MUFFIN (plain cake, with berries)	1 medium, ½ extra large	<input type="radio"/>	<input type="radio"/>				
121	PANCAKES, WAFFLES	1 medium	<input type="radio"/>	<input type="radio"/>				
122	MACARONI, SPAGHETTI, NOODLES (plain)	1 cup cooked/ 250 ml	<input type="radio"/>	<input type="radio"/>				
123	RICE	½ cup cooked/ 125 ml	<input type="radio"/>	<input type="radio"/>				
124	CRISP SNACKS (potato chips, popcorn, pretzels etc)	1 cup	<input type="radio"/>	<input type="radio"/>				
Fruits								
125	APPLE, PEAR	1 medium	<input type="radio"/>	<input type="radio"/>				
126	CITRUS FRUITS (orange, grapefruit)	1 orange, ½ grapefruit	<input type="radio"/>	<input type="radio"/>				
127	BERRIES (strawberries, blueberries, bakeapples)	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
128	GRAPES	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
129	BANANA	1 medium	<input type="radio"/>	<input type="radio"/>				
130	PEACH, PLUM, NECTARINE, APRICOT	1 medium	<input type="radio"/>	<input type="radio"/>				
131	CANTALOUPE	1/8 or 1 slice	<input type="radio"/>	<input type="radio"/>				
132	WATERMELON	1 wedge, 3" base	<input type="radio"/>	<input type="radio"/>				
133	HONEYDEW MELON	1/8 or 1 slice	<input type="radio"/>	<input type="radio"/>				
134	MANGO	1 medium	<input type="radio"/>	<input type="radio"/>				
135	PAPAYA	1 medium	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
FOOD	Average Portion Size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
136	APPLESAUCE	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
137	DRIED FRUITS (raisins, dates, prunes)	2 tbsp/ 2 dates	<input type="radio"/>	<input type="radio"/>				
138	CANNED FRUIT (all kinds)	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
139	ALL OTHER FRUIT (fresh kiwi, pomegranate, etc.)	1 medium	<input type="radio"/>	<input type="radio"/>				
Desserts and Sweets								
140	CAKES	1 slice, 2" x 4" x 1"	<input type="radio"/>	<input type="radio"/>				
141	PIES and TARTS	1 slice	<input type="radio"/>	<input type="radio"/>				
142	DONUTS and SWEET ROLLS	1	<input type="radio"/>	<input type="radio"/>				
143	COOKIES	1	<input type="radio"/>	<input type="radio"/>				
144	ICE CREAM	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
145	LIGHT or DIET ICE CREAM	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
146	PUDDING	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
147	DIET or LIGHT PUDDING	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
148	JELLO	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
149	POPSICLES, FREEZIES	1	<input type="radio"/>	<input type="radio"/>				
150	CHOCOLATE BAR and CHOCOLATE CANDY	1 bar / 50g or 5 candy size	<input type="radio"/>	<input type="radio"/>				
151	CANDY (without chocolate)	1 caramel	<input type="radio"/>	<input type="radio"/>				
Miscellaneous								
152	TOFU, TEMPEH	½ cup, 2" x 2" x 1" piece	<input type="radio"/>	<input type="radio"/>				
153	KETCHUP	1 tbsp	<input type="radio"/>	<input type="radio"/>				
154	MAYONNAISE/ MIRACLE WHIP, Regular fat (on bread, salad, meat, etc)	1 tbsp	<input type="radio"/>	<input type="radio"/>				
155	MAYONNAISE/ MIRACLE WHIP, Light (on bread, salad, meat, etc)	1 tbsp	<input type="radio"/>	<input type="radio"/>				
156	SALAD DRESSING, Regular fat (French, Italian etc)	1 tbsp	<input type="radio"/>	<input type="radio"/>				
157	OIL (in cooking)	1 tbsp	<input type="radio"/>	<input type="radio"/>				

Section A			Section B OVER THE PAST 12 MONTHS				Section C	
FOOD	Average Portion Size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
158 BUTTER (on vegetables or bread; exclude use in baked and mixed dishes)	1 pat/ 1 tbsp	<input type="radio"/>	<input type="radio"/>					
159 MARGARINE (on vegetables or bread; exclude use in baked or mixed dishes)	1 pat/ 1 tbsp	<input type="radio"/>	<input type="radio"/>					
160 PEANUT BUTTER	1 tbsp	<input type="radio"/>	<input type="radio"/>					
161 PEANUTS	30g/ 1 oz	<input type="radio"/>	<input type="radio"/>					
162 OTHER NUTS	30g / 1 oz	<input type="radio"/>	<input type="radio"/>					
163 JAM, JELLY, HONEY, SYRUP	1 tbsp	<input type="radio"/>	<input type="radio"/>					
164 GRAVY	4 tbsp	<input type="radio"/>	<input type="radio"/>					
165 CHOCOLATE or STRAWBERRY SYRUP	1 tbsp	<input type="radio"/>	<input type="radio"/>					
166 CHOCOLATE SPREADS	1 tbsp	<input type="radio"/>	<input type="radio"/>					
167 SAUCES (white, cream, Momay)	30 ml/ 1oz/ 2 tbsp	<input type="radio"/>	<input type="radio"/>					
168 WHEAT BRAN	1 tbsp	<input type="radio"/>	<input type="radio"/>					
169 WHEAT GERM	1 tbsp	<input type="radio"/>	<input type="radio"/>					

Continue on next page →

PART 2 - USE OF VITAMINS AND DIETARY SUPPLEMENTS

Now we would like to know about your use of vitamins and dietary supplements.

OVER THE PAST 12 MONTHS, did you take any of the following? If Yes, then specify usual brand and amount and how long you took them.

Vitamin and Amount – if used, 	How many pills did you take per week?	How long had you taken them?
Vitamin C <input type="radio"/> None <input type="radio"/> Below 500 <input checked="" type="radio"/> 500-1000 <input type="radio"/> above 1000 mg <i>EXAMPLE</i>	<input type="text" value="0"/> <input type="text" value="5"/> per week	<input type="text" value="2"/> <input type="text" value="4"/> months
Multivitamins that include minerals <input type="radio"/> No <input type="radio"/> Yes If yes, usual brand _____ 	<input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months
Multivitamins, no minerals <input type="radio"/> No <input type="radio"/> Yes If yes, usual brand _____	<input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months
B Complex vitamins <input type="radio"/> No <input type="radio"/> Yes If yes, usual brand _____	<input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months
In the following items, DO NOT INCLUDE use of the above MULTIVITAMINS		
Vitamin A <input type="radio"/> None <input type="radio"/> Below 10000 <input type="radio"/> 10000-15000 <input type="radio"/> above 15000 IU	<input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months
Vitamin C <input type="radio"/> None <input type="radio"/> Below 500 <input type="radio"/> 500-1000 <input type="radio"/> above 1000 mg	<input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months
Vitamin E <input type="radio"/> None <input type="radio"/> Below 400 <input type="radio"/> 400-800 <input type="radio"/> above 800 IU	<input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months
Beta-carotene <input type="radio"/> None <input type="radio"/> Below 10000 <input type="radio"/> 10000-15000 <input type="radio"/> above 15000 IU	<input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months
Folic acid <input type="radio"/> None <input type="radio"/> Below 1.0 <input type="radio"/> 1.0 mg <input type="radio"/> above 1.0 mg*	<input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months
Calcium <input type="radio"/> None <input type="radio"/> Below 250 <input type="radio"/> 250-500 <input type="radio"/> above 500 mg	<input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months
Iron <input type="radio"/> None <input type="radio"/> Below 100 <input type="radio"/> 100-200 <input type="radio"/> above 200 mg	<input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months
Other dietary supplements (e.g., yeast, cod liver oil, etc) <input type="radio"/> No <input type="radio"/> Yes, specify type: _____ _____	<input type="text"/> <input type="text"/> per week <input type="text"/> <input type="text"/> per week	<input type="text"/> <input type="text"/> months <input type="text"/> <input type="text"/> months

* 1 mg = 1000 micrograms

Thank you very much for completing this questionnaire! Because we want to be able to use all the information you have provided, we would greatly appreciate it if you would please take a moment to review each page making sure that you:

- Did not skip any page
- Completely erased any changes you may have made

We welcome any other information or comments that you would like to give us:

THANK YOU VERY MUCH for your assistance in this research!

For Office Use Only

Study #: _____

Interviewer: _____

Date completed (D/M/Y): _____

Information Pamphlet

Portion Size Guide

When you are measuring how much you are eating, please use these photos for foods in the questionnaire that refer you to pictures [A](#), [B](#), [C](#) to help estimate your usual portion size. All the food is shown in 9" dish.

Picture A: can be used for Vegetables, Rice, Spaghetti, Salads, Potatoes etc.



Small (S) Medium (M) Large (L)

Picture B: can be used for Meats, Steaks, Chops, Fish etc.



Small (S) Medium (M) Large (L)

Picture C: can be used for Chicken, Turkey etc.



Small (S) Medium (M) Large (L)

*Size of dinner plates shown above is 9 inches.



Health Research Unit,

Division of Community Health & Humanities,

Medicine, Health Science Centre,

Memorial University of Newfoundland

St. John's, NL, Canada, A1B 3V6

Telephone: +1 (709) 777-2043



Assessing the Validity of a Self-administered Food-frequency Questionnaire (FFQ) in the Adult Population of Newfoundland and Labrador

A Guide to Measuring Your Food Consumption



Background

The Food-Frequency Questionnaire (FFQ) is a primary tool for measuring dietary intake in research. Much of the current evidence suggests that diet is of primary importance in the development of chronic illnesses such as cardiovascular disease, diabetes, and certain cancers. The Newfoundland and Labrador (NL) diet is known to be different from the diets of other North American populations, and there is no validated tool for measuring dietary intake in this province yet. A valid tool to collect dietary intake data from residents of NL has significant public health implications.

The Aim

The goal of this study is to develop a Newfoundland and Labrador based FFQ which is valid and can be self-administrated.



Procedure

The designed study has three major phases that are required for people's full participation. Specifically, there are two rounds of 24-hour recalls (winter/spring 2011 and fall 2011) and one FFQ survey in winter/spring 2012. The completion and return of the enclosed FFQ is the third and final phase of this study.

Questionnaire Guide

This guide will help you with some of questions that may be unclear. Please pay particular attention to:

➤ Light and Regular

You will see that questions about fat or dairy products often separate out regular and light brands.

➤ Question 86 HOT DOG or WIENER

This question refers to the meat portion only. If you

eat wieners with a bun, check the bun portion in the bread section

➤ Question 89 BOLOGNA

People who cut their own sometimes cut a thicker slice.

If you do, please tick "Larger" for the portion size.

➤ Question 95 PICKLED MEAT

This is the category salt beef would fit under. The salted/dried meat in Question 94 beef jerky and those kind of meat. Pickled fish in Question 102 is asking about things like bottled pickled herring.

➤ Question 158-159 BUTTER and MARGARINE

Be sure to keep separate the amount of margarine and butter you eat.

➤ Question 164 GRAVY

This asks about an average serving of 1/4 cup [4 tablespoons]. Many of us use much more than this. If you do, you would tick the "Larger" portion.



Summary of Research Abstracts

Abstract 1. *Dietary intake and eating patterns of elderly people in Newfoundland and Labrador.* Presented by **Lin Liu** et.al. at Aging Research in Newfoundland & Labrador: Achievements and Prospects, Conner Brook, NL, Canada; September 2012.

Background:

Wise food choices and a balanced diet are key elements to a healthy lifestyle and can both slow and improve the aging process. Seniors require fewer calories but more nutrients to promote and protect health, and contribute to independence, self-efficacy and quality of life. However, studies reported dietary conditions in elder people across this country are not encouraging. Moreover, no existing literature has been addressed this issue within NL province to our knowledge. Thus, the objectives of the study were to evaluate dietary intake and eating patterns in a representative population sample of elderly people in NL, and to describe demographic factors that relate to the consumption of specific food items.

Methods

Subjects: A random sample of 400 participants from the general public in NL was already recruited, and 234 people who are aged over 50 were enrolled in the present study.

Demographic characteristics: Demographic characteristics were obtained through telephone interviews using questions regarding age, sex, education attainment, marital status, community size, employment, and smoking habits.

Dietary assessment: Most of the tools used to assess nutritional intake in large epidemiological studies were originally developed to be used in young and middle-aged subjects and, therefore, their validity and reliability when employed in older subjects remain uncertain. To obtain a more accurate assessment of the dietary intake in elderly participants, both FFQ and 24-hour dietary recall were used to collect corresponding information in this project.

Statistical analysis: Exploratory Factor Analysis was conducted to define the dietary patterns in NL seniors. Univariate analyses and Multivariable Linear Regression Models were used to assess the relationship between participants' food consumption patterns and demographic variables, with factor scores being the dependent variable.

Abstract 2. *Consumption of Foods with Folate, Niacin, and Vitamin B12: Inadequate and Excessive Nutrient Intakes by an Adult Population of Newfoundland and Labrador* Presented by **Jennifer Colbourne** et al. at Primary Health Care Forum, St. John's, NL, Canada; December 2011.

Purpose: To estimate the daily food intakes of folate, niacin, and vitamin B12 by an adult population of Newfoundland and Labrador (NL).

Methods: Four hundred randomly selected adult NL residents were surveyed by telephone. Secondary analysis was performed on two 24-hour food recalls for each participant. Mean daily intakes of folate, niacin, and vitamin B12 were estimated. Statistical significance testing was conducted to compare the means of the age-sex groups. The amount of folate consumed through ready-to-eat cereal (RTEC) and bread products was also examined.

Results: 18.1% of participants consumed folate within the recommended range, 81.9% consuming less than the recommended amount per day; 73.6% of participants consumed niacin within the recommended range, 21.9% in excess of the recommended amount per day; and 63.7% of participants consumed vitamin B12 within the recommended range, 36.3% consuming less than the recommended amount per day. 41.6 % of males and 15.2% of females consumed an average daily intake of niacin from food above the Tolerable Upper Intake Level (UL).

Conclusions: Despite fortification, NL adults may be consuming inadequate amounts of folate from foods. However, one in every five surveyed was consuming niacin at levels above the maximum recommended value. Closer monitoring of food fortification may be warranted.

Abstract 3. *Fibre Consumption in an Adult Population of Newfoundland and Labrador: How much is being consumed and which food groups are contributing to the intake?* Presented by **Natasha Baker** et al. at Primary Health Care Forum, St. John's, NL, Canada; December 2011.

Purpose: To study dietary intakes from a sample of NL adults for: (1) total fibre and (2) contributions of foods in the four food groups of Eating Well with Canada's Food Guide (CFG) to total fibre.

Methods: 24-hour dietary intake data (2 days) were analyzed by Food Processor SQL. Analysis was completed on data collected from 389 participants, 291 females and 98 males. Data from the original data set were organized and coded into CFG groups using Microsoft Excel 2010. All statistical analyses were completed using Stata version 10.1.

Results and Conclusions: Mean fibre intakes were: for females 13.56g/day (31-50 years) and 15.13g/day (51-70 years), for males 16.28g/day (31-50 years) and 17.25g/day (51-70 years). All mean values were below the recommended Adequate Intake (AI) but 7.14% of females aged 31-50 years, 19.55% of females aged 51-70 years, and 6.45% of males aged 51-70 years met or exceeded the appropriate AI. No conclusions of inadequacy could be made because the AI is not set using the mean/median of a healthy population. Most fibre came from foods of the fruit and vegetables group, followed by grain products. A low percentage of all age-sex groups met the recommended servings of CFG. The greatest intakes were grain products consumed by 51-70 year old females, however only about 11% of this age-sex group consumed at least the minimum number of recommended servings per day. Dietary intake data collected were not normally distributed and showed a high degree of inter-person variability.

Abstract 4. *Food Consumption Patterns in Newfoundland and Labrador, Canada: A Cross-Sectional Telephone Survey.* Presented by **Lin Liu** et al. at the AICR Annual Conference on Food, Nutrition, Physical Activity, and Cancer. Washington, DC, U.S.A.; November 3-4, 2011

Background: The objectives of the study were to evaluate the food consumption pattern in the adult population of NL, and to describe demographic factors that relate to the consumption of specific food items.

Methods: A random sample of 400 participants from the general public was recruited. Food intake was assessed using a 24-hour dietary recall method.

Results: The mean consumption of food by the study population was estimated to be 3023g per day, providing an energy intake of 1572.87kcal per day. Comparing the nutrient intake with the Canadian Community Health Survey (CCHS 2.2) data, Newfoundland population had higher fat intake but lower intakes of carbohydrates and fiber. The results also suggest a relatively lower consumption of fruits and vegetables. For example, 75.43% of participants consumed less than the recommended servings daily.

Conclusion: The results highlight the importance of improving healthy eating in NL adult population.

Abstract 5. *Assessing the validity of a self-administered food-frequency questionnaire (FFQ) in the adult population of Newfoundland and Labrador.* Presented by **Lin Liu** et al. at Cancer Research Symposium 2010, Halifax, Canada; November 8-9, 2010

A Food-Frequency Questionnaire (FFQ) used in NL with the colorectal cancer (CRC) project is a modified version of the well-known Hawaii FFQ with input from NL researchers. However, it has not been appropriately validated which makes some of the questionable findings difficult to interpret. The goal of this study is to develop a NL based FFQ which is valid and can be either self-administrated or completed through telephone interview. Being consistent with the NL CRC project, a randomly digit dialing method will be used to recruit 250 study participants between the ages of 35 and 70. All study participants will be asked to finish two 24-hour recalls by pre-trained interviewers in both winter and summer, as well to complete a FFQ survey at the end of the study. Nutrient intakes for individual nutrients will be calculated using the Canadian Nutrient Database software. This research will provide an important tool that is expected to contribute to future epidemiological and other nutritional studies of the NL population. It will also contribute high quality research which, in turn, will enhance the efficiency and effectiveness of the provincial health system.

This study is supported Newfoundland and Labrador Centre for Applied Health Research (NLCAHR) through a research grant. Lin Liu is a graduate student.

Canadian Study of Diet and Health



Memorial University of Newfoundland

Who this questionnaire is for and what it asks about:

This questionnaire is to be completed by the person taking part in this study:

Part I asks about the foods you ate **OVER THE PAST 12 MONTHS.**

Part II asks about vitamins and other dietary supplements that you may have used.

If possible, please return this questionnaire within two weeks.

The completed questionnaire should be sealed in the pre-paid envelope and mailed back to:

**Health Research Unit,
Room 2801A, Division of Community Health & Humanities,
Medicine, Health Science Centre,
300 Prince Phillip Drive,
St. John's, NL, Canada, A1B 3V6**

If you have any questions about this form or the study, please do not hesitate to contact with us with **709-777-2043**; leave your question when the answering machine indicates and someone will get back to you within the day.

The information given to us in this questionnaire will be kept confidential.

Thank you for your time and assistance

HOW TO COMPLETE THIS QUESTIONNAIRE

We would like to know how often you ate certain foods **OVER THE PAST 12 MONTHS**, and their amounts.

Section A (lists foods and portion sizes)

Amounts are described in various ways, including the number of:

cups, teaspoons (tsp), ounces (oz), inches ("), pieces (e.g., 1 apple)
grams (gm), tablespoons (tbsp), millilitres (ml), centimetres (cm).

We want to know the **Portion Size** of your **USUAL SERVING**. We have given an example of an average portion size in the attached pamphlet. If your portion size was different than the average, you can indicate this by putting an **X** or **✓** in the circles for **Smaller** or **Larger** portion sizes. **Smaller** than average is about 25% or less than the average portion size, while **Larger** than average is about 25% or more than the average size. Leave the circle blank if your typical portion size was average.

One part of the attached pamphlet shows small, medium and large portion sizes for vegetables, meat and chicken. Some questions ask you to refer to the photos to help you figure out correct **Food Portion Size**.

Section B (asks about how often you ate certain foods OVER THE PAST 12 MONTHS)

For each food item listed, choose **one** column (Per Day, Per Week, Per Month, or Never / Rarely) that best describes **HOW OFTEN** you ate or drank that item. For example, if you ate CREAM CHEESE 3 times a month during the year of interest, you would write (3) in the **PER MONTH** column. If you ate SWEET POTATOES only 2 times during the year of interest, you can place a checkmark (✓) in the **NEVER OR RARELY** column.

Section C (To be completed only for seasonal foods)

Some foods (for example fresh fruit and vegetables) are not available throughout the year. **For foods that you do not eat all year round** (i.e. in season only), indicate the number of months of the year that you ate them.

Please complete each question as best you can. We know that it is difficult to recall exactly how often you ate something. If you are not certain, try to give your best estimate. If you need help completing the FFQ please call **(709)-777-2043**. If the call is outside the St. John's area you can call collect.

Section A				Section B OVER THE PAST 12 MONTHS				Section C
Food Item	Average portion size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months Number per Year
		Smaller	Larger	per DAY	per WEEK	per MONT	NEVER	
				(enter a number)	(enter a number)	H (enter a number)	or RARELY Y (check)	
1 CREAM CHEESE	2 tbsp/ 1 oz	<input type="radio"/>	<input type="radio"/>			3		
2 MELONS	1/8 or 1 slice	<input type="radio"/>	<input type="radio"/>		1			4
3 SWEET POTATOES	1 medium/ ½ cup	<input type="radio"/>	<input type="radio"/>				✓	

Section A				Section B OVER THE PAST 12 MONTHS				Section C
Food Item	Average portion size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months Number per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
<i>Beverages</i>								
1	WHOLE MILK (any, include if in cereal & drinks)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
2	2% MILK, 2% Evaporated milk (any, if in cereal & drinks)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
3	SKIM MILK, 1% MILK (any, include if in cereal & drinks)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
4	MILK SHAKE	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
5	YOGURT DRINK	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
6	COFFEE (instant or ground, not decaffeinated)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
7	COFFEE (decaffeinated)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
8	TEA (black)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
9	TEA (herbal)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
10	COCA COLA, PEPSI, OTHER COLA	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
11	DIET SOFT DRINKS	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
12	OTHER SOFT DRINKS (not diet or cola)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
13	ORANGE or GRAPEFRUIT JUICE	$\frac{3}{4}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
14	APPLE or GRAPE JUICE	$\frac{3}{4}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
15	OTHER FRUIT JUICES (pineapple, cranberry, etc.)	$\frac{3}{4}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
16	FRUIT DRINK (such as lemonade, iced tea, fruit punch)	$\frac{3}{4}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
17	VEGETABLE JUICES	$\frac{3}{4}$ cup/ 175 ml	<input type="radio"/>	<input type="radio"/>				
18	BEER or ALE, REGULAR	335 ml/ 1 bottle	<input type="radio"/>	<input type="radio"/>				
19	BEER or ALE, LIGHT	335 ml/ 1 bottle	<input type="radio"/>	<input type="radio"/>				
20	WHITE/RED WINE, SHERRY, PORT (or other fortified wine)	150 ml / 5 oz	<input type="radio"/>	<input type="radio"/>				
21	LIQUOR (vodka, whiskey, rum, mixed alcohol etc.)	45 ml/ 1.5 oz	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
Food Item	Average portion size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months Number per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
<i>Dairy Products</i>								
22	EGG (boiled, poached)	1 large	<input type="radio"/>	<input type="radio"/>				
23	EGG (fried, scrambled, omelette)	1 large	<input type="radio"/>	<input type="radio"/>				
24	CREAM CHEESE, REGULAR	2 tbsp/ 30 ml/ 1 oz	<input type="radio"/>	<input type="radio"/>				
25	CREAM CHEESE, LIGHT	2 tbsp/ 30 ml/ 1 oz						
26	CHEESE, REGULAR (such as cheddar, Swiss, processed)	1 slice/ 30 g/ 1oz	<input type="radio"/>	<input type="radio"/>				
27	CHEESE, LIGHT (8-15% fat, such as cheddar)	1 slice/ 30 g/ 1oz	<input type="radio"/>	<input type="radio"/>				
28	CHEESE, ULTRA-LIGHT (5% fat or less, such as cheddar)	1 slice/ 30 g/ 1oz	<input type="radio"/>	<input type="radio"/>				
29	COTTAGE/RICOTTA CHEESE	125 ml/ ½ cup	<input type="radio"/>	<input type="radio"/>				
30	CREAM, REGULAR (coffee, whipping or sour)	1 tbsp/ 15 ml	<input type="radio"/>	<input type="radio"/>				
31	CREAM, LIGHT (half and half, light sour cream)	1 tbsp/ 15 ml	<input type="radio"/>	<input type="radio"/>				
32	COFFEE WHITENER (non-dairy)	1 tbsp/ 15 ml	<input type="radio"/>	<input type="radio"/>				
33	YOGURT, REGULAR (plain, 2.4% fat or more)	6 oz/ 170 g	<input type="radio"/>	<input type="radio"/>				
34	YOGURT, LIGHT (plain, less than 2.4% fat)	6 oz/ 170 g	<input type="radio"/>	<input type="radio"/>				
35	YOGURT, REGULAR (fruit flavoured or frozen, 2.4% fat or more)	6 oz/ 170 g	<input type="radio"/>	<input type="radio"/>				
36	YOGURT, LIGHT (fruit flavoured or frozen, less than 2.4% fat)	6 oz/ 170 g	<input type="radio"/>	<input type="radio"/>				
<i>Mixed Dishes</i>								
37	SOUPS (creamed, canned)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
38	SOUPS (non-creamed, canned)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
39	PEA SOUP (homemade)	1 cup/ 250 ml						
40	HOMEMADE SOUPS (non-cream)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
41	PIZZA, HOMEMADE, FROZEN	1 medium slice	<input type="radio"/>	<input type="radio"/>				
42	PIZZA, FAST FOOD	1 medium slice	<input type="radio"/>	<input type="radio"/>				
43	CHILI with meat or Con Carne	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
Food Item	Average portion size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months Number per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
44	MACARONI & CHEESE with cheese or cheese sauce/powder	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
45	PASTA WITH TOMATO SAUCE (such as spaghetti)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
46	PASTA WITH MEAT SAUCE (such as spaghetti, lasagna)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
47	MEAT STEW with carrots, other vegetables	photo A, medium	<input type="radio"/>	<input type="radio"/>				
<i>Vegetables</i>								
48	POTATOES (mashed, boiled, baked etc.)	1 medium/ ½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
49	FRENCH FRIES or FRIED POTATOES	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
50	CARROTS (raw or cooked)	1 medium/ ½ cup /125 ml	<input type="radio"/>	<input type="radio"/>				
51	BROCCOLI (raw or cooked)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
52	CABBAGE, COLESLAW	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
53	CAULIFLOWER (raw or cooked)	½ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
54	CORN	1 ear / ½ cup	<input type="radio"/>	<input type="radio"/>				
55	PEAS or LIMA BEANS	½ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
56	GREEN or YELLOW BEANS	½ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
57	BEANS or LENTILS (baked or boiled beans, kidney beans, chickpeas)	½ cup/125 ml cooked	<input type="radio"/>	<input type="radio"/>				
58	SPINACH and other green leafy vegetables (greens, collards, kale, mustard greens etc.)	½ cup cooked or 1 cup raw	<input type="radio"/>	<input type="radio"/>				
59	GREEN SALAD (with lettuce)	1 cup/ 250 ml	<input type="radio"/>	<input type="radio"/>				
60	CUCUMBER	½ cup/ 125 ml sliced	<input type="radio"/>	<input type="radio"/>				
61	TOMATOES (fresh)	1 medium/ ½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
62	TOMATOES (canned, pureed or sauce)	½ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
63	ONIONS (raw or cooked)	½ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
64	BEETS (boiled or pickled)	½ cup/125 ml	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
Food Item	Average portion size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food in Season Only enter Months Number per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
65	TURNIPS or RUTABAGAS	1 medium/ ¼ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
66	OTHER ROOT VEGETABLES (sweet potatoes, yams, radish, etc.)	¼ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
67	CELERY	¼ cup/125 ml						
68	MUSHROOMS (fresh or canned)	¼ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
69	SWEET/HOT PEPPER (green, red or yellow)	¼ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
70	ASPARAGUS or BRUSSEL SPROUTS	¼ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
71	BEAN or ALFALFA SPROUTS	¼ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
72	PICKLES, RELISH	1 dill/ 2 tbsp	<input type="radio"/>	<input type="radio"/>				
73	AVOCADO	¼ medium	<input type="radio"/>	<input type="radio"/>				
74	OTHER VEGETABLES (summer squash, zucchini, eggplant etc.)	¼ cup/125 ml	<input type="radio"/>	<input type="radio"/>				
Meats and Fish								
75	GROUND BEEF, REGULAR (hamburger, meat loaf etc)	85 g/ 3 oz/ 3" patty	<input type="radio"/>	<input type="radio"/>				
76	GROUND BEEF, MEDIUM (hamburger, meat loaf etc)	85 g/ 3 oz/ 3" patty	<input type="radio"/>	<input type="radio"/>				
77	GROUND BEEF, LEAN (hamburger, meat loaf etc)	85 g/ 3 oz/ 3" patty	<input type="radio"/>	<input type="radio"/>				
78	GROUND BEEF, EXTRA LEAN (hamburger, meat loaf etc)	85 g/ 3 oz/ 3" patty	<input type="radio"/>	<input type="radio"/>				
79	ROAST BEEF	photo B, medium	<input type="radio"/>	<input type="radio"/>				
80	STEAK/ SHORT-RIBS	photo B, medium	<input type="radio"/>	<input type="radio"/>				
81	PORK CHOP	photo B, medium	<input type="radio"/>	<input type="radio"/>				
82	ROAST PORK	photo B, medium	<input type="radio"/>	<input type="radio"/>				
83	BAKED HAM	photo B, medium	<input type="radio"/>	<input type="radio"/>				
85	BACON	2 slices	<input type="radio"/>	<input type="radio"/>				
86	LAMB	photo B, medium	<input type="radio"/>	<input type="radio"/>				
87	HOT DOG or WIENER (Enter buns/rolls under item 116)	1 hot dog/ 2 oz.	<input type="radio"/>	<input type="radio"/>				
88	SAUSAGE	85 g/ 3 oz.	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
Food Item	Average portion size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
89	CORNE D BEEF	1 slice	<input type="radio"/>	<input type="radio"/>				
90	COLD CUTS (ham, salami, lunchmeat, bologna, etc.)	1 medium slice/ 30g/ 1 oz.	<input type="radio"/>	<input type="radio"/>				
91	LIVER	85 g/ 3 oz.	<input type="radio"/>	<input type="radio"/>				
92	FRIED CHICKEN or CHICKEN NUGGETS	photo C, medium	<input type="radio"/>	<input type="radio"/>				
93	CHICKEN / TURKEY (roasted or stewed)	photo C, medium	<input type="radio"/>	<input type="radio"/>				
94	CHICKEN / TURKEY, SKIN REMOVED	photo C, medium	<input type="radio"/>	<input type="radio"/>				
95	SALTED MEAT	photo C, small	<input type="radio"/>	<input type="radio"/>				
96	PICKLED MEAT (brined)	photo C, small	<input type="radio"/>	<input type="radio"/>				
97	SHELLFISH (shrimp, lobster, crab)	photo C, small	<input type="radio"/>	<input type="radio"/>				
98	FRIED FISH	170g/6oz/ photo B, medium	<input type="radio"/>	<input type="radio"/>				
99	FISH (baked or broiled)	photo B, medium	<input type="radio"/>	<input type="radio"/>				
101	CANNED FISH (tuna, salmon)	½ can/ 48 ml/ 1.7 oz.	<input type="radio"/>	<input type="radio"/>				
102	SALTED/ DRIED FISH	photo C, small	<input type="radio"/>	<input type="radio"/>				
103	PICKLED FISH	photo C, small	<input type="radio"/>	<input type="radio"/>				
104	SEA-BIRDS, SEAL	photo C, small	<input type="radio"/>	<input type="radio"/>				
105	CARIBOU, MOOSE	photo C, small	<input type="radio"/>	<input type="radio"/>				
106	PARTRIDGE, OTHER WILD BIRDS	photo C, small	<input type="radio"/>	<input type="radio"/>				
<i>Cereals and Grains</i>								
107	READY-TO-EAT CEREALS, WHOLE GRAIN (such as shredded wheat, multigrain)	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
108	READY-TO-EAT CEREALS, SUGAR COATED (such as honey nut, lucky charms)	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
109	READY-TO-EAT CEREALS, NOT SUGAR COATED (such as Special K)	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
Food Item	Average portion size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food In Season Only enter Months Number per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
110	HOT CEREALS (such as oatmeal)	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
111	WHOLE GRAIN or MIXED-GRAIN BREAD	1 slice	<input type="radio"/>	<input type="radio"/>				
112	WHOLE WHEAT BREAD	1 slice	<input type="radio"/>	<input type="radio"/>				
113	HOMEMADE BREAD	1 slice						
114	WHITE BREAD	1 slice	<input type="radio"/>	<input type="radio"/>				
115	OTHER BREAD (French, raisin, banana, etc.)	1 slice	<input type="radio"/>	<input type="radio"/>				
116	WHITE BREAD ROLLS (including hot dog buns etc.)	1 roll	<input type="radio"/>	<input type="radio"/>				
117	WHOLE WHEAT ROLLS	1 roll	<input type="radio"/>	<input type="radio"/>				
118	CRACKERS	5	<input type="radio"/>	<input type="radio"/>				
119	BISCUITS	5	<input type="radio"/>	<input type="radio"/>				
120	BRAN/OAT MUFFIN	1 medium, ½ extra large	<input type="radio"/>	<input type="radio"/>				
121	OTHER MUFFIN (plain cake, chocolate, berry/fruit)	1 medium, ½ extra large	<input type="radio"/>	<input type="radio"/>				
122	BAGELS	1	<input type="radio"/>	<input type="radio"/>				
123	PANCAKES, WAFFLES	1 medium	<input type="radio"/>	<input type="radio"/>				
124	MACARONI, SPAGHETTI, NOODLES (plain)	1 cup cooked/ 250 ml	<input type="radio"/>	<input type="radio"/>				
125	WHOLE WHEAT NOODLES	1 cup cooked/ 250 ml	<input type="radio"/>	<input type="radio"/>				
126	RICE	½ cup cooked	<input type="radio"/>	<input type="radio"/>				
127	DUMPLINGS	1	<input type="radio"/>	<input type="radio"/>				
128	CRISP SNACKS (potato chips, popcorn, pretzels etc.)	1 cup	<input type="radio"/>	<input type="radio"/>				
<i>Fruits</i>								
129	APPLE, PEAR	1 medium	<input type="radio"/>	<input type="radio"/>				
130	CITRUS FRUITS (orange, clementine, grapefruit)	1 orange, ½ grapefruit	<input type="radio"/>	<input type="radio"/>				
131	BERRIES (strawberries, blueberries, blackberries)	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				
132	GRAPES	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>				

Section A				Section B OVER THE PAST 12 MONTHS				Section C
Food Item	Average portion size	Your Portion Size, if NOT Average		HOW OFTEN? (Complete one column only)				If Ate Food in Season Only enter Months Number per Year
		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
133 BANANA	1 medium	<input type="radio"/>	<input type="radio"/>					
134 PEACH, PLUM, NECTARINE, APRICOT	1 medium	<input type="radio"/>	<input type="radio"/>					
135 MELONS (cantaloupe, watermelon, honeydew)	1/8 or 1 slice	<input type="radio"/>	<input type="radio"/>					
136 PINEAPPLE	1 slice							
137 MANGO	1 medium	<input type="radio"/>	<input type="radio"/>					
138 APPLE/CRANBERRY SAUCE	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>					
139 DRIED FRUITS (raisins, dates, prunes)	2 tbs/ 2 dates	<input type="radio"/>	<input type="radio"/>					
140 CANNED FRUIT (all kinds)	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>					
141 ALL OTHER FRUIT (fresh kiwi, pomegranate, etc.)	1 medium	<input type="radio"/>	<input type="radio"/>					
<i>Desserts and Sweets</i>								
142 SUGAR added to tea, coffee, cereal	1 tsp/ 1 cube	<input type="radio"/>	<input type="radio"/>					
143 SWEETENERS (saccharin, splenda)	1 tsp/1 package	<input type="radio"/>	<input type="radio"/>					
144 CAKES	1 slice, 2" x 4" x 1"	<input type="radio"/>	<input type="radio"/>					
145 PIES and TARTS	1 slice	<input type="radio"/>	<input type="radio"/>					
146 DONUTS and SWEET ROLLS	1	<input type="radio"/>	<input type="radio"/>					
147 COOKIES	1	<input type="radio"/>	<input type="radio"/>					
148 ICE CREAM	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>					
149 ICE CREAM, LIGHT or DIET	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>					
150 PUDDING	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>					
151 PUDDING, LIGHT or DIET	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>					
152 JELLO	½ cup/ 125 ml	<input type="radio"/>	<input type="radio"/>					
153 POPSICLES, FREEZIES	1	<input type="radio"/>	<input type="radio"/>					
154 CHOCOLATE BAR and CHOCOLATE CANDY	1 bar / 50g or 5 candy size	<input type="radio"/>	<input type="radio"/>					
155 CANDY (without chocolate)	1 caramel	<input type="radio"/>	<input type="radio"/>					
156 SWEETS (toffees, mints)	1	<input type="radio"/>	<input type="radio"/>					

Section A				Section B OVER THE PAST 12 MONTHS				Section C
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		Smaller	Larger	per DAY (enter a number)	per WEEK (enter a number)	per MONTH (enter a number)	NEVER or RARELY (check)	
<i>Miscellaneous</i>								
157	KETCHUP	1 tbsp	<input type="radio"/>	<input type="radio"/>				
158	MAYONNAISE/ MIRACLE WHIP, REGULAR (on bread, salad, meat, etc.)	1 tbsp	<input type="radio"/>	<input type="radio"/>				
159	MAYONNAISE/ MIRACLE WHIP, LIGHT (on bread, salad, meat, etc.)	1 tbsp	<input type="radio"/>	<input type="radio"/>				
160	SALAD DRESSING, REGULAR (French, Italian etc)	1 tbsp	<input type="radio"/>	<input type="radio"/>				
161	SALAD DRESSING, LIGHT		<input type="radio"/>	<input type="radio"/>				
162	OIL (in cooking)	1 tbsp	<input type="radio"/>	<input type="radio"/>				
163	BUTTER (on vegetables or bread; exclude use in baked and mixed dishes)	1 pat/ 1 tbsp	<input type="radio"/>	<input type="radio"/>				
164	MARGARINE (on vegetables or bread; exclude use in baked or mixed dishes)	1 pat/ 1 tbsp	<input type="radio"/>	<input type="radio"/>				
165	PEANUT BUTTER	1 tbsp	<input type="radio"/>	<input type="radio"/>				
166	PEANUTS	30g/ 1 oz	<input type="radio"/>	<input type="radio"/>				
167	OTHER NUTS	30g /1 oz	<input type="radio"/>	<input type="radio"/>				
168	JAM, JELLY, HONEY, SYRUP	1 tbsp	<input type="radio"/>	<input type="radio"/>				
169	GRAVY	4 tbsp	<input type="radio"/>	<input type="radio"/>				
170	CHOCOLATE or STRAWBERRY SYRUP	1 tbsp	<input type="radio"/>	<input type="radio"/>				
171	CHOCOLATE SPREADS	1 tbsp	<input type="radio"/>	<input type="radio"/>				
172	SAUCES (mustard, barbecue, soy sauce)	30 ml/ 1oz/ 2 tbsp	<input type="radio"/>	<input type="radio"/>				
173	WHEAT BRAN	1 tbsp	<input type="radio"/>	<input type="radio"/>				
174	WHEAT GERM	1 tbsp	<input type="radio"/>	<input type="radio"/>				
175	BREAD STUFFING	1 tbsp	<input type="radio"/>	<input type="radio"/>				

Continue on next page

PART 2 - USE OF VITAMINS AND DIETARY SUPPLEMENTS

Now we would like to know about your use of vitamins and dietary supplements OVER THE PAST 12 MONTHS, did you take any of the following? If Yes, then specify usual brand and amount and how long you took them.

EXAMPLE Vitamin and Amount	if used \Rightarrow	How many pills did you take per week?	How long had you taken them?
> Vitamin C <input type="radio"/> None <input type="radio"/> Below 500 <input checked="" type="radio"/> 500-1000 <input type="radio"/> above 1000 mg		<input type="text" value="0"/> <input type="text" value="5"/> Per week	<input type="text" value="2"/> <input type="text" value="4"/> months
> Multivitamins that include minerals <input type="radio"/> No <input type="radio"/> Yes If yes, usual brand _____		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months
> Multivitamins, no minerals <input type="radio"/> No <input type="radio"/> Yes If yes, usual brand _____		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months
> B Complex vitamins <input type="radio"/> No <input type="radio"/> Yes If yes, usual brand _____		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months
In the following items, DO NOT INCLUDE use of the above MULTIVITAMINS			
> Vitamin A <input type="radio"/> None <input type="radio"/> Below 10000 <input type="radio"/> 10000-15000 <input type="radio"/> above 15000 IU		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months
> Vitamin C <input type="radio"/> None <input type="radio"/> Below 500 <input type="radio"/> 500-1000 <input type="radio"/> above 1000 mg		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months
> Vitamin E <input type="radio"/> None <input type="radio"/> Below 400 <input type="radio"/> 400-800 <input type="radio"/> above 800 IU		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months
> Beta-carotene <input type="radio"/> None <input type="radio"/> Below 10000 <input type="radio"/> 10000-15000 <input type="radio"/> above 15000 IU		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months
> Folic acid <input type="radio"/> None <input type="radio"/> Below 1.0 <input type="radio"/> 1.0 mg <input type="radio"/> above 1.0 mg*		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months
> Calcium <input type="radio"/> None <input type="radio"/> Below 250 <input type="radio"/> 250-500 <input type="radio"/> above 500 mg		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months
> Iron <input type="radio"/> None <input type="radio"/> Below 100 <input type="radio"/> 100-200 <input type="radio"/> above 200 mg		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months
> Other dietary supplements (yeast, cod liver oil, etc) <input type="radio"/> No <input type="radio"/> Yes, specify type: _____		<input type="text"/> <input type="text"/> Per week	<input type="text"/> <input type="text"/> months

* 1 mg = 1000 micrograms

Thank you very much for completing this questionnaire! Because we want to be able to use all the information you have provided, we would greatly appreciate it if you would please take a moment to review each page making sure that you:

- Did not skip any page
- Completely erased any changes you may have made

We welcome any other information or comments that you would like to give us:

THANK YOU VERY MUCH for your assistance in this research!

For Office Use Only

Study #. _____

Interviewer: _____

Date completed (D/M/Y): _____

The Team...

