5-1997

Use of a Self-Administered Food Frequency Questionnaire in a Population 65 Years and Older

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USE OF A SELF-ADMINISTERED FOOD FREQUENCY QUESTIONNAIRE IN A POPULATION 65 YEARS AND OLDER

by

Karri Lynn Hoyt

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Nutrition and Food Sciences

Approved:

UTAH STATE UNIVERSITY
Logan, Utah

1997

squared values were minimal for total population (r^2=0.035), males (r^2=0.020), and females (r^2=0.044). The years of education had a negative relationship with the number of missing values. The p-value was significant at the $p<0.001$ level but the r-squared values were very small for total population (r^2=0.010), males (r^2=0.004), and females (r^2=0.018). The relationship between cognitive status and missing values was inconsistent. The p-values were significant at the $p<0.001$ level; r-squared statistic values were 0.010 (total population), 0.010 (men), and 0.04 (women). A stepwise linear regression model showed age, education, cognitive status, and gender to have a statistically significant effect ($p<0.001$) on missing values; however, it is small and of little practical importance. The elderly appear to be able to reliably describe their diets using a food frequency questionnaire .

(87 pages)

ABSTRACT

Use of a Self-Administered Food Frequency Questionnaire
in a Population 65 Years and Older

by

Karri Lynn Hoyt, Master of Science
Utah State University, 1997

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Little is known of the elderly's ability to use a food frequency questionnaire to describe their dietary intake. This study examines the elderly's ability to reliably describe their diets and how age, education, cognitive status, and gender may affect their ability to complete and return a food frequency questionnaire. The reproducibility of the questionnaire was tested by a repeated administration among 85 participants 65 years of age and older from the Preston, Idaho, area. Correlation coefficients between nutrient scores from the first and second administration ranged from 0.48-0.79 (total population), 0.44-0.88 (males), and 0.39-0.86 (females). Median values for the correlation coefficients were 0.60, 0.66, and 0.58 for total population, men, and women, respectively. Response rate and response quality were determined by distributing 4600 questionnaires to the residents of Cache County, Utah, who were 65 years or older. The overall response rate was 82.1%, 83.2% for men, and 81.3% for women.

Little difference was found between the age, education level, and cognitive status of respondents compared to nonrespondents. Response quality was defined by the number of missing values per questionnaire. Age had a positive relationship with missing values. The linear regression model had a p-value significant at the $p<0.001$ level; however, the r-

ACKNOWLEDGMENTS

I extend my sincere gratitude to Dr. Bonita W. Wyse for allowing me access to the participants of the Cache County Study on Memory in Aging, for her unfailing trust, encouragement, and example, for being the kind of mentor every student needs, and mostly for her friendship; to Dr. Ron Munger for sharing his expansive knowledge of epidemiology and its concepts, for helping to direct me in the right direction, for answering my many questions and concerns, for believing that I could really complete this huge research effort, and for his friendship; to Dr. Nedra K. Christensen for her ever-present faith, encouragement, listening ear, jokes, and friendship (I could never have done this without her); to Dr. Don Sisson for cookies, smiles, laughter, and without whom statistics would have remained a mystery; to Nancy West for allowing me to pester her about writing and running SAS programs; and to all the people at the Cache County Study on Memory in Aging, both administrators and participants; this study would never have come about if they had not cooperated with my efforts.

I express gratitude to my parents, Herond and Gaylen Hoyt, for their love, encouragement, unfailing support, and belief that I could complete this degree and anything else that I want to do. I love them both more than words can say. A special thanks to all my family and friends for believing in me. I could never have come this far without their love and support.

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INTRODUCTION

The elderly population represents the fastest growing segment of the U.S. population. Each year the number of people over the age of 65 exceeds that of the previous year (1). In the United States in 1900, there were approximately three million persons 65 years and older (2) or about 4% of the total population (3). In 1940 this group comprised nearly 7% of the U.S. population and by 1990 the percentage nearly doubled to approximately 13% of the population. By the year 2040, it is estimated that 22% of the population will be 65 years or older (1).

Life expectancy has also markedly increased. At the turn of the century, life expectancy at birth was approximately 45 years (4). Today life expectancy is much greater. Those born in 1994 can expect to live to 75 years of age (4). Currently, life expectancy for a 65-year-old is approximately 20 years for females and approximately 14 years for males (5).

Because of the growing number of elderly, many challenges must be met with regard to the health and well-being of this group. One of the most significant challenges is understanding the nutritional needs of the elderly and developing nutritional standards that reflect those needs. Geriatric nutritional requirements are just beginning to be studied, and coming to a full understanding of those requirements will take many years. Without adequate information concerning the nutritional needs of the elderly and the effect of aging on those needs, the elderly population will not have the opportunity to experience the independence and overall well-being in their later years that they deserve. Nutritional status affects the body's immune function, helps with wound healing, and may affect the occurrence of chronic disease (6, 7).

Assessment of nutritional status and appropriate intervention could help the elderly to maintain independence and health for a longer span of time, thus reducing the financial

burden to themselves and family members as well as the burden to the caregiver. Approximately one-half of lifetime medical costs are paid out in the last two years of an elderly person's life. This cost could possibly be reduced if we better understood the nutritional needs of the elderly.

A better means of assessing nutrient intake and thus nutritional status is needed. Careful attention must be given to the limitations of the method used to collect nutritional data. Methods for the administration of the chosen instrument need to be clarified. One area that needs particular attention is a means of assessing nutritional intake in the elderly beyond the age of 65 years. The food frequency questionnaire (FFQ) is often the method of choice to obtain dietary intake in large epidemiological studies (8, 9). However, information concerning the reliability and response rate of the FFQ for the elderly (> 65 years) is somewhat limited. Having a reliable instrument and one that is comparable to other methods is important in nutritional assessment.

Statement of Problem

Food frequency questionnaires (FFQ) have been widely used in epidemiological studies with participants less than 65 years of age. Little is known about the usefulness of the FFQ to assess the nutritional intake of persons older than 65 years. Therefore, more studies need to be completed that will ascertain the usefulness of the food frequency questionnaire in the elderly population.

Purpose and Objectives

The purpose of this study was to determine the reliability and the response rate and quality of the food frequency questionnaire in a population over 65 years of age. Food frequency questionnaires were administered to residents aged 65 and older in Cache Valley, a region of northern Utah and southern Idaho, to achieve the following objectives:

1. Determine the reliability of the FFQ in a population of persons 65 years of age and older by examining the correlation between nutrient scores from the first and second administrations of the food frequency questionnaire.
2. Evaluate the response rate to the FFQ by age, cognitive status, level of education, and gender.
3. Evaluate the response quality of the FFQ by age, cognitive status, level of education, and gender in a population 65 years of age and older. Response quality is defined as the number of missing values.

LITERATURE REVIEW

Measurements of Dietary Intake

An important component of any nutritional assessment is the instrument used to collect the dietary intake data. The procedure used to obtain the dietary data varies with the circumstances (10). The instrument used should be able to provide as much detailed information as needed to achieve the desired results (11). Each method has strengths and weaknesses that enable it to be used in different situations. Having no "gold standard" for dietary assessment often leads to choosing the most accessible or practical method for obtaining the desired information on dietary intake. Critical attention must be given to methodologic limitations when collecting and interpreting data on dietary intake of older persons (12). Several commonly used methods will be discussed, including how they are employed, information that may be obtained through using the method, and their strengths and limitations. These methods include the 24-hour recall, food diary, diet history, and food frequency questionnaire.

24-Hour Recall

The 24-hour recall is one of the easiest methods used to collect dietary intake data (13). A trained interviewer asks the subject to recall in as much detail as possible all foods and drinks consumed for a specified time period, typically the preceding 24 hours (13, 14). Details reported by the participant include the specific brand name used, method of preparation, and size of the portion eaten (9, 11, 14). The specified recall period is assumed to represent what the subject would typically consume. Strengths of the 24-hour recall include being relatively inexpensive to administer and brief, providing detailed information about the foods eaten, using only short-term memory, having low respondent burden, being used to estimate intakes of groups, and not altering a subject's usual diet (14). The method also has several limitations. The subjects may not be able to recall

specific details of foods, or they may choose not to report all the details concerning foods consumed (13, 14). The day reported is also seldom representative of a subject's usual daily intake secondary to the variability that occurs from day to day in individual consumption (9). One major drawback is the subject's lack of familiarity with the exact measurements of serving sizes, resulting in under- or overestimation of food consumed (10, 14). This lack of familiarity may be overcome by using pictures of actual portion sizes or food models. Lastly, to obtain accurate information, a well-trained interviewer is needed (9, 13).

When using the 24-hour recall method with an older person, additional limitations may be present. Short-term recall memory decreases with advancing age (12); thus, the reliability of the data gathered may not be accurate in the elderly. Campbell and Dodds (12) conducted a study comparing the recall ability of elderly (> 65 years) and younger subjects. Subjects in their study included 200 persons greater than 65 years and 100 persons aged 20-40 years. When the percentage of average calories obtained through probing (interviewer asking specific questions to obtain more detailed information) was evaluated against the total calories from the 24-hour recall, the younger group did significantly ($p < 0.05$) better than the older group. Probing showed the younger group underreporting approximately 20% of calories; the elderly underreported approximately 47% of calories. Campbell and Dodds (12) concluded that short-term recall information from elderly subjects (greater than 65 years) provided an incomplete picture of total intake when compared with a group of younger subjects.

Food Diary

A food record or food diary requires the subject to record, for a specified length of time, the identity and amount of all food and drink consumed. The time period is generally one to seven days (14). The longer the length of time the more accurate will be the picture of the subject's usual diet. Todd et al. (15) found that obtaining only a single-day record

gave a poor estimate of subjects' habitual dietary intake. Reported portion sizes are estimated using standard household measurements or are weighed on a dietary scale (14). Use of a food record has the strength of not relying upon recall memory as the subject records foods at the time of consumption (9). Detailed information may also be provided on food habits and intake patterns such as when, where, and with whom foods are eaten (9, 14). In addition, the food record is generally more representative if multiple, non-consecutive days are used (14, 16). Limitations for this method include the requirement that subjects are literate and have the time and interest to complete several days of records (14). The act of daily recording may alter dietary intake because subjects tend to simplify consumption patterns to make recording easier , and thus decrease the representation of usual intake (9, 14).

Diet History

The diet history is used to assess dietary intake of the individual for an extended period of time. The diet history method is most often associated with B.S. Burke, who developed the method in the 1940s (mentioned in 14, 17). Burke suggested using four steps, which include: 1) collect general information about subject's health habits, 2) question the subjects about their usual eating patterns, 3) probe for further details about the data given in step two, and 4) conclude with a 3-day diet record on each subject for cross-checking data already given (mentioned in 14). Strengths associated with the dietary history approach include its ability to assess an individual's usual dietary intake, including the seasonal variations in food availability, and its ability to provide estimates of total intake for most nutrients a subject consumes. This method has also been found to correlate well with biochemical indicators of nutritional status (14). Limitations of the diet history include an interview lasting several hours, the need for a highly trained interviewer to ascertain specific details of the subject's diet, and the expense and difficulty associated with coding responses (14, 16). Additional limitations include the requirement for subjects to comply

with specific directions in recalling dietary intake. Nutrient intake may be overestimated or underestimated using this method due to the subject's lack of familiarity with portion sizes (9). Because of its length, this method may pose particular difficulty for the elderly.

Food Frequency Questionnaire

The food frequency questionnaire (FFQ) is used to ascertain how frequently specific foods are consumed. The FFQ is currently considered to be the most practical method for obtaining data in large-scale epidemiological studies (18, 19, 20), and it is appealing because it is generally designed to estimate usual intake for an extended period of time (18, 21, 22). It is also a useful tool in epidemiological studies secondary to being relatively inexpensive and less time-consuming to administer when compared to other methods (20, 21, 23). The FFQ can be either self-administered or administered by a trained interviewer.

The FFQ is used to assess energy and nutrient intake for a specified list of foods (14, 18). Food lists are generally obtained by conducting numerous 24-hour recalls in the desired population and then pooling the most commonly reported foods into a food list. The subject indicates how many times per day, week, month, or year each of the specified foods is consumed. Feskanich et al. (24) found with their brief 45-item FFQ that correlation for most nutrients increased when the number of frequency categories available increased. Standard portion sizes may also be specified for each given food. However, there is disagreement as to whether or not having the subject specify a portion size as compared to using a standard serving size improves the quality of the data. There have been reports that the subject's ability to accurately describe portion size without the aid of measuring devices is poor (25). Hunter et al. (26) have supported the use of standardized serving sizes. Another study determined that subjects were unable to specify usual portion size and that little additional information was gained by inquiring about specific portion sizes (18). In contrast, Hankin (27) found that subjects could specify portion size

especially with help from photographs showing appropriate serving sizes. Chu et al. (28) found that standardized portion sizes and quantitative portion sizes did not give the same results for any food item, group, or nutrient they tested.

The strengths of a food frequency questionnaire are that it can be self-administered, is relatively inexpensive to administer when compared to other methods, may present a better picture of usual intake when compared to diet records, and that its design can be based on large-population data (9, 14). Limitations of the FFQ are inherently connected with the food list that is used (29). Limitations may include using foods or portion sizes that are not representative of the population and underestimating usual intake when similar foods are grouped together. The subject's ability to accurately report usual diet may also affect the reliability of the data collected (9, 14). The FFQ also does not adequately capture data on the seasonality of foods.

To adequately describe the dietary patterns for the group of interest, the instrument must be reproducible and valid. Reproducibility or reliability means the instrument gives the same results on two or more administrations. Validity implies the instrument actually measures what it was designed to measure. Absolute validity is impossible to measure due to the inability to know the precise truth about dietary intake, so "relative validity" is generally stated. Relative validity is determined by using a different method for measuring dietary intake that is considered more accurate and by comparing the results of the two studies; however, this may be impractical in a large study. Ideally the two methods used should have errors that are independent (30).

Many studies have been carried out to test the reproducibility and relative validity of the FFQ. However, the reported use of the FFQ in elderly populations is less than that for younger populations. Most studies report the use of FFQs in participants less than 70 years of age. Many of the studies include subjects from younger population brackets along with elderly participants, but few are exclusive to the elderly.

Willet et al. (9) used a self-administered FFQ among registered nurses aged 34-59 years in the Boston area. The FFQ was administered twice to 173 nurses at approximately a 1-year interval. Intraclass correlation coefficients ranged from 0.49 (total vitamin A without supplementation) to 0.71 (sucrose). The researchers concluded that the FFQ demonstrated sufficient reproducibility. Munger et al. (19) administered a FFQ, based on the Willet questionnaire, to 44 participants of the Iowa Women's Health Study. The questionnaire was administered two times at a 6-month interval. Reproducibility was highest for alcohol, caffeine, and vitamin E at 0.99, 0.95, and 0.90, respectively, and lowest for sucrose, polyunsaturated fat, and iron at 0.53, 0.56, and 0.59, respectively. They concluded that the questionnaire produced reasonably accurate and reproducible results for the age group 55-69. Pietinen et al. (31) studied the reproducibility of a questionnaire administered to 121 Finnish men (aged 55-69). The questionnaire was completed three times at 3-month intervals. Most of the intraclass correlation coefficients ranged between 0.60 to 0.70 with the lowest being vitamin A (0.56) and the highest being alcohol (0.88). The FFQ was determined to be reproducible for the age group that was studied. Lazarus et al. (32) studied the reproducibility of a FFQ among elderly persons in Western Sydney, Australia. A group of 62 (24 men, 38 women) participated in the study. The mean age was 78 years and ranged from 65 to 88. The repeated administration was done 1 month following baseline data collection. Intraclass correlation coefficients ranged from 0.63 (beta carotene) to 0.82 (saturated fat). The researchers reported no significant difference in nutrient scores between baseline and the repeated administration. They concluded that reproducibility of nutrient intake estimations of the elderly using a FFQ was high. Anjani et al. (33) used a self-administered semi-quantitative FFQ on participants in an eye disease study. The ages ranged from 25-81 years. They used calorie-adjusted correlation coefficients for evaluation of nutrients. The correlations ranged from 0.38 to 0.75 for nutrient scores. The authors concluded that their questionnaire provided fairly

reliable dietary information for the nutrients of interest, namely, protein, fat, carotene, vitamin C, vitamin E, and zinc.

Morabia et al. (34) compared a 24-hour recall and a FFQ in a Geneva, Switzerland, population, with participants 35 years and older. They found the FFQ to slightly underestimate the total intake of alcohol, fiber, and calcium since it was based on a subsample of foods from the 24-hour recalls. Overall the FFQ was determined to be useful in assessing mean nutrient intake and to be a better alternative to the 24-hour recall. Martin-Moreno et al. (18) compared the response of 147 Spanish women, aged 18-74 years, using a FFQ and a 4-day diet record. They found correlations for designated foods ranging from 0.51 (saturated fat) to 0.88 (alcohol). On average, 68% of participants scored within one quintile on the FFQ as on the food record. They concluded that the FFQ provides a potentially reliable scale for categorizing individuals according to levels of nutrient intake. Jackson et al. (35) studied the reliability of a short, self-completed FFQ. The participants were non-Asian men (aged 65-74 years) and women (aged 59-65 years). The participants were randomly assigned into two groups. One group completed the questionnaire and was then interviewed; the reverse procedure was done with the other group. Nutrients reported were fat, fiber, and calcium. Correlation coefficients were 0.49 (fat), 0.45 (fiber), and 0.41 (calcium). Subjects ranking into tertile agreement were 58% (fiber), 53% (fat), and 49% (calcium). The authors reported that nutrient score differences were independent of age and gender and suggested that the FFQ method provides adequate means for ranking individuals according to specific nutrient intake.

Horwath and Worsely (25) attempted to validate a 90-item FFQ using direct observation of domestic food storage found in the homes of 3,000 persons 65 years and older. They obtained correlation coefficients ranging from 0.42 for vegetables consumed compared with vegetables observed to 0.86 for total variety of food reported eaten compared with total variety of foods observed to be in the home's storage. They

concluded that a self-administered questionnaire could provide valid measures of food use in the elderly. Jacques et al. (23) used a semi-quantitative FFQ and biochemical indicators to assess nutrient status in a sample population of 137 men and women aged 40-83 years. Correlation between the two separate means of assessing nutrient status led them to conclude that a FFQ could be used to adequately measure nutrient intake. Block et al. (36) used multiple diet records (three 4-day) for validation of a self-administered FFQ. The subjects were women aged 45-70 years. The women were divided into two groups: low-fat diet and usual diet. All subjects completed diet records at 0, 6, and 12 months of the study. The FFQ was self-administered at 1 year after entry into the study. Study results indicated that the mean nutrient scores for the FFQ closely resembled those of the diet records (i.e., both found approximately 38% calories from fat for usual diet group and approximately 21% calories from fat from low-fat diet group). Correlations for all nutrient scores ranged from 0.50 to 0.60. The authors concluded that the questionnaire had the ability to assess usual intake for most nutrients and for varying levels of fat.

Grootenhuis et al. (37) used a diet history for validation of a FFQ in the elderly. Study participants included 75 men and women aged 50-75 years. To negate the bias due to order of administration, one-half of subjects completed the questionnaire first and were then interviewed; the other one-half was done in the reverse order. Pearson correlation coefficients ranged from 0.65 to 0.78 for macronutrients and 0.36 to 0.81 for vitamins and minerals. Classifying nutrient scores into tertiles revealed only 3.9% of macronutrients and 5.9% of vitamins and minerals were not within one tertile. The authors concluded the FFQ to be a viable tool for studying dietary intake. Horwath (30) utilized a short self-administered semi-quantitative FFQ with a group of 53 elderly people (mean age 70 years) from Dunedin, New Zealand, in a validation study. Correlation between nutrient intake measured with the FFQ and five 2-day diet records ranged from 0.34 to 0.75 with less than 5% difference in nutrient scores between the two methods. At least 70% of participants fell

within the same quintile or within one quintile when the two methods were compared. Horwath concluded that using a semi-quantitative self-administered FFQ with the elderly provided similar results as multiple day diet records. Nes et al. (16) studied 38 elderly females in Norway (aged 67 to 80 years) to evaluate a self-administered FFQ with a weighed diet record for 14 nonconsecutive days. The Spearman correlations between the two methods for evaluating nutrient intake ranged from 0.43 (carbohydrates) to 0.88 (energy from alcohol). The two methods placed 77% of subjects within the same or within one quintile and the authors concluded that using a self-administered FFQ for assessing group nutrient intake was successful.

Rothenberg (38) attempted to show the relative validity of a FFQ using a 4-day diet record, four consecutive 24-hour urinary collections, and a study-specific limit for the ratio between energy intake and basal metabolic rate. The study population consisted of seventy-six 70-year-olds from a representative population sample. Subjects were instructed to complete the diet record for four consecutive days (three weekdays, one weekend); urinary collection was collected during the same time period. The FFQ was completed at the medical examination for 35 subjects, and urinary collections were returned for 41 subjects. Results showed correlation coefficients varying between 0.35 (total sugar) and 0.60 (energy and fat). The FFQ consistently provided higher intake estimates than the diet record; however, the proportion of nutrients was similar between the two methods. The authors concluded that the FFQ may adequately reflect habitual intake.

Smith-Porter and Cook (39) compared means of administering a quantitative FFQ in a group of older adults, aged 60-90. They used two different questionnaires, a 34-item FFQ based on the Health Habits and History Questionnaire (HHHQ) of the National Cancer Institute and the original HHHQ. Their shorter version was both self-administered and interviewer-administered, and the HHHQ was interviewer-administered only. Each subject participated in both administrations of the questionnaire. When they compared the

interviewer-administered short version with the interviewer-administered full questionnaire, the Pearson correlations ranged from 0.86 to 0.98. Upon comparing the self-administered short version with the interview-administered full questionnaire, Pearson correlation coefficients ranged from 0.26 to 0.58. Significant differences were found for mean nutrient level between the two different administration methods for protein, vitamin A, thiamin, riboflavin, calcium, and phosphorus. They concluded that method of administration may cause significant difference in the results obtained. However, they did not indicate which method was preferred.

Judging from the above-cited research, the FFQ appears able to provide adequate information on the dietary patterns of study participants when compared with other methods of dietary data collection. It should be noted, however, that the FFQ is most useful in classifying or ranking individuals according to nutrient intake rather than giving a precise estimate of the nutrient intake itself. The FFQ is also useful when data need to be collected and analyzed from large populations (29).

Response Rate and Response Quality

Response rate is "the proportion of eligible respondents who actually complete the survey" (40, page S200). Response rates are an important aspect of any study, particularly those involving the elderly. Without an adequate response rate, collected data may not be representative of the study population; significance of the collected data may be difficult to prove. It has been proposed that response rate is negatively associated with advancing age (40, 41). However, according to Herzog and Rodgers (40, page S205), the link between age and a decreasing response rate "has never been systematically evaluated." Disagreement also exists among researchers as to a standard definition for response rate, thus making it difficult to compare and contrast study results (40).

Many of the studies looking at response rate and age were conducted using face-to-face interviews or telephone surveys. Little is known about response rates in the elderly when mailed surveys are used (41). Herzog and Rodgers (40) investigated the age-response rate relationship by reviewing respondent and non-respondent data from three large surveys conducted by the University of Michigan. They found a general negative linear relationship between age and response rate; however, the relationship was relatively weak though consistent. Kaldenberg et al. (41) looked at response rate patterns of the elderly to determine if response rate declined with age. They sampled 1,000 retired public employees aged 60 and older. A four-page questionnaire was mailed to each participant. Using a regression approach, they found a significant decline in response rate with increasing age, explaining approximately 30% of the variance in the response rate.

The quality of the response also affects the overall quality of the data. Regardless of the rate of response, if the data collected are generally incomplete or of poor quality, the results will not be of much value. An individual's ability to understand each question influences his/her ability to complete the questionnaire (41). A participant's lack of understanding of the questionnaire may result in data that are incomplete and of poor quality. Kaldenberg et al. (41) looked at response quality in their study of retired public employees. They used linear regression to analyze the responses from five different question formats. They found a significant negative relationship between age and response quality in all except the open-ended question format.

After a fairly comprehensive literature review, only a few applicable references were found connecting response rate and quality with age and cognitive status. No references were found concerning educational level and response rate and quality.

MATERIALS AND METHODS

The methods used in this study were selected to best address the major purpose of this study, which was to determine the reliability and the response rate and quality of the food frequency questionnaire (FFQ) in a population over 65 years of age. Food frequency questionnaires were administered to residents of Cache Valley aged 65 and older. The reliability of the food frequency instrument was determined by correlating nutrient scores from the first and second administrations of the FFQ. Response rate was evaluated with respect to the subjects' gender, age, education level, and cognitive status. The quality of the response, defined here simply as the number of missing values, was also evaluated by age, level of education, and cognitive status.

Population and Sampling

A study of reliability for the FFQ as an instrument of dietary assessment in elderly persons 65 years and older was conducted in the Preston, Idaho, area. Participants were subjects for a pilot study of the Cache Valley Study on Memory in Aging (CVSMA). Names of possible participants for the CVSMA pilot came from a list purchased from Survey Sampling, Inc., Fairfield, Connecticut. The list was derived from voter registration lists and subscriptions to auto insurance. The individuals on the list were prioritized from 0-10 based on the completeness of demographic data. A priority of 8-10 signified that actual date of birth data for the person were known and their age could be determined. Any priority less than eight as determined by Survey Sampling was computed using a regression model based on other parameters. The data fields provided for each individual on the list included area code, telephone number, county code, name, street address, city, state, and zip code. The list obtained from Survey Sampling, Inc. for the Preston, Idaho, area contained 274 names. The list of names was reviewed, and those individuals not meeting the desired criteria of being 65 years of age or older were eliminated. All possible

study participants were not contacted due to budget constraints. The CVSMA baseline questionnaire was pretested using this group of people. The CVSMA contacted 168 people; this pilot group consisted of 74 males and 94 females. The ages of all participants ranged between 65 and 99 years, with a mean of 78.6 years.

Of the 168 participants in the CVSMA pilot study, 120 were asked to complete a FFQ. The FFQ was not ready for distribution at the time CVSMA began interviewing; therefore, 48 people who participated in the CVSMA pilot were not evaluated as part of this study. The study of reliability was conducted by repeating the administration of the FFQ. One hundred-twenty questionnaires were distributed to participants of the CVSMA pilot, and 4 months later a copy of the same questionnaire was sent to those individuals who completed and returned the first FFQ.

A larger FFQ dietary survey was conducted among participants of the Cache County Study on Memory in Aging (CCSMA). Participants of the CCSMA survey included only individuals from Cache County, Utah. The CCSMA sample was based on a list of possible participants from Medicare records provided by the Health Care Finance Administration (HCFA). The HCFA list included those individuals 65 years and older and who were permanent residents of Cache County, Utah, as of December 31, 1994. The list included 5,877 individuals. The data provided for each individual included name, address, date of birth, date of death (if applicable), state, county, zip code, gender, and race. The address provided was a mailing address and not one of residence; hence, the list did not contain all individuals who might have been eligible (e.g., if their Medicare checks were sent to an address other than Cache County, Utah). The list also contained the names of individuals who did not reside permanently in Cache County but had their Medicare checks sent to an address in Cache County. The individuals who were not permanent residents of Cache County, Utah, were deleted from the list of eligible individuals. The list was revised, and those individuals who did not meet the criteria of being a permanent resident

of Cache County, Utah, or had moved from the area prior to December 31, 1994, were eliminated. If individuals moved or died after the December 31, 1994, cutoff date, they were coded as such and counted as part of the study group. There were also individuals found who were not on the HCFA list, and other individuals called the study office and asked to be a part of the study. The list of possible participants was continually updated through monitoring the obituaries in the local newspaper (The Herald Journal) and by receiving the quarterly update from the Vital Statistics Department of the Utah State Health Department. The number of eligible individuals for the CCSMA was 5,663. Of those eligible, 63 (1%) died during the study interview period, 498 (9%) refused to participate, 19 (<1%) could not be located, and 367 (6%) had a proxy complete the interview, leaving 4,700 (83%) interviews who were completed by a study-eligible participant. The ethnic composition of the group was 98% Caucasian, <1% African-American (2 persons), 1% other, and 1% unknown. The category "other" included Asian, Pacific Islander, and Native American.

Food Frequency Questionnaire

The semi-quantitative food frequency questionnaire used in this study (see Appendix A) was adapted from a version of the Nurses Health Study questionnaire (9) and the Iowa Women's Health Study (19). Minor modifications made to the Iowa version for our study included adding foods commonly used by Utah elderly (based on a series of 24-hour dietary recalls collected in Utah by Dr. Ann Sorenson 1993, unpublished data) including tortillas, enchiladas, tacos, burritos, fried fish, green peppers, onions, avocados, cocoa, instant breakfast, peanuts, and popcorn. Horwath and Worsley (25) have indicated the importance of customizing the food list for the specific region and study participants. These alterations of the questionnaire were done to obtain a better representation of the population. The FFQ included questions pertaining to average consumption of 147

different foods over the past year, supplement use, and methods of food preparation. Foods in the food list were divided into specific categories, including dairy foods, fruits, vegetables, eggs, meats and mixed dishes, breads, cereals and starches, beverages, and sweets, baked goods, and miscellaneous items. Questions were asked concerning what types of fats were typically used for cooking and baking. The CCSMA survey questionnaire (see Appendix B) also included questions on physical activity (e.g., working around the house, walking, or other transportation) and social activities (e.g., contact with friends and family, attending clubs or other social organizations) with the FFQ, but these questions were not included in the Preston, Idaho, study. Information was also collected on current height, weight, and age of the participant. The questionnaire was completed by each participant without input from outside sources, resulting in its being classified as a self-administered questionnaire.

The food composition database came from the Harvard School of Public Health and was provided courtesy of Dr. Walter Willet. It is based on the United States Department of Agriculture's Handbook 8 and other sources. It contains approximately 600 foods and 180 nutrients.

Assessment of Cognitive Status

Cognition is defined as "the process of obtaining, organizing, and using intellectual knowledge" (42, page 157). Folstein et al. (43) developed the "Mini-Mental State" (MMS) as a means of testing the cognitive abilities of psychiatric patients. The MMS consists of 11 questions that focus on two parts of cognitive function: 1) vocal response and 2) following verbal or written commands (43). By posing questions regarding orientation, registration (instantaneous recall), attention and calculation, recall and language, and constructional capabilities, the MMS provides information for evaluating the patients' cognitive function or status (44). Strengths of the MMS include ease of

administration and scoring, and detection of delirium and dementia (44); weaknesses may include restrictions in the degrees of question difficulty, and, therefore, it may not be accurate in differentiating degrees of dementia (45).

Teng and Chiu (45) modified the MMS by adding four new tests, changing content order, standardizing testing procedures, and incorporating more graded scoring of responses. The Modified Mini-Mental State (3MS) exam has the sensitivity to detect both lower and higher ranges of mental function and provides a good gross estimate of cognitive function. It also incorporates sections to test a subject's ability for learning, retention, language, attention span, visual and spacial skills, and orientation. The 3MS widened the scoring range from 0-30 on the MMS to 0-100 (45).

The 3MS was used as the measurement tool to assess the cognitive status of the CCSMA participants. Additional modifications were made by the principal investigator, John C. S. Breitner, M.D., to make a better fit to the CCSMA population. These modifications included the rewording of several questions and answers so that different versions of the test could be produced. This was done as a precaution against the correct answers being spread throughout the community.

Food Frequency Questionnaire Administration

Reliability Study--First Administration

A self-administered FFQ was distributed to the participants in the Cache Valley Study on Memory in Aging in Preston, Idaho, during February to April 1995 by an interviewer at the conclusion of the field interview. Participants were asked by the interviewer if they would complete a questionnaire about the frequency of their own food consumption. A packet containing the FFQ, a postage-paid envelope, and a letter (see Appendix C) explaining the intent of the FFQ was given to the participants upon their agreement. After completing the questionnaire, the participant returned it via the postage-

paid envelope. Upon receipt of the questionnaire at the study office, it was checked for completeness. Completeness was defined as having fewer than 16 questions left unanswered. Participants whose questionnaires were deemed incomplete were contacted by telephone and were asked to complete any questions left unanswered. Responses given over the telephone were coded in pen color different from the original to indicate a "phone response."

A thank-you note or a reminder postcard was sent to all participants to encourage them to complete and return the questionnaire approximately 8 days after they received the questionnaire. (See Appendix D.)

Reliability Study--Second Administration

The second administration of the FFQ was done 4 months after the first, during June to August 1994. All participants who returned the initial FFQ were mailed a second, identical questionnaire. The repeated administration was explained to the participants in an accompanying letter (see Appendix E). The repeated administration was done so that the two responses could be compared to determine how well they were correlated. After receiving the questionnaires from the second administration, they were checked for completeness using the same protocol as the first administration. Participants with an incomplete questionnaire were contacted by telephone and asked to provide a response for the incomplete questions. The answers received over the telephone were coded in the same manner as the first administration.

A thank-you note or a reminder postcard was sent to all participants to encourage them to complete and return the questionnaire approximately 8 days after they received the questionnaire.

Use of the Food Frequency Questionnaire in the Cache County Study on Memory in Aging

The self-administered FFQ was given to those participating in the baseline interview portion of the Cache County Study on Memory in Aging (CCSMA) along with a business reply envelope, and a letter (see Appendix F) explaining why the data were being collected and requesting their cooperation in completing and returning the questionnaire. There were approximately 300 individuals excluded from completing the questionnaire because a proxy completed the baseline interview portion of the CCSMA for them. Upon receipt of the questionnaires in the study office, questionnaires were checked for subject identification number and entered into a tracking log. Because of concerns for responder burden by the principal investigators of the CCSMA, no further contact was made with the respondents regarding their FFQ.

Several questions required written responses and were coded manually prior to data entry using the data management software KeyEntry III (46). Each questionnaire was entered twice, once initially and once for verification, to minimize data entry errors.

Data Analysis

Analyses of collected data were performed using SAS statistical software (47). Means and standard deviations for nutrient intakes were computed with and without dietary supplements. Paired t-tests, Pearson correlation coeffiecients, and multiple linear regression were computed for the two studies described below.

Reliability Study

Reliability of the questionnaire was defined as its ability to produce the same results on two or more separate administrations and was described statistically with paired t-tests and Pearson correlation coefficients. Paired t-tests were performed to compare mean nutrient scores from the two administrations of the FFQ to determine the similarity in the

reporting of nutrients over a 4-month time span. Pearson correlation coefficients were used to compare nutrient scores from the first and second administrations and were calculated using the SAS statistical software package. Because mean data were skewed to the right, the nutrient scores were placed in a natural log transformation to improve normality before being used in either the paired t-test or Pearson correlation analyses. Nutrient scores were obtained by running coded food frequency data from the questionnaires through a nutrient scoring program adopted from the Nurses Health Study, provided courtesy of Dr. Walter Willet, Harvard University School of Public Health. Responses were evaluated by the discrete variable gender to determine how men's and women's ability to describe their diets differed. An exclusion of those with a daily caloric intake reported as less than 600 kilocalories or greater than 5000 kilocalories was made due to those values being judged implausible (48).

Response Rate and Response Quality Study of CCSMA Participants

Response rate was defined as the number of participants in the sample population who completed the FFQ and returned it divided by the total number of participants who received the FFQ in the CCSMA population. Response quality was defined as the number of completed questions in the FFQ.

Regression analyses were used to evaluate the relationship between age, cognitive status, and education level with response rate and response quality.

RESULTS AND DISCUSSION

Of the initial 120 questionnaires distributed in the Preston, Idaho, study, 110 (91.7%) were returned. Eight questionnaires were returned without any means of identifying the subject; therefore, 102 (85%) questionnaires were deemed usable. The usable sample for this analysis consisted of 61 females and 41 males.

Eighty-five questionnaires of the 102 sent out for the second administration were returned, resulting in a response rate of 83.3%. Of the 85 questionnaires returned, two of the subjects refused further participation, and five subjects could not be contacted for completion of their questionnaire due to illness, relocation, or work schedule. Exclusion of those with total caloric intakes of less than 600 kilocalories or greater than 5000 kilocalories also eliminated questionnaires from being used. Seventy-six subjects remained after all elimination processes were completed. The response rate for the 76 subjects was 75%.

More women than men were available for the study; however, the response rates were similar for both groups. Seventy-four percent of the women from the first administration return the second questionnaire as compared to 76% for the men. For response rates for individual age groups, consult Table 1. It was surprising to see that the male participants achieved a slightly better response rate.

The age group from 70 to 74 years had the highest number of respondents for the first and second administration for the men. For women, the highest number of respondents from the first administration was in the 80- to 84-year-olds category; for the second administration the same number responded from both the 70- to 74-year olds and the 80- to 84-year olds. It was not expected that the 80- to 84-year-old females would be the group that responded the best overall, for both male and females in either administration. For the complete number of respondents from each age group, consult Table 1.

TABLE 1 Number of participants and response rate by age group and gender in the Preston, Idaho, dietary survey for the first and second administration of the food frequency questionnaire, 1995

Age groups	Men		Male response rate (%)	Women		Female response rate (%)
	FFQ1[1]	FFQ 2[2]		FFQ1	FFQ 2	
65 - 69	8 (19.5)[3]	6 (19.4)	75	8 (13.1)	5 (11.1)	62.5
70 - 74	13 (13.7)	10 (32.3)	77	14 (23.0)	14 (31.1)	100
75 - 79	7 (17.1)	5 (16.1)	71	16 (26.2)	10 (22.2)	62.5
80 - 84	11 (26.8)	9 (29.0)	82	17 (27.9)	14 (31.1)	82
85 - 89	1 (2.4)	1 (3.2)	100	3 (4.9)	1 (2.2)	33
90+				1 (1.6)	1 (2.2)	100
TOTAL	41	31	75.6	61	45	73.8

[1] First administration of the FFQ, February-March, 1995
[2] Second administration of the FFQ, June-August, 1995
[3] Percentage of participants

Other information collected from participants included their age, height, and weight. Mean and standard deviation for age, height, and weight are shown in Table 2. The mean age does not appear to differ significantly between the two administrations for the total population, males, or females. The mean height and weight are also fairly comparable between the first and second administration for the men and also for the women. These data may indicate that persons representing similar weight ranges returned questionnaires from the first and second administrations. The questions asked did not influence the overweight or the underweight subjects not to respond to the second administration.

TABLE 2 Means and standard deviations for age, height, and weight from first and second administration populations in the Preston, Idaho, dietary survey, 1995.

Variable	Mean (sd) Male		Mean (sd) Female	
N of subjects	FFQ1[1] n=41	FFQ2[2] n=31	FFQ1 n=61	FFQ2 n=45
Age (years)	75.1 (6.0)[3]	75.9 (6.2)	76.8 (6.1)	76.5 (6.2)
Height(inches)	68.2 (2.6)	67.9 (2.8)	64.1 (3.2)	64.2(3.3)
Weight (pounds)	177.6 (42.1)	173.7 (42.5)	156.7 (34.0)	159.9 (35.9)

[1] First administration of the FFQ, February-April, 1995
[2] Second administration of the FFQ, June-August, 1995
[3] Standard deviation

Nutrient Intake

Each questionnaire was analyzed to obtain total nutrient scores using a program from Harvard University. The nutrient totals from all foods were combined and then averaged across the entire population. The mean and standard deviation of each nutrient were calculated for food only and for food and supplements combined for the total population, male cohort, and female cohort. The table of these values is presented in Appendix G. For the average amount of key nutrients consumed by the total population from the first and second administration, consult Table 3. Table 4 displays the mean and standard deviation of key nutrients for men and women. Subjects who had reported caloric intakes less than 600 or greater than 5000 were not included in the calculations.

The total population reported similar amounts for selected nutrients between the first and second food frequency questionnaires. This lends credibility to the reliability of the FFQ used in this study. When comparing the nutrient totals for food only with studies

using participants of similar age, there does not appear to be a significant difference (32, 37).

Supplements appear to contribute a significant amount to the overall nutrient totals. Supplements caused the nutrient intake to increase by an average of 69% in the first administration and 52% for the second administration.

TABLE 3 Average consumption of specified nutrients for the total population in the Preston, Idaho, dietary survey, 1995

Nutrient	FFQ1[1]	FFQ2[2]
Kilocalories	1989.4	1980.2
Protein gm	85.9	87.4
Total Fat	69.8	72.0
Calcium mg		
food only	1017.9	997.4
total[3]	1254.1	1213.9
Iron mg		
food only	17.1	17.5
total	22.8	23.7
Vitamin C mg		
food only	175.8	152.1
total	480.9	341.1
Vitamin A IU		
food only	16,189.1	14,452.1
total	23,771.6	18,827.1

[1] First administration of the FFQ, February-April, 1995
[2] Second administration of the FFQ, June-August, 1995
[3] Total intake from food sources and supplements

TABLE 4 Average consumption of specified nutrients for the male and female populations in the Preston, Idaho, dietary survey, 1995.

	Males		Females	
Nutrient	FFQ1[1]	FFQ2[2]	FFQ1	FFQ2
Kilocalories	1964.0 (815.0)[3]	2122.0 (820.0)	1931.0 (715.0)	1794.0 (730.5)
Protein gm	86.0 (38.3)	94.0 (41.8)	85.1 (38.1)	81.9 (37.1)
Total Fat	68.0 (32.8)	77.2 (34.3)	65.8 (28.6)	62.5 (27.0)
Calcium mg				
food only	977.9 (486.2)	1063.9 (600.2)	1028.6 (491.6)	932.2 (561.0)
total	1195.3 (655.9)	1220.3 (678.0)	1277.8 (592.1)	1191.8 (683.4)
Iron mg				
food only	16.7 (9.1)	17.8 (8.6)	17.3 (10.4)	17.0 (11.7)
total	21.2 (13.8)	30.6 (56.7)	24.7 (22.6)	23.9 (20.5)
Vitamin C mg				
food only	175.3 (120.1)	151.0 (108.0)	177.4 (95.3)	154.3 (87.4)
total	473.9 (457.5)	336.2 (370.3)	486.9 (495.6)	345.9 (404.9)
Vitamin A IU				
food only	16,583.8 (13,765.7)	15,620.2 (15,523.6)	15,917.0 (9,208.7)	13,533.6 (14,611.3)
total	22,437.0 (16,169.9)	20,136.3 (17,654.3)	21,681.0 (12,963.2)	15,034.0 (9,554.8)

[1] First administration of the FFQ, February-April, 1995
[2] Second administration of the FFQ, June-August, 1995
[3] Standard deviation

The calories reported by male subjects increased by 9% from the first administration to the second administration. An increase in the amount reported was the trend for 6 of 11 nutrients, including with and without supplements, for males. All nutrients that increased did so by at least 8%. The female subjects reported calories decreased by 8% from the first administration to the second administration. This trend can be seen in all the nutrients with and without supplements. The nutrient reporting decreased by at least 3%. For males in the first administration, supplements caused intake to increase by an average of 163%; in the second administration the increase was 160%. For females, the increase due to supplementation was 171% in the first administration and 154% in the second administration.

Although the method and FFQ used by Block and Subar (49) are different from the one used in this study, it was the only study found that had male and females results separated. When comparing the males from the Block and Subar study with the males from this study, the nutrient consumption totals are not vastly different. All amounts reported are less in the Block and Subar study than in this study. The largest difference, one of approximately threefold, is seen in the reported amounts of vitamin A between the two studies.

When the females of the two studies were compared, there appears to be a significant difference in the reported value of nutrient intake. The values from the Block and Subar study are much less than those from this study. Vitamin A again has the greatest difference of about threefold. There is also a fairly significant difference between the total calcium reported. The value is higher in this study. This may be linked to more milk drinking by the female population of the current study.

The percentage of intake due to supplements compared to food only is reported in Table 5. This was determined by dividing the amount of the nutrient supplied by supplement only by the total amount of the nutrient from all sources. Supplements appear

to contribute significantly to the total nutrient intake for the nutrients of interest particularly for vitamin C. The decrease between the first and second administration in the percentage of total nutrients supplied by supplements may be due to the increased availability of the seasonal fruits and vegetables during the second administration.

The foods listed in the FFQ were divided into specific food groups. The percentage of total calories obtained from the specific food group was determined. The results are shown in Table 6.

Foods in the beverage group included carbonated drinks, punch, tea, coffee, and alcoholic beverages. Foods within the designation of mixed dishes included those that could not be easily assigned to another category due to a combination of foods being part of the dish such as enchiladas, tacos, and sandwiches.

The food group providing the largest percentage of calories was the meat/protein group for the total population and for females. Cereals/breads provided the greatest percentage for the males; however, the meat/protein group was not significantly different. The trend of receiving a large portion of total calories from meats seems to follow what is known of the typical American diet.

TABLE 5 Supplement intake as a percentage of dietary intake from foods only from the FFQ administered in Preston, Idaho, 1995.

Nutrient	Male		Female	
	FFQ1[1]	FFQ2[2]	FFQ1[1]	FFQ2[2]
Calcium	22.2	14.7	24.2	27.8
Iron	26.9	71.9	41.0	40.6
Vitamin C	170.2	122.6	174.5	124.2
Vitamin A	35.3	28.9	36.2	11.1

[1] First administration of the FFQ, February-April, 1995
[2] Second administration of the FFQ, June-August, 1995

Fats and sugars provide the third largest percentage toward overall calories. This is not totally surprising considering the fact that most Americans are becoming a population troubled more and more by obesity. The female population of this study consumed the highest percentage of total calories from sugars and fats.

Fruits and vegetables are nearer the bottom in the percentage of total calories provided. However, fruits and vegetables do not provide a large number of calories themselves. Even large quantities may not significantly affect the total percentage of calories. These percentages are probably what would be expected from the population as a whole.

TABLE 6 Percentage of total calories from specified food groups from the food frequency questionnaire used in the Preston, Idaho, population, 1995.

	Total Population		Male		Female	
Food Group	FFQ1[1]	FFQ2[2]	FFQ1	FFQ2	FFQ1	FFQ2
Beverage	3.64	5.87	3.29	5.69	3.88	5.78
Bread/Cereals	18.46	17.72	19.25	17.34	17.67	17.79
Dairy	14.63	13.46	13.75	13.78	14.31	13.27
Fats/Sugars	15.49	16.76	15.68	17.07	17.67	15.55
Fruits	13.05	11.05	13.03	10.77	12.95	11.18
Meats/Protein	19.06	22.59	19.16	20.00	18.70	18.94
Mixed Dishes	5.66	2.98	5.32	4.88	6.10	7.22
Vegetables	10.01	9.55	10.53	10.46	11.23	10.10

[1] First administration of the FFQ, February-April, 1995

[2] Second administration of the FFQ, June-August, 1995

Reliability

The paired t-test of the mean difference between nutrient scores from the first and second administrations revealed that at the $p< 0.05$ level for the population as a whole, only 3 of 66 nutrient paired t-test values were significant. These nutrients are animal fat, vitamin C, and vitamin A. This number is less than would be expected due to chance alone. The male participants had 8 of 66 correlation coefficients that were significant at the $p< 0.05$ level. The nutrients included calories, protein, total fat, vitamin C, cholesterol, zinc, niacin from food only, and B_6 from food only. This is greater than would be expected due to chance alone. This result indicates the male population had nutrient scores more closely related and may lead to the conclusion that the male population was more able to describe their diet using a FFQ. The female participants had only 2 of 66 correlation coefficients that were significant at the $p< 0.05$ level. These nutrients are vitamin C and vitamin A. This again is less than would be expected because of chance.

The Pearson correlation coefficients for mean nutrient scores from the first and second administration are summarized in Table 7. The highest correlations were vitamin C (0.79) for the total population, caffeine (0.88) for male participants, and vitamin E (0.86) for female participants. The lowest correlation coefficients were vitamin K from food only (0.49) for the total population, vegetable fat (0.39) for the female cohort, and iron without supplements (0.44) for the male cohort. Correlation coefficients ranged from 0.49 to 0.79 for the total population, 0.44 to 0.88 for the male participants, and 0.39 to 0.86 for the female participants. The median values for the correlation coefficients are 0.60, 0.66, and 0.58 for the total population, males, and females, respectively. Munger et al. (19) found a range of 0.33-0.99 and a median value of 0.61 for his population of females aged 55-69 when comparing the first and second administrations of the FFQ they used. The ranges and median values are similar between the two studies and lend credibility to the elderly's ability to adequately describe their food consumption.

TABLE 7 Correlation coefficients of nutrient means from two separate FFQ administrations for the total population, males, and females from the Preston, Idaho, dietary survey, 1995.

Nutrient	Total Population n=76	Male n=31	Female n=45
Calories	.59	.66	.55
Total protein gm	.58	.64	.55
Animal protein gm	.53	.60	.51
Vegetable protein gm	.61	.65	.59
Total fat gm	.57	.66	.50
Animal fat gm	.54	.73	.51
Vegetable fat gm	.59	.72	.39
Saturated fat gm	.59	.69	.53
Monounsaturated fat gm	.58	.73	.49
Polyunsaturated fat gm	.58	.74	.47
Cholesterol mg	.53	.65	.44
Carbohydrate gm	.57	.58	.58
Sucrose gm	.61	.63	.61
Dietary fiber gm	.59	.56	.63
Calcium mg	.68	.72	.66
Iron mg	.50	.61	.42
Magnesium mg	.62	.72	.56
Phosphorus mg	.61	.68	.57
Potassium mg	.60	.66	.58
Sodium mg	.60	.64	.59
Zinc mg	.58	.68	.55
Manganese mg	.53	.57	.51
Vitamin C mg	.79	.81	.78
Thiamin (B_1) mg	.61	.53	.66
Riboflavin (B_2) mg	.67	.68	.67
Niacin mg	.65	.66	.65
Vitamin B_6 mg	.70	.74	.69
Folate mcg	.68	.82	.58
Vitamin B_{12} mcg	.54	.67	.66
Vitamin K mcg	.49	.49	.49
Vitamin A IU	.62	.71	.57
Retinol IU	.66	.76	.61
Carotene IU	.64	.65	.64
Vitamin D IU	.69	.75	.67
Vitamin E IU	.81	.74	.86
Caffeine mg	.75	.88	.64
Calcium w/o pills mg	.67	.71	.65
Iron w/o pills mg	.50	.44	.54
Magnesium w/o pills mg	.64	.74	.58
Phosphorous w/o pills mg	.62	.67	.59
Potassium w/o pills mg	.60	.66	.58
Zinc w/o pills mg	.57	.65	.53
Manganese w/o pills mg	.56	.59	.55
Vitamin C w/o pills mg	.54	.57	.51
B_1 w/o pills mg	.64	.59	.67

TABLE 7 continued

Nutrient	Total Population n=76	Male n=31	Female n=45
Vitamin B_6 w/o pills mg	.62	.69	.59
Folate w/o pills mcg	.59	.63	.55
B_{12} w/o pills mcg	.52	.62	.47
Vitamin K w/o pills mcg	.48	.49	.48
Vitamin A w/o pills IU	.62	.68	.58
Retinol w/o pills IU	.53	.54	.53
Carotene w/o pills IU	.61	.63	.63
Vitamin D w/o pills IU	.67	.61	.70
Vitamin E w/o pills IU	.61	.62	.64

By comparing the correlation coefficients between the total population, males, and females, it would appear that the males have the greatest correlation overall between the two administrations. This may be because males have a more established pattern to the foods they eat and are, therefore, able to more easily recall and accurately describe their diet over a period of time.

The correlation coefficients from this study were similar to those in the study by Munger et al. (19), who used a method similar to the one used in this study. This could indicate the elderly are able to recall food consumption frequencies as accurately as the younger population.

Perhaps if the FFQ had been completed every 4 months over a period of 2 years, a better picture of consumption would emerge and correlation coefficients would have been even higher. Seasonal variation may also play a role in some values that were not particularly high. The two FFQs were distributed and completed during a time of year when seasonal fruits and vegetables were available.

When correlation coefficients were compared to studies with participants in a similar age range (32, 37), the correlation coefficients were not closely comparable. The incomparability between the correlation coefficients may be because of the FFQ itself or the method used as opposed to a reflection of the elderly participants' ability to recall their

food consumption patterns. Differing FFQs and the method used to administer the questionnaire would influence the data obtained as shown by Smith-Porter and Cook (38) in their study on FFQ administration methods.

Response Rate

The Cache County Study on Memory in Aging (CCSMA) participants who also had the opportunity to participate in this study totaled 5,000. Of that number, 367 had proxies complete the CCSMA interview process and were, therefore, ineligible to complete the food frequency questionnaire (FFQ) for this study. The total number of questionnaires distributed equaled 4,633. The number of returned questionnaires equaled 3,805 for an overall response rate of 82.1%. Of the overall number returned, 30 were not tagged with the appropriate identification for the participant and, therefore, could not be used in the final analysis. The total number of males and females in the response rate study equaled 1,984 and 2,649, respectively. The total number of male respondents was 1,651 and female respondents was 2,153. The response rate by gender equaled 83.2% for males and 81.3% for females.

The mean (standard deviation) age of the population who returned the questionnaire was 75.0 (6.8) years. The mean (standard deviation) years of education obtained by the same population was 13.3 (3.8) years. The 3MS score mean (standard deviation), which was adjusted for education, equaled 88.5 (11.2). Means and standard deviations were also computed for those who did not return the questionnaire. This was possible because of access of the CCSMA database, which contained data on age, education, and education-adjusted 3MS for every subject of the CCSMA. The mean (standard deviation) age of the nonrespondent population equaled 77.0 (8.8) years. The mean (standard deviation) years of education attained was 12.8 (3.3). The mean (standard deviation) for unadjusted 3MS score equaled 88.4 (13.0) The education-adjusted 3MS score mean (standard

deviation)equaled 88.1 (12.97). When the populations were stratified by gender, the means and standard deviation for age, education, unadjusted 3MS, and adjusted 3MS can be found in Table 8.

The data on age, educational level, unadjusted 3MS, and adjusted 3MS show there was not a significant difference between those who responded to the study questionnaire and those who did not. The results, therefore, would appear to be more generalizeable to the population as a whole.

TABLE 8 Means (sd) for age, education, unadjusted 3MS, and adjusted 3MS for male and female respondents and nonrespondents to the Cache County Study on Memory in Aging FFQ,1995

Variable	Male		Female	
	Respondents (n=1,651)	Nonrespondents (n=411)	Respondents (n=2,153)	Nonrespondents (n=567)
Age (years)	74.6 (6.7)[1]	75.6 (7.2)	75.3 (6.9)	78.1 (7.6)
Education (years)	14.1 (4.9)	13.5 (3.6)	12.9 (2.3)	12.6 (4.6)
Unadjusted 3MS	88.3 (13.6)	91.9 (5.3)	89.8 (12.1)	86.8 (22.4)
Adjusted 3MS[2]	88.4 (10.3)	86.7 (9.6)	89.7 (10.9)	85.7 (13.2)

[1] Standard deviation
[2] Adjusted 3MS score is adjusted for education level.

Response Quality

The completeness or response quality was also studied using the independent variables gender, age, education, and education-adjusted 3MS score. Response quality was determined by the total number of missing values from the FFQ. The hypothesis tested was that all independent variables would not significantly affect how completely a questionnaire was answered. A stepwise regression model was used to test the hypothesis.

The dependent variable was the total number of missing answers from each questionnaire. The average number of missing values was examined by age group,

education level, and adjusted 3MS score. The average number of missing answers by age group for male and female is shown in Table 9. As was expected, the number of missing answers has a positive relationship to the age of the participant. As age increases, so does the number of questions left unanswered. The exception to this relationship is the male age group of 80-84, which had a slightly higher mean for missing answers than did the 85-89 year age group. The number of respondents with an age greater than 95 years was small, and this may have affected the results for that group. The p-values for the linear regression models were significant at the $p< 0.001$ level; however, the r-squared was very small , 0.035, 0.020, and 0.044 for the total population, males, and females, respectively. The values may be statistically significant because of the large sample size, but they may not be of practical importance because so little of the variation in missing values is explained by the variables.

TABLE 9 Mean (sd) for missing values per age group for the FFQ administered to the Cache County Study on Memory in Aging, 1995.[1]

Age Group	# of male	Male	# of female	Female
65-69	459	3.8 (15.7)[2]	515	3.4 (12.6)
70-74	431	2.8 (10.1)	542	4.8 (15.2)
75-79	356	5.2(16.0)	496	8.0 (20.8)
80-84	211	9.6 (24.1)	340	12.2 (26.9)
85-89	98	9.4 (24.0)	162	17.2 (31.4)
90-95	39	11.0 (27.7)	53	16.6 (31.6)
96-99	5	9.2 (17.3)	6	1.7 (2.2)
100+			1	5.0 ([3])

[1] r^2 for total population: 0.035; males: 0.020; females: 0.044; $p<0.001$

[2] Standard deviation

[3] Only one participant, so there was no standard deviation.

The question that needs to be addressed because of these results is whether or not the elderly are eating as great a variety of foods, and whether the foods that are not consumed are skipped, or if the elderly are just unable to completely fill out the questionnaire. It is expected that a decrease in kilocalories will be seen as one ages. This may lend support to the possibility that the elderly are just leaving blank the foods they do not consume.

The Harvard Nurses' study conducted by Willet (9) considered foods not marked on the questionnaire as never being eaten. This study followed the same procedure. The reason most often given during the reliability study in Preston, Idaho, when participants were called to complete their FFQ, was they did not mark the food item because they did not eat it. Munger et al. (19), however, used a cutoff of 29 missing answers to exclude participants from the study's analysis. Excluding participants based entirely on a number of foods not marked results in the loss of data from those participants who did not mark the foods they did not consume, and may affect data quality.

Table 10 shows the mean and standard deviation for missing values for years of education achieved. The relationship is a negative one. This negative relationship is seen consistently across all the educational-level divisions. With an increase in years of education, the number of missing answers on the questionnaire decreases. A linear regression model showed the r-squared values to be 0.01 for the total population, 0.004 for the males, and 0.018 for females. Again the p-values were significant at the $p< 0.001$ level. Statistical significance is apparent, but this significance may be influenced by the large sample size. The practical importance is small because the r-squared values are small, indicating little variation in missing values is explained by education.

The mean and standard deviation for missing values for the adjusted 3MS score is shown in Table 11. The highest mean for missing answers was for the 70-79 score range for both male and female participants. It appears that females missed more overall than

TABLE 10 Mean (sd) missing values per education level for the FFQ administered to the Cache County Study on Memory in Aging, 1995.[1]

Education Level	# of males	Male	# of females	Female
< 12 years	702	6.5 (19.8)[2]	1199	9.4 (23.6)
13-15 years	369	4.8 (16.4)	581	6.3 (18.3)
16 or > years	540	3.5 (13.2)	352	3.8 (13.4)

[1] r^2 for total population: 0.01; males: 0.004; females: 0.018; $p<0.001$
[2] Standard deviation

males in every scoring range. The values for the r-squared statistic are 0.01, 0.01, and 0.04 for the total population, males, and females, respectively. The p-values were significant at the $p< 0.001$ level, but the practical significance again comes into question.

The relationship between missing values and the adjusted 3MS score is inconsistent as opposed to the relative consistency that is seen with the comparison of missing values to age and educational level. There does not appear to be any pattern of relationship displayed when the data are divided into the groups shown in Table 11. However, if 90 years were used as the cut point for division, a clearer relationship emerges and cognitive function appears to be important. The relationship at the lower ends of cognitive function is much more variable. The more cognitively intact a person is, the fewer missing values were apparent. The inconsistency may suggest that until we are very old, we are able to describe our food consumption patterns.

Table 12 displays the results of the stepwise regression model of the hypothesis that all independent variables would significantly affect how completely a questionnaire could be answered. None of the variables are significant at the $p<0.05$ level. These results lead to the rejection of the hypothesis that gender, age, education, and adjusted 3MS significantly affect how well or completely an individual may answer a FFQ. Age appears to have the greatest effect, while gender has the least effect of the four variables.

TABLE 11 Mean (sd) for missing values per adjusted 3MS score for the FFQ administered to the Cache County Study on Memory in Aging, 1995.[1]

Adjusted 3MS	# of males	Male	# of females	Female
< 70	40	6.5 (18.1)[1]	54	10.5 (28.0)
70-79	101	8.7 (22.1)	84	27.6 (40.1)
80-89	524	6.8 (20.2)	552	12.5 (26.1)
> 90	939	3.7 (14.2)	1441	4.4 (14.8)

[1] r^2 total population: 0.01; males: 0.01; females: 0.04; $p<0.001$
[2] Standard deviation

TABLE 12 Forward stepwise multiple linear regression results for comparing total missing values with age, education level, education adjusted 3MS, and gender for the Cache County Study on Memory in Aging, 1995. N=3725

Step	Independent Variable	Model df	Mean Square	partial r^2	model r^2	p-value
1	Age	1	48,065.6	0.0343	0.0343	0.0001
2	Education	2	27,162.6	0.0045	0.0388	0.0001
3	Education Adjusted 3MS	3	19,252.6	0.0024	0.0412	0.0001
4	Gender	4	15,339.93	0.0026	0.0438	0.0005

CONCLUSIONS AND RECOMMENDATIONS

The FFQ appears to be a reasonably reliable instrument for data collection in those persons 65 years of age and older based on the results of this study. The ranges and median values for the correlation coefficients were very similar to those found in studies of younger participants in which the FFQ was determined to be reliable.

Results of the response rate study indicate that age, education, cognitive status, and gender have very little effect on the elderly's ability to return a FFQ. The response rates for males and females were quite similar. There did not appear to be any notable difference between the mean age, education level, or cognitive status for those who responded to the questionnaire and those who did not.

Based on the results of the linear regression models between the number of missing values and the means of age, education, and cognitive status, there does not appear to be an effect of practical importance shown, although statistical significance was demonstrated. From information gathered when completing the FFQ over the phone, most participants left food items blank because they did not eat them.

Overall, it can be concluded that those who are 65 years and older are able to complete the FFQ used in this study. The use of the FFQ should be extended to those of all ages. Age, cognitive function, and educational level attained do not have a notable effect on the elderly's ability to complete the questionnaire. However, there is a positive relationship between the number of missing values and increasing age, and a negative relationship with cognitive function and educational level.

It is recommended that future researchers who use the FFQ as the means of obtaining data for the elderly 65 years of age and older follow the methodology used here . This includes determining the age, education level, and cognitive function of the study group, as well as customizing the questionnaire food list to the population being studied.

Also, the reason behind missing values should be ascertained to determine what effect it will have on study results.

By following these recommendations, it is believed that a greater understanding of the elderly's abilities and their nutritional needs will be achieved.

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APPENDIXES

APPENDIX A: First Administration Food Frequency Questionnaire

Case Number:_____

UTAH STATE UNIVERSITY NUTRITION QUESTIONNAIRE

Marking Instructions

Please follow these few simple rules in completing this questionnaire. Thank You!!

- Use only a pencil
- Darken completely the circle of the answer you choose
- Erase cleanly any answer that you wish to change
- Make no stray marks of any kind on the form

Dietary Supplements

PLEASE INDICATE WHICH, IF ANY, OF THE FOLLOWING SUPPLEMENTS YOU ARE CURRENTLY TAKING.

1. **Do you regularly take multivitamins**
   - O NO > GO TO QUESTION 2
   - O YES > CONTINUE:

   (A) How many years have you taken multivitamins?
   O 0-1 years O 2-4 years O 5-9 years O 10 or more years

   (B) What specific brand did you use? _____

Excluding multi vitamins, do you take any of the following supplements? Please answer either "yes" or "no" for each of the following suppplements listed

2. **Do you regularly take Vitamin A?**
   - O NO > GO TO QUESTION 3
   - O YES > CONTINUE:

   (A) How many years have you taken Vitamin A?
   O 0-1 years O 2-4 years O 5-9 years O 10 or more years

   (B) What dose did you take per day?
   O less than 8,000 IU O 8,001 to 13,000 IU O 13,001 to 22,000 IU O 22,001 IU or more O Don't know

3. **Do you regularly take Vitamin C?**
   - O NO > GO TO QUESTION 4
   - O YES > CONTINUE:

   (A) How many years have you taken Vitamin C?
   O 0-1 years O 2-4 years O 5-9 years O 10 or more years

   (B) What dose did you take per day?
   O less than 400 mg O 401 to 700 mg O 701 to 1300 mg O 1301 mg or more O Don't know

4. **Do you regularly take Vitamin E?**
   - O NO > GO TO QUESTION 5
   - O YES > CONTINUE:

   (A) How many years have you taken Vitamin E?
   O 0-1 years O 2-4 years O 5-9 years O 10 or more years

   (B) What dose did you take per day?
   O less than 100 IU O 101 to 300 IU O 301 to 500 IU O 501 IU or more O Don't know

5. **Do you regularly take Calcium?**
   - O NO > GO TO QUESTION 6
   - O YES > CONTINUE:

   (A) How many years have you taken Calcium?
   O 0-1 years O 2-4 years O 5-9 years O 10 or more years

   (B) What dose did you take per day?
   O less than 400 mg O 401 to 900 mg O 901 to 1300 mg O 1301 mg or more O Don't know

6. **Do you regularly take Vitamin D?**
   - O NO > GO TO QUESTION 7
   - O YES > CONTINUE:

   (A) How many years have you taken Vitamin D?
   O 0-1 years O 2-4 years O 5-9 years O 10 or more years

   (B) What dose did you take per day?
   O less than 200 IU O 200 to 400 IU O 401 to 1,000 IU O more than 1,000IU O Don't know

7. **Do you regularly take Vitamin B6?**
   - O NO > GO TO QUESTION 8
   - O YES > CONTINUE:

   (A) How many years have you taken Vitamin B6?
   O 0-1 years O 2-4 years O 5-9 years O 10 or more years

   (B) What dose did you take per day?
   O less than 10 mg O 10 to 39 mg O 40 to 79 mg O 80 mg or more O Don't know

8. **Do you regularly take Selenium?**
   - O NO > GO TO QUESTION 9
   - O YES > IF YES CONTINUE:

   (A) How many years have you taken Selenium?
   O 0-1 years O 2-4 years O 5-9 years O 10 or more years

   (B) What dose did you take per day?
   O less than 80 mcg O 81 to 130 mcg O 131 to 250 mcg O 251 mcg or more O Don't know

9. **Do you regularaly take Iron?**
   - O NO > GO TO QUESTION 10
   - O YES > IF YES CONTINUE:

   (A) How many years have you taken Iron?
   O 0-1 years O 2-4 years O 5-9 years O 10 or more years

   (B) What dose did you take per day?
   O 50 mg or less O 51 to 200 mg O 201 to 400 mg O 401 mg or more O Don't know

10. **Do you regularly take Zinc?**
    - O NO > GO TO NEXT SECTION
    - O YES > IF YES CONTINUE:

    (A) How many years have you taken Zinc?
    O 0-1 years O 2-4 years O 5-9 years O 10 or more years

    (B) What dose did you take per day?
    O less than 25 mg O 26 to 75 mg O 76 to 100 mg O 101 mg or more O Don't know

DO YOU TAKE ANY OF THE FOLLOWING SUPPLEMENTS:

Cod liver oil	O YES . . . . . O NO	Folic acid	O YES . . . . . O NO
Other fish oil	O YES . . . . . O NO	Iodine	O YES . . . . . O NO
Niacin	O YES . . . . . O NO	Brewer's yeast	O YES . . . . . O NO
Beta-caroten	O YES . . . . . O NO	Magnesium	O YES . . . . . O NO
Thiamine (vitamin B1) . .	O YES . . . . . O NO	Any others?	O YES . . . . . O NO
B-complex vitamins	O YES . . . . . O NO	please specify_____	

FOODS YOU EAT

For each food listed, please mark a circle for how often during the past year, on average, you have eaten the serving size specified. Be sure to mark a circle for every food listed.

	AVERAGE USE FOR PAST 12 MONTHS								
DAIRY FOODS	NONE OR < 1 PER MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Skim or low fat milk (8 oz. glass)	O	O	O	O	O	O	O	O	O
Whole milk (8 oz. glass)	O	O	O	O	O	O	O	O	O
Chocolate milk or cocoa (8 oz. glass)	O	O	O	O	O	O	O	O	O
Cream or half-and-half, e.g. coffee, whipped (Tbs)	O	O	O	O	O	O	O	O	O
Sour cream (Tbs)	O	O	O	O	O	O	O	O	O
Non-dairy coffee whitener (tsp)	O	O	O	O	O	O	O	O	O
Sherbet, ice milk, or frozen yogurt (½ cup)	O	O	O	O	O	O	O	O	O
Ice cream (½ cup)	O	O	O	O	O	O	O	O	O
Yogurt (1 cup)	O	O	O	O	O	O	O	O	O
Cottage or ricotta cheese (½ cup)	O	O	O	O	O	O	O	O	O
Cream cheese (1 oz.)	O	O	O	O	O	O	O	O	O
Other cheese, e.g. American, cheddar, etc., plain or as part of a dish (1 slice or 1 oz. serving)	O	O	O	O	O	O	O	O	O
Margarine (tsp), added to food or bread; exclude use in coooking)	O	O	O	O	O	O	O	O	O
Butter (tsp), added to food or bread; exclude use in cooking)	O	O	O	O	O	O	O	O	O
FRUITS									
Raisins (1 oz. or small pack) or grapes (½ c)	O	O	O	O	O	O	O	O	O
Prunes (7 prunes or ½ cup)	O	O	O	O	O	O	O	O	O
Bananas (1)	O	O	O	O	O	O	O	O	O
Cantaloupe (1/4 melon)	O	O	O	O	O	O	O	O	O
Avocado (½ fruit or ½ cup)	O	O	O	O	O	O	O	O	O

	NONE, < 1 per MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Fresh apples or pears (1)	O	O	O	O	O	O	O	O	O
Apple juice or cider (small glass)	O	O	O	O	O	O	O	O	O
Oranges (1)	O	O	O	O	O	O	O	O	O
Orange juice (small glass)	O	O	O	O	O	O	O	O	O
Grapefruit (½)	O	O	O	O	O	O	O	O	O
Grapefruit juice (small glass)	O	O	O	O	O	O	O	O	O
Other fruit juices (small glass)	O	O	O	O	O	O	O	O	O
Strawberries, fresh, frozen or canned (½ cup)	O	O	O	O	O	O	O	O	O
Blueberries, fresh, frozen or canned (½ cup)	O	O	O	O	O	O	O	O	O
Peaches, apricots or plums (1 fresh, or ½ cup canned)	O	O	O	O	O	O	O	O	O
VEGETABLES									
Tomatoes (1)	O	O	O	O	O	O	O	O	O
Tomato juice, V8 (small glass)	O	O	O	O	O	O	O	O	O
Tomato sauce (½ cup) e.g. spaghetti sauce	O	O	O	O	O	O	O	O	O
Salsa or red chili sauce (1 Tbs)	O	O	O	O	O	O	O	O	O
Tofu or soybeans (3-4 oz.)	O	O	O	O	O	O	O	O	O
String (green) beans (½ cup)	O	O	O	O	O	O	O	O	O
Broccoli (½ cup)	O	O	O	O	O	O	O	O	O
Cabbage or cole slaw (½ cup)	O	O	O	O	O	O	O	O	O
Cauliflower (½ cup)	O	O	O	O	O	O	O	O	O
Brussels sprouts (½ cup)	O	O	O	O	O	O	O	O	O
Carrots, raw (½ carrot or 2-4 sticks)	O	O	O	O	O	O	O	O	O
Carrots, cooked (½ cup) or carrot juice (2-3 oz.)	O	O	O	O	O	O	O	O	O
Red Beets--not greens (½ cup)	O	O	O	O	O	O	O	O	O
Corn (1 ear or ½ cup frozen or canned)	O	O	O	O	O	O	O	O	O
Peas or lima beans (½ cup fresh, frozen, or canned)	O	O	O	O	O	O	O	O	O
Mixed vegetables (½ cup)	O	O	O	O	O	O	O	O	O
Beans or lentils, baked or dried (½ cup)	O	O	O	O	O	O	O	O	O
Dark orange (winter) squash (½ cup) (acorn, butternut squash)	O	O	O	O	O	O	O	O	O
Eggplant, zucchini or other summer squash (½ cup)	O	O	O	O	O	O	O	O	O
Yams or sweet potatoes (½ cup)	O	O	O	O	O	O	O	O	O
Spinach, cooked (½ cup)	O	O	O	O	O	O	O	O	O
Spinach, raw as in a salad (1 cup serving)	O	O	O	O	O	O	O	O	O
Kale, mustard or chard greens (½ cup)	O	O	O	O	O	O	O	O	O

	NONE, < 1 per MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Iceberg or head lettuce (1 cup serving)	O	O	O	O	O	O	O	O	O
Romaine or leaf lettuce (1 cup serving)	O	O	O	O	O	O	O	O	O
Celery (2-4 4" sticks)	O	O	O	O	O	O	O	O	O
Sweet green or red peppers (3 slices or 1/4 pepper)	O	O	O	O	O	O	O	O	O
Onions as a garnish, or in salad (1 slice)	O	O	O	O	O	O	O	O	O
Onions as a vegetable, rings or in soup (1 onion)	O	O	O	O	O	O	O	O	O
EGGS, MEATS, ETC.									
Eggs (1)	O	O	O	O	O	O	O	O	O
Chicken with skin (4-6 oz)	O	O	O	O	O	O	O	O	O
Chicken without the skin (4-6 oz.), includes grilled chicken sandwich	O	O	O	O	O	O	O	O	O
Turkey, including ground turkey (4-6 oz. or 2 Turkey dogs)	O	O	O	O	O	O	O	O	O
Hot dogs (1)	O	O	O	O	O	O	O	O	O
Bacon (2 slices)	O	O	O	O	O	O	O	O	O
Processed meats, e.g. sausage, salami, bologna, etc. (piece or slice)	O	O	O	O	O	O	O	O	O
Hamburger (1 patty)	O	O	O	O	O	O	O	O	O
Taco or tostado (1)	O	O	O	O	O	O	O	O	O
Burrito (1)	O	O	O	O	O	O	O	O	O
Enchilada (2)	O	O	O	O	O	O	O	O	O
Beef, pork, or lamb as a sandwich or mixed dish, e .g. stew, casserole, lasagna, chili etc.	O	O	O	O	O	O	O	O	O
Pork as a main dish, e.g. ham or chops (4-6 oz.)	O	O	O	O	O	O	O	O	O
Beef or lamb as a main dish, e.g. steak, roast (4-6 oz)	O	O	O	O	O	O	O	O	O
Liver: beef, calf, or pork (4 oz)	O	O	O	O	O	O	O	O	O
Liver: chicken or turkey (2 oz)	O	O	O	O	O	O	O	O	O
Canned tuna fish (3-4 oz)	O	O	O	O	O	O	O	O	O
Dark meat fish, e.g. mackerel, salmon, sardines, bluefish, swordfish (3-5 oz.)	O	O	O	O	O	O	O	O	O
Fried fish, e.g. fish sticks, fish and chips style fish (3-5 oz.)	O	O	O	O	O	O	O	O	O
Other fish (3-5 oz.)	O	O	O	O	O	O	O	O	O
Shrimp, lobster, scallops as a main dish	O	O	O	O	O	O	O	O	O
BREADS, CEREALS, STARCHES									
Cold breakfast cereal (1 cup)	O	O	O	O	O	O	O	O	O
Cooked oatmeal/cooked oat bran (1 cup)	O	O	O	O	O	O	O	O	O

	NONE, < 1 per MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Other cooked breakfast cereal (1 cup)	O	O	O	O	O	O	O	O	O
Instant breakfast	O	O	O	O	O	O	O	O	O
White bread (slice), including pita bread	O	O	O	O	O	O	O	O	O
Dark bread (slice), including pita bread	O	O	O	O	O	O	O	O	O
English muffins, bagels, or rolls (1)	O	O	O	O	O	O	O	O	O
Muffins or biscuits (1)	O	O	O	O	O	O	O	O	O
White rice (1 cup)	O	O	O	O	O	O	O	O	O
Pasta, e.g. spaghetti, noodles, etc (1 cup)	O	O	O	O	O	O	O	O	O
Tortillas (1)	O	O	O	O	O	O	O	O	O
Other grains, e.g. bulgur, kasha, couscous, etc (1 cup)	O	O	O	O	O	O	O	O	O
Pancakes or waffles (serving)	O	O	O	O	O	O	O	O	O
French fried potatoes (4 oz. or size of small fries order)	O	O	O	O	O	O	O	O	O
Potatoes, baked, boiled (1), or mashed (1 cup)	O	O	O	O	O	O	O	O	O
Potato chips or corn chips (small bag or 1 oz.)	O	O	O	O	O	O	O	O	O
Crackers, e.g. Triscuits, Wheat Thins (5)	O	O	O	O	O	O	O	O	O
Pizza (2 slices)	O	O	O	O	O	O	O	O	O
BEVERAGES									
Plain water, bottled or tap (1 cup or 8 oz. glass)	O	O	O	O	O	O	O	O	O
Hawaiian Punch, lemonade, or other non-carbonated fruit drinks (1 glass, bottle, can)	O	O	O	O	O	O	O	O	O
Low-calorie cola, e.g. Diet Coke with caffeine (can)	O	O	O	O	O	O	O	O	O
Low-calorie caffeine-free cola (can)	O	O	O	O	O	O	O	O	O
Other low-calorie carbonated beverage, e.g. Fresca, Diet	O	O	O	O	O	O	O	O	O
7-Up, diet ginger ale (can)	O	O	O	O	O	O	O	O	O
Coke, Pepsi, or other cola with sugar (can)	O	O	O	O	O	O	O	O	O
Caffeine Free Coke, Pepsi, or other cola with sugar(can)	O	O	O	O	O	O	O	O	O
Other carbonated beverages with sugar, e.g. 7-Up (can)	O	O	O	O	O	O	O	O	O
Regular Beer (1 glass, bottle, or can)	O	O	O	O	O	O	O	O	O
Light Beer (1 glass, bottle, or can)	O	O	O	O	O	O	O	O	O
Red wine (4 oz. glass)	O	O	O	O	O	O	O	O	O
White wine (4 oz. glass)	O	O	O	O	O	O	O	O	O
Liquor, e.g. whiskey, gin, etc (1 drink or shot)	O	O	O	O	O	O	O	O	O
Dark tea with caffeine (1 cup), not herbal tea	O	O	O	O	O	O	O	O	O
Green tea or herbal tea (1 cup)	O	O	O	O	O	O	O	O	O

	NONE, < 1 per MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Coffee with caffeine (1 cup)	O	O	O	O	O	O	O	O	O
Decaffeinated coffee (1 cup)	O	O	O	O	O	O	O	O	O
SWEETS, BAKED GOODS, MISC									
Chocolate (bar or packet) e.g. Hershey's, M & M's	O	O	O	O	O	O	O	O	O
Candy bars, e.g. Snickers, Milky Way, Reeses	O	O	O	O	O	O	O	O	O
Candy without chocolate (1 oz)	O	O	O	O	O	O	O	O	O
Cookies, home baked (1)	O	O	O	O	O	O	O	O	O
Cookies, ready make (1)	O	O	O	O	O	O	O	O	O
Brownies (1)	O	O	O	O	O	O	O	O	O
Doughnuts (1)	O	O	O	O	O	O	O	O	O
Cake, home baked (slice)	O	O	O	O	O	O	O	O	O
Cake, ready make (slice)	O	O	O	O	O	O	O	O	O
Pie, homemade (slice)	O	O	O	O	O	O	O	O	O
Pie, ready made (slice)	O	O	O	O	O	O	O	O	O
Sweet roll, coffee cake or other pastry, home baked(1 serving)	O	O	O	O	O	O	O	O	O
Sweet roll, coffee cake or other pastry, ready made(1 serving)	O	O	O	O	O	O	O	O	O
Jams, jellies, preserves, syrup, or honey (1 Tbs)	O	O	O	O	O	O	O	O	O
Peanut butter (1 Tbs)	O	O	O	O	O	O	O	O	O
Popcorn (1 cup)	O	O	O	O	O	O	O	O	O
Peanuts (small packet or 1 oz.)	O	O	O	O	O	O	O	O	O
Other nuts (small packet or 1 oz.)	O	O	O	O	O	O	O	O	O
Oat bran, added to food (1 Tbs)	O	O	O	O	O	O	O	O	O
Other bran, added to food (1 Tbs)	O	O	O	O	O	O	O	O	O
Wheat germ (1 Tbs)	O	O	O	O	O	O	O	O	O
Chowder or cream soup (1 cup)	O	O	O	O	O	O	O	O	O
Olive oil salad dressing (1 Tbs)	O	O	O	O	O	O	O	O	O
Other oil and vinegar dressing, e.g. Italian (1 Tbs)	O	O	O	O	O	O	O	O	O
Mayonnaise or other creamy salad dressing (1 Tbs)	O	O	O	O	O	O	O	O	O
Salt added at table (1 shake)	O	O	O	O	O	O	O	O	O
Garlic (1 clove or 4 shakes)	O	O	O	O	O	O	O	O	O

FOOD PREPARATION

1. Do you eat cold breakfast cereal?
   - O No > GO TO NEXT QUESTION
   - O YES > what brand do you usually eat? _____

2. How many teaspoons of sugar do you add to your beverages or food each day?
   - O 0-1 O 2-4 O 5-9 O 10 or more

3. When you have beef or lamb as a main dish, how well done is the meat cooked?
   - O rare O medium O well
   - O medium rare O medium well O do not eat meat

4. How much of the visible fat on your beef, pork, or lamb do you remove before eating?
   - O remove all visible fat O remove none
   - O remove most visible fat O remove small part of visible fat
   - O do not eat meat

5. How often do you eat food that is fried at home? (exclude Pam-type spray)
   - O less than once per week O 4-6 times per week
   - O 1-3 times per week O daily

6. How often do you eat fried food away from home? (e.g. french fries, fried chicken, fried fish).
   - O less than once per week O 4-6 times per week
   - O 1-3 times per week O daily

7. What type and brand of cooking oil or fat do you usually use at home (e.g. corn oil, Mazola brand; lard)

   type:_____
   brand:_____

8. How does your current diet compare to your usual diet over the past five years?
   - O almost the same O moderately changed
   - O slightly changed O greatly changed

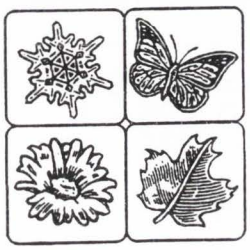
Thank you for completing this questionnaire. Please place it in the envelope provided and seal it. Postage has been provided--please return it to us in the mail.

Thank you for your time and cooperation. You have made an important contribution to our study of nutrition and health.

Utah State University

APPENDIX B: Cache County Study on Memory in Aging Food Frequency Questionnaire

Case Number:_____



CACHE COUNTY STUDY ON MEMORY IN AGING

NUTRITION QUESTIONNAIRE

Conducted by: Utah State University

Marking Instructions

Please follow these few simple rules in completing this questionnaire.

1. Use only a pencil. (Please DO NOT use a pen)
2. Darken completely the circle of the answer you choose
3. Erase cleanly any answer that you wish to change
4. Make no stray marks of any kind on the form
5. For food that you never or rarely eat, please mark the first column labeled "None or less than once a month. Please do not leave any food items blank.
6. Please note the correct way to mark the answers.

Correct Mark				Incorrect Marks			
○	●	○	○	⊗	✓	⊙	◒

Please answer the following. Check the appropriate gender, and fill in your height, weight, and age

Male_____ Female_____

Height_____ Weight_____ Age_____

THANK YOU!!!!

DIETARY SUPPLEMENTS

PLEASE INDICATE WHICH, IF ANY, OF THE FOLLOWING SUPPLEMENTS YOU ARE CURRENTLY TAKING. PLEASE ANSWER "YES" OR "NO" FOR ANY SUPPLEMENT LISTED.

1. **Do you regularly take multivitamins**
   - ○ NO > PLEASE GO TO QUESTION 2
   - ○ YES > CONTINUE:

   (A) How many years have you taken multivitamins?
   - ○ 0-1 years
   - ○ 2-4 years
   - ○ 5-9 years
   - ○ 10 or more years

   (B) What specific brand do you use? _____

Excluding multivitamins, do you take any of the following supplements listed below?

2. **Do you regularly take Vitamin A?**
   - ○ NO > PLEASE GO TO QUESTION 3
   - ○ YES > CONTINUE:

   (A) How many years have you taken Vitamin A?
   - ○ 0-1 years
   - ○ 2-4 years
   - ○ 5-9 years
   - ○ 10 or more years

   (B) What dose do you take per day?
   - ○ less than 8,000 IU
   - ○ 8,001 to 13,000 IU
   - ○ 13,001 to 22,000 IU
   - ○ 22,001 IU or more
   - ○ Don't know

3. **Do you regularly take Vitamin C?**
   - ○ NO > PLEASE GO TO QUESTION 4
   - ○ YES > CONTINUE:

   (A) How many years have you taken Vitamin C?
   - ○ 0-1 years
   - ○ 2-4 years
   - ○ 5-9 years
   - ○ 10 or more years

   (B) What dose do you take per day?
   - ○ less than 400 mg
   - ○ 401 to700 mg
   - ○ 701 to 1300 mg
   - ○ 1301 mg or more
   - ○ Don't know

4. **Do you regularly take Vitamin E?**
   - ○ NO > PLEASE GO TO QUESTION 5
   - ○ YES > CONTINUE:

   (A) How many years have you taken Vitamin E?
   - ○ 0-1 years
   - ○ 2-4 years
   - ○ 5-9 years
   - ○ 10 or more years

   (B) What dose do you take per day?
   - ○ less than 100 IU
   - ○ 101 to 300 IU
   - ○ 301 to 500 IU
   - ○ 501 IU or more
   - ○ Don't know

5. **Do you regularly take Calcium?**
   - ○ NO > PLEASE GO TO QUESTION 6
   - ○ YES > CONTINUE:
     - (A) How many years have you taken Calcium?
       - ○ 0-1 years
       - ○ 2-4 years
       - ○ 5-9 years
       - ○ 10 or more years
     - (B) What dose do you take per day?
       - ○ less than 400 mg
       - ○ 401 to 900 mg
       - ○ 901 to 1300 mg
       - ○ 1301 mg or more
       - ○ Don't know

6. **Do you regularly take Vitamin D?**
   - ○ NO > PLEASE GO TO QUESTION 7
   - ○ YES > CONTINUE:
     - (A) How many years have you taken Vitamin D?
       - ○ 0-1 years
       - ○ 2-4 years
       - ○ 5-9 years
       - ○ 10 or more years
     - (B) What dose do you take per day?
       - ○ less than 200 IU
       - ○ 201 to 400 IU
       - ○ 401 to 1,000 IU
       - ○ 1,000 IU or more
       - ○ Don't know

7. **Do you regularly take Vitamin B6?**
   - ○ NO > PLEASE GO TO QUESTION 8
   - ○ YES > CONTINUE:
     - (A) How many years have you taken Vitamin B6?
       - ○ 0-1 years
       - ○ 2-4 years
       - ○ 5-9 years
       - ○ 10 or more years
     - (B) What dose do you take per day?
       - ○ less than 10 mg
       - ○ 10 to 39 mg
       - ○ 40 to 79 mg
       - ○ 80 mg or more
       - ○ Don't know

8. **Do you regularly take Selenium?**
   - ○ NO > PLEASE GO TO QUESTION 9
   - ○ YES > IF YES CONTINUE:
     - (A) How many years have you taken Selenium?
       - ○ 0-1 years
       - ○ 2-4 years
       - ○ 5-9 years
       - ○ 10 or more years
     - (B) What dose do you take per day?
       - ○ less than 80 mcg
       - ○ 81 to 130 mcg
       - ○ 131 to 250 mcg
       - ○ 251 mcg or more
       - ○ Don't know

FOR OFFICE USE ONLY

(A)	(B)	©
1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0
○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0
○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○

9. **Do you regularly take Iron?**
   - ○ NO > PLEASE GO TO QUESTION 10
   - ○ YES > IF YES CONTINUE:
     - (A) How many years have you taken Iron?
       - ○ 0-1 years
       - ○ 2-4 years
       - ○ 5-9 years
       - ○ 10 or more years
     - (B) What dose do you take per day?
       - ○ 50 mg or less
       - ○ 51 to 200 mg
       - ○ 201 to 400 mg
       - ○ 401 mg or more
       - ○ Don't know

10. **Do you regularly take Zinc?**
   - ○ NO > PLEASE GO TO NEXT SECTION
   - ○ YES > IF YES CONTINUE:
     - (A) How many years have you taken Zinc?
       - ○ 0-1 years
       - ○ 2-4 years
       - ○ 5-9 years
       - ○ 10 or more years
     - (B) What dose do you take per day?
       - ○ less than 25 mg
       - ○ 26 to 75 mg
       - ○ 76 to 100 mg
       - ○ 101 mg or more
       - ○ Don't know

11. DO YOU TAKE ANY OF THE FOLLOWING OTHER SUPPLEMENTS:

Cod liver oil . . . . . ○ YES. . . . ○ NO	Folic acid. . . . . ○ YES. . . . .○ NO
Other fish oil. . . . . ○YES. . . . . ○ NO	Iodine. . . . . .○ YES. . . . .○ NO
Niacin. . . . . .○ YES. . . . ○ NO	Brewer's yeast. . . . . ○ YES. . . . .○ NO
Beta-caroten. . . . . .○ YES. . . . ○ NO	Magnesium. . . . . .○ YES. . . . . ○ NO
Thiamine (vitamin B1). . . ○ YES. . . . ○ NO	Any others?. . . . . ○ YES. . . . . ○ NO
B-complex vitamins. . . . . ○ YES. . . . .○ NO	If yes, please specify_____
	_____

FOODS YOU EAT

For each food listed, please mark a circle for how often during the past year, on average, you have eaten the serving size specified. Be sure to mark a circle for every food listed. If you never eat the food listed mark the circle in the first column.	AVERAGE USE FOR PAST 12 MONTHS								
DAIRY FOODS	NONE OR LESS THAN 1 PER MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Skim or low fat milk (8 oz. glass)	O	O	O	O	O	O	O	O	O
Whole milk (8 oz. glass)	O	O	O	O	O	O	O	O	O
Chocolate milk or cocoa (8 oz. glass)	O	O	O	O	O	O	O	O	O
Cream or half-and-half, e.g. coffee, whipped (Tbs)	O	O	O	O	O	O	O	O	O
Sour cream (Tbs)	O	O	O	O	O	O	O	O	O
Non-dairy coffee whitener (tsp)	O	O	O	O	O	O	O	O	O
Sherbet, ice milk, or frozen yogurt (½ cup)	O	O	O	O	O	O	O	O	O
Ice cream (½ cup)	O	O	O	O	O	O	O	O	O
Yogurt (1 cup)	O	O	O	O	O	O	O	O	O
Cottage or ricotta cheese (½ cup)	O	O	O	O	O	O	O	O	O
Cream cheese (1 oz.)	O	O	O	O	O	O	O	O	O
Other cheese, e.g. American, cheddar, etc., plain or as part of a dish (1 slice or 1 oz. serving)	O	O	O	O	O	O	O	O	O
Margarine (1 tsp), added to food or bread; exclude use in cooking	O	O	O	O	O	O	O	O	O
Butter (1 tsp), added to food or bread; exclude use in cooking	O	O	O	O	O	O	O	O	O
FRUITS									
Raisins (1 oz. or small pack) or grapes (½ c)	O	O	O	O	O	O	O	O	O
Prunes (7 prunes or ½ cup)	O	O	O	O	O	O	O	O	O
Bananas (1)	O	O	O	O	O	O	O	O	O
Cantaloupe (1/4 melon)	O	O	O	O	O	O	O	O	O
Avocado (½ fruit or ½ cup)	O	O	O	O	O	O	O	O	O
Fresh apples or pears (1)	O	O	O	O	O	O	O	O	O
Apple juice or cider (small glass)	O	O	O	O	O	O	O	O	O

	NONE < 1 per MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Oranges (1)	○	○	○	○	○	○	○	○	○
Orange juice (small glass)	○	○	○	○	○	○	○	○	○
Grapefruit (½)	○	○	○	○	○	○	○	○	○
Grapefruit juice (small glass)	○	○	○	○	○	○	○	○	○
Other fruit juices (small glass)	○	○	○	○	○	○	○	○	○
Strawberries, fresh, frozen or canned (½ cup)	○	○	○	○	○	○	○	○	○
Blueberries, fresh, frozen or canned (½ cup)	○	○	○	○	○	○	○	○	○
Peaches, apricots or plums (1 fresh, or ½ cup canned)	○	○	○	○	○	○	○	○	○
VEGETABLES									
Tomatoes (1)	○	○	○	○	○	○	○	○	○
Tomato juice, V8 (small glass)	○	○	○	○	○	○	○	○	○
Tomato sauce (½ cup) e.g. spaghetti sauce	○	○	○	○	○	○	○	○	○
Salsa or red chili sauce (1 Tbs)	○	○	○	○	○	○	○	○	○
Tofu or soybeans (3-4 oz.)	○	○	○	○	○	○	○	○	○
String (green) beans (½ cup)	○	○	○	○	○	○	○	○	○
Broccoli (½ cup)	○	○	○	○	○	○	○	○	○
Cabbage or cole slaw (½ cup)	○	○	○	○	○	○	○	○	○
Cauliflower (½ cup)	○	○	○	○	○	○	○	○	○
Brussels sprouts (½ cup)	○	○	○	○	○	○	○	○	○
Carrots, raw (½ carrot or 4 sticks)	○	○	○	○	○	○	○	○	○
Carrots, cooked (½ cup) or carrot juice (2-3 oz.)	○	○	○	○	○	○	○	○	○
Red Beets--not greens (½ cup)	○	○	○	○	○	○	○	○	○
Corn (1 ear or ½ cup frozen or canned)	○	○	○	○	○	○	○	○	○
Peas or lima beans (½ cup fresh, frozen, or canned)	○	○	○	○	○	○	○	○	○
Mixed vegetables (½ cup)	○	○	○	○	○	○	○	○	○
Beans or lentils, baked or dried (½ cup)	○	○	○	○	○	○	○	○	○
Dark orange (winter) squash (½ cup) (acorn, buttermut squash)	○	○	○	○	○	○	○	○	○
Eggplant, zucchini or other summer squash (½ cup)	○	○	○	○	○	○	○	○	○
Yams or sweet potatoes (½ cup)	○	○	○	○	○	○	○	○	○

	NONE < 1 per MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Spinach, cooked (½ cup)	O	O	O	O	O	O	O	O	O
Spinach, raw as in a salad (1 cup serving)	O	O	O	O	O	O	O	O	O
Kale, mustard or chard greens (½ cup)	O	O	O	O	O	O	O	O	O
Iceberg or head lettuce (1 cup serving)	O	O	O	O	O	O	O	O	O
Romaine or leaf lettuce (1 cup serving)	O	O	O	O	O	O	O	O	O
Celery (2-4 4" sticks)	O	O	O	O	O	O	O	O	O
Sweet green or red peppers (3 slices or 1/4 pepper)	O	O	O	O	O	O	O	O	O
Onions as a garnish, or in salad (1 slice)	O	O	O	O	O	O	O	O	O
Onions as a vegetable, rings or in soup (1 onion)	O	O	O	O	O	O	O	O	O
EGGS, MEATS, ETC.									
Eggs (1)	O	O	O	O	O	O	O	O	O
Chicken with skin (4-6 oz)	O	O	O	O	O	O	O	O	O
Chicken without the skin (4-6 oz.), includes grilled chicken sandwich	O	O	O	O	O	O	O	O	O
Turkey, including ground turkey (4-6 oz. or 2 Turkey dogs)	O	O	O	O	O	O	O	O	O
Hot dogs (1)	O	O	O	O	O	O	O	O	O
Bacon (2 slices)	O	O	O	O	O	O	O	O	O
Processed meats, e.g. sausage, salami, bologna, etc. (1 piece or slice)	O	O	O	O	O	O	O	O	O
Hamburger (1 patty)	O	O	O	O	O	O	O	O	O
Taco or tostado (1)	O	O	O	O	O	O	O	O	O
Burrito (1)	O	O	O	O	O	O	O	O	O
Enchilada (2)	O	O	O	O	O	O	O	O	O
Beef, pork, or lamb as a sandwich or mixed dish, e.g. stew, casserole, lasagna, chili etc.	O	O	O	O	O	O	O	O	O
Pork as a main dish, e.g. ham or chops (4-6 oz.)	O	O	O	O	O	O	O	O	O
Beef or lamb as a main dish, e.g. steak, roast (4-6 oz)	O	O	O	O	O	O	O	O	O
Liver: beef, calf, or pork (4 oz)	O	O	O	O	O	O	O	O	O
Liver: chicken or turkey (2 oz)	O	O	O	O	O	O	O	O	O
Canned tuna fish (3-4 oz)	O	O	O	O	O	O	O	O	O

	NONE < 1 per MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Dark meat fish, e.g. mackerel, salmon, sardines, bluefish, swordfish (3-5 oz.)	O	O	O	O	O	O	O	O	O
Fried fish, e.g. fish sticks, fish and chips style fish (3-5 oz.)	O	O	O	O	O	O	O	O	O
Other fish (3-5 oz.)	O	O	O	O	O	O	O	O	O
Shrimp, lobster, scallops as a main dish	O	O	O	O	O	O	O	O	O
BREADS, CEREALS, STARCHES									
Cold breakfast cereal (1 cup)	O	O	O	O	O	O	O	O	O
Cooked oatmeal/cooked oat bran (1 cup)	O	O	O	O	O	O	O	O	O
Other cooked breakfast cereal (1 cup)	O	O	O	O	O	O	O	O	O
Instant breakfast beverage, e.g. Carnation	O	O	O	O	O	O	O	O	O
White bread (slice), including pita bread	O	O	O	O	O	O	O	O	O
Dark bread (slice), including pita bread	O	O	O	O	O	O	O	O	O
English muffins, bagels, or dinner rolls (1 each)	O	O	O	O	O	O	O	O	O
Muffins or biscuits (1 each)	O	O	O	O	O	O	O	O	O
White rice (1 cup)	O	O	O	O	O	O	O	O	O
Pasta, e.g. spaghetti, noodles, etc (1 cup)	O	O	O	O	O	O	O	O	O
Tortillas (1-10 inch shell)	O	O	O	O	O	O	O	O	O
Other grains, e.g. bulgur, kasha, couscous, etc (1 cup)	O	O	O	O	O	O	O	O	O
Pancakes or waffles (2 each)	O	O	O	O	O	O	O	O	O
French fried potatoes (4 oz. or size of small fries order)	O	O	O	O	O	O	O	O	O
Potatoes, baked, boiled (1 each), or mashed (1 cup)	O	O	O	O	O	O	O	O	O
Potato chips or corn chips (small bag or 1 oz.)	O	O	O	O	O	O	O	O	O
Crackers, e.g. Triscuits, Wheat Thins (5 each)	O	O	O	O	O	O	O	O	O
Pizza (2 slices)	O	O	O	O	O	O	O	O	O
BEVERAGES									
Plain water, bottled or tap (1 cup or 8 oz. glass)	O	O	O	O	O	O	O	O	O
Hawaiian Punch, lemonade, or other non-carbonated fruit drinks (1 glass, bottle, can)	O	O	O	O	O	O	O	O	O
Low-calorie cola, e.g. Diet Coke with caffeine (can)	O	O	O	O	O	O	O	O	O

	NONE < 1 per MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Low-calorie caffeine-free cola (can)	○	○	○	○	○	○	○	○	○
Other low-calorie carbonated beverage, e.g. Fresca, Diet 7-UP (can)	○	○	○	○	○	○	○	○	○
7-Up, diet ginger ale (can)	○	○	○	○	○	○	○	○	○
Coke, Pepsi, or other cola with sugar (can)	○	○	○	○	○	○	○	○	○
Caffeine Free Coke, Pepsi, or other cola with sugar (can)	○	○	○	○	○	○	○	○	○
Other carbonated beverages with sugar, e.g. Sprite, Root beer (can)	○	○	○	○	○	○	○	○	○
Regular Beer (1 glass, bottle, or can)	○	○	○	○	○	○	○	○	○
Light Beer (1 glass, bottle, or can)	○	○	○	○	○	○	○	○	○
Red wine (4 oz. glass)	○	○	○	○	○	○	○	○	○
White wine (4 oz. glass)	○	○	○	○	○	○	○	○	○
Liquor, e.g. whiskey, gin, etc (1 drink or shot)	○	○	○	○	○	○	○	○	○
Dark tea with caffeine (1 cup), not herbal tea	○	○	○	○	○	○	○	○	○
Green tea or herbal tea (1 cup)	○	○	○	○	○	○	○	○	○
Coffee with caffeine (1 cup)	○	○	○	○	○	○	○	○	○
Decaffeinated coffee (1 cup)	○	○	○	○	○	○	○	○	○
SWEETS, BAKED GOODS, MISC									
Chocolate (bar or packet) e.g. Hershey's, M & M's	○	○	○	○	○	○	○	○	○
Candy bars, e.g. Snickers, Milky Way, Reeses	○	○	○	○	○	○	○	○	○
Candy other than chocolate (1 oz)	○	○	○	○	○	○	○	○	○
Cookies, home baked (1)	○	○	○	○	○	○	○	○	○
Cookies, ready make (1)	○	○	○	○	○	○	○	○	○
Brownies (1)	○	○	○	○	○	○	○	○	○
Doughnuts (1)	○	○	○	○	○	○	○	○	○
Cake, home baked (1 slice)	○	○	○	○	○	○	○	○	○
Cake, ready make (1 slice)	○	○	○	○	○	○	○	○	○
Pie, homemade (1 slice)	○	○	○	○	○	○	○	○	○
Pie, ready made (1 slice)	○	○	○	○	○	○	○	○	○
Sweet roll, coffee cake or other pastry, home baked (1 each)	○	○	○	○	○	○	○	○	○

	NONE < 1 per MO.	1-3 PER MO.	1 PER WK.	2-4 PER WK.	5-6 PER WK.	1 PER DAY	2-3 PER DAY	4-5 PER DAY	6+ PER DAY
Sweet roll, coffee cake or other pastry, ready made (1 each)	O	O	O	O	O	O	O	O	O
Jams, jellies, preserves, syrup, or honey (1 Tbs)	O	O	O	O	O	O	O	O	O
Peanut butter (1 Tbs)	O	O	O	O	O	O	O	O	O
Popcorn (1 cup)	O	O	O	O	O	O	O	O	O
Peanuts (small packet or 1 oz.)	O	O	O	O	O	O	O	O	O
Other nuts (small packet or 1 oz.)	O	O	O	O	O	O	O	O	O
Oat bran, added to food (1 Tbs)	O	O	O	O	O	O	O	O	O
Other bran, added to food (1 Tbs)	O	O	O	O	O	O	O	O	O
Wheat germ (1 Tbs)	O	O	O	O	O	O	O	O	O
Chowder or cream soup (1 cup)	O	O	O	O	O	O	O	O	O
Olive oil salad dressing (1 Tbs)	O	O	O	O	O	O	O	O	O
Other oil and vinegar dressing, e.g. Italian (1 Tbs)	O	O	O	O	O	O	O	O	O
Mayonnaise or other creamy salad dressing (1 Tbs)	O	O	O	O	O	O	O	O	O
Salt added at table (1 shake)	O	O	O	O	O	O	O	O	O
Garlic (1 clove or 4 shakes)	O	O	O	O	O	O	O	O	O

FOOD PREPARATION

1. Do you eat cold breakfast cereal?
   - O No > PLEASE GO TO NEXT QUESTION
   - O YES > what kind do you usually eat?_____

2. How many teaspoons of sugar do you add to your beverages or food each day?
   - O 0-1 O 2-4 O 5-9 O 10 or more

3. When you have beef or lamb as a main dish, how is the meat cooked?
   - O rare O medium O well
   - O medium rare O medium well O do not eat meat

4. How much of the visible fat on your beef, pork, or lamb do you remove before eating?
   - O remove all visible fat O remove none
   - O remove most visible fat O do not eat meat
   - O remove small part of visible fat

5. How often do you eat food that is fried at home? (exclude Pam-type spray)
   - O less than once per week O 4-6 times per week
   - O 1-3 times per week O daily

6. How often do you eat fried food away from home? (e.g. french fries, fried chicken, fried fish).
   - ○ less than once per week
   - ○ 1-3 times per week
   - ○ 4-6 times per week
   - ○ daily

7. What type and brand of cooking oil or fat do you usually use at home (e.g. corn oil, Mazola brand; lard)

   type:_____
   brand:_____

8. How does the amount of food you eat now compare to the amount you ate five years ago?
   - ○ I eat almost the same
   - ○ I eat less now
   - ○ I eat more now

9. What was the main source of your drinking water over the past year?
   - ○ city system
   - ○ rural or county system
   - ○ private well
   - ○ bottled water
   - ○ other (please specify _____)

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(D)	(E)	(F)
1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0
○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○
1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0
○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○

YOUR ACTIVITIES

1. About how many hours per day do you spend in light activity, such as walking, shopping, child care, cooking, carrying light objects, cleaning, and repairing?

   Hours per day_____

2. About how often do you take part in moderate physical activities including bowling, golf, light swimming, gardening, walks over 15 minutes, fishing, light bicycling, or other light sports...

   - ○ Usually every day
   - ○ 2-6 times a week
   - ○ About once a week
   - ○ A few times a month
   - ○ A few times a year
   - ○ Rarely or never

3. About how often do you take part in vigorous physical activity including jogging, tennis, racquetball or squash, lap swimming, aerobics, vigorous bicycling, skiing, hiking, hunting, or other vigorous sports...

- ○ Usually every day
- ○ 2-6 times a week
- ○ About once a week
- ○ A few times a month
- ○ A few times a year
- ○ Rarely or never

4. How often do you talk on the telephone with family, friends, or neighbors?

- ○ Usually every day
- ○ 2-6 times a week
- ○ About once a week
- ○ A few times a month
- ○ A few times a year
- ○ Rarely or never

5. How often do you get together with family, friends, or neighbors? This includes meeting in your own home, meeting in other's homes, or going out together.

- ○ Usually every day
- ○ 2-6 times a week
- ○ About once a week
- ○ A few times a month
- ○ A few times a year
- ○ Rarely or never

6. How often do you attend meetings of social clubs, groups, or organizations such as bridge clubs, book clubs, hospital volunteer, gardening clubs, Rotary club, Kiwanis, VFW, etc.

- ○ Usually every day
- ○ 2-6 times a week
- ○ About once a week
- ○ A few times a month
- ○ A few times a year
- ○ Rarely or never

Thank you for completing this questionnaire. Please make sure that no questions or pages have been skipped. Please place it in the postage-paid envelope that has been provided and seal it. Please return it to us in the mail.

Thank you for your time and cooperation. You have made an important contribution to our study of nutrition and health.

Utah State University

APPENDIX C: Letter to Participant--First Administration

<date>

Dear Friend,

Nutrition is of vital importance in all stages of life because it can influence so many different aspects of life. We would like to ask for your assistance in completing a nutrition questionnaire. It includes questions on nutritional supplements, the foods you eat and how often you eat them, and food preparation methods.

Please use a pencil to mark the questionnaire. For each question, please darken in one circle. If you do not eat the food that is listed, please fill in the circle in the first column labeled "none or less than one per month."

Please complete the questionnaire and return it to us within a few days. Before returning the quesitonniare, please make sure that all questions have been answered. We have to have a completed questionnaire in orter to use it in our study.

If you have any questions about the nutrition quesitonnaire, pleas call our nutrition study coordinator Karri Hoyt, RD at (801) 797-1536 from 8:00 A.M. to 11:00 A.M. Monday-Friday.

Thank you again for making this important study possible; without you we would have no study.

Sincerely,

Bonita W. Wyse, Ph.D.
Dean, College of Family Life

APPENDIX D: Reminder/Thank You Note

Dear Friend,

This is just a reminder regarding the nutrition questionnaire for the Cache Valley Study on Memory in Aging. If you have completed and returned the questionnaire, please accept our sincerest thank you. If you have not completed the questionnaire, please do so and return it to us as soon as possible.

If there are any questions, please feel free to call me. My number is (801) 797-1536 between 11:30 and 2:30 Monday through Friday.

Once again, thank you for your participation. It is greatly appreciated.

Sincerely,

Karri Hoyt

APPENDIX E: Participant Letter--Second Administration

<date>

Dear Friend,

Thank you for your invaluable time and effort spent in filling out and returning the nutrition quesitonnaire for the Cache Valley Study on Memory in Aging.

Nutrition is of vital importance in all stages of life because it can influence so many different aspects of life. We would like to ask for your assistance again in completing another nutrition questionnaire indentical to the one you previously filled out. The questionnaire has not been changed in any way. It includes questions on nutritional supplements, the foods you eat and how often you eat them, and food preparation methods.

The more information that we can collect, the better will be our understanding of the relationship between nutrition and aging. Having you provide us with two questionnaires will help provide a larger database and will help in supplying the much needed information. We are also testing to see if the questionnaire is able to provide accurate information over a specified period of time between administrations.

Please use a pencil to mark the questionnaire. For each question, please darken in one circle. If you do not eat the food that is listed, please fill in the circle in the first column lableled "none or less than one per month."

Please complete the questionnaire and return it to us within a few days. Before returning the questionnaire, please make sure that all questions have been answered. We have to have a completed questionnaire in orter to use it in our study.

If you have any questions about the nutrition questionnaire, please call our nutrition study coordinator Karri Hoyt, RD at (801) 797-2491 from 8:00 A.M. to 11:00 A.M. Monday-Friday.

Thank you again for making this important study possible; without you we would have no study.

Sincerely,

Bonita W. Wyse, Ph.D.
Dean, College of Family Life

APPENDIX F: Cache County Study on Memory in Aging Participant Letter

<date>

Dear Friend,

Thank you for your invaluable participation in the study of memory in aging. We appreciate the time that you have taken to speak with our interviewer. As a prticipant in this study, you are making a critical contribution to our knowledge of memory and aging.

Nutrition is an important part of your overall health picture and plays a role in the aging process. We would like to ask you to complete the attached nutrition questionnarie so that we can better understand the relationship between nutrition, memory, and aging. The nutrition questionnaire includes questions on nutritional supplements, the foods you eat and how often you eat them, food preparation methods, and your activities.

Please use a pencil to mark the quesitonnaire. For each question, please darken in one circle. If you do not eat the food that is listed, please fill in the circle in the first column lableled "none or less than one per month."

Please complete the questionnaire and return it to us within a few days. It is not necessary to complete it right after the Memory Study interview, but please do it as soon as possible.

If there is not a case number in the upper left-hand corner of the front page, please print your name in the blank. To use your data from this questionnaire, we need to be able to link it with the other information you have provided in the interview. If you print your name on the quesitonnaire, it will be immediately removed to insure confidentiality of your data as soon as your case number has been tagged to the questionnaire.

If you have any questions about the nutrition questionnaire, please call our nutrition study coordinator Karri Hoyt, RD at (801) 797-2491 from 8:00 am to 11:00 am Monday-Friday.

Thank you again for making this important study possible.

Sincerely,

Bonita W. Wyse, Ph.D.
Dean, College of Family Life

APPENDIX G: Table of Nutrient Intake from First and Second Administration of the Food Frequency Questionniare

Nutrient intake mean (±sd) from first and second administrations of the food frequency questionnaire Preston, Idaho dietary survey, 1995.

Nutrient	Total Population FFQ1[1] n=101	Total Population FFQ2[2] n=76	Male FFQ1[1] n=41	Male FFQ2[2] n=31	Female FFQ1[1] n=60	Female FFQ2[2] n=45
Calories	1989.4 (776.7)	1980.2 (811.9)	1964.2 (815.0)	2122.1 (820.0)	1930.8 (715.0)	1794.0 (730.5)
Total protein gm	85.9 (38.2)	87.4 (39.6)	85.9 (38.3)	94.1 (41.8)	85.1 (38.1)	81.9 (37.1)
Animal protein gm	60.8 (29.4)	64.2 (33.0)	60.9 (28.9)	69.7 (36.2)	60.7 (29.8)	60.2 (30.3)
Vegetable protein gm	25.0 (11.5)	23.3 (9.8)	24.9(11.2)	24.5 (9.1)	24.4 (11.4)	21.7 (9.7)
Total fat gm	69.8 (31.7)	72.0 (32.9)	68.3 (32.8)	77.2 (34.31)	65.8 (28.6)	62.5 (27.0)
Animal fat gm	28.9 (15.8)	45.0 (24.4)	39.9 (20.7)	47.9 (25.5)	37.5 (18.5)	38.4 (20.3)
Vegetable fat gm	69.8 (31.7)	27.0 (14.0)	28.4 (16.9)	29.4 (15.3)	28.3 (14.7)	24.1 (12.0)
Saturated fat gm	25.1 (11.7)	26.7 (13.3)	24.6 (11.7)	28.6 (13.8)	23.3 (10.7)	22.9 (11.1)
Monounsatruated fat gm	26.9 (12.9)	27.8 (12.8)	26.1 (13.4)	29.7 (13.4)	25.2 (11.5)	23.9 (10.2)
Polyunsaturated fat gm	11.7 (5.6)	11.4 (5.3)	11.6 (6.1)	12.4 (5.5)	11.5 (5.2)	10.3 (4.8)
Cholesterol mg	291.2 (170.9)	303.6 (194.3)	316.6 (214.9)	326.0 (184.9)	266.9 (128.6)	279.6 (195.2)
Carbohydrate gm	266.7 (99.1)	256.3 (105.5)	263.3 (103.9)	274.4 (103.5)	261.9 (92.8)	235.7 (100.1)
Sucrose gm	48.4 (24.5)	48.0 (25.5)	48.9 (28.5)	51.8 (23.5)	48.1 (21.7)	45.5 (26.8)
Dietary fiber gm	23.2 (10.9)	21.1 (21.1)	22.9 (10.8)	22.5 (9.9)	23.4 (10.9)	20.2 (9.4)
Calcium mg	1254.1 (618.4)	1214.9 (680.6)	1195.3 (655.9)	1220.30 (678.0)	1277.8 (592.1)	1191.88 (683.4)
Iron mg	22.8 (15.9)	23.7 (19.7)	21.2 (13.8)	30.60 (56.7)	24.7 (22.6)	23.86 (20.5)
Magnesium mg	334.2 (140.9)	325.6 (149.1)	327.7 (133.4)	336.44 (132.1)	324.9 (137.8)	311.31 (158.0)
Phosperous mg	1465.2 (612.5)	1478.3 (693.4)	1460.7 (621.1)	1587.74 (685.0)	1449.9 (604.6)	1381.91 (684.4)
Potassium mg	3249.9 (1321.4)	3091.0(1442.7)	3244.3 (1434.9)	3311.1(1506.3)	3253.6 (1250.2)	2938.9(1393.7)

Nutrient	Total Population FFQ1[1]	Total Population FFQ2[2]	Male FFQ1[1]	Male FFQ2[2]	Female FFQ1[1]	Female FFQ2[2]
Sodium mg	2532.1 (1036.7)	2468.5 (996.8)	2474.4 (1072.6)	2555.8 (961.6)	2445.6 (946.8)	2262.5 (931.4)
Zinc mg	27.1 (30.2)	28.6 (35.4)	24.1 (23.9)	35.0 (41.6)	29.2 (33.9)	24.1 (30.1)
Manganese mg	3.4 (1.7)	3.5 (1.9)	3.4 (1.6)	3.4 (1.7)	3.3 (1.9)	3.4 (2.04)
Vitamin C mg	480.9 (478.2)	341.1 (388.6)	473.9 (457.5)	336.2 (370.3)	486.9 (495.6)	346.0 (404.9)
Thiamin (B_1) mg	8.7 (18.5)	5.8 (12.4)	4.3 (7.1)	3.9 (6.6)	6.3 (10.6)	4.0 (5.9)
Riboflavin (B_2) mg	5.5 (7.1)	5.1 (6.7)	3.8 (3.3)	3.7 (3.4)	4.4 (4.0)	4.1 (3.7)
Niacin mg	49.9 (51.7)	46.5 (50.5)	35.3 (22.5)	35.4 (24.1)	41.4 (31.8)	38.1 (29.7)
Vitamin B_6 mg	10.8 (29.3)	6.9 (19.8)	3.5 (1.8)	3.5 (1.9)	14.8 (36.2)	8.5 (24.6)
Folate mcg	523.6 (311.9)	466.6 (279.6)	481.9 (273.6)	442.0 (242.9)	513.6 (259.5)	476.4 (288.2)
Vitamin B_{12} mcg	11.4 (9.8)	10.8 (13.2)	12.7 (13.1)	9.4 (5.8)	10.2 (6.5)	11.4 (16.5)
Vitamin K mcg	152.9 (104.4)	139.0 (92.9)	131.5 (77.4)	132.0 (81.2)	165.8 (117.3)	141.9 (100.1)
Vitamin A IU	23771.6(16303.9)	18827.1(16267.8)	22437.5(16169.9)	20136.3(17654.3)	15917.0(9208.7)	15033.6(9554.8)
Retinol IU	7298.5 (8001.9)	5776.4 (6146.7)	7269.9 (8078.9)	5179.2 (3956.1)	6817.9 (7203.8)	5521.2 (6491.3)
Carotene IU	16473.2 (11008.5)	14366.5 (14304.4)	15167.6 (10226.4)	14957.2 (15245.7)	14862.9 (9083.2)	11734.7 (11102.9)
Vitamin D IU	599.9 (416.4)	573.0 (425.2)	578.7 (371.3)	567.6 (337.9)	562.8 (360.7)	508.1 (315.4)
Vitamin E IU	111.4 (195.2)	104.9 (220.2)	97.6 (155.3)	107.4 (222.8)	120.6 (219.1)	102.8 (220.9)
Alcohol gm	0.0 (0.2)	0.1 (0.5)	0	0.1 (0.4)	0.0 (0.3)	0.1 (0.5)
Caffeine gm	54.7 (133.5)	59.4 (137.0)	64.8 (131.5)	73.8 (126.9)	47.9 (135.5)	49.4 (144.0)
Calcium w/o pills mg	1017.9 (489.5)	997.4 (580.6)	977.9 (486.2)	1063.9 (600.2)	1028.6 (491.9)	932.2 (561.0)
Iron w/o pills mg	17.1 (9.9)	17.5 (10.6)	16.7 (9.1)	17.8 (8.6)	17.3 (10.4)	17.1 (11.7)
Magnesium w/o pills mg	309.1 (132.3)	304.2 (143.4)	309.5 (131.9)	321.9 (132.6)	306.9 (132.8)	289.7 (149.2)

Nutrient	Total Population FFQ1[1]	Total Population FFQ2[2]	Male FFQ1[1]	Male FFQ2[2]	Female FFQ1[1]	Female FFQ2[2]
Phospherous w/o pills mg	1451.3 (617.4)	1457.2 (693.9)	1445.5 (628.7)	1571.6 (692.3)	1437.1 (607.7)	1357.5 (679.6)
Postassium w/o pills mg	3246.4 (1322.2)	3085.2 (1441.8)	3239.4 (1438.3)	3305.9 (1507.8)	3250.9 (1249.1)	2932.7 (1390.8)
Zinc w/o pills mg	12.0 (5.8)	12.8 (6.4)	11.7 (5.6)	13.2 (6.1)	12.2 (6.1)	12.4 (6.6)
Copper w/o pills mg	1.5 (.8)	1.4 (0.9)	1.5 (.9)	1.5 (0.7)	1.5 (.6)	1.4 (1.0)
Manganese w/o pills mg	3.19 (1.7)	3.0 (1.6)	3.2 (1.6)	3.1 (1.4)	3.1 (1.8)	2.9 (1.7)
Vitamin C w/o pills mg	175.8 (105.3)	152.1 (95.3)	175.3 (120.1)	151.0 (108.0)	177.4 (95.3)	154.3 (87.4)
B_1 w/o pills mg	1.6 (.7)	1.6 (0.7)	1.3 (0.7)	1.7 (0.6)	6.3 (10.6)	1.5 (0.7)
B_2 w/o pills mg	2.2 (.9)	2.2 (1.2)	2.2 (1.1)	2.2 (1.0)	4.4 (4.0)	2.1 (1.3)
Niacin w/o pills mg	21.1 (9.5)	21.7 (9.6)	20.9 (9.1)	23.1 (9.8)	41.4 (31.8)	20.4 (9.2)
Vitamin B_6w/o pills mg	2.4 (1.1)	2.4 (1.2)	2.3 (1.1)	2.5 (1.2)	14.9 (36.3)	2.3 (1.2)
Folate w/o pills mcg	334.2 (160.8)	324.5 (167.6)	335.5 (147.8)	325.9 (157.4)	513.6 (259.5)	325.3 (176.9)
B_{12} w/o pills mcg	8.8 (9.3)	8.4 (12.0)	10.5 (12.9)	7.6 (5.4)	10.2 (6.5)	2.1 (1.3)
Vitamin K w/o pills mcg	152.4 (104.1)	137.3 (92.8)	130.9 (77.2)	130.4 (81.)	165.8 (117.3)	140.2 (99.9)
Vitamin A w/o pills IU	16189.1 (11207.2)	14452.1 (14983.1)	16583.8 (13733.7)	15620.2 (15523.6)	216801.0 (12693.2)	13533.6 (14611.3)
Retinol w/o pills IU	2950.3 (11207.2)	3079.1 (4187.2)	3489.4 (4403.1)	2921.1 (2203.7)	6818.0 (7203.8)	30763.8 (5009.8)
Carotene w/o pills IU	13238.9 (9279.8)	11373.1 (12287.6)	13094.9(10154.0)	12699.1 (14.689.3)	14863.0 (9083.2)	10456.9 (10398.0)
Vitamin D w/o pills IU	334.3 (166.2)	346.7 (237.2)	349.4 (168.0)	383.8 (223.0)	322.2 (165.2)	308.1 (206.3)
Vitamin E w/o pills IU	10.2 (5.5)	10.1 (5.9)	9.7 (5.3)	10.7 (5.5)	10.4 (5.5)	9.5 (6.1)

[1] First administration of the FFQ, February - April 1995

[2] Second administration of the FFQ, June - August 1995