THE VALIDATION OF A FOOD FREQUENCY QUESTIONNAIRE FOR USE IN MEASURING FOOD INTAKE OF LOW-INCOME WOMEN

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1979

Submitted to the Faculty of the
Graduate college of the
Oklahoma State University
in partial fulfillment of
the requirements for
the degree of
MASTER OF SCIENCE
May, 2000

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QUESTIONNAIRE FOR USE IN

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ACKNOWLEDGEMENTS

I would like to take this opportunity to express my sincere appreciation to all those who helped and guided me through the completion of this study. My thesis advisor, Dr. Kathy Keim, thank you for your guidance, patience, and time to complete this study. My appreciation is extended to my committee members, Dr. Gail Gates, and Dr. Janice Hermann, for all their expertise and support. I would also like to thank Dr. Glenna Williams, for securing grant money from the Oklahoma Nutrition Education Program to help fund this project which allowed two students to assist with computer data entry.

I also wish to thank the Oklahoma Cooperative Extension Service for their financial support and encouragement through my graduate study.

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CHAPTER ONE

INTRODUCTION

There is little research available concerning valid methods for measuring dietary patterns in low-income participants of nutrition education programs. This is especially true for the Expanded Food and Nutrition Education Program (EFNEP) and the Oklahoma Nutrition Education Program (ONE).

EFNEP is a federally funded program of the Cooperative State Research, Education and Extension Service, seeking to improve the diets and food related practices of low-income families (Extension Service-USDA, Science and Education Administration, 1979). The program has existed since 1968 and operates in all states. Since EFNEP's inception, the 24-hour food recall has been the primary tool for assessing impact of the program on food intake by comparing 24-hour food recalls and a ten question behavior checklist at entry and exit (Cooperative Extension Service, USDA, 1994).

The curriculum used in Oklahoma consists of sixteen lesson plans developed by Michigan State University, Cooperative Extension Service, titled, "Eating Right is Basic." The average length of time that a participant is enrolled in the program is between 6-9 months. Trained paraprofessionals teach the lessons individually in the home or in a small group environment. Most participants have instruction twice a month.

The ONE program has been in existence since 1995. This program focuses on nutrition education for food stamp recipients. This state grant was made available from the United States Department of Agriculture (USDA) and comes to the Oklahoma State University, Cooperative Extension Service, through the Oklahoma State Department of Human Services. This grant requires a 50% match in funds from non-federal sources. The same curriculum is used in both programs. The primary tool for assessing program impact is the 24-hour food recall and a ten-question behavior checklist performed at entry and exit.

Background

It has been widely recognized that 24-hour food recalls performed at entry and exit do not capture all the important outcomes of EFNEP (Gersovitz et al., 1973). One important aspect of a food instrument is responsiveness to cultural sensitivity and the ability to collect the data among ethnic groups (Cassidy, 1981). Culturally sensitive research recognizes that there are differences in values and meanings attached to foods and food related behaviors, resulting from differences in race, ethnic background, and income. These differences affect the meanings and values attached to food, which will affect responses on assessment instruments. Cultural sensitivity is particularly important in EFNEP and ONE as its participants have very diverse ethnic backgrounds.

The Food Patterning Model

A low income population's food intake can be described by the food patterning model and by identifying core foods, which determine the foods that provide a majority of the daily intake (Kristal et al., 1990). In the food patterning model, foods that people eat are categorized based on frequency of consumption. Primary foods are consumed 2 to 7 times per week, secondary foods are consumed at least once a week, and peripheral foods are consumed only occasionally (Kristal et al., 1990; Jerome, 1980). A food frequency questionnaire can be used to determine these core foods among different ethnic groups. Ethnic groups within a low-income population can be described according to the foods they regularly consume with respect to their central "core diet" and secondary foods (Caster, 1980). It is important to identify ethnic foods and to understand the differences in dietary patterns among ethnic groups for nutrition assessment, program planning, and nutrition education (Bartholomew et al., 1990). Once core foods are established within an ethnic group, a shortened food frequency questionnaire can be developed to evaluate food intake changes based on participation in a nutrition education program (Kristal et al., 1990).

The Problem

Currently, the EFNEP and ONE program use the 24-hour food recall to measure food behavior change. A well known problem with this method is that it relies on only one day of reporting, and may result in under or over reporting of food intake amounts (Zulkifli, 1992). Errors in interpretation of food intakes are common and forgetting of foods such as liquids, high calorie snacks, alcohol, and fat intake often occurs (Thompson and Byers, 1994). There is also no way of determining food patterns among the different cultural groups using a single 24-hour food recall. Data may not accurately reflect nutrient intakes for a population because of variations in individual food consumption from day to day (Thompson and Byers, 1994).

In order to measure change after participating in a nutrition education program, a reliable tool must be implemented to determine different ethnic food patterns of a low-income population (Bartholomew et al., 1990). A food frequency questionnaire is an acceptable method to use for describing food intake patterns to determine the core diet. This information will assist in identifying the different food patterns and habits of different low-income ethnic groups enrolled in the EFNEP and ONE program.

Purpose

The purpose of this study was to determine the core and secondary core foods of an adult population of low-income women participating in the EFNEP and ONE program in Tulsa County. This is a dietary pattern study which is based on an anthropological model, called food patterning, and can be used to describe a targeted group within a population (Kristal et al., 1990; Caster, 1980; Koehler et al., 1989). Once dietary patterns have been established, the food patterning model is appropriate for designing nutrition education interventions and measuring dietary food intake changes (Kristal et al., 1990).

The information gathered from the Block 92 food frequency questionnaire and daily food records will be used to develop a shortened culturally specific food frequency questionnaire for use with low-income women in the EFNEP and ONE program.

Objectives

The objectives of this study were to:

1) Determine the differences in core and secondary foods among four cultural groups, Mexican Americans, Native Americans, African Americans, and whites enrolled in the EFNEP and ONE program in Tulsa County.

2) Identify foods consumed by each cultural group that are not included in the Block 92 food frequency questionnaire.

3) Determine nutrient intake differences as measured by the food frequency questionnaire, three 1-day food records, and a 24-hour food recall for each

subject. Nutrient levels compared included the total calories, the calories from fat, fat grams, saturated fat, cholesterol, protein, carbohydrate, and amounts of iron, fiber, calcium, sodium, and folate.

4) To determine nutrient intake differences among Hispanics, blacks and whites.

5) Develop a shortened food frequency questionnaire representing the core and secondary core foods of the four cultural groups participating in the EFNEP and ONE program.

Assumptions

In this study, the researchers assumed that participants were trained by paraprofessionals to accurately report their dietary intake. Participants completed the Block 92 food frequency questionnaire after a brief explanation of the food frequency questionnaire and were able to add additional ethnic foods in the blank spaces provided. In addition, participants in the EFNEP and ONE program accurately reported their food intake for three concurrent days in the form of daily food records after completing the food frequency questionnaire. Paraprofessionals reviewed these records for completeness, and it was assumed that they asked for clarification from the participants.

Limitations

The Block 92 food frequency questionnaire was not designed to record frequency of food consumption in culturally diverse or culturally distinct populations, and the validity of this questionnaire in such populations has not been thoroughly tested (Teufel, 1997). Blank spaces were added under each

food group to encourage participants to record other traditional foods consumed. Participants may have felt uncomfortable, did not remember, or did not bother to write in additional foods. Three daily food records and one 24-hour food recall were used as the criterion measure to compare nutrient values to determine the validity of the Block 92 food frequency questionnaire. This number of days recorded was used to minimize respondent burden within a low-income population, but may not be enough to estimate nutrient intake. The total number of participants was only 113, the number of Hispanics was low (n=16), and the number of Native Americans was low (n=7), which may not be representative of the target population. The data was collected by trained paraprofessionals, but there was no way to monitor all of them when conducting the 24-hour food recalls, and explaining the Block 92 FFQ or the three 1-day food records.

Definition of Terms

1. Core foods – Foods identified by at least 25% of the target group and consumed daily, twice a day, 5-6 times a week, or 3-4 times per week, as measured using the food frequency questionnaire (Caster, 1980; Jerome, 1980).
2. Secondary core foods – Foods identified by at least 25% of the target group and consumed once a week, twice a week, or 2-3 times a month, as measured using the food frequency questionnaire (Caster, 1980; Jerome, 1980).

3. Peripheral foods – Foods identified by at least 25% of the target group and consumed never or less than once per month, as measured using the food frequency questionnaire (Caster, 1980; Jerome, 1980).

CHAPTER TWO

REVIEW OF THE LITERATURE

Nutrient and Food Intake of Low-income Persons

Social and economic circumstances leave many Americans unable to meet basic needs (Bell et al., 1998). Food insecurity leading to hunger is a growing problem in America (Bell et al., 1998). In a study by Bell et al. (1998), one 24-hour food recall was collected by a trained interviewer from 69 persons, who were waiting for emergency food at a food pantry in Kansas. Data were collected from December 1994 through March 1995. The subject's ages ranged from 21-37 years. The racial composition was predominately white (46 women and 23 men). Most of the subjects reported that they were also receiving other food assistance. There was large variation in caloric and nutrient intake, with many subjects not consuming adequate amounts of protein, iron, folate, calcium, and vitamin A, C, D, and E. This was defined as less than 67% of the 1989 Recommended Dietary Allowances (RDA). The percentage of subjects consuming less than 67% of the RDA for these nutrients averaged between 41% and 78%.

In this same group of people, inadequate intake was found for fruits (n=53), vegetables (n=55), dairy (n=49), and breads and cereals (n=40) (Bell et al., 1998). The Food Group Pyramid minimum servings per group was used as the

criteria. Participants consumed many foods of low nutrient density and high fat content such as chips, sodas, and other snack foods. Sodas were consumed in the highest frequency, with 21 persons reporting 2 or more 12-ounce servings per day. High fat meats such as sausage, hotdog, and hamburger were reported by 27 persons at the level of 2 or more 3-ounce servings per day.

A study by Emmons (1986) collected four weekly 24-hour food recalls from one adult person per low-income family receiving food stamps. Twenty-three white and 53 black low-income families were interviewed each week for four weeks. Ages ranged from 17 to 42 years and all families had one child under the age of 3 years. Family size ranged from 2 to 8 members. Interviewers were low-income women who were trained how to obtain 24-hour food recalls.

The black subjects were found to experience significant decreases in the number of servings from high protein foods, fruits, vegetables, and soft drinks and a significant increase in the servings of lentils between the beginning and the end of the month (Emmons, 1986). Soft drinks and fruit-flavored drinks were consumed in large quantities throughout the month by whites. Protein, niacin, and riboflavin were well above the1984 RDA's for both ethnic groups at both the first week and the fourth week of the month. Vitamin B6, vitamin D, zinc, calcium, and iron were well below the1984 RDA's at all weeks for both ethnic groups. Calories were just above recommended levels the first week and below recommended levels by the fourth week for whites. For the black subjects, calories were below the recommended levels throughout the month and decreased by the fourth week. The black subjects had a higher percentage of

calories from animal fat and the white subjects had a higher percentage of calories from refined carbohydrates.

In the Nationwide Food Consumption Survey, 1977-1978, 4,408 households that were eligible for food stamps were interviewed about the kinds and amounts of all foods used by the household during the previous seven days (Peterkin et al., 1982). Six hundred and twenty-seven persons who were the head of household and whose food costs were more than 10% over their food stamp allotment level, had their food intake analyzed. For the entire sample, 80% met the 1979 RDA for protein, iron, phosphorus, thiamin, riboflavin, and vitamin B12. Less than 50% reported food intake that met the 1979 RDA for calcium, magnesium, and vitamin B6.

Rose and Oliveria (1997) analyzed the diets of 3,774 adult women between the ages of 19-50 years as measured by one 24-hour food recall. Trained interviewers were used to gather the 24-hour food recall data in the homes. Data were part of the Continuing Survey of Food Intake by Individuals (CSFII – 1989 to 1991) and cluster samples of housing units were gathered from 48 states.

In the Rose and Oliveria (1997) study low nutrient intakes were defined as less than 50% of the 1989 RDA's. This conservative cut-off was chosen because under-reporting is likely in diet surveys and because of the variability involved in one day recall data (Rose and Oliveria, 1997). Food insufficient individuals were defined as those who reported that they sometimes or often did not have enough to eat. The subjects from food insufficient households had a mean education of 10 years. Fifty-percent resided in a central city, 46% were

single and head of household, 69% participated in a food assistance program, 49% were white, 29% were black, 17% were Hispanic, and the mean household size was four persons. The food-insufficient women were found to be 1.4 times more likely to have energy intakes below 50% of the food energy recommendations. The mean consumption level for calcium was only 56% of the RDA for women in food insufficient households. The consumption levels for vitamin B6, vitamin A, iron, vitamin E, zinc, and folate ranged from 62% to 82% of the RDA.

The FY 99 data from the 24-hour food recalls at entry into the Oklahoma Nutrition Education (ONE) program in Tulsa County show a similar pattern. Food stamp recipients in the ONE program had nutrient intakes at entry that were below 80% of the1989 RDA for iron, calcium, and vitamins A, C, and B6. Protein intake exceeded 90% of the RDA. The mean percentage of calories from fat was 38%. Ranges for caloric intake varied from a low of 800 to a high of 2400, with a mean intake of approximately 1650 calories. About 25% of the participants consumed less than 1200 calories per day and 25% consumed more than 2200 calories per day (unpublished data, Dietary Summary Report System, ERS Data, 1999, Tulsa ONE program).

Dietary Assessment Tools

Food Records

A food record is a record of all foods and beverages consumed with exact amounts consumed (Thompson and Byers, 1994). The amounts are measured

by the respondents using scales, household measuring cups or spoons, food models, or pictures at the time the food is consumed. Furthermore, the respondent must be responsible for important details, such as brand names, preparation methods, and serving sizes (Thompson and Byers, 1994).

Rebro et al. (1998) studied the effect on eating patterns when subjects were asked to record food intake for four days. Data were collected on 175 women, 50-79 years of age, who were participating in the Women's Health Trial Feasibility Study in minority populations. Women recorded food intake over four alternate days for a one-week period, after receiving instructions from a nutritionist. Four 1-day food records were reviewed for completeness by nutrition educators. Records including a weekend were excluded because of variability in weekend meal patterns (i.e. family gatherings).

Significantly fewer food components, food items, and snacks were reported on day four as compared to day one (Rebro et al., 1998). Respondents were found to reduce the number of food and snacks consumed and decrease the complexity of their diet by substituting foods that were easier to record. The importance of avoiding lengthy periods of consecutive reporting days, including four days or more for diet records is important to minimize changes in eating patterns.

Mela and Aaron (1997) stated there is little information on the factors that predict the likelihood of subjects generating valid or invalid food intake records. The objective of the Mela and Aaron (1997) study was to gain insight into subjects' views of different diet recording tasks. The sample included 240

subjects, mostly female, with a mean age of 41 years. Each subject was given a questionnaire only if they had never before recorded their food intake. Making estimates in household measures were viewed as significantly more difficult than completing a food frequency questionnaire, presumably because they were not confident in their ability to make such estimates. Some respondents also acknowledged that they would alter their food intake behavior during recording periods. The conclusion of the Mela and Aaron (1997) study was that in order to obtain a valid food record, supplemental counseling and instruction would be required to determine portion sizes.

Several studies have shown that individuals have difficulty in estimating portion sizes of foods and as a result underestimate amounts eaten in food records and 24-hour food recalls (Thompson and Byers, 1994). To increase the accuracy of self-reporting, researchers have examined the effect of training sessions on estimating portion sizes. When subjects were trained in portion size estimations, using actual food models, and container sizes, researchers reported increased validity of portion size estimation (Briefel et al., 1997).

The form used to record foods and beverages consumed must be designed carefully to assist the respondent in recording intake (Thompson and Byers, 1994). An instruction booklet for subjects' use during the food recording period was found to be essential. If the intent of the study is to generate a population distribution of a nutrient's intake, then only 2 days of recalls were needed on a sample. But, three days of dietary information were needed to estimate the distribution of usual diet intake from food records (Thompson and Byers, 1994).

A combined 24-hour dietary recall and record approach in which an initial interviewer administered a 24-hour food recall was used by USDA in its 1977-78 and 1987-88 Nationwide Food Consumption Surveys (Peterkin et al., 1982).

24-hour Food Recalls

When conducting a 24-hour food recall, the individual is asked to recall and report all food and beverages consumed during the previous 24 hours. Experienced interviewers who have knowledge about food and preparation practices, are important in administering a 24-hour food recall in order to retrieve food items not originally reported by the individual (Thompson and Byers, 1994).

The multiple pass method was created to help individuals remember foods that are commonly forgotten when remembering foods consumed within the past 24-hours (Briefel et al., 1997). These items prompt an interviewer or an individual to remember to include: crackers, breads, rolls, tortillas, hot or cold cereals, added cheese, chips, candy, nuts, seeds, fruits eaten with meals or snacks, coffee, tea, soft-drinks, juices, beer, wine, cocktails, brandies, and any other alcoholic beverages (Briefel et al., 1997).

The 24-hour food recall can provide an exaggerated estimate of the distribution of intake, because on any given day some individuals will eat very little food, whereas others will eat an unusually large amount (Block et al., 1992). However, the 24-hour food recall has been used extensively in nutrition education programs because it is easy to administer, economical, and the effectiveness of the recall is not dependent on the literacy of the respondent (Del

Tredici et al., 1988). Multiple recalls may be needed to more accurately replicate the dietary intake of a participant (Karvetti and Knuts, 1985). Current literature suggests the following points are keys to an accurate food recall: use food models to determine portion sizes, ask open-ended questions, and train interviewers to use the same standardized tools for determining foods and portion sizes (Karvetti and Knuts, 1985).

Block 92 Food Frequency Questionnaire

The Block 92 food frequency questionnaire (FFQ) developed at the National Cancer Institute by Gladys Block, used national data as the basis for its development (Thompson and Byers, 1994; Block et al., 1992). This 100-item food frequency questionnaire (FFQ) was based on 24-hour food recall data collected on adults in NHANES II (Thompson and Byers, 1994). This FFQ was used in the present study. The major food sources of energy and 17 nutrients and usual portion sizes of those foods were determined (Thompson and Byers, 1994). Validation and calibration studies using this 100-item FFQ have been reported for middle-aged and older women, middle aged and older men, and a low-income black population (Block et al., 1992). This 100-item food frequency questionnaire included the frequencies of each food item consumed by the number of times a day, week, or month. Portion sizes, small, medium, and large were also included. Estimations of nutrient intake were calculated by using the following formula: nutrient estimate = food frequency x serving size x nutrient standard (Zulkifli, 1992). This 100-item questionnaire has been shown to produce

not only good ranking of individuals but also accurate estimates of mean nutrient intake when compared to the NHANES II reference data (Block et al., 1992).

Accuracy of Food Frequency Questionnaires Compared with Food Recalls and Food Records

Three 1-day diet records are appropriate for studies involving moderate to large groups (Bergman et al., 1990). Bergman et al. (1990) asked 47 women with a mean age of 60 years, to fill out a food frequency questionnaire after receiving a 20-minute instructional session. The food frequency questionnaire included 141 food items and the subjects were asked to report food consumed over the past year. Two weeks later, the same subjects were taught how to complete three 1-day diet records. Subjects were asked the complete the diet records over the next two weeks. The food frequency questionnaire consistently resulted in higher estimates for energy and nutrient intake compared with the three 1-day diet records. The food frequency gave significantly higher estimates for energy, carbohydrate, protein, vitamin A, iron, and calcium. Estimates of fat and percent of total energy from fat were not significantly different between the food frequencies and the diet records.

Block et al. (1992) compared two dietary questionnaires, the University of Michigan (UM) FFQ and the Block 92 FFQ against multiple dietary records collected during one year. The subjects consisted of 85 black and white persons, between the ages of 25-50 years. The 85 participants completed a series of four sets of three 1-day diet records each three months apart, and 4 sets of 24-hour

food recalls. Trained interviewers administered the 24-hour food recalls. After the recall, the interviewer instructed the respondent on proper recording of three 1-day food records. In each instance, the interviewer returned to the respondent's home to clarify responses. After completion, 85 respondents were asked to complete the University of Michigan food frequency questionnaire and the Block 92 FFQ.

The correlation between energy and nutrient intake of the 24-hour food recalls and the mean of four 3-day food records was between $r=.70$ and $r=.80$ ($p<.01$). This included calories, protein, fat, carbohydrate, saturated fatty acids, calcium, B vitamins, and iron. A correlation of at least $r=.70$ was considered significant at the $p<.01$ level. Correlation coefficients should be in the range of .40 to .80 and significant in order to be acceptable (Block et al., 1992). Vitamin A was omitted from the analysis because the correlation was only $r=.34$. Sixteen days of dietary records were inadequate to reflect usual intake for Vitamin A (Block et al., 1992).

The UM food frequency questionnaire was developed to estimate the usual diet of an individual over a year's time and contained 113 food items. This food frequency was interviewer assisted by asking the respondent to sort food items by frequency into piles, and then asking about portion sizes for each food item. In this study, the 100-item Block 92 FFQ was self-administered after the UM food frequency had been explained (Block et al., 1992).

Both FFQ's tended to overestimate nutrient intake. The UM FFQ overestimated energy and all of the nutrients compared with the sixteen days of

diet records and recalls. The median value of the correlations from the UM questionnaire was r=.53 when compared with the 16 days of food records. The Block 92 FFQ produced significantly higher estimates for six of the nutrients when compared with the16 days of dietary recalls and records. These included vitamin C, thiamin, riboflavin, niacin, calcium, potassium, and fiber. The Block 92 FFQ produced the highest median correlation of r=.63 for energy and nutrients when compared to the 16 days of diet record and food recalls. The conclusion of this study was that the self-administered Block 92 FFQ with the small, medium, and large portion sizes listed can estimate an individuals mean energy and nutrient intake when compared to diet records.

Suitor et al. (1989) developed a self administered food frequency questionnaire for use with low-income pregnant women and compared it to three 24-hour food recalls. The prenatal food frequency questionnaire (PFFQ) was adapted from the Willett food frequency questionnaire (Willett et al., 1985). The PFFQ was designed to categorize pregnant women by intake levels over the past four weeks for energy, protein, calcium, iron, zinc, vitamin A, vitamin B6, and vitamin C. The PFFQ was pre-tested by 73 women. Adjustments were made in food items and format based on their responses. Some portion size information was deleted due to the increase in reading time and reported lack of use by the respondents. Portion sizes, small, medium, and large were retained for milk, juice, and meat. The final PFFQ included 90 food items (Suitor et al., 1989).

After subjects were given a two-dimensional food portion visual aid to take home, three non-consecutive diet recall interviews were conducted by telephone

(Suitor et al., 1989). Ninety-five women, aged 14 to 43 years old provided the three follow up diet recalls. Subjects with caloric intakes on the PFFQ who exceeded 4500 calories were excluded from the data analysis. This represented about 18% of the sample population. The correlation of nutrient intake between the PFFQ and three diet recalls ranged from r= .50 for vitamin B6 to r= .60 for calcium. All correlations for vitamin A remained at r=0.15.

Suitor et al. (1989) concluded that a self-administered questionnaire can provide useful data about recent intake of selected nutrients in a majority of low-income pregnant women, but that overestimation of food use may occur in about 20% of the population. A self-administered food frequency questionnaire holds potential for obtaining representative food and nutrient intake data in a more cost-effective manner for women who have fifth grade level reading skills (Suitor et al., 1989).

The Food Patterning Model

An early report of anthropological research for determining dietary patterns was when Jerome Bennett described dietary patterns by categorizing available foods in a community in southern Illinois by their frequency of use: foods used daily, weekly, and rarely (Bennett, 1942). Kristal et al. (1990) applied this definition to determine the core, secondary core, and peripheral foods in a group of women residing in Washington state. In dietary survey studies, the emphasis has been on the precise description of a sample population and accurate assessments of nutrient intakes (Brown, 1986). A description of the community's diet includes the range of dietary practices and the socioeconomic and cultural

factors that influence these food patterns (Brown, 1986). Information is needed on the foods which provide a major part of the daily food intake in population groups to determine both descriptive information and nutritional evaluation (Caster, 1980)

In a study by Caster (1980) a food frequency questionnaire was completed by a group of women living in poverty in 10 counties in northeast Georgia. One hundred and forty-three food items were identified in a pilot study. These 143 food items were used to measure the food intake of 114 women attending public health clinics. Of these subjects, 37 were white, 77 were black, and 70 were pregnant. The purpose of this study was to determine a procedure for interpreting dietary data based on the frequency with which different foods were consumed.

The core diet contained 34 food items, with the criteria for inclusion as a core food, being foods consumed at least 5-7 times a week by at least 25% of the population (Caster, 1980). Common items consumed 0.8 to 1.8 times a day were whole milk, coffee, soft drinks, citrus fruits or juice, corn grits, corn bread, and biscuits, and provided 69% of the total energy. Thirty-eight food items were considered secondary foods since these were consumed 1 to 2 times a week (Caster, 1980). The core diet was found to lack protein, iron, and vitamin A.

The core foods were the same between cultures, but the secondary foods varied between cultures (Caster, 1980). Food items in the secondary core group provided about 27% of the total energy. In the meat group, blacks reported more frequent consumption of ham, beef roast, and organ meats, while whites reported

more frequent consumption of beef steaks ($p<.05$). Vegetable items such as black-eyed peas, sweet potatoes, turnip greens, and collard greens were reported more frequently by blacks, and whites indicated that they consumed more soups, stews, and carrots ($p<.05$). Fruit items such as grapes, pineapple, fruit cocktail, and peaches were reported more frequently by blacks, while the whites reported more frequent consumption of strawberries ($p<.05$). Secondary foods for all ethnic groups tended to be higher in beta-carotene, protein, iron, and, niacin (Caster, 1980).

Koehler et al. (1989) determined the core, secondary core, and peripheral foods of Hispanics, Navajo Indian, and Jemez Indian children living in rural New Mexico. One hundred and sixty children aged 9-16 years, who attended one of four K-8 grade schools in central and northwest New Mexico were subjects. Forty-two were Hispanic, 68 were Navajo, and 50 were Jemez Indian. Core foods included foods eaten 3-5 times per week, once a day, twice a day, or 3 or more times a day. Secondary foods included foods eaten 1-2 times per week or 1-4 times per month, and peripheral foods were eaten less than once a month.

Seventy-seven food items were recorded by the children using a FFQ and placed in categories of meat, New Mexican foods, diary products, cereals, vegetables, fruit, fats and oils, and desserts (Koehler et al., 1989). Fourteen foods were categorized as core foods for all three ethnic groups and included eggs, whole milk, tortillas, fry bread, bread and rolls, cereal, pancakes, potatoes, bananas, citrus fruit, fruit juice, soda, fruit drinks, chips, and lard.

There were differences in consumption for secondary core foods among the three ethnic groups (Koehler et al., 1989). Secondary food items which were common to the Hispanics included dried beans, tacos, burritos, chili relenos, enchiladas, avocados, salsa, and chilies. Secondary foods for the Navajo children included tacos, mutton stew, green chili stew, cornmeal, and green chilies. Secondary foods for the Jemez Indians included bananas, tacos, enchiladas, green chili stew, red chilies, mayonnaise, and gravy.

Bartholomew et al. (1990) used a food frequency questionnaire to determine ethnic differences in food patterns of 190 low-income elderly Mexican Americans and 62 non-Hispanic whites living in San Antonio. The food frequency from the Hispanic Health and Nutrition Examination Survey (HHANES) was used. The purpose of this study was to explore the relationship of ethnicity on the frequency of consumption of different foods.

The food frequency from the Hispanic Health and Nutrition Examination Survey (HHANES) was used, and the researchers selected fifty-seven food items from the HHANES FFQ. The foods were categorized according to the five basic food groups of dairy products, meat and meat alternatives, fruits and vegetables, bread and cereals, fats and sugar, and beverages. To create a core food diet, twenty-seven food items were deleted from the 57 items because they were consumed less than once a week, resulting in 28 core foods (Bartholomew et al., 1990).

Mexican Americans reported more frequent consumption of whole milk, eggs. poultry, avocados, legumes, sugar, lard, rice, and flour tortillas

(Bartholomew et al., 1990). These foods were consumed at least 2-6 times a week. Consumption of orange, green and other vegetables, skim milk, ice cream, citrus fruits, juices, pasta, and beef, was once a week.

Non-Hispanic whites reported more frequent consumption of skim milk, cheese, beef, casseroles, orange and green vegetables, fruits and juice, cereal, bread, and oil and margarine (Bartholomew et al., 1990). These items were consumed 3-8 times a week. Secondary foods for non-Hispanic whites, having an average consumption of once a week, included fish, legumes, poultry, rice, and pasta.

Results from this study indicated that ethnicity was one of the most important predictors of food consumption (Bartholomew et al., 1990). Ethnic differences in food intake were due to differences in cultural orientation for Mexican-Americans and non-Hispanic whites. Mexican Americans reported a lower intake in skim milk, ice cream, fruits, juice, bread, and oil when controlled for ethnicity (Bartholomew et al., 1990).

A food frequency questionnaire was found to be an appropriate tool for use in multi-ethnic and low-income subjects to evaluate dietary patterns and change (Kristal et al., 1990; Koehler et al., 1989; Bartholomew et al., 1990). Further information about food patterns with low-income diverse cultural groups is necessary. Nutritional problems are best understood when they are considered from a comprehensive multicultural perspective (Caster, 1980). The nutritional anthropological model of dietary patterns can be used to describe a population,

examine food behaviors, and provide nutrition educators with the knowledge to promote healthy behavior changes (Caster, 1980).

Development of Culturally Competent Food Frequency Questionnaires

Food frequency questionnaires have become a principal dietary survey tool because they allow assessment of long term or usual food intake over a month or year, thereby reducing errors introduced by estimating usual intake from the day to day variability in the 24-hour food recall (Teufel, 1997). A culturally appropriate food frequency questionnaire modified from the Block 92 food frequency questionnaire should include blank lines at the end of each food group to allow for recording of culturally specific foods (Teufel, 1997). According to Teufel (1997) culture-specific food frequency questionnaires should be validated against multiple 24-hour food recalls, preferably including weekdays and weekends, and all recall information should be collected by trained interviewers. All interviewers need to be trained and use a kit to demonstrate portion sizes such as bowls, cups, and food models.

Cotugna and Fleming (1998) compared fruit and vegetable intake of Hispanic women on the basis of data collected by a 7-item FFQ with and without portion-size measurement aids. One hundred women of Mexican origin participating in the Women, Infant and Children Supplemental Nutrition Program (WIC) completed this survey. The 7-item FFQ was used to measure fruit and vegetable intake for the previous one-month period. Food items included 100% juices, orange and grapefruit juice, green salad, fried potatoes, other potatoes, other

yellow or green vegetables, and other fruits not counting juices. Portion size information was obtained by showing the participant a rubber food model and asking her to compare her usual portion size to the food model. The mean fruit and vegetable consumption was 4.3 servings per day without adjusting for portion sizes. Adjusting the portion size increased the average daily fruit and vegetable consumption to 6.9 servings. On average, the participants consumed almost twice the recommended 6-oz portion of juice, 1 cup of raw salad, ½ cup for fruit, and 1.5 times the recommended portion for ½ cup of other vegetables. Cotugna and Fleming (1998) concluded that the FFQ may underestimate fruit and vegetable intake in the Hispanic population especially when portion size information is excluded.

There has been little research evaluating food frequency questionnaires for use in minority populations and the 100-item Block 92 FFQ, developed by Block was not developed specifically for use in minority populations (Block et al., 1992). Coates and Monteilh (1997) determined whether the FFQ surveys could perform as well in African-American populations. Nineteen additional foods commonly consumed by low-income African-Americans from the NHANES II data were added to the 98 food items, including the usual three portion size options. This suggests that for the Block 92 to be useful in different cultural populations, additional foods might have to be either incorporated into the existing FFQ groups or added as individual items (Coates and Monteilh 1997). Within food groups on questionnaires, there may be variations according to ethnic groups in

food preparation affecting nutrient density, patterns of consumption, and frequency of consumption.

An evaluation of the Block 92 FFQ food groupings that used 24-hour food recall data from African Americans and European Americans in NHANES II revealed that the frequency of consumption of specific foods within the Block 92 FFQ food groups varied according to racial group. But the nutrients provided by each food group did not differ substantially between races and the food groupings were appropriate for both populations (Dreon et al., 1993). Flegal and Larkin (1990) observed that variations in nutrient density within food groups contributed little to differences between nutrient intake estimate derived from food records and those estimated with use of food frequency questionnaires in either African Americans or a European American population.

Garcia et al. (2000) addressed the reproducibility of the Southwestern Food Frequency Questionnaire (SWFFQ) among 75 males and females who were Mexican-American or European-American. Several additional foods were included that were identified by focus groups and from previously administered 24-hour food recalls specific to the Southwest. Some foods added included prickly pear paddles (nopalitos) and a sweet rice drink (horchata). The SWFFQ was administered twice to the same subjects. Garcia et al. (2000) observed that food items selected by Mexican Americans and non-Hispanics did not differ. The Spearman correlation coefficients of frequency responses between the first and second administration for each food item ranged from $r=.45$ to $r=.89$ ($p<.001$). Estimated nutrient intake correlation coefficients between the first and second

administration were between r=.60 and r=.90 (p<.001). These results suggest that many non-Hispanics in the Southwest have adopted Hispanic foods into their diet and the acculturation of dietary patterns occurs in both directions. Garcia et al. (2000) also concluded that the inclusion of less frequently reported food items in a FFQ may lead to lower reproducibility. This recommendation supports the practice of choosing FFQ food items from multiple food records from the target population rather than composing a list from ethnographic studies.

Reliability of FFQ's by Race and Education

Kristal et al. (1997) addressed whether a food frequency questionnaire was reliable and valid across groups classified by race/ethnicity and level of education. The data in this study were collected from a randomized clinical trial conducted between 1992 and 1994 from the Women's Health Trial Feasibility Study in Minority populations. This study targeted 1,015 participants who were low-income black and Hispanic women with a mean age of 60 years. The purpose of this study was to test the consumption of a low fat, high fruit and vegetable diet on prevention of cardiovascular disease and cancer. The food frequency questionnaire was administered at screening, at baseline before training, before intervention, and six months later.

The food frequency questionnaire consisted of 100 food items with 19 additional questions related to fat, fruit, and vegetable intake (Kristal et al., 1997). Portion sizes included small, medium, and large. The time reference was in the past three months. Exclusion criteria for subjects to be excluded from the data

set included those with less than 600 calories or greater than 5000 calories at screening. The four 1-day food records were initiated after 30 minutes of instruction, and included a booklet with instructions to record portion sizes and food preparation methods. Analysis included a comparison of food records and frequencies at baseline. Participants maintained records on alternate days after receiving the four 1-day food record form and instruction booklet.

Correlations at baseline between the FFQ and the four 1-day food records for the percentage of energy derived from saturated fat, were significantly poorer for blacks ($r = 0.26$, $p<.05$) compared to whites ($r = 0.49$, $p<.05$) and Hispanics ($r = 0.35$, $p<.05$) (Kristal et al., 1997). Correlation coefficients between the FFQ and the food records were not significantly different across racial/ethnic groups for energy, total fat, beta-carotene, and alpha-tocopherol between the FFQ and the four 1-day food records. The correlation coefficients between the estimated nutrient intake as measured by the food frequency questionnaire and the food record regarding percentage of energy from fat was relatively low, for both blacks ($r = 0.37$, $p<.05$) and whites ($r = 0.51$, $p<.05$). This same correlation was also low when compared between Hispanics ($r = 0.34$, $p<.05$) and whites ($r = 0.45$, $p<.05$). This study concluded that multiple 4-day food records may be biased or inappropriate in minority populations with less than an eight grade education in the same way as the food frequency questionnaire when trying to determine the percentage of energy derived from fat (Kristal et al., 1997). This suggests that special efforts are needed when using dietary assessment tools in participants with little education or culturally diverse eating habits. Future studies need to

examine the need for additional instruction, and careful review by a nutrition educator in conjunction with the participant to improve the validity of food frequency questionnaires.

CHAPTER THREE

METHODOLOGY

Research Design

A descriptive research design was used to determine the core and secondary core foods of the EFNEP and ONE participants residing in Tulsa County and Creek County. Three 1-day food records, one 24-hour food recall, and one food frequency questionnaire was administered within a period of two to three weeks. These instruments were used to determine nutrient intake for total calories, the percentage of calories from fat, fat, saturated fat, iron, calcium, fiber, protein, carbohydrates, cholesterol, sodium, sugar, and folate. The association among nutrient intake as measured by food records, the food frequency questionnaire, and the 24-hour food recall was determined.

Research Overview

The purpose of this study was to determine the core and secondary core foods consumed by adult low-income women participating in the EFNEP and ONE program in Tulsa and Creek County. Newly enrolled participants were asked to participate in the study by the paraprofessional, after completing the enrollment form for EFNEP or ONE. The enrollment form included demographic

information, age, sex, ethnic background, and income data. This form also included a space to record the 24-hour food recall.

All newly enrolled participants who volunteered were asked to participate in all phases of the study. New enrollees who were in the program for less than two months were asked to participate. It was felt that these participants had not received enough nutrition education to influence their reporting of food intake.

The information gathered from the Block 92 food frequency questionnaire (FFQ), and food records was used to develop a shortened culturally specific food frequency questionnaire which included the core and secondary core foods of the four cultural groups. The reporting of food records and the food frequency questionnaire took approximately four days for the subjects to complete. Core foods from the Block 92 FFQ were defined as foods consumed twice a day, once a day. 5-6 times a week, or 3-4 times a week. Secondary core foods were defined as foods consumed 2 times a week, once a week, or 2-3 times a month. (Kristal et al., 1990). Each participant was given a cookbook called "Simply Good Eating," from the Minnesota Extension Service as an incentive for completing the food instruments (University of Minnesota). The Spanish version used was an adaptation of the "Simply Good Eating" as adapted by Colorado State University.

Selection of Subjects

Subjects were a convenience sample of women aged 19 to 50 years, who were newly enrolled in the EFNEP or the ONE program. The current income criteria for the EFNEP and ONE program is less than 130% of the federal poverty level (Federal Register, 1999 HHS Poverty Guidelines, Vol.64, No. 52). Participants were automatically eligible if they received food stamps and/or temporary assistance for needy families (TANF). Participants in the ONE program all received food stamps or were food stamp eligible because that is part of the enrollment criteria. Participants with developmental disabilities or who were unable to read were excluded. Participants who were presently altering their normal diet due to medical conditions within the past three months were also excluded from this study. All subjects were asked to sign a consent form in order to participate (Appendix A). This study was approved by the Institutional Review Board at Oklahoma State University (Appendix B).

Research Instruments

Food Intake Records

Three 1-day food records, one 24-hour food recall, and the Block 92 food frequency questionnaire (Block 92 FFQ) were instruments used to measure nutrient and food intake in the present study. The 24-hour food recall instrument was recorded by the paraprofessional while visiting with the subject (Appendix C).

The Block 92 FFQ is a list of 100 food items (Thompson and Byers, 1994). A food line may consist of a single food item, e.g., white bread, or a group of foods having similar nutrient composition, e.g. English muffins, bagels, or rolls (Teufel, 1997; Block et al., 1992). These lines are grouped into food categories, e.g., breads, dairy products, fruits, vegetables and meats. In the original food frequency questionnaire, respondents were asked to report frequency of consumption over the past year.

The Block 92 FFQ was adapted in the present study to record foods consumed within the past month. The frequency of consumption for solid food ranged from never or less than once a month, once per month, 2-3 times a month, once a week, twice a week, 3-4 times a week, 5-6 times a week, once a day, to twice a day. The frequency of consumption for beverages ranged from never or less than once a month, 1-3 times a month, once a week, 2-4 times a week, 5-6 times a week, once per day, 2-3 times a day, 4-5 times a day, to 6 or more times a day. Serving sizes were identified as small, medium, or large portions. An example of a medium size portion was provided on the food frequency for each food item. Blank spaces after each food category were added to allow for cultural differences in food intake and to allow subjects to write in a food item (Teufel, 1997).

The English version of the Block 92 FFQ was translated into Spanish for use in the present study (Appendix D). This was developed by using the qualitative method of back translation to determine a language that was common to the Hispanic subgroup living in Tulsa County (Gans et al., 1999). A bilingual

Nutrition Education Assistant who had resided in Mexico, first translated the English version of the Block 92 FFQ, food diary booklet, and consent form into Spanish. Two researchers, a fellow graduate student, Marisela Conteras (a native of Venezuela) and an American student knowledgeable of the Spanish language rechecked the Block 92 FFQ, food diary, and the consent form for translation consistencies. The bilingual NEA looked at the FFQ, food diary, and the consent form again and suggested revisions so that the documents could be better understood by the subjects.

The following questions regarding food security were added to the food frequency questionnaire in the present study: which of the following statements best describes the food eaten your household: 1) Enough of the foods we want to eat; 2) Enough but not always what we want to eat; 3) Sometimes not enough to eat; 4) Often not enough to eat (NHANES II 1976-1980).

The daily food record booklet (Appendix E) explained how to record food consumed and the amounts. Examples of portion sizes were included in the booklet. This booklet was translated into Spanish.

Validity of food records, food recalls, and food frequency questionnaires have been questioned and were discussed in the review of literature. This includes errors such as over reporting or under reporting of food and nutrients, and problems of validity in low-income and culturally diverse audiences (Teufel, 1997; Thompson and Byers, 1994; Zulkifli, 1992; Block et al., 1992). The present study minimized these problems by training the paraprofessionals and providing both oral and written instructions for recording food intake to the

subjects. Food models of portion sizes were given to each subject before completing the three 1-day food records.

Training the Paraprofessionals

The 24-hour Food Recall

EFNEP and ONE paraprofessionals attended a one-hour training session conducted by a nutrition professional on how to conduct and record a 24-hour food recall to improve accuracy. This training module was developed by Oklahoma State University Cooperative Extension service (Joyce and Williams, The 24-hour Food Recall an Essential Tool in Nutrition Education. Oklahoma Cooperative Extension Service, 1997).

Each paraprofessional received paper cut-outs of portion sizes for cake, pie, pizza, and samples of different size bowls, cups, bean bag measurements for ¼ cup, ½ cup, and 1 cup, and a deck of cards to represent 3 ounces of meat. Paraprofessionals practiced asking each other open-ended questions and obtaining information to accurately record a 24-hour food recall. Each paraprofessional teamed up with a partner to complete a 24-hour food recall. A list of food items was shown to each paraprofessional to aid their memory (Briefel et al., 1997). This food list included crackers, breads, rolls, tortillas, hot or cold cereals, added cheese, chips, candy, nuts, seeds, fruit eaten with meals or snacks, coffee, tea, soft drinks, juices, beer, wine, and any other drinks made with liquor. The food recalls were collected by the trainer and reviewed for completeness and legibility. Completeness was defined as the proper

identification of all types of food with preparation used, their brand name, condiments added, and with their accompanying portion sizes for the assessment of nutrient intakes.

The Food Frequency Questionnaire

The Block 92 food frequency questionnaire (Appendix D) was introduced and explained by the trainer. The bean bag measurements were used to explain the small, medium, and large portion sizes. Paraprofessionals were asked to identify portion sizes that were small, medium, and large. The food picture book, "Portion Sizes of Common Foods," developed by Mary Abbott Hess, RD, for the American Dietetic Association, 1998, was used in the training session. Each paraprofessional was then asked to practice explaining how to fill out the food frequency questionnaire with each other. They practiced working with the food frequency by filling out one for themselves. This was collected by the trainer and checked for completeness for each food item. Completeness was defined as checking to see that the respondents did not skip any food items or portion sizes.

Training for the Daily Food Record

Each paraprofessional received the daily food record booklet (Appendix E). Each paraprofessional reviewed the booklet and then practiced explaining the procedures to each other. Each paraprofessional filled out the food record for the following day. This was collected by the trainer and checked for completeness. Completeness was defined as the proper identification of types of

food including preparation method, brand name, condiments added, and a portion size.

Pilot Study

A pilot study was conducted by using a convenience sample of EFNEP and ONE participants who were enrolled during the months of July and August 1998. Thirty subjects were asked to complete the food frequency questionnaire and two 1-day food records. The 24-hour food recall was copied from the initial enrollment form, along with their demographic information. Initial problems that were found included inaccuracy of recording food intakes on the food frequency questionnaire, skipping foods due to narrow lines on the FFQ, and incompleteness of the daily food records. Twenty-three FFQ's and food records were completed. It was decided that more pre-instruction was needed for the subjects because many of them did not take the time to read the instructions. To increase validity of nutrient levels, it was decided that three 1-day food records were necessary (Thompson and Byers, 1994; Bergman et al., 1990). Paraprofessionals needed to specify more clearly on the 24-hour food recall forms the preparation methods for certain types of combination foods and also the chain of the restaurant when eating a fast food meal for proper data entry and analysis.

Data Collection and Procedures

A copy of the EFNEP and ONE enrollment form and the entry 24-hour food recall (Appendix F) was made for each subject that agreed to participate in the study. The 24-hour food recall was completed at the initial time of enrollment. It was the responsibility of the paraprofessional to ask open-ended questions to record the participants food intake within the past 24 hours as accurately as possible. A typical open-ended question was "What was the first thing you had to drink when you got up yesterday morning?" The subjects were also read a list of food items to help them remember. This list includes foods that subjects typically forget to write down including snack food items, drinks, added cheese, and fruits. This was a modified multiple pass approach (Briefel et al., 1997) (Appendix G). After completing the 24-hour food recall, the food frequency questionnaire was explained to each subject. This took about 15 minutes. The paraprofessional brought portion sizes and samples of drinking cups to explain small, medium, and large portions. The subject then filled out the food frequency questionnaire which took approximately 20 minutes to complete. The paraprofessional assisted the participant with the interpretation of the food frequency questionnaire and made sure that all the food items had a response.

Next, the paraprofessional explained the three1-day food record booklet and the instructions. This explanation took about 10 minutes. The participants were asked to record their food intake for three consecutive days. This food record was collected at the next scheduled visit by the paraprofessional. The paraprofessional checked the forms to ensure that all foods and beverages were

recorded with detailed portion sizes, food preparation techniques, and the contents of combination type foods.

Analysis of Data

The Food Processor (version 7.2, ESHA, Salem, OR) was used to analyze the food records and the 24-hour food recall data to estimate nutrient intakes for total energy, calories from fat, protein, carbohydrate, fiber, iron, grams of fat, saturated fat, cholesterol, folate, calcium, and sodium. Responses to the food frequency questionnaire were entered using an analysis software program called DIETSYS (DIETSYS, version 4.0, National Cancer Institute, Information Management Services, Inc., Block Dietary Data Systems, 1994). The nutrient data base was changed in the FFQ to reflect folate fortification.

Respondents who committed serious reporting errors were excluded from the data set. Serious reporting errors for the FFQ included if more than 15 foods were skipped, more than 75% of the foods were consumed once per day, or if more than two food items were reported with unreasonable frequencies (Block et al., 1992). Food records and food frequency questionnaires which resulted in a caloric intake in excess of 4,500 calories per day were excluded from the data set (Suitor et al., 1989).

Based on the responses to the Block 92 food frequency questionnaire, the core foods and secondary core foods were determined. Core foods were identified as those food items that were consumed twice a day, once per day, 5-6 times a week, or 3-4 times a week. At least 25% of the population identified

these food items as a core food (Caster, 1980). These core foods also agreed with the 3-day food records. Secondary core foods were defined as foods eaten twice per week, once per week, or 2-3 times a month with at least 25% of the population identifying these food items as secondary core foods (Caster, 1980). A qualitative content analysis was completed to make sure that the frequency of food items recorded on the Block 92 FFQ agreed with what was recorded on the four one-day food records. Two researchers individually checked the food records with the responses on the Block 92 FFQ.

A qualitative content analysis was completed by looking at the frequency counts of foods that were core, secondary, and peripheral. This method was also used to determine if participants added any foods in the blank spaces on the Block 92 FFQ. A shortened food frequency questionnaire was developed to include core and secondary foods which estimated the mean calories, fat, folate, and calcium intake from the four one-day food records and the Block 92 FFQ.

Statistical Analysis

Research Questions:

1) Is there a difference in the core foods and secondary core foods among the ethnic groups?

2) What are the core or secondary core foods identified by each ethnic group that are not included in the Block 92 food frequency questionnaire?

3) What is the association among the total calories, calories from fat, protein, carbohydrate, fiber, iron, fat, saturated fat, cholesterol, folate, calcium, and

sodium as determined by the food frequency questionnaire, three daily food records, and the 24-hour food recall?

4) What is the difference among ethnic groups for estimated mean nutrient intake?

5) What is the relationship between the nutrients of interest as measured by the shortened food frequency questionnaire and the 100 item Block 92 food frequency questionnaire for the subjects in the EFNEP and ONE program?

Hypothesis

Ho.1. There will be no significant difference in core or secondary core foods among the four ethnic groups .

Ho.2. There will be no foods identified by the four ethnic groups that are not already included in the Block 92 food frequency questionnaire.

Ho.3. There will be no correlation between the estimated amount of total calories, calories from fat, grams of fat, protein, carbohydrate, saturated fat, cholesterol, iron, fiber, calcium, sugar, sodium and folate as determined by the food frequency questionnaire, three 1-day food records, and the 24-hour food recall.

Ho. 4. There will be no significant difference among the four ethnic groups for estimated mean nutrient intake as determined by the 24-hour food recall and the three 1-day food records.

Ho. 5. The shortened food frequency questionnaire will not adequately assess the nutrient intakes of interest for the four ethnic groups participating in the EFNEP and ONE program.

Paired t-tests and correlation analyses were used between the mean nutrient intake for the three 1-day food records and the 24-hour food recall for the nutrients of interest. Since the 24-hour food recall and the three 1-day food records are not a true criterion measure of dietary intake, correlations and differences were interpreted as measures of convergent validity (Kristal et al., 1997; Windsor et al., 1994).

The estimated nutrient intakes were compared using paired t-tests between the 24-hour food recall and the 3-day food record (Gay,1996). The estimated nutrient intake was then compared between the four days of merged food records and the Block 92 FFQ for the nutrients of interest using a paired t-test.

Correlation analysis was used to determine the association between the 24-hour food recalls and three 1-day food records for the nutrients of interest using Spearman's rho correlation coefficient. Spearman's rho was then used to determine the relation between the merged four days of food records and the Block 92 FFQ. Correlation analysis was also conducted after computing the nutrient intake as nutrient intake per 1000 Kcal. Brown and Griebler (1993) found that the crude adjustment of dividing by 1000 Kcal may be more legitimate to improve correlations between measurement methods. Flegal and Larkin (1990) found that adjustment for total caloric intake improved the agreement in macronutrients per 1000 Kcal between food records and a food frequency

questionnaire. Acceptable correlations for nutrients usually range from r=.40 to r=.80 (Block et al., 1992).

Chi-square was used to determine differences in core and secondary core foods by ethnic group. Analysis of variance (ANOVA) was used to determine the differences in nutrient intakes by ethnic group.

The short FFQ was developed by including the core and secondary core foods, and two peripheral foods selected as a higher frequency by the blacks and Hispanics. An acceptable level of agreement between the short FFQ and the Block 92 FFQ was considered to be between 75 – 85% of the mean nutrients of interest, which included total calories, fat, calcium and folate (Brown and Griebler, 1993). Block et al. (1992) reported that the percentage of energy from fat. and the estimated mean intake of vitamin A, C, and calcium in a short 60-item food frequency questionnaire represented 80% of the nutrients from the NHANES II data base, and was not significantly different from the NHANES II data (1987) which used one 24-hour food recall.

The Spearman's rho rank correlation was calculated between the Block 92 FFQ and the short FFQ. Correlation coefficients between .70 and .77 represent reasonable reproducibility for a shortened FFQ (Brown and Griebler, 1993).

CHAPTER FOUR

RESULTS

Introduction

The purpose of this study was to determine the core, secondary, and peripheral foods of an adult population of low-income women participating in the EFNEP and ONE program in Tulsa County. The objectives of this study were: 1) determine the differences in core and secondary core foods among the four ethnic groups; 2) determine estimated nutrient intake differences for the nutrients of interest as measured by the Block 92 food frequency questionnaire (Block 92 FFQ), three 1-day food records, and one 24-hour food recall; 3) determine estimated nutrient intake difference among the ethnic groups; and 4) develop a shortened food frequency questionnaire representing the core and secondary core foods for each ethnic group participating in the EFNEP and ONE program.

Description of Subjects

The subjects in this study were newly enrolled volunteer participants in the EFNEP and ONE program in Tulsa County. One hundred seventy-three women were asked to participate and signed the consent form. A total of 113 women actually completed the Block 92 FFQ, the three 1-day food records, and the 24-

hour food recall. Ten subjects were removed from the data analysis for the Block 92 FFQ because they skipped too many foods, or had caloric intakes that were below 500 calories or above 4500 calories. Five subjects on the Block 92 FFQ were also deleted from the data base due to the calcium values being greater than three standard deviations from the mean.

Ages ranged from 19 to 50 years with the mean age being 31 years (Table 1). The majority of the participants were either black or white, with a smaller percent of Hispanic, American Indian, and Asian origin. Most of the participants resided in a central city over 50,000, which was Tulsa. The mean household income was $533 per month and the average amount of money spent on food per month was $238. The majority of the participants were receiving food stamps and less than half were participating in Women, Infant, and Children Supplemental Nutrition Program (WIC) or Temporary Assistance for Needy Families (TANF). The majority reported 1 or 2 children living in the household under the age of 19 years, and almost half were from single parent households. Twenty-eight percent responded that they have enough of the food that they want to eat, 46% responded that they have enough but not what they want to eat, and 23% responded that they sometimes do not have enough to eat.

Determination of Core Foods

Data from the Block 92 FFQ was compiled to determine the core foods. Following the methods of Jerome (1980) and Castor (1980), core foods were defined as foods that at least 25% of the respondents selected 3-4 times per week, 5-6 times per week, once a day or 2 or more times a day. Core beverages

were defined as beverages consumed once per day, 2-3 times per day, 4-5 times per day, or 6 or more times a day. The percentages indicate the percentage of the total sample who ate the food at least 3-4 times a week. For the total sample this resulted in 12 core foods (Table 2). Several of the core foods could be considered condiments, such as margarine, salad dressing and mayonnaise. Margarine on bread or vegetables were added together. Milk and milk on cereal was also grouped together. The top seven non-condiment foods were white bread, regular soft drinks, fruit drinks, eggs, whole milk, cheeses and cheese spreads, and hamburgers, meatloaf, burritos, and tacos.

Determination of Secondary Core Foods

Data from the Block 92 FFQ were compiled to determine the secondary core foods. These included food items that 25% of the total target population consumed at least twice a month, 2-3 times a month, once per week, or twice a week (Jerome, 1980, Castor, 1980). Secondary beverages were defined as being consumed at least once per week, 2-4 times a week or 5-6 times a week. Table 3 presents the listing of the 51 food items. The top 16 foods included: spaghetti, macaroni and cheese, fried chicken, other potatoes, corn, cornbread, tortillas, ham and bologna, pork, pizza green beans, doughnuts, cookies, and cakes, ice cream, hotdogs, biscuits and muffins, carrots, and beefsteaks.

Determination of Peripheral Foods

Data from the Block 92 food frequency questionnaire were compiled to determine the peripheral foods. These included food items that 25% of the total target population consumed never or less than once a month (Jerome, 1980, Castor 1980). Beverages were defined as being consumed never or less than once a month up to 1 to three times per month (Jerome, 1980, Castor, 1980). The twelve foods least likely to be consumed in this population included: moronga blood sausage, oysters, liverwurst, wine and liquor, pumpkin pie, beer, shell fish, raw spinach, skim milk, cream in coffee, liver, and other fish, broiled (Table 4).

Differences in Core, Secondary, and Peripheral Foods by Ethnic Group

The original target group for determining the core, secondary, and peripheral foods included all 113 subjects. Asians and Native Americans were eliminated from the data analysis for determination of differences among ethnic groups. This was due to the small number of Asians (n=2) and Native Americans (n=7). Whites (41), blacks (37), and Hispanics (16), were included for a total number of 94.

Core Foods by Ethnic Group

The association among ethnic group and the core foods was determined using Chi square analysis (Table 5). Fewer Hispanics (44%) selected white bread as a core food compared to whites (73%) and blacks (84%) ($p<.05$). Fewer Hispanics (25%) and whites (29%) selected fruit drinks as a core food compared to blacks (65%) ($p<.05$). More Hispanics (68%) selected eggs as a core food compared to

whites (29%) and blacks (30%) ($p<.05$). Fewer Hispanics (7%) selected regular salad dressing and mayonnaise than whites (44%) or blacks (32%) ($p<.05$). Based on the core food definition, regular salad dressing and mayonnaise are not a core food in the Hispanic food pattern. The complete list of core foods by ethnic group are in the Appendix: Hispanics (Appendix H), blacks (Appendix I), and whites (Appendix J).

Secondary Core Foods by Ethnic Group

Red chili sauce was selected by 61% of the whites and 41% of the blacks, compared to 13% of the Hispanics ($p<.05$) (Table 5). Thirteen out of 16 Hispanics (81%) selected red chili sauce as a core food . More blacks (81%) selected fried chicken as a secondary core food compared to whites (56%) and Hispanics (50%) ($p<.05$). Forty-four percent of whites and 31% of Hispanics considered fried chicken a peripheral food. Seventy-eight percent of blacks and 61% of whites selected cornbread and tortillas as a secondary food compared to 13% of the Hispanics ($p<.05$). Twelve out of 16 Hispanics (75%) selected cornbread and tortillas as a core food. Gravy or white sauce was selected by 49% of the whites and 44% of the blacks as a secondary core food compared to 7% of the Hispanics ($p<.05$). Fourteen Hispanics (81%) selected gravy and white sauce as a peripheral food. Fewer blacks (22%) selected berries, fruit cocktail, and grapes as secondary core foods compared to whites (43%) and Hispanics (56%) ($p<.05$). Sixty-seven percent of blacks selected berries as a peripheral food. Oranges were less commonly reported as as secondary food item by blacks (19%) compared to Hispanics (56%) and whites (46%) ($p<.05$). Other soups

were reported more often as a secondary core food by Hispanics (67%) compared to blacks (19%) and whites (37%) ($p<.05$). More blacks (78%) selected other soups as a peripheral food. Fried fish was selected more frequently as a secondary core food by blacks (43%) and Hispanics (44%) compared to whites (12%) ($p<.05$). Eighty-five percent of whites selected fried fish as a peripheral food. Strawberries in season were selected more frequently as a secondary core food by Hispanics (56%) compared to whites (20%) and blacks (14%) ($p<.05$). Seventy percent of whites and 72% of blacks selected strawberries as a peripheral food. The other secondary food items were not significantly different by ethnic group.

Peripheral Foods by Ethnic Group

Mustard greens and collard greens were selected less frequently as a peripheral food by blacks (43%) compared to whites (95%) and Hispanics (100%) ($p<.05$) (Table 5). Fifty-four percent of blacks selected mustard greens as a secondary core food. Cantaloupe in season was selected less frequently as a peripheral food by Hispanics (50%) compared to whites (73%) and blacks (84%) ($p<.05$). Fifty–percent of Hispanics selected cantaloupe in season as a secondary core food. Coffee, regular, or decaffeinated was selected as a peripheral food more frequently by the whites (63%) and blacks (78%) compared to Hispanics (38%) ($p<.05$).

Agreement between Block 92 FFQ and the Four 1-day Food Records

Although blank spaces were included on the Block 92 FFQ, no other foods were written in by any of the respondents. Two researchers reviewed the four 1-day food records and did not find any additional foods recorded by the participants that were not included on the Block 92 FFQ. A Hispanic food item that was added to the Block 92 FFQ from the pilot study included blood sausage (Moronga). This was not reported on the four 1-day food records, and was a peripheral food item on the Block 92 FFQ.

Estimated Nutrient Intake as Measured by the Three 1-day Food Record Compared with the 24-hour Food Recall

Estimated mean nutrient intake as measured by the three 1-day food records was compared with the estimated mean nutrient intake as measured by the 24-hour food recall using a paired t-test. Only sodium was found to be significantly different between the two methods ($p<.05$) (Table 6). Table 7 presents the Spearman's rho correlation coefficients between the estimated nutrient intake from the three 1-day food record and the 24-hour food recall for the selected nutrients. The highest significant correlations were found for sugar ($r=.629$), carbohydrates ($r=.569$), fiber ($r=.495$), folate ($r=.493$), and total calories ($r=.454$). The other significant correlation coefficients ranged from $r=.388$ to $r=.245$. All correlations were significant at the $p<.01$ level. Based on these results, it was decided to

merge the three 1-day food records and the 24-hour food recall to compare with the Block 92 FFQ.

Estimated Nutrient Intake as Measured by the Four 1-day Food Records Compared with the Block 92 FFQ

A total of fifteen subjects from the food frequency data base were deleted because of one of the following reasons: estimated calcium value greater than three standard deviations from the median; estimated caloric intake greater than 4500 calories (Suitor et al., 1989); selection of too many of the serving sizes as small; or more than 75% of the foods being consumed once per day; or more than two food items were reported with unreasonable frequencies (Block et al., 1992).

The estimated mean nutrient intake of the three 1-day food records merged with the 24-hour food record, resulted in a total of 4 days of food records. The estimated mean nutrient intake as measured by the four 1-day food records was compared with the estimated mean nutrient intake of the Block 92 FFQ using paired t-tests. Estimated carbohydrate, fiber, and iron intake were not found to be significantly different between the two methods (Table 8). However, the Block 92 FFQ provided significant mean estimates for calories, protein, fat, cholesterol, folate, calcium, and sodium.

Table 9 presents the Spearman's rho correlation coefficients between the estimated intake as measured by the four days of food records and the food frequency. The highest significant correlation at the $p<.001$ level were found for calcium ($r=.552$), fiber ($r=.456$), and folate ($r=.486$). The correlation coefficients for

saturated fat, total fat, cholesterol, iron, and calories ranged from r=.394 to r=.285. The correlation coefficient between the two methods for estimated protein intake was significant at the p<.05 level (r=.248). The Spearman's rho correlation coefficient was not significant for estimated sodium intake.

Adequacy of Estimated Nutrient Intake using Four 1-day Food Records

Estimated mean nutrient intakes were compared between the Block 92 FFQ and the four 1-day food records for the following nutrients: total calories, protein, fat, cholesterol, calcium, iron, and folate. Nutrient intakes were divided into the following groups, less than 83% of the RDA, between 83% of the RDA and the RDA, and greater than the RDA. Standard reference values for women were used to determine calories and fat intake. Fat grams were determined as 30% of 2200 calories, the standard reference value for women. The percentage of fat intake is recommended to be no more than 30% of the total calorie intake (Department of Health and Human Services, 1992). The reference value for total fat was determined to be 73 grams, and 83% of this was 61 grams. Groups were divided into less than 61 grams, 61 grams to 73 grams, and greater than 73 grams of fat. Calories were determined by using the standard reference value for women, 19-50 years of age at 2200 calories. This was multiplied by .83 to determine less than 1826 calories. Groups were divided into less than 1826 calories, 1826 to 2200 calories, and greater than 2200 calories. The 1989 RDA's for protein, and iron for women were multiplied by .83 to determine less than 83% of the RDA. The RDA for protein is 50 grams, and the RDA for iron is 15 mg. The current adequate

intake recommendation (AI) for calcium is 1000 mg for women between 19-50 years. This was multiplied by .83 to estimate less than the adequate intake. The current RDA for folate is 400 mcg. The Estimated Average Requirement (EAR) value for folate is 320 mcg.

Table 10, summarizes the percentage of respondents who were below 83% of the standard reference value, RDA, or AI, and above the standard reference value, RDA, or AI for calories, fat, protein, calcium, iron, and folate. Sixty-six percent of the respondents consumed less than 1826 calories per day, or below 83% of the standard reference value. Thirty-five percent of the respondents had fat in excess of 73 grams, and 72% were higher than the RDA for protein (50 grams). Eighty-percent of the respondents had less than 830 mg of calcium, 60% had less than 12.5 mg of iron, and 72% had less than 320 mcg of folate per day.

Estimated Nutrient Intake as Measured by the Four 1-day Food Records Compared with the Block 92 FFQ on a Nutrient per 1000 Kcal Basis

All nutrient values were expressed on a 1000 Kcal basis and comparisons were made using paired t-tests between the estimated nutrient intakes for the four 1-day food records and the Block 92 FFQ. Energy - adjusted protein and sodium estimated intakes were not significantly different (Table 11). Higher estimated nutrient intakes were found using this energy – adjusted method for carbohydrate, fiber, and iron.

Table 12 represents the Spearman's rho correlation coefficient between the four 1-day food records and the Block 92 FFQ nutrient intakes per 1000 Kcal. The

highest significant correlation coefficients were found for fiber (r=.609), folate (r=.602), fat (r=.549), calcium (r=.546), and protein (r=.540). Carbohydrate, iron, cholesterol, and sodium correlation coefficients ranged from r=.487 to r=.320. All correlations were significant at the p<.01 level.

Nutrient Comparison by Ethnicity using the Four 1-day Food Records

Analysis of variance was performed to determine differences by ethnicity for whites, blacks, and Hispanics using the four 1-day food records for selected estimate nutrient intakes (Table 13). The estimated calorie intake from fat for Hispanics (444±155) was significantly lower compared to whites (660±210) and blacks (629±170) (p<.05). The estimated fiber intake for Hispanics (18±9) was significantly higher compared to blacks (9±5), and whites (12±5) (p<.05). The estimated saturated fat intake for Hispanics (18±6) was significantly different from the whites (26±10), but not the blacks (24±7) (p<.05). Whites were significantly higher in calcium intake (692±358) compared to blacks (492±187), but not the Hispanics (643±253) (p<.05), and blacks were not significantly different than the Hispanics.

Estimated Nutrient Intake between the Block 92 FFQ and the Short FFQ

Table 14 presents the estimated mean intakes of calories, fat, folate, and calcium from the short food frequency questionnaire and the Block 92 FFQ. The short FFQ included the core foods, the secondary core foods, and two foods, mustard greens and cantaloupe in season, identified as secondary by the blacks

and Hispanics, respectively. This list included a total of 61 food items (Appendix K). The core foods only provided 619 calories. The estimated mean calorie intake from the short FFQ was1395 calories. Using paired t-tests all four nutrient levels were significantly different between the short FFQ with the Block 92 FFQ. All four estimated mean nutrients for the short FFQ were lower. Table 15 represents the Spearman's rho correlation coefficients between these four estimated nutrient intakes from the short FFQ and the Block 92 FFQ. The correlation coefficients ranged from .621 to .849 and all were significant at $p<.001$.

Table 1. Demographic characteristics of low-income women (n=113)

Age	**n**	**%**
19-25	35	32
26-35	38	35
36-50	37	33
Missing data	3	
Ethnic group		
White	45	41
Black	39	35
Native American	7	6
Hispanic	18	16
Asian	2	2
Missing data	2	
Place of Residence		
Central cities over 50,000	85	82
Suburbs over 50,000	3	3
Towns and Cities 10,000 – 50,000	4	4
Towns under 10,000	12	12
Household income last month		
$0-290	34	32
$292-790	40	37
$800-1500	33	31
Missing data	6	
Money spent on food last month		
$0-180	28	30
$200-280	32	35
$300-600	33	36
Missing data	20	
WIC participants	51	46
Food stamp recipients	78	70
TANF participant	45	40
Number of children through age 19		
0	1	1
1	33	31
2	45	42
3	16	15
4	9	8
5	3	3
6	1	1
Missing data	5	
Number of other adults in household		
0	55	52
1	42	40
2	6	6
3	2	2
Missing data	8	

Table 1 continued

	n	%
Food Security Responses		
Enough of the food we want to eat	30	28
Enough but not what we want to eat	49	46
Sometimes not enough to eat	3	3
Often not enough to eat	3	3
Missing data	6	

Table 2. Percent of respondents who selected these foods as core foods (n=100-103)*

Core foods	**n**	**%**
White bread	75	73
Regular soft drinks	55	53
Butter or margarine	51	50
Fruit drinks with added vitamin C	42	41
Eggs	40	39
Whole milk	38	38
Other cheeses, cheese spreads	35	34
Salad dressing and mayonnaise	33	32
Hamburgers, meatloaf	33	32
Salty snacks, chips	32	32
French fries	32	31
Orange juice	26	26

* Missing data

Table 3. Percent of respondents who selected these foods as secondary core foods (n=99-103)*

Secondary core foods	**n**	**%**
Spaghetti	73	71
Macaroni and cheese	72	70
Fried chicken	65	63
Other potatoes	63	62
Corn	63	62
Cornbread, tortillas	63	61
Ham, bologna, salami	61	60
Pork	59	57
Pizza	58	56
Green beans	56	54
Doughnuts, cookies, cakes	55	54
Ice cream	55	53
Hotdogs	55	53
Biscuits, muffins, pancakes	53	51

Table 3 Continued.

Secondary Core Foods	n	%
Carrots	53	51
Beef steaks, roasts	50	50
Chicken or turkey, broiled	50	49
Bananas	49	48
Chocolate candy	49	48
Other candy	48	47
Tea	47	46
Tomatoes	47	46
Bacon	47	46
Saltines	46	45
Sausage	45	44
Chili with beans	44	44
Red chili sauce	45	44
Green salad	43	42
Other cold cereals, Cornflakes	42	41
Gravies	41	41
Peas	41	40
Rice	39	39
Berries, fruit cocktail, grapes	39	39
Baked beans	39	39
Oranges	38	37
Tuna salad	37	36
Other soups	36	35
Beef stew	35	34
Vegetable and tomato soup	34	33
Broccoli	34	33
Apple, pear	33	33
Cooked cereal	32	31
Peanut butter	32	31
Sugar in tea and cereal	31	31
Peaches, apricots	29	29
Fried fish	30	29
Watermelon in season	29	29
Coleslaw	27	26
Any other cooked vegetable, onions	27	26
Cooked spinach	26	25
Strawberries in season	25	25

* Missing data

Table 4. Percent of respondents who selected these foods as peripheral foods (n=101-103) *

Peripheral foods	n	%
Moronga – blood sausage	102	100
Oysters	101	100
Liverwurst	101	99
Liquor, wine	101	98
Pumpkin pie	100	98
Beer	99	97
Shell fish	98	95
Spinach, raw	96	94
Skim milk	95	93
Cream in coffee	95	92
Liver	93	91
Other fish broiled	93	91
Cantaloupe rest of year	91	91
Other pies	90	89
Winter squash	88	88
Milk in coffee or tea	89	86
Grapefruit	84	85
Lemon in tea	86	83
Sweet potatoes	85	83
Flavored yogurt	83	81
Cottage cheese	83	81
Highly fortified cereals, Total	82	80
Cauliflower, brussel sprouts	81	79
Non-dairy creamer	81	79
Mustard and collard greens	80	78
2% Milk	79	77
Cantaloupe in season	77	75
High fiber cereals	73	72
Dark bread	67	65
Coffee	66	64

*Missing data

Table 5. Percent of respondents by race that selected these foods as core foods, secondary core foods, and peripheral.

	n=41		n=37		n=16	
Core foods	**White**		**Black**		**Hispanic**	
	n	**%**	**n**	**%**	**n**	**%**
White bread *	30	73	31	84	7	44
Fruit drinks	12	29	24	65	4	25
Eggs	12	29	11	30	11	69
Regular dressing, mayonnaise	18	44	12	32	1	7
Secondary core foods						
Red chili sauce	25	61	15	41	2	13
Fried chicken	23	56	30	81	8	50
Cornbread, tortillas	25	61	29	78	2	13
Gravies	20	49	16	44	1	7
Other fruit, berries	17	43	8	22	9	56
Oranges	19	46	7	19	9	56
Other soups	15	37	7	19	10	67
Fried fish	5	12	16	43	7	44
Strawberries in season	8	20	5	14	9	56
Peripheral foods						
Mustard greens	39	95	16	43	16	100
Cantaloupe in season	30	73	31	84	8	50
Coffee	26	63	29	78	6	38

* $p<.05$

Table 6. Comparison of estimated mean intake of nutrients as measured by the three 1-day food records and the 24-hour food recall (n = 109-111) *

	24-hour mean	Std dev	3-day mean	Std dev	p value
Energy (Kcal)	1633.7	631.0	1713.8	558.8	.172 [1]
Energy from fat (kcal)	579.8	558.8	628.0	224.1	.085 [1]
Protein (g)	66.9	30.5	65.1	22.5	.572 [1]
Carbohydrate (g)	200.6	95.3	212.7	87.1	.139 [1]
Fiber (g)	11.3	8.5	11.8	6.3	.511 [1]
Sugar (g)	92.3	52.8	94.7	52.8	626 [1]
Iron (mg) [3]	12.1	7.5	12.7	5.5	.420 [1]
Fat (g)	64.6	29.9	69.8	24.8	099 [1]
Saturated fat (g)	22.9	12.0	24.4	9.6	.219 [1]
Cholesterol (mg)	278.2	199.7	275.4	135.0	891 [1]
Folate (mcg)	262.4	150.8	263.2	124.8	.958 [1]
Calcium (mg)	591.1	384.0	615.2	318.2	476 [1]
Sodium (mg)	2610.7	1343.3	2882.8	964.4	036 [2]

[1] Means are not significantly different using paired t- test.
[2] Means significantly different using paired t-test.
[3] Iron had 109 subjects.
* Missing data

Table 7. Correlations between the merged 3-day food record and the 24-hour food record for the nutrients of interest (n=111-113)

	24-hour food recall					
3 day food record						
	Energy (Kcal)	Fat Energy (Kcal)	Protein (g)	Carbohydrate (g)	Fiber (g)	Sugar (g)
Energy (Kcal)	.454 [1]					
Fat Energy Kcal)		.334 [1]				
Protein (g)			.307 [2]			
Carbohydrate (g)				.569 [1]		
Fiber (g)					495 [1]	
Sugar (g)						.629 [2]

[1]Spearman's rho correlation coefficient two-tailed is significant at p<.001
[2]Spearman's rho correlation coefficient two-tailed is significant at p<.01

Table 7 Continued

	24-hour food recall						
3 day food record							
	Iron (mg)	Fat (g)	Saturated Fat (g)	Cholesterol (mg)	Folate (mcg)	Calcium (mg)	Sodium (mg)
Iron (mg)	.249 [2]						
Fat (g)		.335 [1]					
Saturated Fat (g)			.388 [1]				
Cholesterol (mg)				.308 [2]			
Folate (mcg)					.493 [1]		
Calcium (mg)						.383 [1]	
Sodium (mg)							.313 [2]

[1]Spearman's rho correlation coefficient two-tailed is significant at p<.001
[2]Spearman's rho correlaton coefficient two-tailed is significant at p<.01

Table 8. Comparison of estimate mean nutrient intake as measured by the three 1-day food records and the 24-hour food records (4 days), to the food frequency (n=98)

	Four 1- day record Mean	Std dev	Block 92 FFQ Mean	Std dev	p value
Calories (Kcal)	1677.3	496.5	1913.7	675.2	.002 [1]
Protein (g)	64.8	21.0	75.9	27.8	.000 [1]
Carbohydrate (g)	207.3	76.3	207.9	77.1	.950 [2]
Fiber (g)	11.6	6.2	10.8	5.6	.208 [2]
Iron (mg)	12.2	4.8	12.0	4.7	.701 [2]
Fat (g)	68.1	22.8	82.9	34.3	.000 [1]
Saturated Fat (g)	24.0	8.9	32.2	13.2	.000 [1]
Cholesterol (mg)	273.5	127.4	388.6	215.4	.000 [1]
Folate (mcg)	257.1	110.6	384.3	188.0	.000 [1]
Calcium (mg)	618.9	309.0	802.9	434.3	.000 [1]
Sodium (mg)	2827.8	854.6	3231.5	1265.6	.006 [1]

[1]Means are significantly different using paired t-test.
[2]Means are not significantly different using paired t-test

Table 9. Correlation coefficients between the four 1-day food records and the Block 92 FFQ for nutrients of interest (n=98)

	Block 92 FFQ					
Four 1-day food records						
	Energy (kcal)	Protein (g)	Carbohydrate (g)	Calcium (mg)	Iron (mg)	Sodium (mg)
Energy (Kcal)	.318 [1]					
Protein (g)		.248 [2]				
Carbohydrates (g)			.389 [3]			
Calcium (mg)				.552 [3]		
Iron (mg)					.285 [1]	
Sodium (mg)						.172 [4]

[1]Spearman's rho correlation coefficient is significant at p<.01 (two-tailed).
[2]Spearman's rho correlation coefficient is significant at p<.05 (two-tailed).
[3]Spearman's rho correlation coefficient is significant at p<.001 (two-tailed).
[4] Spearman's rho correaltion coefficient is not significant at p<.05 (two-tailed).

Table 9 continued

	Block 92 FFQ				
Four 1-day Food records					
	Saturated Fat (g)	Fat (g)	Cholesterol (mg)	Fiber (g)	Folate (mcg)
Saturated Fat (g)	.394 [3]				
Fat (g)		.349 [1]			
Cholesterol (mg)			.384 [3]		
Fiber (g)				.456 [3]	
Folate (mcg)					.486 [3]

[1]Spearman's rho correlation coefficient is significant at p<.01 (two-tailed).
[2]Spearmna's rho correlation coefficient is significant at p<.05 (two-tailed).
[3]Spearman's rho correlation coefficient is significant at p<.001 (two-tailed)
[4]Spearman's rho correlation coefficient is not significant at p< 05 (two-tailed)

Table 10. Adequacy of estimated nutrient intake using four 1-day food records

	< 83% RDA[1]	83% RDA to RDA[2]	> RDA or AI [3]
	%	%	%
Calories	66	17	16
Fat (g)	42	23	35
Protein (g)	14	15	72
Calcium (mg)	80	6	14
Iron (mg)	60	19	20
Folate (mcg)	72	13	14

[1] Estimated Average Requirement (EAR) for folate
[2] Recommended Dietary Allowance
[3] Adequate intake for calcium.

Table 11. Comparison of estimated nutrient intake per 1000 Kcal as measured by the four 1-day food records and the Block 92 FFQ (n=94-96)

	Merged 4 day record Mean	Std dev.	Block 92 Mean	Std dev.	p value
Protein (g)	39.7	10.4	40.7	7.6	.300 [1]
Carbohydrate (g)	122.2	20.8	110.6	18.6	.000 [2]
Fiber (g)	7.1	3.6	5.8	2.1	.000 [2]
Iron (mg)	7.5	3.0	6.4	1.4	.000 [2]
Fat (g)	40.6	6.9	43.3	7.6	.000 [2]
Cholesterol (mg)	171.1	81.8	208.6	82.9	.000 [2]
Folate (mcg)	158.8	67.5	204.6	68.6	.000 [2]
Calcium (mg)	374.6	155.3	424.2	175.7	.003 [2]
Sodium (mg)	1734.0	450.7	1708.1	380.0	.628 [1]

[1]Means are not significantly different using paired t-test
[2]Means are significantly different using paired t-test

Table 12. Correlation coefficients of estimated nutrient intake per 1000 Kcal as measured by the Block 92 FFQ and four 1-day food records (n=98)

	Block 92 FFQ					
Four 1-day Food Records	Fiber (g)	Fat (g)	Protein (g)	Carbohydrate (g)	Iron (mg)	Cholesterol (mg)
Fiber (g)	.609 [1]					
Fat (g)		.549 [1]				
Protein (g)			.540 [1]			
Carbohydrate (g)				.487 [1]		
Iron (mg)					.479 [1]	
Cholesterol (mg)						.427 [1]

[1]Spearman's rho correlation coefficient is significant at p<.001(two-tailed) .

Table 12 continued

	Block 92 FFQ		
Four 1–day Food Records	Folate (mcg)	Calcium (mg)	Sodium (mg)
Folate (mcg)	.602 [1]		
Calcium (mg)		.546 [1]	
Sodium (mg)			.320 [2]

[1] Spearman's rho correlation coefficient two-tailed is significant at p<.001
[2] Spearman's rho correlation coefficient two-tailed is significant at p<.01

Table 13. Mean nutrient comparisons by ethnicity using the four 1-day food records

	Whites (n=47) Mean + Std dev	Blacks (n=37) Mean + Std dev	Hispanics (n=16) Mean + Std dev
Calories	1794 ± 577 [a]	1620 ± 455 [a]	1507 ± 402 [a]
Fat (kcal)	660 ± 210 [a]	629 ± 170 [a]	444 ± 155 [b]
Protein (g)	68 ± 25 [a]	63 ± 15 [a]	65 ± 20 [a]
Carbohydrate (g)	223 ± 89 [a]	189 ± 73 [a]	206 ± 67 [a]
Fiber (g)	12 ± 5 [a]	9 ± 5 [a]	18 ± 9 [b]
Sugar (g)	103 ± 51 [a]	85 ± 50 [a]	80 ± 37 [a]
Iron (mg)	13 ± 5 [a]	12 ± 5 [a]	13 ± 5 [a]
Fat (g)	73 ± 23 [a]	70 ± 19 [a]	49 ± 17 [b]
Saturated Fat (g)	26 ± 10 [a]	24 ± 7 [a, b]	18 ± 6 [b]
Cholesterol (mg)	251 ± 124 [a]	289 ± 128 [a]	291 ± 104 [a]
Folate (mcg)	267 ± 118 [a]	235 ± 103 [a]	308 ± 118 [a]
Calcium (mg)	692 ± 358 [a]	492 ± 187 [b]	643 ± 253 [a, b]
Sodium (mg)	2998 ± 979 [a]	2669 ± 896 [a]	2505 ± 522 [a]

[a] Means with the same superscript were not significantly different using analysis of variance at $p<.05$.
[b] Means with different superscripts were significantly different using analysis of variance and Scheffe post hoc test at $p<.05$.

Table 14. Comparison of estimated mean nutrients between the short FFQ and the Block 92 FFQ (n=94-97)

	Short FFQ		Block 92 FFQ		p value
	Mean	Std dev	Mean	Std dev	
Calories	1391.2	504.3	1881.6	660.6	.000 [1]
Fat (g)	69.0	28.6	82.7	34.4	.000 [1]
Folate (mcg)	269.3	114.5	386.1	188.8	.000 [1]
Calcium (mg)	532.9	245.3	790.4	432.8	.000 [1]

[1] Means are significantly different using paired-t tests

Table 15. Spearman's rho correlation coefficients between the Short FFQ and the Block 92 FFQ for the nutrients of interest (n = 95-98)

	Short FFQ			
Block 92 FFQ				
	Calories (Kcal)	Fat (g)	Folate (mcg)	Calcium (mg)
Calories (Kcal)	.842 [1]			
Fat (g)		.849 [1]		
Folate (mcg)			.758 [1]	
Calcium (mg)				.621 [1]

[1] Spearman's rho correlation coefficient is significant at p<.001 (two-tailed).

CHAPTER FIVE

DISCUSSION

Introduction

The purpose of this study was to determine the core, secondary core, and peripheral foods of an adult population of low-income women participating in the EFNEP and ONE program in Tulsa and Creek County. This study was also used to develop a shortened culturally specific food frequency questionnaire for use in the EFNEP and ONE program for evaluating dietary changes in total calories, fat grams, calcium, and folate. The objectives of this study were to: 1) determine the differences in core and secondary core foods among the four ethnic groups; 2) determine nutrient intake differences for the nutrients of interest as measured by the Block 92 food frequency questionnaire, three 1-day food records, and one 24-hour food recall; 3) determine estimated nutrient intake differences among the ethnic groups; and 4) develop a shortened food frequency questionnaire representing core and secondary core foods for each ethnic group participating in the EFNEP and ONE program.

Determination of Core and Secondary Food Items

Core foods were determined using the methods described by Caster (1980) and Jerome (1980). Two other methods were tried first. The first method calculated the top fifty foods consumed using the Block 92 FFQ, by counting how many people ate the food without looking at frequency per day, per week or per month (Fanelli et al., 1985). In other words the category "never or less than once a month" was recorded as zero and all other categories on the Block 92 FFQ were coded as one. This method resulted in a list that the researchers felt did not represent what was observed when looking at the four days of food records. For example, corn and lunchmeat ranked in the top eleven foods but were not common when comparing this list to the food records. Also, items such as orange juice, salty snacks, fruit drinks, whole milk, and french fries appeared lower in the rank of foods that were consumed compared to the core foods (Table 2) that were generated and were common in the four days of food records.

The second method, used a formula (Reaburn et al., 1979) that created a frequency score by taking into account the percent of respondents that selected each frequency of consumption category on the Block 92 FFQ. This list of foods did not agree with the core foods that was generated using the method by Caster (1980) which defined core food items in which at least 25% of the respondents selected the foods 3-4 times a week, 5-6 times a week, once a day, or 2 or more times a day. When using the Reaburn et al. (1979) formula, apples became a core food and orange juice was no longer a core food. This

did not agree with what was observed when reviewing the food records. Based on the four days of food records and the fact that 33% of the sample consumed apples, the researchers decided to use the definition created by Jerome (1980) and Caster (1980) to determine the core, secondary, and peripheral foods.

Comparison of Core and Secondary Food Items

It was difficult to do a direct comparison between our results of core and secondary food items with other researchers because the methods used to determine core foods differed by author. Caster (1980) identified core food items consumed by low-income black and white women. High frequency food or core foods included bread, eggs, fried potatoes, milk, citrus juices, soft drinks, and coffee or tea. The present study also included fruit drinks, margarine, other cheeses, salad dressing, hamburgers, and salty snacks in the core foods. In the present study, coffee was a peripheral food and tea was a secondary food item. Ground beef was a secondary food item in Caster's (1980) study, and a core food in the present study. The secondary food list in the present study was similar to Caster's (1980) in that both studies included beef steak, pork, chicken, ham, peas, green beans, carrots, soups, stews, candy, peanuts, pears, grapes, and peaches. Strawberries and mustard greens were a secondary food item in Caster's (1980) study, while in the present study, strawberries and mustard greens were peripheral food items. Caster (1980) had a list of 34 core food items, while in the present study there were 12 core

food items. The subjects in the present study appeared to have a less varied diet than the subjects in the Caster (1980) study.

Fanelli et al. (1985) generated a list of frequently consumed foods from the Nationwide Food Consumption Survey (1977-78) using 3 days of food records. The subjects in the Fanelli et al. (1985) study were 1353 women aged 55-64 years. In the present study the core food list contained 12 food items. The list that Fanelli et al. (1985) generated in descending order by their food frequency use score included white bread, ground coffee, whole milk, margarine, sugar, lettuce, tea, orange juice, potatoes, eggs, low-fat milk, tomatoes, butter, bacon, cola, crackers, salad dressing, whole-wheat bread, bananas, apples, mayonnaise, cereal, luncheon meats, cheeses, and ice cream. Similarities in the present study's list of core foods included whole milk, white bread, orange juice, eggs, and margarine. Hamburger and salty snacks did not appear in the core list that Fanelli et al. (1985) generated.

Reaburn et al. (1979) identified fifty-two food items consumed by 112 low-income Canadian women using a frequency score. A list of 12 foods were identified as high-use foods. High-use foods were defined as food items in which 75% to 95% of the population selected several times a week and often daily. These foods were 2% milk, white bread, whole milk, powdered milk, whole grain bread, homemade bread, ground coffee, cheddar cheese, frozen orange juice, processed cheese, instant coffee and margarine. In the present study, 2% milk was a peripheral food item along with coffee. The present study did not specify the type of orange juice, bread, or coffee. The medium-use

foods were defined as food items that 49-74% of the populations selected several times a month (Reaburn et al., 1979). These foods were lettuce, diet soft drinks, fresh tomatoes, regular soft drinks, butter, chicken, bacon, cold cereal, ice cream, whole chicken, spaghetti, rice, canned salmon, and cake mix. Low-use foods were defined as food items that 24-48% percent of the population selected never or only on special occasions (Reaburn et al., 1979). These foods were pork, strawberries, grapes, broccoli, beef liver, fish, hot cereal, and fish and chips. In the present study, the following Reaburn's (1979) medium-use and low-use foods were found in the present study's secondary core list which included lettuce, tomatoes, chicken, bacon, cold cereal, ice cream, spaghetti, rice, pork, strawberries, grapes, broccoli, and fried fish. Diet soft drinks, liver, and other fish were peripheral foods in the present study. Some of the food items like canned salmon and cake mixes were not specified in the present study.

Core, Secondary, and Peripheral Food Differences by Ethnic Group

No additional foods were written in the Block 92 FFQ by the participants in the present study. The researchers felt that the 100-item FFQ was lengthy, and the subjects may have felt intimidated or uncomfortable writing in additional foods. The researchers did not notice any discrepancy between the foods recorded in the 4-day food records and the Block 92 FFQ for food items.

In the present study, several core, secondary core, and peripheral food items differed by ethnic group. Several researchers observed differences in secondary core foods but not core foods (Caster, 1980; Koehler et al., 1989). Caster (1980) found that in the core food list, there was significantly more cheese, peanut butter, and mayonnaise in the diet of white subjects compared to the black subjects ($p<.05$). In the secondary foods determined by Caster (1980), blacks had a higher consumption compared to whites for the following food items: ham, beef roast, organ meats, rice, cakes, doughnuts, sweetened dry cereals, sweet potatoes, turnip greens, collard greens, grapes, fruit cocktail, pineapple, peaches, puddings, peanuts, beer, tang, and milkshakes ($p<.05$) (Caster, 1980). The whites had a higher frequency consumption compared to blacks for the following food items in the secondary food list which included *unsweetened dry cereals, pasta, carrots, soup,* stews, strawberries, and low calorie drinks ($p<.05$) (Caster, 1980).

Koehler et al. (1989) found that the Hispanic children compared to the Navajo and Jemez Indian children ate significantly more tortillas, bread and rolls, cereal, and cola. The Hispanics reported less frequent use of pancakes or waffles compared to the Indian children. Regional foods that the Hispanic children reported more frequently consuming included salsa and green chilies when compared with the Indian children.

In the present study, Hispanics differed the most compared to blacks and whites in core foods, choosing tortillas over white bread, and indicating more frequent consumption of eggs. Koehler et al. (1989) identified cereal and cola

as being more frequently consumed by the Hispanic children. The present study did not show differences among whites, blacks, and Hispanics for cereals or sodas. In the present study, the differences between whites and blacks was not significant for mayonnaise and salad dressings, but Hispanics reported this less frequently. Caster (1980) found that mayonnaise was more frequently used by the whites than the blacks ($p<.05$). The present study indicated that Hispanics do not consider salad dressing and mayonnaise a core food item. Fruit drinks were a core food among the blacks compared to the whites or Hispanics. In the study by Caster (1980), the blacks reported more frequent use of Tang, which is similar to a fruit drink.

In the present study, secondary core foods also differed by ethnicity. Blacks more frequently selected fried chicken, cornbread, and fried fish as a secondary core food compared to the whites and Hispanics. In the present study, soups, oranges, strawberries, and other fruits were reported less frequently by the blacks compared to the whites or Hispanics. Caster (1980) found that whites consumed more soups and strawberries compared to the blacks.

In the present study, Hispanics had the highest frequency count for other fruits, berries, oranges, other soups, and strawberries in season compared to whites and blacks in the secondary core food list. Koehler et al. (1989) indicated that red chili sauce or salsa was a regional food common to the Hispanic children. In the present study, red chili sauce was a core food item for the Hispanics. The secondary foods for the whites were similar to the blacks

except that more whites tended to consume other soups, fruits, oranges, and gravies, and less fried fish compared to blacks. Caster (1980) stated that eating oranges was more common among the blacks compared to the whites. In the present study, fewer blacks and whites compared to Hispanics consumed fruits and vegetable food items, as secondary core foods.

Peripheral foods in the present study, included mustard greens, cantaloupe in season, and coffee. Mustard greens were identified as a secondary core food item by blacks in the present study. Caster (1980) also found that greens were a more popular food item among blacks. Cantaloupe in season was more frequently reported as a secondary core food by the Hispanics in the present study. Fewer Hispanics reported consumption of coffee compared to the whites and blacks. Comparing food frequency by ethnicity, more Hispanics tended to mention fruit intake compared to the whites and blacks because more Hispanics listed fruits as secondary core foods. Bartholomew et al. (1990) reported that Hispanic elderly low-income women had significantly less frequent consumption of oranges, and other fruits and juices compared to low-income white elderly women.

Three 1-day Food Record and 24-hour Food Recall

The three 1-day food records were compared with the 24-hour food recall for the nutrients of interest using the Spearman's rho rank coefficient. Block et al. (1992) reported correlations between .70 and .80, ($p<.01$) between the 24-hour food recall and 4 days of food records for calories, protein, fat,

carbohydrate, saturated fat, calcium, B vitamins, and iron. The low correlation coefficients in the present study ranged from r=.249 to r=.569 and may be the result of high participant burden described by Mela et al. (1997) and Rebro et al. (1998). Mela et al. (1997) concluded that some respondents may alter their food intake during reporting periods to lessen the burden. Rebro et al. (1998) also found that respondents reduced the number of snacks and food consumed so that the food items were easier to record.

Paired t-tests in the present study showed that there was not a significant difference between the estimated mean intake for calories, calories from fat, protein, carbohydrate, fiber, sugar, iron, fat, saturated fat, cholesterol, folate, and calcium. Only sodium intake was found to be significantly different ($p<.05$) when comparing three 1-day foods records to the 24-hour food recall. In the present study we combined the 24-hour food recall to create a four-day food record to increase the validity when compared to the Block 92 FFQ.

Four 1-day Food Records Compared with the Block 92 FFQ

Thirteen percent (n=15) of our sample population had extremely high calcium intakes, failed to report serving sizes, or skipped too many foods in the Block 92 FFQ and were deleted from the data base. Suitor et al. (1989) estimated that 20% of a low-income population will have difficulty in responding correctly to a food frequency questionnaire.

In the present study, we found that the Block 92 FFQ overestimated total calories, protein, fat, saturated fat, cholesterol, folate, and calcium, compared to

the four 1-day food records using paired t-tests. Mean intakes of nutrients were not significantly different for carbohydrate, iron, and fiber ($p<.05$). Block et al. (1992) found that the Block 92 FFQ produced higher estimates for calcium, energy, and fiber comparing it with 16 days of dietary records. Kristal et al. (1997) reported correlations that were similar for saturated fat between the FFQ and four days of food records, but this was reported by ethnic groups. Correlations were r=.26 for blacks, and r=.49 for blacks, and r=.35 for Hispanics (Kristal et al., 1997). In the present study, Spearman's rho correlation coefficients ranged from r=.248 to r=.552 for calories, protein, carbohydrates, calcium, fat, saturated fat, fiber, iron, and folate (Table 9), when comparing the Block 92 FFQ with the four 1-day food records.

Adequacy of Estimated Nutrient Intake using the Four 1-day Food Records

In the present study, the poor nutrient intakes agree with current research Sixty-six percent of the participants consumed less than 83% of the standard reference energy value for women. Eighty percent were below 83% of the AI for calcium, 60% were below 83% of the RDA for iron, and 72% were below the EAR (less than 320 mcg) for folate. Seventy-two percent of the respondents were above the RDA for protein, and 35% of the respondents were above the reference value for fat (Table 10). Bell et al. (1998) found that many subjects did not consume adequate amounts of iron, calcium, and folate in food insufficient households, and that high-fat meats, and snack foods were

consumed daily. Emmons (1986) reported that low-income families on food stamps consumed less than the RDA for calcium and iron, but that protein remained above the RDA. Rose et al. (1997) found that food insufficient women were more likely to have energy intakes below 50% of the recommendations, and were below the RDA for iron and folate.

Four 1-day Food Records Compared to the Block 92 FFQ per 1000 Kcal

When nutrient values were converted to nutrients per 1000 Kcal, the correlation coefficients increased from r=.248 to r=.540 for protein, from r=.456 to r=.609 for fiber, from r=.486 to r=.602 for folate, from r=.285 to r=.479 for iron and from r=.349 to r=.549 for fat. However, there was no increase in the correlation coefficient for sodium. Brown and Griebler (1993) indicated that converting the estimated mean intakes to nutrient per 1000 Kcal improved correlations for the long version of the Block 92 FFQ for calcium and energy. Correlations for calcium improved on the short FFQ for calcium (Brown and Griebler, 1993). Flegal et al. (1990) found that adjusting for total kilocalorie intake by dividing by 1000 kcal improved agreement in mean intakes for macronutrients using ANOVA and paired t-tests.

Nutrient Comparisons by Ethnicity

In order to determine the nutrient intake differences by ethnicity, the Block 92 FFQ was not selected because it tends to overestimate energy and nutrient intakes (Bergman et al., 1990; Suitor, 1989). In the present study, the

Block 92 FFQ was found to overestimate nutrient intakes for calories, protein, fat, folate, and calcium. The four 1-day food records were used to compare nutrient intake differences among the whites, blacks, and Hispanics. In the present study, fat, fiber and calcium were significantly different. The Hispanics estimated fiber intake was higher and estimated fat was lower compared to whites and blacks. In the present study, blacks had a lower estimated calcium intake than the whites. Kristal et al. (1997) found that there were no significant differences in whites, blacks, or Hispanics for energy, total fat, saturated fat, or beta-carotene using four 1-day food records. Vitamin C and calcium intake were significantly lower among blacks than whites (Kristal et al., 1997).

Comparison of the Short FFQ with the Block 92 FFQ

The shortened FFQ was created by using the core foods, most of the secondary core foods, and selected peripheral foods (Appendix K). The core foods provided 619 ± 258 Kcal and thus secondary core foods were added to created the short FFQ. Calories, calcium, and folate were chosen as the nutrients of interest due to the low intake in the sample. The short FFQ represented 74% of the estimated mean calorie intake compared with the Block 92 FFQ, 83% of the estimated fat, 70% of the estimated folate, and 67% of the estimated calcium. Brown and Griebler (1993) reported that an acceptable level of estimated nutrients between a long and short FFQ should be between 75-85%. Brown and Griebler (1993) found that mean calcium intakes recorded by the short FFQ (85%), were less than the long FFQ which is a reflection of the

reduced items on the short form. Brown et al. (1993) concluded that a short FFQ can still provide a reasonable estimate of nutrient intakes if it contains the foods that are most important for the nutrients of interest. In the present study, correlation coefficients between the short FFQ and the Block 92 FFQ were r= .842 for calcium, r=.849 for fat, r=.758 for folate, and r=.621 for calcium. Brown et al. (1993) found correlations between a long FFQ and short FFQ for calcium that ranged from r= .67 to r=.85 over three times during a six month period. Brown et al. (1993) concluded that correlation coefficients of .70 to .77 reflect reasonable reproducibility.

Summary of Findings

The lists of core foods, secondary core foods, and peripheral foods were *created using a method adapted from* Jerome (1980) and Caster (1980) and was felt to reflect the findings of food records. The food intake observed in core foods from four days of food records were defined as foods that at least 25% of the respondents selected 3-4 times a week, 5-6 times a week, once a day or 2 or more times a day. The 12 core food items only provided 619 ±258 calories. Secondary food items were defined as foods which at least 25% of the respondents selected twice a month, once per week, or twice a week (Jerome, 1980; Caster 1980). This list provided a total of 51 food items.

Core foods, secondary core foods, and peripheral foods differed by ethnic groups. Hispanics were significantly different in their frequency of consumption

of other fruits, berries, oranges, soups and strawberries in season compared to whites and blacks.

Overestimation of foods from the Block 92 FFQ as compared to the four 1-day food records were noted for calories, fat, cholesterol, folate, and calcium. Mean estimated nutrient intakes for carbohydrates, fiber, and iron were not significantly different between the Block 92 FFQ and the four 1-day food records. Spearman's rho correlation coefficients between the Block 92 FFQ and the four 1-day food records were significant and acceptable for all nutrients except sodium.

Converting the estimated nutrient intakes as measured by the four 1-day food records and the Block 92 FFQ to per 1000 Kcal resulted in improved correlations. The Spearman's rho correlation coefficients improved with this method and ranged from r=.427 to r=.609. Correlations between estimated sodium intakes did not improve after energy adjustment.

Using the four 1-day food records, Hispanics consumed more fiber compared to whites and blacks, and lower fat intake compared to whites and blacks. Whites were higher in their calcium intake compared to blacks, but not the Hispanics.

The short FFQ was created to measure the mean estimated calorie, calcium, folate, and fat intake. This included all of the core foods, 47 food items from the secondary core foods, and two foods in the overall peripheral food list for the entire sample that were identified as secondary by the Hispanics and blacks (cantaloupe in season, and mustard greens). The total list for the short

FFQ included 61 food items and provided an estimated calorie intake of 1391± 503 calories. The nutrients estimated by the short FFQ were acceptably correlated with the Block 92 FFQ for calories, fat, folate, and calcium (Block et al. 1997; Brown and Griebler, 1993). Spearman rho's correaltion coefficients ranged from r=.621 to r=.842.

CHAPTER SIX

CONCLUSIONS

Hypothesis 1: There will be no significant difference in core or secondary core foods among the four ethnic groups. The null hypothesis was rejected. We compared the core and secondary core foods for blacks, whites, and Hispanics. Native Americans were not included in the analysis due to a small sample size (n=7). As shown in Table 5, fewer Hispanics selected white bread, fruit drinks and mayonnaise as a core food. More blacks selected fruit drinks as a core food compared with whites or Hispanics. Eggs were selected more often by the Hispanics as a core food compared with whites or blacks. Fried chicken was selected as a secondary core food more frequently by blacks than whites or Hispanics. The Hispanics more often selected red chili sauce and tortillas as a core food. Fewer blacks selected berries, fruit cocktail, grapes, oranges, as secondary core items compared to whites and Hispanics. Other soups, and fresh strawberries were reported more often as a secondary core by the Hispanics than the whites or blacks. Fried fish was selected more frequently by the blacks and Hispanics than the whites as a secondary core food. All of these differences were significant at the $p<.05$ level using Chi square analysis.

Hypothesis 2: There will be no foods identified by the four cultural groups that are not already included in the Block 92 food frequency questionnaire. The

second hypothesis was accepted. This was also compared with the four days of food records to see if additional foods were written in that were not included in the Block 92 FFQ. No foods were added in the blank spaces of the Block 92 FFQ or identified in the four 1-day food records that were not included in the Block 92 FFQ.

Hypothesis 3: There will be no correlation between the total number of calories, grams of fat, protein, carbohydrates, saturated fat, cholesterol, iron, fiber, calcium, sugar, sodium, and folate as determined by the food frequency questionnaire, three daily food records and the 24-hour food recall. The third null hypothesis was rejected. As shown in Table 6, only sodium was found to be significantly different for the estimated mean intake comparing the 3-day food records with the 24-hour food recall, using paired t-tests. All correlations shown in Table 7 were significant at the $p<.01$ level. Table 8 shows the differences between the estimated mean intake of nutrients from the merged four days with the food frequency using paired t-tests. Carbohydrate, iron, and fiber intake were not significantly different. All correlations were considered significant except for sodium.

Hypothesis 4: There will be no significant difference among the four ethnic groups for estimated mean nutrient intake as determined by the 24-hour food recall and the three 1-day food records. The fourth null hypothesis was partially rejected. Estimated saturated fat intake was significantly different among the whites and Hispanics but not the blacks. Estimated mean calcium intake was

significantly different for the whites and blacks, but not the Hispanics. Therefore, the fourth null hypothesis was partially rejected.

Hypothesis 5: The shortened FFQ will not adequately assess the nutrient intakes of interest for the four ethnic groups participating in the EFNEP and ONE program. The fifth null hypothesis was rejected. Correlation coefficients for folate, calcium, calories, and fat were between r=.621 and r=.842. It was concluded that these correlations had good acceptability when compared to the Block 92 FFQ.

Implications

In this study we were able to identify differences in core food items, secondary core food items, and peripheral food items by whites, blacks, and Hispanics. The results show the importance of recognizing that nutrient intakes differ by ethnic groups in the same geographic location. This has important implications for describing the low-income population participating in the EFNEP and ONE program in Tulsa County. Nutrition educators in the EFNEP and ONE program need to be aware of the ethnic diversity of dietary patterns and should use this knowledge when measuring dietary outcomes before and after participation in community nutrition education programs. Nutrition educators in public health need to recognize the differences in nutrient intakes by ethnic background which will affect responses on dietary assessment instruments, and apply this knowledge to dietary changes.

Spearman rho's correlation coefficients showed good reproducibility between the Block 92 FFQ and the short FFQ for the nutrients of interest which

included: calories, fat, folate, and calcium. A short FFQ which represents the core and secondary core foods from a target population may be another tool to supplement the 24-hour food recall which can be used to determine dietary change after participation in the EFNEP and ONE program.

Recommendations

Further research is necessary to more accurately define the core and secondary core foods for a low-income population with different ethnic backgrounds. An easier method for quickly determining core foods for a population needs to be validated. There is also a need for a more valid measurement of nutrient intake other than self-reported food records. The accuracy of the self-reported three 1-day food records could not be determined in this sample study. Other methods for collecting food records such as more 24-hour food recalls recorded by the paraprofessionals, or weighed food records may result in improved comparisons of estimated mean nutrient intakes. The estimated mean nutrient intakes may improve between more days of food records and the Block 92 FFQ. The reliability and validity of the Short FFQ needs to be determined in future studies.

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APPENDIXES

APPENDIX A

CONSENT FORM FOR PARTICIPATION
ENGLISH AND SPANISH

Consent Form
Validation of a Food Frequency Questionnaire

Oklahoma State University would like your help in a study, which would help us make recommendations for improving people's health. To do this we will need you to measure exactly how much food you eat for a period of 24 hours (one full day). We will ask you to do this three days in a row. We will use this information to develop a food behavior questionnaire that will help us determine what EFNEP participants need. We hope that we will be able to better serve you by collecting this information from you.

If you participate in the study, we will ask you to:

1. Fill out a form that asks you how often you eat certain foods.
2. Learn how to record the food that you eat. This will take about 20 minutes.
3. Record everything that you eat and drink from the time you wake up until the time you go to sleep for three days.
4. Allow a nutrition educator to visit your home so that she can help you with any problems that you might have when recording your foods.
5. The information collected in this study is confidential

You will receive a cookbook at the end of the course.

I understand that I may stop taking part in the study at any time and that there is no penalty for refusal to participate in this study.
I agree to take part in the study as described above: I sign it freely and voluntarily. A copy has been given to me.

(signed)_____ _____
Participant Date and Time

(signed)_____ _____
Witness Date and Time

If you have any questions you may contact **Melanie Cook** at telephone number **(918) 746-3719**, or you may contact **Kathy Keim**, 425 Department of Nutritional Sciences, Oklahoma State University, Stillwater, OK 74078, telephone number **(405) 744-5040.** You may also contact **Gay Clarkson** at University Research Services, 203 Whitehurst, Oklahoma State University, Stillwater, OK 74078; Telephone: **(405) 744-5700**.

Forma de Consentimiento
Cuestionario de Frecuencia de Comida

La Universidad del Estado de Oklahoma le brindará ayuda e información para mejorar su salud. Por lo tanto necesitamos que describas exactamente lo que comiste durante 24 horas(un dia completo). Necesitamos que hagas esto tres veces consecutivas, desarrollar un cuestionario sobre la comida. Esto nos servira para medir cambios. De este modo nosotros podremos servirte mejor, recibiendo la informaciòn completa de tus hàbitos alimenticios.

Si participas en este estudio, necesitamos que hagas lo siguente.

1. Llena la forma de cada cuando comes y cada cuando tomas liquido.
2. Aprenderas como anotar la comida que injeriste. Esto dura como unos 20 minutos.
3. Anotar todo lo que comes y bebes desde que te levantas, por un periodo de 24 horas. Vas hacer esto tres veces.
4. Un maestra de nutrición visitará tu casa para ayudarte con cualquier problema que puedas tener anotando tus comidas .
5. Toda la informaciòn que usted nos brindará, será confidencial, aseguremos esto por medio de un código al solo usted tendra acceso, durante el estudio usaremos solamente su codigo.

Recibiras un libro de recetas al terminar este curso.

Yo entiendo que mi participaciòn es voluntaria y que puedo dejarlo en cualquier momento.
No hay penalidad por dejar de participar en este curso.
Yo voluntariamente participé en este estudio descrito arriba: Yo firmo voluntariamente y obtenedré una copia de este certificado de curso.

(Firma)_____ _____
Participante Fecha y Hora

(Firma)_____ _____
Testigo Fecha y Hora

Si tienes alguna pregunta puedes llamar a **Melanie Cook**. el numero de telefono es **(918) 746-3719**. También a **Kathy Keim**, 425 HES, Department of Nutritional Sciences, Oklahoma State University,Stillwater OK 74078, telefono**(405) 744-5040** Tambien puedes llamar **Gay Clarkson** a la University Reserch Services, 203 Whitehurst, Oklahoma State University, Stillwater,OK 74078; Telefono: **(405) 744-5700**.

APPENDIX B

IRB APPROVAL FORM

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD

DATE: 05-11-98 **IRB# HE-98-096**

Proposal Title: THE VALIDATION OF FOOD FREQUENCY QUESTIONNAIRE FOR USE BY EFNEP AND ONE WOMEN 19 TO 50 YEARS OF AGE

Principal Investigator(s): Kathryn S. Keim, Glenna Williams, Michelle Dimond, Melanie Cook

Reviewed and Processed as: Modification

Approval Status Recommended by Reviewer(s): Continuation

Signature: Carol Olson

Date: 03-17-99

Carol Olson, Director of University Research Compliance
cc: Glenna Williams

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modification to the research project approved by the IRB must be submitted for approval. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

APPENDIX C

24-HOUR FOOD RECALL INSTRUMENT

HOMEMAKER'S 24-HOUR FOOD RECALL (Form A)

1. ID #:	2. Date Taken:
3. HM Name:	4. NEA Name:
5. Pregnant ☐ Yes ☐ No 6. Nursing ☐ Yes ☐ No	7. Takes Nutritional Supplements ☐ Yes ☐ No If "Yes" List Type:
8. Money Spent on Food Last Month: $ _____	

MEAL TYPE		MEAL TYPE		SERVING ABBREVIATIONS		9. Check Which Food Record.
Morning	= 1	Afternoon	= 4	TBSP = tablespoon	c = cup	☐ ENTRY ☐ EXIT
MidMorning	= 2	Evening	= 5	tsp = teaspoon	lb = pound	☐ Other: Number _____
Noon	= 3	Late Evening	= 6	oz = ounce	sl = slice	

10. What did homemaker eat and drink in the last 24 hours? (To be filled out by NEA or Homemaker)

11. To Be Coded By NEA:

FOOD ITEMS AND DESCRIPTION (List all foods and beverages. List separately main ingredients in mixed dishes.)	AMOUNT EATEN (ex: 1/2 c)	MEAL TYPE	FOOD ID NUMBER	AMOUNT CODE (ex: .50)

12. Number of Lessons Taught Since Last Record

Individual _____ Group _____ Other ____

APPENDIX D

BLOCK 92 FFQ
ENGLISH AND SPANISH

Name _____

Food Frequency Questionnaire

Subject Number _____ Date _____

The following section is about your usual eating habits. Think back over the **past month**. How often do you usually eat the foods listed?

First: Mark (√) the column to show how often, on the average, you ate the food during the past year.
Please BE CAREFUL which column you put your answer in. It will make a big difference if you say "Hamburger once a day" when you mean "Hamburger once a week"!
For example, if you eat bananas twice a week put a √ in the "2 per week" column.

Second: Mark (√) whether your usual serving size is small, medium, or large.
Please DO NOT OMIT serving size. Only omit serving size if you do not eat this food at all.

Additional comments:

A small serving is about one-half the medium serving size shown, or less.
A large serving is about one-and-a-half times as much, or more.
Please DO NOT SKIP any foods. If you never eat a food, mark "Never or less than once a month" and leave the portion columns unmarked.

EXAMPLE: This person ate a medium serving of rice about twice per month and never ate squash.

TYPE OF FOOD	HOW OFTEN									HOW MUCH			
	Never or less than once per month	1 per mon	2-3 per mon	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium Serving	Your Serving Size		
											S	M	L
Rice			√							3/4 cup		√	
Winter squash. baked squash	√									1/2 cup			

FOOD FREQUENCY

TYPE OF FOOD	HOW OFTEN									HOW MUCH			
	Never or less than once per month	1 per mon	2-3 per mon	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium Serving	Your Serving Size		
											S	M	L
FRUITS AND JUICES													
Apples, applesauce, pears										1 medium or 1/2 cup			
Bananas										1 medium			
Peaches, apricots, (fresh or canned)										1 medium or 1/2 cup			
Cantaloupe (in season)										1/4 medium			
Cantaloupe (rest of year)										1/4 medium			
Watermelon (in season)										1 slice			
Strawberries (in season)										1/2 cup			
Oranges										1 medium			
Grapefruit										1/2 medium			
Orange juice or grapefruit juice										6 ounce glass			
Fruit drinks with added vitamin C, such as Hi-C										6 ounce glass			
Any other fruit, including berries, fruit cocktail, grapes										1/2 cup			

TYPE OF FOOD	HOW OFTEN								HOW MUCH			
	Never or less than once per month	1 per mon	2-3 per mon	! per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium Serving	Your Serving Size		
											S	M	L
MEAT, FISH, POULTRY, LUNCH ITEMS													
Hamburgers, cheeseburgers, meatloaf, beef burritos, tacos										1 med. or 4 ounces			
Beef, (steaks, roasts, etc., including sandwiches)										4 ounces			
Beef stew or pot pie with carrots or other vegetables										1 cup			
Liver, including chicken livers										4 ounces			
Pork, including chops, roasts										2 chops or 4 ounces			
Fried chicken										2 small or 1 large pce			
Chicken or turkey (roasted, stewed or broiled, including on sandwiches)										2 small or 1 large pce			
Fried fish or fish sandwich										4 oz. or 1 sandwich			
Tuna, tuna salad, tuna casserole										½ cup			
Oysters										5 pieces, ¼ cup, or 3 oz.			
Shell fish, (shrimp, crab, lobster, etc.)										5 pieces, ¼ cup, or 3 oz.			
Other fish (broiled or baked)										2 pieces or 4 ounces			
Spaghetti, lasagna, other pasta with tomato sauce										1 cup			
Pizza										2 slices			
Mixed dishes with cheese (such as macaroni and cheese)										1 cup			
Liverwurst										2 slices			

TYPE OF FOOD	HOW OFTEN									HOW MUCH			
	Never or less than once per month	1 per mon	2-3 per mon	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium Serving	Your Serving size		
											S	M	L
Hot dogs										2 hot dogs			
Ham, bologna, salami, and other lunch meats										2 slices or 2 ounces			
Vegetable and tomato soups, including vegetable beef, minestrone										1 medium bowl			
Other soups										1 medium bowl			
BREADS, SNACKS, SPREADS													
Biscuits, muffins, (including fast foods)										1 medium piece			
White bread (including sandwiches, bagels, burger rolls, French or Italian bread)										2 slices			
Dark bread, such as wheat, rye, pumpernickel, (including sandwiches)										2 slices			
Corn bread, corn muffins, corn tortillas										1 medium piece			
Salty snacks, such as potato chips, corn chips, popcorn										2 handfuls or 1 cup			
Peanuts, peanut butter										2 tbsp			
Margarine on bread or rolls										2 pats			
Butter on bread or rolls										2 pats			
Gravies made with meat drippings, or white sauce										2 tbsp			
Saltines, Soda Crackers										4 each			

TYPE OF FOOD	HOW OFTEN									HOW MUCH			
	Never or less than once per month	1 per mon	2-3 per mon	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium Serving	Your Serving Size		
											S	M	L
BREAKFAST FOODS													
High fiber, bran or granola cereals, shredded wheat										1 medium bowl			
Highly fortified cereals, such as Total, Just Right or Product 19										1 medium bowl			
Other cold cereals, such as corn flakes, Rice Krispies										1 medium bowl			
Cooked cereal, or grits										1 medium bowl			
Milk on cereal										1/2 cup			
Sugar added to cereal										2 tsp.			
Eggs										1 egg=sml 2 eggs=med			
Bacon										2 slices			
Sausage										2 patties or links			
VEGETABLES													
String beans, green beans										½ cup			
Peas										½ cup			
Chili with beans										¼ cup			
Other beans such as baked beans, pintos, kidney, limas, and lentils										¾ cup			
Corn										½ cup			
Winter squash/baked squash										½ cup			
Tomatoes, tomato juice										1 medium or 6 oz. glass			
Red chili sauce, taco sauce, salsa picante										2 tbsp.			
Broccoli										½ cup			
Cauliflower or Brussels sprouts										½ cup			

TYPE OF FOOD	HOW OFTEN									HOW MUCH			
	Never or less than once per month	1 per mon	2-3 per mon	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium Serving	Your Serving Size		
											S	M	L
Spinach (raw)										¾ cup			
Spinach (cooked)										½ cup			
Mustard greens, turnip greens, collards										½ cup			
Cole slaw, cabbage, sauerkraut										½ cup			
Carrots, or mixed vegetables containing carrots										½ cup			
Green salad										1 medium bowl			
Regular salad dressing & mayonnaise, including on sandwiches or on potato salad, etc.										2 tbsp.			
French fries or fried potatoes										¾ cup			
Sweet potatoes, yams										½ cup			
Other potatoes, including boiled, baked, mashed & potato salad										1 medium or ½ cup			
Rice										¾ cup			
Any other vegetable, including cooked onions, summer squash										½ cup			
Butter, margarine or other fat added to veg., potatoes, etc.										2 pats			

TYPE OF FOOD	HOW OFTEN									HOW MUCH			
	Never or less than once per month	1 per mon	2-3 per mon	1 per week	2 per week	3-4 per week	5-6 per week	1 per day	2+ per day	Medium Serving	Your Serving size		
											S	M	L
DAIRY PRODUCTS													
Cottage cheese										½ cup			
Other cheeses and cheese spreads										2 slices or 2 ounces			
Flavored yogurt, frozen yogurt										1 cup			
SWEETS													
Ice cream										1 scoop or ½ cup			
Doughnuts, cookies, cake, pastry										1 piece or 3 cookies			
Pumpkin pie, sweet potato pie										1 medium slice			
Other pies										1 medium slice			
Chocolate candy										1 small bar or 1 oz.			
Other candy, jelly, honey, brown sugar										3 pieces or 1 tbsp.			

TYPE OF FOOD	HOW OFTEN									HOW MUCH			
	Never or less than once per month	1-3 per mon	1 per week	2-4 per week	5-6 per week	1 per day	2-3 per day	4-5 per day	6+ per day	Medium Serving	Your Serving Size		
											S	M	L
BEVERAGES (Please note that the categories for these columns are different.)													
Whole milk and beverages with whole milk (not including on cereal)										8 oz. glass			
2% milk and beverages with 2% milk (not including on cereal)										8 oz. glass			
Skim milk, 1% milk or buttermilk (not including on cereal)										8 oz. glass			

TYPE OF FOOD	HOW OFTEN									HOW MUCH			
	Never or less than once per month	1-3 per mon	1 per week	2-4 per week	5-6 per week	1 per day	2-3 per day	4-5 per day	6+ per day	Medium Serving	Your Serving Size		
											S	M	L
Regular soft drinks (not diet soda)										12 oz. can or bottle			
Beer										12 oz. can or bottle			
Wine or wine coolers										1 medium glass			
Liquor										1 shot			
Coffee, regular or decaf										1 medium cup			
Tea (hot or iced)										1 medium cup			
Lemon in tea										1 tsp.			
Non-dairy creamer in coffee or tea										1 tbsp.			
Cream (real) or Half-and-Half in coffee or tea										1 tbsp.			
Milk in coffee or tea										1 tbsp.			
Sugar in coffee or tea										2 teaspoons			
Glasses of water										8 oz. glass			

SUMMARY QUESTIONS	AVERAGE USE LAST MONTH								
	Less than once per week	1-2 per week	3-4 per week	5-6 per week	1 per day	1 ½ per day	2 per day	3 per day	4+ per day
a. How often do you use fat or oil in cooking?									
b. About how many servings of vegetables do you eat, not counting salad or potatoes?									
c. About how many servings of fruit do you eat, not counting juices?									
d. About how many servings of cold cereal do you eat?									

Which if the following best describes the food eaten in your household (circle only one):

a) enough of the kinds of food we want to eat
b) enough but not always what we want to eat
c) sometimes not enough to eat
d) often not enough to eat

Nombre _____

Cuestionario de Frecuencia de Comida

Número del Sujeto _____ Fecha _____

La siguiente sección es sobre tus hábitos de comer usualmente. Piensa sobre el **mes pasado**. Cada cuanto comes las comidas de la lista?

Primero: Marca con una (√) la columna para saber cuando haz comido las comidas durante el mes pasado. Por favor cuida en cual columna pones tú respuesta, sería muy grande la diferencia si dices "una hamburguesa diaria," cuando quieres decir una hamburguesa por semana.
Por ejemplo: Si comes plátano dos veces por semana marca con una (√) en la columna "dos veces por semana".

Segundo: Marca con una (√) si el tamaño de la porción es chico, mediano o grande. Por favor NO OMITAS el tamaño de las porciones.

Comentario adicional:
Una porción chica es la mitad de una porción mediana, una porción grande es igual a dos porciones medianas. Por favor NO DEJES DE apuntar ninguna comida. Si nunca comes las comidas de la lista, marca con una (√) "nunca o menos de una vez por mes".

EJEMPLO: Esta persona comió arroz dos veces por mes y nunca comió calabacitas.

Tipo de comida	Cada Cuando									Cuanto			
	Nunca o menos de una vez por mes	1 por mes	2-3 por mes	1 por semana	2 por semana	3-4 por semana	5-6 por semana	1 diaria	2+ diaria	Media Porción	Tu tamaño de porción		
											C	M	G
Arroz					√					3/4 taza		√	
Calabacita de verano o horneada	√									½ taza			

Frecuencia de Comida

Tipo de comida	Cada Cuando									Cuanto			
	Nunca o menos de una vez por mes	1 por mes	2-3 por mes	1 por semana	2 por semana	3-4 por semana	5-6 por semana	1 diaria	2+ diaria	Media Porción	Tu tamaño de porción		
											C	M	G
JUGOS Y FRUTAS													
Manzanas, Peras, o puré de manzana										1 mediana ½ taza			
Plátanos										1 mediano			
Durazno, Albaricoque (enlatados o frescos)										1 mediano ½ taza			
Melón de temporada										1/4 mediano			
Melón resto del año										1/4 mediano			
Sandía de temporada										1 rebanada			
Fresas de temporada										½ Taza			
Naranja										1 mediana			
Toronja										½ mediano			
Jugo de naranja o jugo de toronja										1 vaso de 6 onzas			
Bebidas de fruta con vitamina C, como Hi-C										1 vaso de 6 onzas			
Cualquier otra fruta incluyendo fresas o coctel de frutas y uvas										½ Taza			

Tipo de comida	Cada Cuando									Cuanto			
	Nunca o menos de una vez por mes	1 por mes	2-3 por mes	1 por semana	2 por semana	3-4 por semana	5-6 por semana	1 diaria	2 + diaria	Media Porción	Tú tamaño de porción		
											C	M	G
ALMUERZO													
Cereales altos en fibra, trigo o granola										1 tazón mediano			
Cereal fortificado, como Total, o el Product 19										1 tazón mediano			
Cereales frios, Comflakes, Cereal de arroz										1 Tazón mediano			
Cereal cocido, como avena										1 Tazón mediano			
Cereal con leche										½ Taza			
Azúcar añadida al cereal										2 cucharaditas			
Huevos										1 huevo= chico 2 huevo= med.			
Tocino										2 rebanada			
Chorizo										2 rebanadas o salchicha			
Moronga										2 Tortas o salchicha			
VEGETALES													
Ejotes										½ Taza			
Chicharos										½ Taza			
Frijol con carne										3/4 Taza			

Tipo de comida	Cada Cuando									Cuanto			
	Nunca o menos de una vez por mes	1 por mes	2-3 por mes	1 por semana	2 por semana	3-4 por semana	5-6 por semana	1 diaria	2 + diaria	Media Porción	Tú tamaño de porción		
											C	M	G
Frijol, lentejas, frijol rojo, frijol blanco, frijol pinto										3/4 Taza			
Elote										½ Taza			
Calabacita de verano u horneada										½ Taza			
Tomate o jugo de tomate										1 mediano o un vaso de 6 oz			
Salsa picante, chile rojo, salsa										2 cucharas			
Brocoli										½ Taza			
Coliflor o Colecillas de Bruselas										½ Taza			
Espinaca cruda										3/4 Taza			
Espinaca (Cocida)										½ Taza			
Hojas de remolacha, mostaza y nabo										½ Taza			
Ensalada de repollo, repollo con vinagre o repollo										½ Taza			
Zanahorias o vegetales mixtos que contienen zanahoria										½ Taza			
Ensalada verde										1 Tazón mediano			
Mayonesa y ensaladas con mayonesa etc.										2 cucharas			
Papas Fritas										3/4 Taza			
Camote										½ Taza			
Otras papas incluyendo horneadas, cocidas o puré										1 mediana o ½ taza			
Arroz										3/4 Taza			
Cualquier otra verdura incluyendo cebolla o calabacita										½ Taza			
Mantequilla u otro tipo de grasa que pones a los vegetales										2 cucharaditas			

Tipo de comida	Cada Cuando									Cuanto			
	Nunca o menos de una vez por mes	1 por mes	2-3 por mes	1 por semana	2 por semana	3-4 por semana	5-6 por semana	1 diaria	2 + diaria	Media Porción	Tú tamaño de porción		
											C	M	G
CARNES, PESCADO, AVES Y CARNES FRESCAS													
Hamburguesas, Hamburguesas con queso, Torta de carne molida, Burritos de carne molida, o tacos de carne molida										1 mediana o 4 onzas			
Carne de res (Chuletas incluyendo lonches)										4 onzas			
Caldo de res, pay de carne con zanahoria y otro vegetales										1 Taza			
Higado, incluyendo higado pollo										4 onzas			
Carne de puerco, chuletas y bisteks										2 Chuletas o 4 onzas			
Pollo Frito										2 piezas chicas o 1 grande			
Pollo o Pavo (rostizado, cocido o horneado, incluyendo lonches)										2 piezas chicas o 1 grande			
Pescado frito o lonche de pescado										4 oz. O 1 lonche			
Atún, ensalada de atún, atún guisado										½ Taza			
Ostras										5 piezas 1/4 Taza o 3 oz.			
Mariscos, (camarón, cangrejo, langosta, etc.)										5 piezas 1/4 taza o 3 oz.			
Otros pescados horneados o la parrilla										2 piezas o 4 oz			
Espagueti, lasagna u otro tipo de pasta con salsa de tomate										1 Taza			
Pizza										2 Rebanadas			
Platos mixtos con queso (como macarrones con queso)										1 Taza			

Tipo de comida	Cada Cuando									Cuanto			
	Nunca o menos de una vez por mes	1 por mes	2-3 por mes	1 por semana	2 por semana	3-4 por semana	5-6 por semana	1 diaria	2 + diaria	Media Porción	Tú tamaño de porción		
											C	M	G
Salchicha de higado										2 Rebanadas			
Perro caliente										2 Salchichas			
Jamón, Boloña . Salami y otros tipos de salchichas										2 Rebanadas o 2 oz.			
Caldo de vegetales y sopa de tomate, incluyendo vegetales con carne y minestrone										1 Tazón Mediana			
Otro tipos de caldo										1 Tazón mediana			
PAN, BOTANAS Y MERMELADAS													
Pasteles, bisquets (incluyendo comidas rápidas)										1 pieza 1 mediano			
Pan blanco (incluyendo lonches, hamburguesas, pan italiano o francés)										2 rebanadas			
Pan de trigo , pumpernickel incluyendo lonches										2 rebanadas			
Pan de maiz o tortillas										1 pieza 1 mediano			
Botanas saladas, como papitas, tostadas o palomitas										1 taza o 2 mano llenas			
Cacahuates o crema de cacahuate										2 cucharas			
Margarina sobre el pan										2 cucharaditas			
Mantequilla sobre el pan										2 cucharaditas			
Gravies hecho de las sobras de la carne o salsa blanca										2 cucharas			
Saltines, Galletitas salada										4 galletas			

Tipo de comida	Cada Cuando									Cuanto			
	Nunca o menos de una vez por mes	1 por mes	2-3 por mes	1 por semana	2 por semana	3-4 por semana	5-6 por semana	1 diaria	2+ diaria	Media Porción	Tú tamaño de porción		
											C	M	G
PRODUCTOS LACTEOS													
Requesón										½ Taza			
Otros tipos de queso										2 rebanadas o 2 onzas			
Yogurt de sabores y congelados										1 Taza			
DULCES													
Helado (nieve)										1 cuchara o ½ taza			
Donas, galletas, pastel o pan dulce										1 pieza o 3 galletas			
Pan de calabasa, pay de camote										1 rebanada mediana			
Otros tipos de pay										1 rebanada mediano			
Dulces de chocolate										1 barra chica o 1 onza			
Otros tipos de dulce, gelatina, azúcar morena, miel de abeja										3 piezas o 1 cuchara			

BEBIDAS (POR FAVOR NOTAR LA DIFERENCIA EN LAS RESPUESTAS)													
	Nunca o menos de una vez por mes	1-3 cada mes	1 por semana	2-4 por semana	5-6 por semana	1 diaria	2-3 diarias	4-5 diarias	6 o mas diarias	Media Porción	Tú tamaño de porción		
											C	M	G
Leche pura, bebidas que contienen leche pura (sin incluir la leche de cereal)										un vaso de 8 oz.			
Leche de 2% y bebidas que contienen leche de 2% (sin incluir la leche de cereal)										un vaso de 8 oz.			
Leche sin grasa, o leche de 1% o leche de mantequilla (sin incluir la leche de cereal)										un vaso de 8 oz			
Sodas regulares (no de dieta)										un lata o botella de 12 oz			
Cerveza										un lata o botella de 12 oz			
Vino										1 vaso mediano			
Licor										1 copita			
Café, regular o sin cafeina										1 vaso mediano			
Té caliente o frio										1 vaso mediano			
Té con limón										1 cucharita			
Crema pura(no de leche) con café o te										1 cuchara			
Crema de leche o mitad leche y mitad crema, con café o Té										1 cuchara			
Café o Té con leche													
Café o Té con azúcar										2 cucharas			
Agua										1 vaso de 8 oz.			

Preguntas	Sobre el mes pasado								
	Menos de 1 vez por semana	1-2 cada semana	3-4 cada semana	5-6 cada semana	1 diaria	1 ½ diaria	2 diarias	3 diarias	4 o mas diarias
Cada cuanto usas grasa o aceite para cocinar?									
Como cuantas porciones de verduras comes? (Sin contar papas y ensalada)									
Como cuantas porciones de fruta comes?(sin contar jugos)									
Como cuantas porciones de cereal comes?									

Cuál de las siguientes repuestas explica mejor la comida que comieron en su hogar. (Selecciona una sola respuesta)

a) Suficientes comidas de las que queremos comer.
b) Suficiente, pero no siempre de lo que queremos comer.
c) Alguna veces no es lo suficiente que queremos comer.
d) Regularmente no hay suficiente que comer

APPENDIX E

DAILY FOOD RECORD BOOKLET
ENGLISH AND SPANISH

FOOD DIARY

Dear EFNEP participant,

Thank you for participating in this very important study. Everything that goes into your body is important to your health. For this reason, we would like for you to write down everything that you eat and drink for 24 hours (one whole day) and do this three days in a row. We hope this study will help us make recommendations for improving your health based on what you eat. If you have any questions at any time, feel free to ask. Do not change your eating habits during the time that you keep this diary. This is very important since we must know exactly what you eat.

Thank you!

Directions for Using the Food Diary

1. Write down **everything** that you put into your mouth for one day and do this three days in a row. This includes foods, candies, drinks, and anything that you swallow. Everything that goes into your body is important.

2. List the food as soon as it is eaten on the pages given to you. Also list the time of day and amount that you ate. Please indicate whether a.m. or p.m.

3. Describe every item that you record. For example:
   a. Write "fried chicken wing" if it is fried, not just chicken
   b. Write milk, whole milk, 2% milk, or skim milk. Do not just write milk.
   c. Write white bread, wheat bread, do not just write bread.
   d. Record the name brands when you know it. For example "Kellogg's Frosted Flakes", "Campbell's chicken soup", or "Ramen noodles".
   e. Include everything that you add to your food or drinks (jellies, sugar, salad dressings, mustard, ketchup, mayonnaise, butter, sauces, etc.).

For example:

Time of day	Food Item and Method of Preparation	Amount Eaten
6:30 p.m.	Canned green beans with	½ cup
	margarine	2 tsp
6:30 p.m.	French fries (Burger King) with	1 small order
	ketchup	2 TB
6:30 p.m.	Iced tea with	16 oz
	sugar	2 tsp
6:30 p.m.	Fried chicken thigh	1 whole

4. Estimate what you ate in household measures (tablespoons, cups, slices, etc.). Your nutrition educator will show some examples. List the amount that you ate in the column marked amount eaten.

5 Please write in pencil and write as neatly as possible. Use as many pages as you need to record what you ate.

6. If anything is not clear to you, be sure to ask the nutrition educator any questions that you have before you leave today.

7. Bring your food diary with you to your next scheduled lesson.

Use the following measurements when recording these items:

Drinks (cups or fluid ounces)

Time of day	Food Item and Method of Preparation	Amount Eaten
7:30 p.m.	Pepsi	20 fl oz
9:00 p.m.	Unsweet tea	1 ½ cups
10:00 p.m.	Kool aid	16 fl oz

Fruits (pieces, portions of pieces, or cups)

Time of day	Food Item and Method of Preparation	Amount Eaten
7:30 a.m.	Peaches canned in heavy syrup	½ cup
12:00 p.m.	Banana (whole)	1
3:30 p.m.	Red apple	1 whole

Vegetables (cups)

Time of day	Food Item and Method of Preparation	Amount Eaten
12:00 p.m.	Green peas	½ cup
2:00 p.m.	Canned kernel corn	1 cup
6:30 p.m.	Mashed potatoes	1 cup
9:00 p.m.	French fries	10

Grains (slices, cups)

Time of day	Food Item and Method of Preparation	Amount Eaten
7:30 a.m.	White bread	1 slice
6:30 p.m.	Cooked spaghetti	2 cups
6:30 p.m.	White dinner roll	1 medium

Meats (ounces or cups)

Time of day	Food Item and Method of Preparation	Amount Eaten
6:30 p.m.	Hamburger meat	3 oz
6:30 p.m.	Fried eggs	2
6:30 p.m.	Fried chicken legs	2
6:30 p.m.	Refried beans	1 ½ cups

Milk Items (cups or ounces)

Time of day	Food Item and Method of Preparation	Amount Eaten
7:30 a.m.	Whole milk	1 cup
7:15 p.m.	Dannon strawberry yogurt	6 oz
9:30 p.m.	Braums chocolate ice-cream	1 cup

Combination foods

Time of day	Food Item and Method of Preparation	Amount Eaten
6:30 p.m.	Cheese and pepperoni pizza (10 inch)	2 slices
6:30 p.m.	Hamburger helper	1 cup
6:30 p.m.	Chili dog	1 footlong
6:30 p.m.	Beef stew with carrots and potatoes	2 cups
6:30 p.m.	Sopapilla	1

Sweets/Others

Time of day	Food Item and Method of Preparation	Amount Eaten
6:30 p.m.	Keebler chocolate chip cookies	2 whole
6:30 p.m.	Homemade oatmeal cookies	4 whole
6:30 p.m.	Snicker candy bar	1 king-size
8:30 p.m.	Donuts (plain cake type)	2
9:30 p.m.	Potato chips	20
9:45 p.m.	Strawberry hard candy	2 pieces

You may need some help in trying to decide how much you ate. Use this guide to help you.

Grains:
1. An average size bagel is the size of a hockey puck.
2. A medium size pancake is the size of a CD.
3. 1 cup of rice or pasta would be about the size of a walkman.
4. 1/2 cup of rice or pasta would fill a cupcake wrapper.
5 1 cup of dried breakfast cereal would be a large handful.

Fruits:
1. A fruit that is considered to be medium sized is the size of a tennis ball.
2. 1 cup of chopped fruit is about the size of a baseball.
3. 1/2 cup of fruit looks like a pile of 15 marbles.

Vegetables:
1. 1 cup of lettuce is 4 large leaves.
2. 1 cup of chopped vegetables is the size of a fist.
3. 1/2 cup of chopped vegetables is the size of a light bulb.

Meat:
1. 3 ounces of cooked meat is the size of a deck of cards or a cassette tape.
2. 1 ounce of meat is the size of a matchbook or 1 domino.

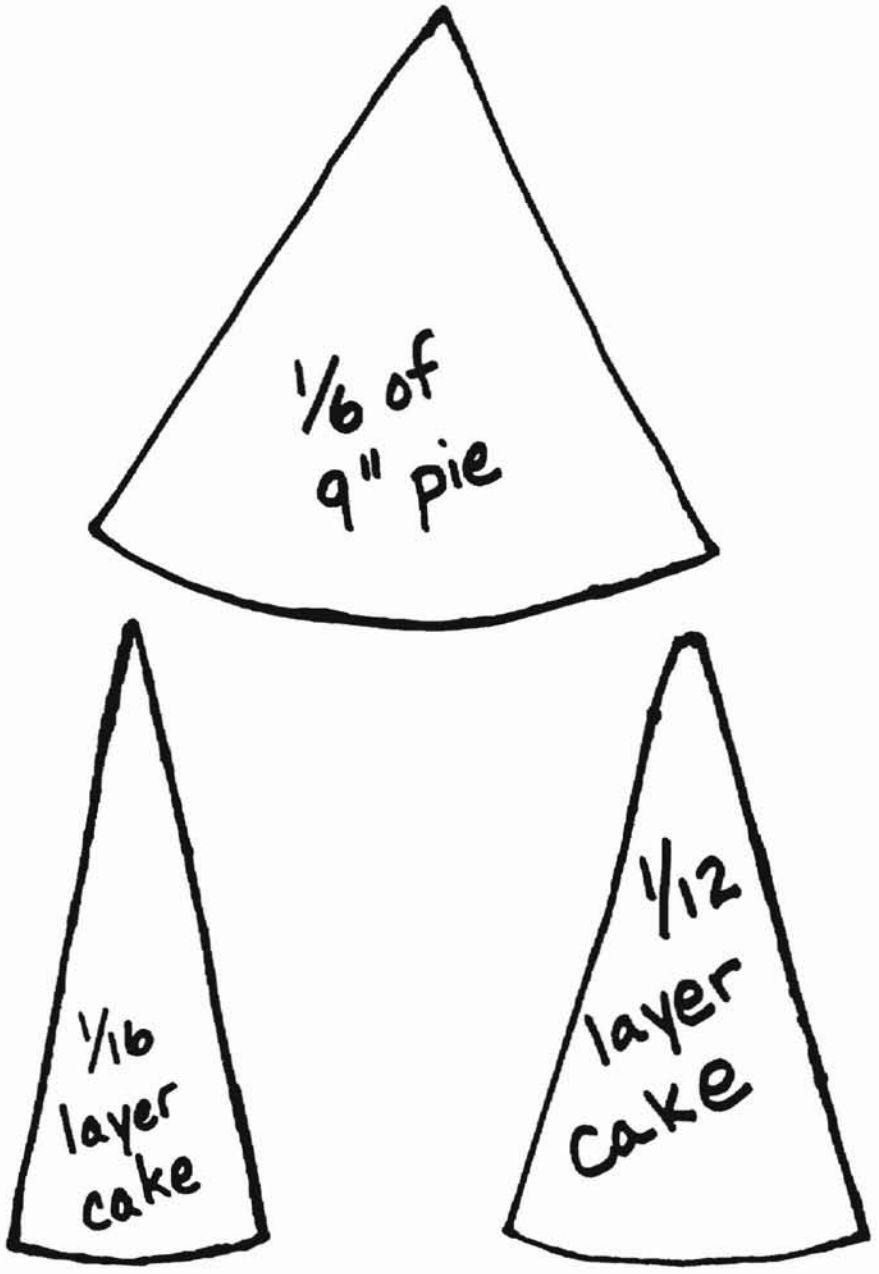
Milk Items:
1. 1 1/2 ounces of cheese looks like 3 dominoes or a 9-volt battery.
2. 1 ounce of cheese is the size of 4 dice.

Fats, oils, sweets/others:
1. 1/2 cup of ice cream is the size of a tennis ball.
2. 2 tablespoons of butter, salad dressing, peanut butter, or mayonnaise is the size of 1 dice.
3. 1 ounce of small snack foods like hard candy or nuts is a handful.
4. 1 ounce of larger snack foods like pretzels, cornchips, or potato chips is a large handful.

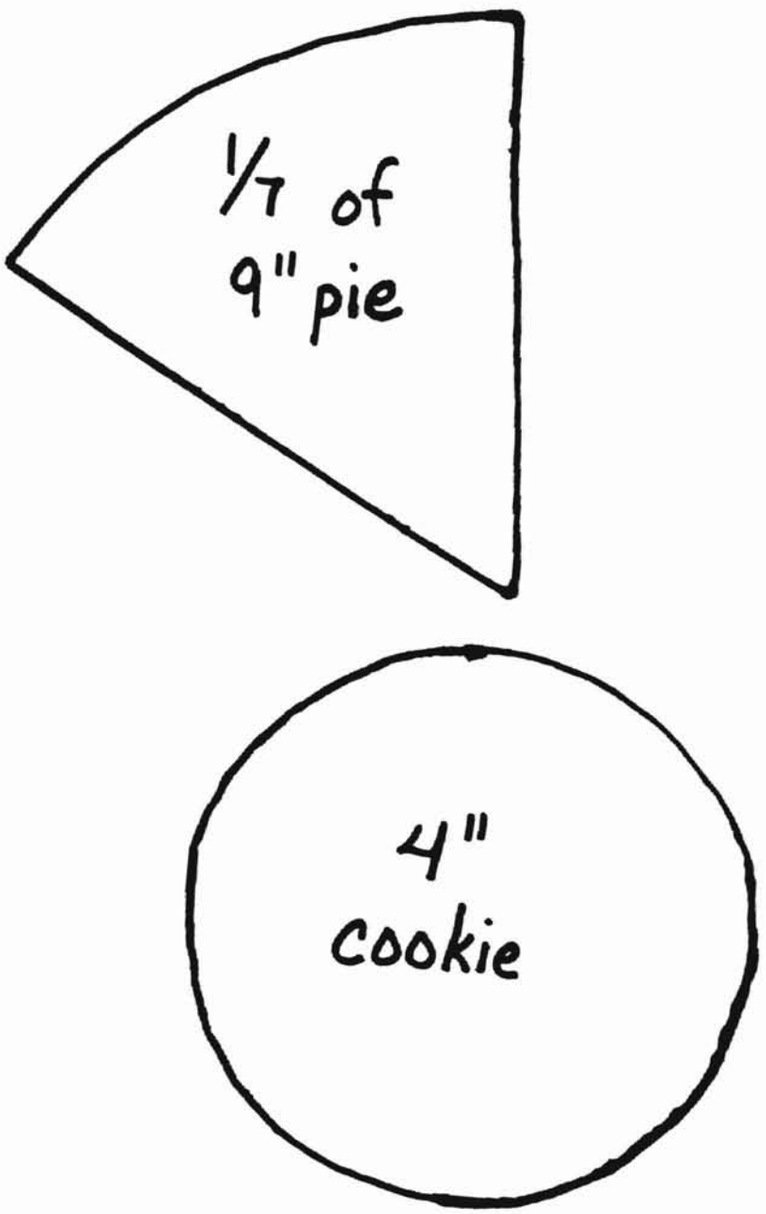
For your information:
1. 1 cup is the size of softball.
2. 1 tablespoon is 3 teaspoons.

Use the following pages to help you figure out how much you ate.

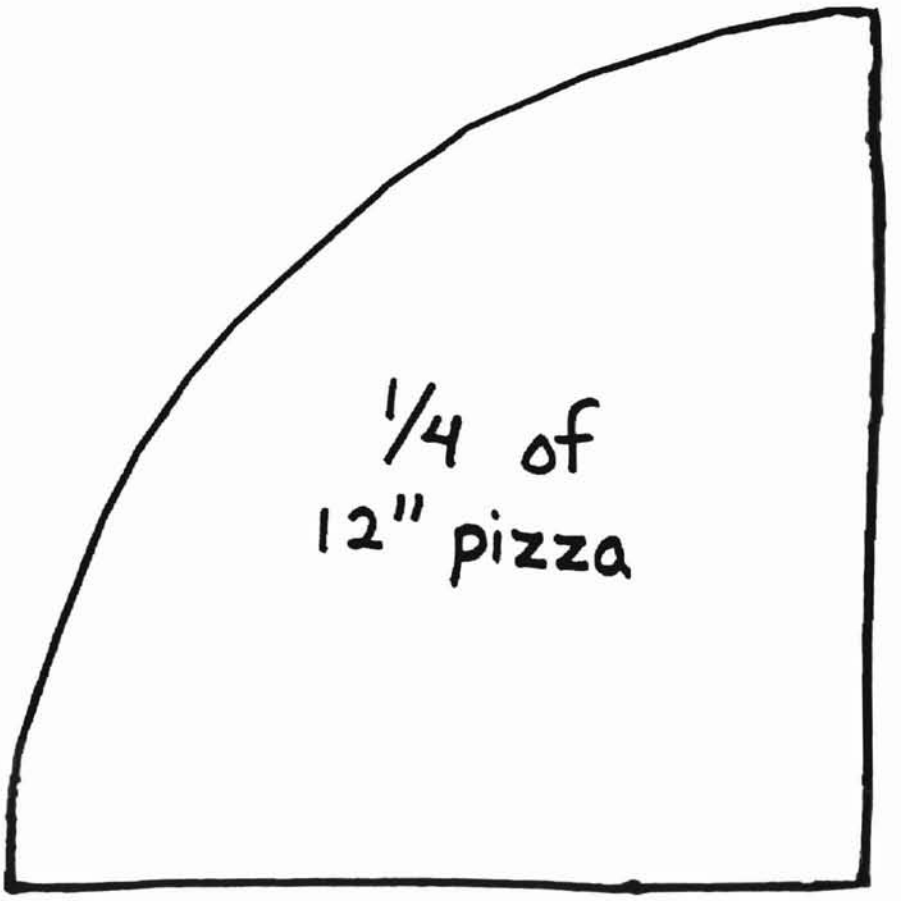
Use this page to help you determine how much pie or cake you ate.



Use this guide for cookies and pie



Use this guide for pizza.



If you ate ½ this amount you would record 1/8 of a 12" pizza.

Name_____

Identification #_____ Date_____

Time of day	Food Item and Method of Preparation	Amount Eaten

Name____________________________

Identification #________________________________ Date____________

Time of day	Food Item and Method of Preparation	Amount Eaten

Name_____

Identification #_____ Date_____

Time of day	Food Item and Method of Preparation	Amount Eaten

Diario de Comida

Queridos Participantes

Muchas gracias por participar en este estudio tan importante.
Todo lo que entra a tu cuerpo es muy importante para tu salud.
Por esta razón nos gustaría que escribieras todo lo que comes
y bebes durante 3 dias seguidos (todo lo que comes duraute las 24 horas de cada dia). Ojalá que este estudio nos ayude hacer recomendaciones para mejorar tu salud basado en lo que comes. Si tienes alguna pregunta a cualquier hora, por favor pregunta sin cuidado. Por favor no
cambies tus hábitos de comer durante los días en que vas a escribir lo que comes. Esto es muy importante porque necesitamos saber exactamente que comes.

Gracias !

Como debes usar el Diario de Comida

1.) Escribe todo lo que comes por 3 dias. Incluyendo comidas, dulces, bebidas y cualquier cosa que te comes. Todo lo que entra a tu cuerpo es importante.
2.) Escribe una lista de los alimentos al momento en que comiste sobre los paginas que te dejaron.
También escribe la hora y la cantidad que comiste. Por favor indique si es la a.m. o p.m.

3.) Explica cada comida que escribas. Por ejemplo:
   a.) Si escribes "pollo", explica si es frito, asado, al horno, etc. y cual parte del pollo: ala, pierna, etc.
   b.) Si escribes "leche", explica si es pura, 2 %, sin grasa, etc. No escribas solo leche.
   c.) Si escribes "pan", explica si es blanco, de trigo, de maíz, dulce, etc. No escribas solo pan.
   d.) Escribe la marca del producto o comida. Por ejemplo cereal Confleis: kellogg's, sopa de pollo: Cambells, o Ramen Noodles.
   e.) Incluye todo lo que le pones a la comida. Por ejemplo: mermeladas, azúcar, catsup, mostaza, mayonesa, mantequilla y salsas.

Hora	**Comidas y moda de Preparar**	**Cantidad**
6:30 p.m.	Nopalitos con chile colorado cocido con aceite	1 taza
6:30 p.m.	Arroz con salsa de tomate y verduras mixtas	½ taza
6:30 p.m.	Te con hielo	12 oz
6:30 p.m.	Azúcar	2 cucharaditas

4.) Estima que comes con medida (cuchara, taza o rebanada.) Tu maestra de nutrición te enseñara algunos ejemplos. Pon en una lista marcando la cantidad que comes.
5.) Por Favor escribe con lápiz y claramente. No te preocupes por la cantidad de papeleria que uses para escribir todo lo que comiste.
6.) Si tienes alguna pregunta o algo que no entiendas, por favor pregunta a tu maestra antes de que se vaya.
7.) No se te olvide traer tu diario en tu próxima cita.

Usa las siguientes medidas cuando estas escribiendo las comidas:

Bebidas (tazas o onzas)

Hora	Comida y Moda de Preparar	Cantidad
7:30 p.m.	Pepsi	20 oz.
9:00 p.m.	Te con hielo (sin azúcar)	8 oz
10:00 p.m.	Kool aid	16 o

Frutas (pieza, porciones, o tazas)

Hora	Comida y la Modo de Preparar	Cantidad
7:30 a.m.	Duraznos (enlatada con miel)	½ taza
12:00 p.m.	Plátano	1
3:30 p.m.	Manzana (roja)	1 mediana

Vegetales (tazas)

Hora	Comida y Modo de Preparar	Cantidad
12:00 p.m.	Chicharos (enlatados)	½ taza
2:00 p.m.	Maíz (enlatados)	1 taza
9:00 p.m.	Puré de papa	1 taza

Granos (Rebanada, tazas)

Hora	Comida y Modo de Preparar	Cantidad
7:30 a.m.	Pan blanco	1 rebanado
6:30 p.m.	Espaguetis cocidos	2 tazas
6:30 p.m.	Biscuete blanco (pan pequeño)	1 mediano

Carnes (onzas o tazas)

Hora	Comida y Modo de Preparar	Cantidad
6:30 p.m.	Hamburguesa	3 oz
6:30 p.m.	Huevos fritos	2
6:30 p.m.	Piernas de pollo fritas	2
6:30 p.m.	Frijoles refritos	2 tazas

Productos de Leche (tazas o onzas)

Hora	Comida y Modo de Preparar	Cantidad
7:30 a.m.	leche entera	1 taza
7:15 p.m.	Yogurt de fresa (Dannen)	6 oz
9:30 p.m.	Nieve chocolate (Braums)	1 taza

Comidas Combinadas

Hora	Comida y Modo de Preparar	Cantidad
6:30 p.m.	Pizza con queso y chiles	2 piezas
6:30 p.m.	Carne molida con tomate, cebolla y chile	1 taza
6:30 p.m.	Burrito de res con tomate cebolla y chile	1
6:30 p.m.	Caldo de res con papa, repollo y tomate y cebolla	1 taza
6:30 p.m.	Sopapilla	1

Dulces/Mas

Hora	Comida y Modo de Preparar	Cantidad
6:30 p.m.	Galletas de mantequilla (Keebler)	3
6:30 p.m.	Galletas de avena	2
6:30 p.m.	Chocolates (Snickers)	1 barra grande
8:30 p.m.	Donas	2
9:45 p.m.	Papitas fritas (Chips)	20

Si necesitas ayuda para decidir cuanto comiste; usa la guía para que te ayudes.

Granos:
1 Un hot cake seria del tamaño de un CD disco compacto
2. Una taza de arroz o sopa o pasta, seria del tamaño de un radio pequeña.
3. 1/2 taza de arroz o sopa seria del tamaño de los quequis.
4. Una taza de cereal seco seria igual que una mano llena.

Fruta:
1 Una fruta mediana del tamaño de una pelota de tenis.
2. 1 taza de fruta cortada seria del tamaño de una pelota de beisbol.
3. 1/2 taza de verduras seria del tamaño de un foco.

Carne:
1. 3 oz. de carne cocida seria del tamaño de un casette o un juego de barajas.
2. 1 oz. de carne seria del tamaño de una caja de cerillos o una pieza de domino.

Productos de Leche:
1. 1 1/2 oz. de queso seria del tamaño de 3 piezas de domino o un pila de 9 voltios.
2. 1 oz. de queso seria del tamaño de 4 dados.

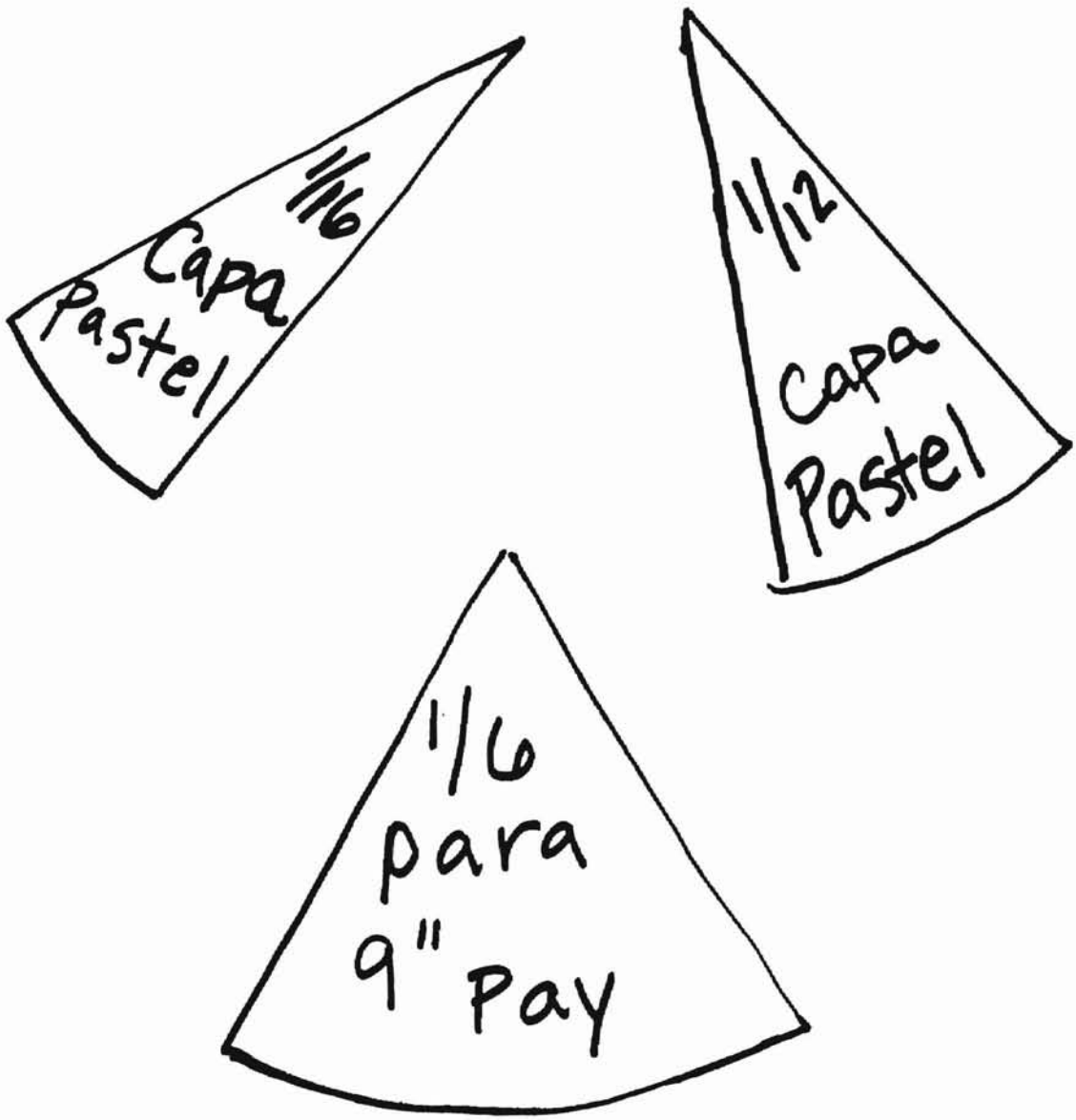
Grasa, Aceite, Dulces:
1. 1/2 taza de nieve seria del tamaño de una pelota de tenis.
2. 2 cucharaditas de mantequilla o crema de cacahuate ò mayonesa seria del tamaño de un dado.
3. 1 oz. de dulce duro o nueces es como una mano llena.
4. 1 oz. de papitas seria como una mano grande llena.

Verduras:
1. 1 taza de lechuga es igual que 4 hojas grandes.
2. 1 taza de verduras picadas es del tamaño de un puño.
3. 1/2 taza de verduras seria del tamaño de un foco.

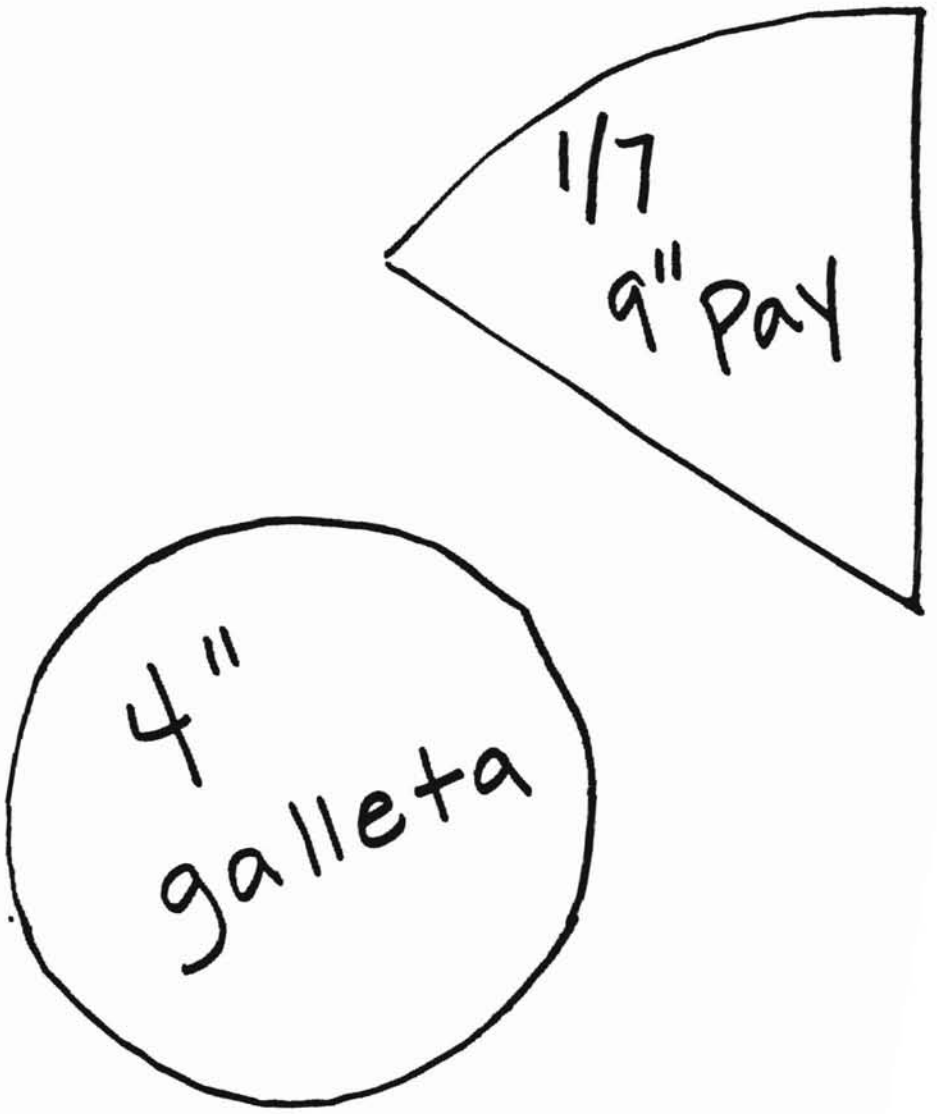
Información:
1 1 taza es la tamaño de un pelota de sofbol
2. 1 cucharada grande es 3 cucharaditas pequeñas.

Usa las siguientes páginas para determinar la cantidad que comiste.

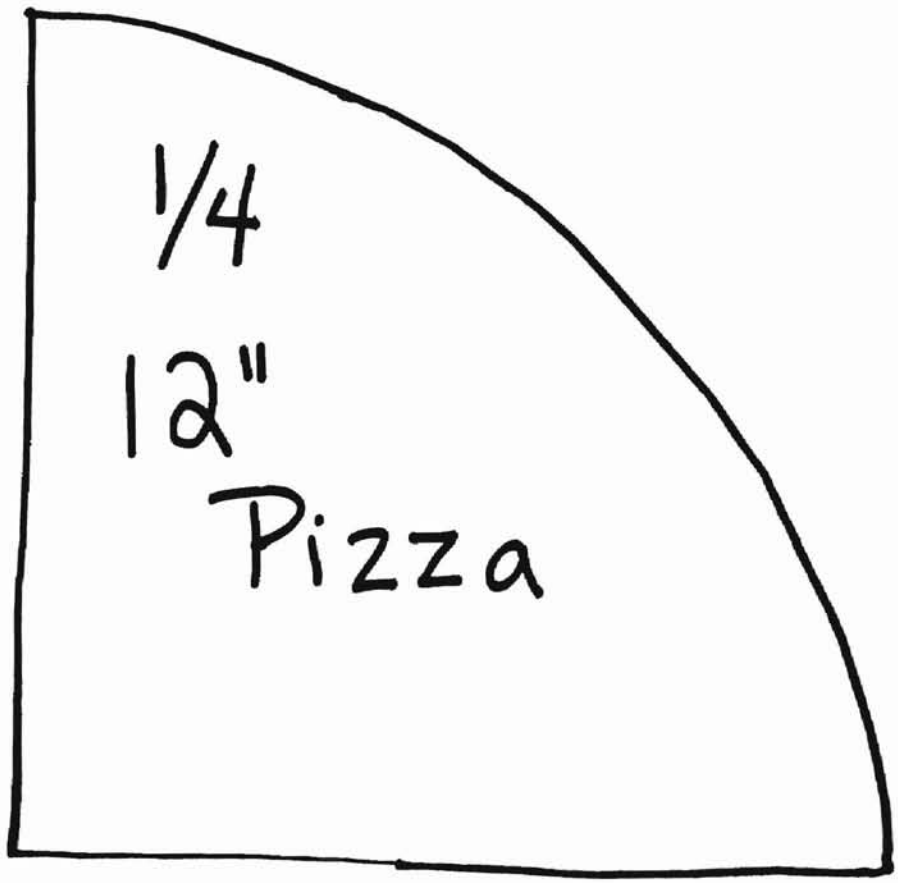
Usa esta pagina para determinar cuanto pastel o pay te has comido



Usa esta guía para galletas o pay.



Usa esta guía para pizza/tortilla.



Si comiste la mitad de esta medida escribe 1/8 de uua pizza de 12 inches.

Nombre_____

de Identificación_____ Fecha_____

Hora	Comida y Modo de Preparar	Cantidad

Nombre_____

de Identificación _____ Fecha _____

Hora	Comida y modo de preparar	Cantidad

Nombre_____

de Identificación _____ Fecha _____

Hora	Comida y modo de preparar	Cantidad

APPENDIX F

EFNEP AND ONE ENROLLMENT FORM

A ID# _____

Expanded Food and Nutrition Education Program
Adult Enrollment Form (Family Record)

Fill out for each family at ENTRY and again at EXIT. Keep in family file after it's reviewed by Agent and sent to Secretary for computer entry.

1. NEA's Name: ____ ENTRY ____ EXIT

4. Family ID: _____ a) Name _____
b) Street _____ c) City _____ Zip
d) Phone _____

5. Enrolled in EFNEP before? (circle Y for Yes, N for No) Y N
6. If Yes, did you receive a Certificate of Completion? Y N

7. Age: _____ 8. Sex: F M
9. Pregnant: Y N 10. Breast-Feeding: Y N

11. Race: Check the category you identify with

1-00 ___ White (non-Hispanic)
2-00 ___ Black (non-Hispanic)
3-00 ___ Am Indian/Alaskan Native
4-00 ___ Hispanic
5-00 ___ Asian or Pacific Islander

12. Place of Residence: circle

1 Farm
2 Towns under 10,000 & rural non-farm
3 Towns & Cities 10,000 to 50,000
4 Suburbs of Cities over 50,000
5 Central Cities over 50,000

13. Total Household Income Last Month: $_____

15. Number of Other Adults in Household (don't count Homemaker) _____

14. Household Members: Children by Age
List First Name of Children(through Age 19) | Age (Years)

1) _____
2) _____
3) _____
4) _____
5) _____
6) _____
7) _____

16. Instruction (Lesson) Type:
1 Group
2 Individual
3 Both
4 Other

17. Total Number of Lessons:

18. Entry Date:

19. Assistance programs that the Family Participates in at ENTRY: (circle)

WIC/CSFP	Y	N	Commodities	Y	N
Food Stamps	Y	N	Head Start	Y	N
FDPIR (Food Distribution Prog. on Indian Res.)	Y	N	Child Nutrition AFDC	Y	N
Other _____ (Specify)	Y	N			

[redacted]

20. Exit Date:

21. Exit Reason: (circle)
1 Educational Objective Met
2 Returned to School
3 Took Job
4 Family Concerns
5 Staff Vacancy
6 Moved
7 Lost Interest
8 Other

22. Did your family receive assistance as the result of a referral or suggestion from EFNEP personnel? Y N

If yes, check all that apply:
___ WIC/CSFP
___ Food Stamps
___ FDPIR (Food Distribution Prog. on Indian Res.)
___ Commodities
___ Head Start
___ Child Nutrition
___ AFDC
___ Other _____ (Specify)

Comments

APPENDIX G

MODIFIED MULTIPLE PASS INSTRUMENT

For your information:

1. 1 cup is the size of a baseball
2. 1 tablespoon is 3 teaspoons.

Remember to write down these items

- Crackers, breads, rolls, tortillas.
- Hot or cold cereals.
- Cheese added as topping on vegetables or on a sandwich.
- Chips candy, nuts, seeds.
- Fruit eaten with meals or as a snack.
- Coffee, tea, soft drinks, juices.
- Beer, wine cocktails, brandies, any other drinks made with liquor

Use the cups that we have left with you to figure out how many ounces you drink and eat.

APPENDIX H

CORE FOODS SELECTED BY HISPANICS

Core foods selected by Hispanics (n=16).

	N	%
Red chili sauce	13	81
Cornbread, tortillas	12	75
Tomatoes	11	69
Eggs	11	69
Regular soft drinks	10	63
Baked beans	10	63
Rice	9	56
Butter, margarine added to veg.	8	50
Other vegetables	8	50
Other candy	7	44
Other cheeses	7	44
White bread	7	44
Hamburgers	7	44
Milk on cereal	6	43
Other cold cereals	6	38
Sugar in coffee or tea	6	37
Coffee	6	37
Apple, pear	6	37
Whole milk	5	31
Doughnuts, cookies	5	31
Orange juice	5	31
Bananas	5	31
Saltines	4	25
Margarine on bread	4	25
Salty snacks	4	25
Fruit drinks	4	25
Oranges	4	25

APPENDIX I

CORE FOODS SELECTED BY BLACKS

Core foods selected by blacks (n=37)

	N	%
White bread	31	84
Fruit drinks	24	65
Margarine on bread	20	56
Regular soft drinks	18	49
French fries	17	47
Milk on cereal	16	43
Butter, margarine added to veg.	15	41
Salty snacks	13	36
Bacon	13	35
Chocolate candy	13	35
Ham	13	35
Orange juice	12	34
Salad dressing, mayonnaise	12	32
Whole milk	12	32
Eggs	11	30
Sausage	10	28
Sugar added to cereal	9	25

APPENDIX J

CORE FOODS SELECTED BY WHITES

Core foods selected by whites (n=39-41).

	N	%
White bread	30	73
Butter, margarine added to veg.	29	71
Regular soft drinks	22	54
Margarine on bread	21	51
Salad dressing, mayonnaise	18	44
Hamburgers	17	41
Other cheeses	17	41
Milk on cereal	15	38
Whole milk	13	32
Salty snacks	12	30
Fruit drinks	12	29
Other potatoes	12	29
Eggs	12	29
French fries	11	27

APPENDIX K

SHORT FFQ LIST OF FOODS

SHORT FOOD FREQUENCY FOOD LIST

1. White bread
2. Regular soft drinks
3. Margarine
4. Fruit drinks
5. Eggs
6. Whole milk
7. Other cheeses, cheese spreads
8. Salad dressing and mayonnaise
9. Hamburgers, meatloaf
10. Salty snacks, chips
11. French fries
12. Orange juice
13. Spaghetti
14. Macaroni and cheese
15. Fried chicken
16. Other potatoes
17. Corn
18. Cornbread, tortillas
19. Ham, bologna, salami
20. Pork
21. Pizza
22. Green beans
23. Doughnuts, cookies, cakes
24. Ice cream
25. Hotdogs
26. Biscuits, muffins, pancakes
27. Carrots
28. Beef steaks, roasts
29. Chicken or turkey, broiled
30. Bananas
31. Chocolate Candy
32. Other candy
33. Tea
34. Tomatoes
35. Bacon
36. Saltines
37. Sausage
38. Chili with beans
39. Red chili sauce
40. Green salad
41. Other cold cereals, cornflakes
42. Gravies
43. Peas
44. Rice
45. Berries, fruit cocktail, grapes
46. Baked beans
47. Oranges
48. Tuna salad
49. Other soups
50. Beef stew
51. Vegetable and tomato soup
52. Broccoli
53. Apple, pear
54. Cooked cereal
55. Peanut butter
56. Sugar in tea and cereal
57. Peaches, apricots
58. Fried Fish
59. Any other cooked vegetable, onions
60. Strawberries in season
61. Mustard and collard greens

VITA

Melanie Ann Cook

Candidate for the Degree of

Master of Science

Thesis: THE VALIDATION OF A FOOD FREQUENCY QUESTIONNAIRE FOR USE IN MEASURING FOOD INTAKE OF LOW-INCOME WOMEN

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