OKLAHOMA COMMUNITY NUTRITION EDUCATION PROGRAM PARTCIPANT'S DIET QUALITY DOES NOT DIFFER BY FOOD SECURITY STATUS

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CHAPTER I

INTRODUCTION

Throughout the literature food security and food insufficiency are used interchangeably although their definitions are different. Food security is defined as "access by all people at all times to enough food for an active, healthy life and includes at a minimum the ready availability of nutritionally adequate and safe foods and an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing or other coping strategies)" (Bickel et al. 2000, p. 6; Life Sciences Research Office (LSRO), 1990). Food insecurity is defined as the "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways (Bickel et al. 2000, p. 6; LSRO, 1990). Food sufficiency is defined as "having enough food to eat and of the kind of foods wanted" (Ribar and Hamrick, 2003). Food insufficiency is defined as "an inadequate amount of food intake due to lack of resources" (Alaimo et al. 1998; Briefel and Woteki, 1992).

The questions used to measure food insecurity and food insufficiency differ. The USDA Continuing Survey of Food Intakes by Individuals (CSFII) food sufficiency question asks respondents about their perceptions of the adequacy of their household food.

The National Health and Nutrition Examination Survey (NHANES) asks the same question but at the individual rather than the household level (Rose et al. 1998). The food sufficiency question covers only one portion of the larger definition of food insecurity, which measures the progression of declining amounts of food. Food insufficient households are food insecure, but food insecure households are not always food insufficient (Rose et al. 1998). The USDA food security questions seek to assure that the reported behavior is due to household financial restraints by including phrases such as "because we couldn't afford that" or "because there wasn't enough money for food" (Bickel et al. 2000). For the purpose of this study food insecurity was measured however the review of the literature will contain studies that use both terms.

Currently food security status is measured in the U.S. using the United States Department of Agricultures (USDA) 6-item or 18-item Core Food Security Module (CFSM). This information is available for individual states and the nation annually via the U.S Census Bureau's Current Population Survey (CPS). While the information provided by the CPS is helpful in determining state and national levels of food security it does not provide food security status for individual counties or areas within a state.

Food insecurity is increased in households with lower income and lower levels of education (Rose, 1999), and in households with children headed by a single women (Nord et al. 2002). This population is at a greater risk of suffering from food insecurity and the far reaching physical, psychological and sociofamilial consequences of being food insecure (Hamelin et al. 1999). Research indicates that food insecure households have lower nutrient intakes than food secure households (Rose, 1999). In a study by Tarasuk and Beaton, (1999 B) lower nutrient and energy intakes were observed among

women from food insecure households to the point that potential nutritional problems could arise from these decreased intakes over a long term period.

The USDA Healthy Eating Index (HEI) measures diet quality. Previous research using national level data by Basiotis et al. (2002) has found that individuals in lower income households scored lower on the HEI compared to higher income households. Scores also varied by gender, race, and level of education. Currently there is no other research available regarding diet quality as measures by the HEI and food security status.

By determining food security status of low-income household in the Community Nutrition Education Program (CNEP) and the relationship to diet quality we will be better able to tailor nutrition lessons to program participant's needs and identify participants who require additional help in acquiring and managing food. Measuring food security status could also evaluate CNEP effectiveness in improving food security.

The purpose of this study was to determine diet quality of food secure/insecure Community Nutrition Education Program (CNEP) households within the state of Oklahoma. This will also help to tailor nutrition education lessons in a way that will benefit the participant. The information provided by this project will further characterize food secure and food insecure Oklahoma households.

The objectives of the present study were to:

1. Determine if reasons for not having enough food differ by food security status.
2. Determine whether food resource management practices differ by food security status.
3. Determine if nutrient intake differs by food security status.
4. Determine if diet quality differs by food security status.

Assumptions

In this study, the researchers assumed that the information provided by the participants was accurate and complete. It was assumed that the Nutrition Education Assistants (NEA) accurately recorded participants' responses to questions, 24-hour food recall, and asked for clarification if needed.

Definition of Terms

Food security: "Access by all people at all times to enough food for an active, healthy life. This definition includes at a minimum (1) the ready availability of nutritionally adequate and safe foods, and (2) an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing or other coping strategies)."(Bickel et al. 2000, p.6; LSRO, 1990).

Food insecurity: "The limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing or other coping strategies)." (Bickel et al. 2000, p. 6; LSRO, 1990).

Food secure: "Households show no or minimal evidence of food insecurity" (Bickel et al. 2000, p.11)

Food insecure without hunger: "Food security is evident in household members concerns about adequacy of the household food supply and in adjustments to household food management, including reduced quality of food and increased unusual coping patterns. Little or no reduction in members food intake is reported" (Bickel et al. 2000, p.11).

Food insecure with hunger (moderate): "Food intake for adults in the household has been reduced to an extent that implies that adults have repeatedly experienced the physical sensation of hunger. In most (but not all) food-insecure households with children, such reductions are not observed at this stage for children". (Bickel et al. 2000, p11).

Food insecure with hunger (severe): "At this level, all households with children have reduced the children's food intake to an extent indicating that the children have experienced hunger. For some other households with children, this already has occurred at an earlier stage of severity. Adults in households with and without children have repeatedly experienced more extensive reductions in food intake" (Bickel et al. 2000, p12).

Gleaning: For the purpose of this study, gleaning is defined as Nutrition Education Assistants (NEAs) providing produce donated by local grocers to CNEP participants. NEAs use the produce to educate participants on how to incorporate fruits and vegetables into their diets (http://www.fcs.okstate.edu/cnep/success/gleaning.htm).

Hunger: "The uneasy or painful sensation caused by a lack of food. The recurrent and involuntary lack of access to food. Hunger may produce malnutrition over time and is a potential, although not necessary, consequence of food insecurity" (Bickel et al. 2000,) (Life Sciences Research Office (LSRO), 1990).

HEI: Healthy Eating Index is a single summary measure of diet quality. The HEI contains 10 components, which are based on different aspects of a healthful diet. Each component has a score ranging from 0-10 with the overall index ranges from 0-100 (Kennedy et al. 1995). A total HEI score over 80 implies a "good" diet, while a total HEI score between 51-80 implies a diet that "needs improvement," and an HEI score less than 51 implies a "poor" diet (Basiotis et al. 2002).

Income to poverty ratio: expressed as a ratio of income to the families (or unrelated individual's) appropriate poverty threshold. Ratios below 1.00 are below the official definition while a ratio of 1.00 or greater indicates income above the poverty level. A

ratio between 1.00 and 1.25 indicates for example that a family's income was above their poverty threshold but below 125 percent of their poverty threshold. If a family's poverty threshold was $10,000 a ratio of 1.00 to 1.25 thus would mean their income was between $10,000 and $12,500 (http://www.census.gov/hhes/income/defs/ratio.html).

Food Sufficiency: Having enough food to eat and of the kind of foods wanted (Ribar and Hamrick, 2003).

Food Insufficiency: "an inadequate amount of food intake due to lack of resources" (Alaimo et al. 1998) (Briefel and Woteki, 1992).

Chapter II

REVIEW OF THE LITERATURE

The review of the literature includes an overview of the Community Nutrition Education Programs (CNEP), United States Department of Agriculture Core Food Security Module (CFSM), 24-hour food recall, nutrient intakes of low-income populations with regards to food security status, and the Healthy Eating Index (HEI).

Community Nutrition Education Programs

Community Nutrition Education Programs (CNEP) offered by the Oklahoma Cooperative Extension Service include within it the Expanded Food and Nutrition Program (EFNEP) and the Oklahoma Nutrition Education Program (ONE). The United States Department of Agriculture (USDA) Cooperative Extension Service developed the Expanded Nutrition Education Program in 1969 to aid limited resource families to obtain a healthy diet through food and nutrition education. EFNEP is available in all 50 states and reaches around 200,000 families with young children per year. Since its beginning

EFNEP has become the largest federally funded program to offer only nutrition education. EFNEP is available to families with children < 18 years of age or who are pregnant and are receiving any type of federal food assistance (Arnold and Sobal, 2000), (http://fcs.okstate.edu/cnep/about/funds.htm). The ONE program is made available through the Food and Nutrition Service of the USDA and the Oklahoma Cooperative Extension Service in conjunction with the Oklahoma Department of Human Services food stamp program. The ONE program is available to people of all ages who use food stamps or who are food stamp eligible (http://fcs.okstate.edu/cnep/about/funds.htm).

CNEP offers nutrition education on a regular basis to its participants through one-to-one visits at participants' homes, small groups within the community, and preformed groups in nearly 40 Oklahoma counties. Participants enrolled in these programs are able to select lesson plans that will best meet their individual and family needs. Lesson plan topics offered to participants include food budgeting, shopping, meal planning and preparation, general nutrition education, and food safety (http://fcs.okstate.edu/cnep/about/mission.htm).

Nutrition Education Assistants (NEAs) are in charge of educating the participant. NEAs are individuals within the community that CNEP has trained and employed to serve as teaching paraprofessionals. CNEP provides in-service education and training to help NEAs learn money management skills, basic nutrition, food safety, and food preparation techniques. NEAs set out with two goals: (1) help families improve their diet and (2) help families learn to manage their resources so they can eat as well at the end of the month as the beginning. These NEAs are unique in that many of them have used some type of federal food assistance in the past. This common experience of utilizing

federal assistance that is shared by the NEA and the participant provides a common ground for both parties (http://fcs.okstate.edu/cnep/about/who.htm) (http://fcs.okstate.edu/cnep/about/what.htm).

Most of the participants enrolled within the CNEP program will meet with an NEA at least 3 times a month for up to 9 to 11 months. This time allows NEAs and families to choose the changes a family needs to make and establish mini goals to help them achieve those changes. This type of education design offers an individual personalized learning experience for each family (http://fcs.okstate.edu/cnep/about/what.htm).

CNEP offers participants a long and short term program. The long term program provides education focusing on improving health and nutrition. Upon completion of the long term program participants receive a certificate of completion after 6 to 11 months of participation, completion of a minimum of 16 lesson topics and improvement in 2 areas of the food recall and 2 behaviors of the CNEP survey. The short term program provides intensive education focusing on survival skills and specific resource management and nutrition needs. This program is tailored to families undergoing change and who are on the move. Upon completion participants receive an introductory certificate of completion for 2 to 5 months of participation and successful completion of specific lesson topics which include food guide pyramid, label reading, budgeting, meal planning, food safety, and one lesson from the following topics of feeding young children, breakfast, or healthy snacks (http://fcs.okstate.edu/cnep/about/enrollment.htm).

CNEP enrollment for the year of 2003 in Oklahoma consisted of 5,089 low-income families. Roughly 67% of enrolled families had children. Out of the 67% with

children, more than 7,186 were between the ages of <1 to 19, with 49% of all the children being aged 5 or under. Fifty-five percent of CNEP participants were white with the remaining 45% being ethnic minorities such as African American (22%), American Indian (15%), and Hispanic (6%). When comparing CNEP entrance and exit interviews, 91% of program participants demonstrated a positive change towards a healthy diet as a result of nutrition training. Eighty-two percent of participant's demonstrated improvements in one or more food resource practices, such as meal planning, using a grocery list, and comparing prices when shopping. Eighty-seven percent of participants demonstrated improvements in one or more nutrition practices, such as limiting sodium use when preparing foods and reading nutrition facts labels. Thirty-seven percent of participants ran out of food less often before the end of the month after graduating. Sixty-two percent of participants followed the recommended food safety practice of not thawing food at room temperature and 24% of participants reported that children within the household ate breakfast more frequently after graduation (Oklahoma Cooperative Extension Service FY2003 data)

Arnold and Sobal (2000) determined the benefits gained and maintained by EFNEP participants in areas such as food practices, nutrient intake, and nutrition knowledge, and non-nutritional benefits such as healthier family and positive employment changes after completion of the program. The study was a prospective within subject design consisting of 59 EFNEP participants ranging in age from 17-47 years with a mean age of 29 from both rural and urban areas. Participants were largely white and 41% had not completed high school. The mean duration of time between entry and graduation was 11 months. Nutrient analysis was based on 24-hour food recall

data. Fourteen different nutrients were examined including total kcal, percentage of kcal from fat, carbohydrate, protein, calcium, iron, vitamin A, vitamin C, vitamin E, folate, saturated fat, unsaturated fat, cholesterol, and dietary fiber.

Participants' nutrition knowledge about the grain group, iron rich foods, and frequency of inclusion of calcium rich foods increased from program entry through graduation to follow-up one year after completion of the program. Improvements during the program occurred for 10 of the 12 foods and nutrition practices. No significant changes were found in caloric intake between entry, graduation and follow up. Intakes of vitamin C, folate, and fiber changed significantly between entry and graduation (reported as mean ± standard deviation). Vitamin C increased significantly from 71.7 ± 67.1 mg/d at entry to 107.3 ± 104.6 mg/d at graduation (p=.03). Folate increased significantly from 185.3 ± 121.5 µg/d at entry to 244.7 ± 159.7 µg/d at graduation (p=.02) and fiber increased from 10.0 ± 6.5g/d at entry to 13.2 ± 6.2 g/d at graduation (p=.01). Significant decreases occurred between graduation and follow up for calcium and folate intake. Calcium decreased significantly from 1038.1 ± 621.0 mg/d at graduation to 782.9 ± 506.5 mg/d at follow up (p=.02) and folate decreased from 244.7 ± 159.7 µg/d at graduation to 194.3 ± 118.5 µg/d at follow up (p=.05). Fiber intake increased significantly between 10.0 ± 6.5 g/d at entry to 12.9 ± 8.2 g/d at follow up (p=.03) (Arnold and Sobal, 2000).

Burney and Haughton (2002) examined whether participation in EFNEP helped households use resources wisely, whether participation helps individuals within households improve nutrient intake, and the cost to improve these behaviors. A random sample of 384 subjects from 16 Tennessee counties served by EFNEP was used. All subjects were low-income women between the ages of 18 to 72 years with a mean age of

31 years. The study was a prospective quasi-experimental design, with nonequivalent comparison group using 3 groups. Group A received EFNEP nutrition education and collected cash register receipts for food purchased. Group B received EFNEP nutrition education and estimated food expenditures from recall. Comparison group C who qualified for EFNEP but delayed participation in EFNEP until groups A and B completed EFNEP education.

All cost data were collected over a 6-month period. Outcome data were collected using EFNEP program entry and exit forms including family record, dietary recall form, and EFNEP survey. Net Present Value (NPV) was used to evaluate benefits and costs in a particular time dimension. If the NPV was greater than zero a program or intervention was considered to be cost beneficial (Burney and Haughton, 2002).

The mean EFNEP program cost per participant was found to be $388 per person. On average EFNEP participants saved $124 to $234 per year on food resources (Burney and Haughton 2002). Previous research indicated that EFNEP participants retain benefits for 3 to 5 years (Torisky et al. 1987). Subjects in groups A saved $10.36 ± $9.79 per month and subjects in group B saved $19.53 ± $6.79 per month on average family food costs while subjects in group C spent $5.22 ± $8.64 more on food. Subjects in groups A and B increased estimated intakes of iron, vitamin C, vitamin B-6, and fiber. Subjects from groups A and B also reported decreasing the amount of salt used when cooking, reading nutrition labels more, and not running out of food at the end of the month as often. Assuming that benefits were retained for five years at a 7% discount rate and that the food expenditure recalls by the participants are valid, the NPV was $600 demonstrating that EFNEP is a cost beneficial program (Burney and Haughton, 2002).

Food Security

Food security is defined as "access by all people at all times to enough food for an active, healthy life and includes at a minimum the ready availability of nutritionally adequate and safe foods and an assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing or other coping strategies)." Food insecurity is defined as the limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways (Bickel et al. 2000, p. 6; LSRO, 1990). Bickel et al (2000) described food security as being part of an essential, universal dimension of household and personal well-being and food insecurity and hunger as the deprivation of basic need and possible precursors to nutritional health and developmental problems.

Food insufficiency is defined as "an inadequate amount of food intake due to lack of resources" (Alaimo et al. 1998; Briefel and Woteki 1992). Several studies have confirmed the validity of the USDA food sufficiency question as a measure of food insecurity (Rose et al. 1998). Throughout this review of the literature we will look at studies that measure both food security and food sufficiency.

Measurement of Food Security

In 1990 the National Nutrition Monitoring and Related Research Act developed a 10-year plan for the development of a standard measure of food insufficiency or food

security and standard methods for their use at state and local levels (Klein 1996). The 1992 Food Security Measurement Project was a collaborative undertaking by federal government agencies and private sector experts. It was headed by the Food and Nutrition Service (FNS) and Economic Research Service (ERS) of the USDA and the Centers for Disease Control and Prevention, and the National Center for Health Statistics (NCHS) of the U.S. Department of Health and Human Services and was formed to develop the needed food security measure (Bickel et al. 2000). At the 1994 USDA and U.S. Department of Health and Human Services Conference on Food Security Measurement and Research, an expert panel reached agreement on requirements on a measure for collecting data on food insecurity and hunger (Klein 1996).

The measure known today as the USDA Core Food Security Module (CFSM) was developed using previous research from the Cornell University Division of Nutritional Sciences and research from the Community Childhood Hunger Identification Project (CCHIP). The Cornell University Division of Nutritional Sciences through the examination of the dimensions of food insecurity had developed food security measurement scales at the household and individual level. CCHIP had developed one of the earliest instruments to measure hunger and the risk of hunger in children from low-income families (Carlson et al. 1999). Today food security is measured annually via the U.S. Census Bureaus Current Population Survey (CPS) using the USDA 18-item CFSM (Appendix A) (Bickel et al. 2000).

The 18-item CFSM was implemented in April 1995 in the first food security supplement of the CPS to monitor food security in the U.S. A variety of specific conditions, experiences, and behaviors serve as indicators of the varying degrees of food

insecurity and hunger within a household. The 18-item CFSM uses established questions that inquire about the following types of household behaviors, conditions, events, and subjective reactions: (1) anxiety about running out of food or money to buy food, (2) the actual experience of running out of food, and not money to buy more, (3) respondents feelings that the food eaten by household members was inadequate in quality or quantity, (4) making adjustments to normal food use, by substituting fewer and cheaper foods than usual, (5) situations of reduced food intake by household adults, or consequences of reduced intake such as the physical sensation of hunger or weight loss, and (6) situations of reduced food intake, or consequences of reduced intake, for children in the household. Each question within the CFSM shares the characteristics of asking about circumstances that occurred during the previous 12 months and assuring that the behavior or condition that is reported is due to financial limitations of the household (Bickel et al. 2000).

The questions within the 18-item CFSM form a single overall measure called the food security scale. The food security scale measures the sufficiency of food in the household as experienced by household members and not the nutritional adequacy of diets within the household. The food security scale is a continuous scale which measures the degree of severity of food insecurity/hunger within a household by assigning a household a numerical value ranging from 0 to 10. The value or score that a household receives is determined by the number of affirmative responses that a household gives to the increasingly severe sequence of survey questions. A household with a scale value of 0 has not experienced any of the conditions of food insecurity covered by the 18-item CFSM. A scale value of 10 indicates that a household has experienced all of the conditions of food insecurity covered by the 18-item CFSM (Bickel et al. 2000).

The questions within the 18-item CFSM work together to identify the household level of food insecurity/hunger severity as responses to individual questions alone are not able to determine food security status. Four categories have been defined to cover the range of severity of the food security scale using the 18-items (1) Food secure households are households that show no or little evidence of food insecurity, (2) Food insecure without hunger exist in households where food insecurity is evident through household members concerns about the adequacy of household food supplies and changes in food management practices such as buying reduced quality of food, with minimal to no reduction in household members food intake reported at this level, (3) Food insecure with hunger (moderate) exists when adults in the household have reduced their food intake to the extent that implies that the physical sensation of hunger has been experienced repeatedly, and in most cases children within households that fall at this level have not experienced a reduction in food intake, (4) Food insecure with hunger (severe) exists when households with children have reduced food intake to the point that the children have experienced hunger (Bickel et al. 2000).

Research indicates that households encounter different behavioral and experiential stages as food insecurity increases (Bickel et al. 2002). In the beginning stage of experiencing food insecurity households often encounter inadequacy of food supplies and food budgets, feelings of anxiety about having enough food to meet household's basic needs, and adjusting food budgets and types of foods served to what. As the situation worsens or length of time of inadequacy increases, adults begin reducing food intake in order to provide enough food for their children and often the adult begins to experience hunger. If food insecurity continues to increase, children begin to suffer from hunger

from reduced food intake and adults continue to further decrease their food intake. Although not all households experience this pattern the same way, U.S households demonstrate similarities in their experiences across the ranges of severity of food inadequacy (Bickel et al. 2002).

Validity of 18-item and 6-item CFSM

The 18-item CFSM is well grounded in the understanding of food insecurity and hunger (Frongillo 1999). The 18-item CFSM was developed primarily using the CCHIP and Radimer/Cornell measures of hunger and food insecurity. Selected questions from the CCHIP survey and the Radimer /Cornell measure have been validated for measuring hunger and food insecurity in households in previous research (Frongillo et al. 1997). Frongillo et al. (1997) compared the Radimer/Cornell and CCHIP measures against a criterion measure developed using data from a 1993 survey of 193 households of women and children. The Radimer/Cornell and CCHIP measures agreed on the categorization of food insecurity and hunger in 85% of the households. Both measures had good specificity and excellent sensitivity when compared to the criterion measure. Derrickson et al. (2000) found that the 18-item CFSM is valid and reliable when used with a population of Asian and Pacific islanders from Hawaii with goodness-of-fit of the items suggesting that the CFSM works as well for the Asian and Pacific Islander population of Hawaii as it did for the national sample. Opsomer et al. (2003) evaluated the measurement of food insecurity currently used by the USDA using generalized linear mixed models (GLMM). Data used were from the 1995, 1997 and 1999 USDA CFSM

from the CPS. All of the food security items were found to be highly significant when data from the CPS CFSM were fitted to the GLMM.

A 6-item subset (short form) (Appendix B) of the 18-item CFSM was developed for use when respondent burden and time and resource constraints are an issue (Bickel et al. 2000, Blumberg et al. 1999). The 6-item subset can distinguish between the three main categories of food secure, food insecure without hunger, and food insecure with hunger (moderate). The 6-item subset can only provide an indicator of the risk of children's hunger by measuring food insecurity with hunger (moderate). However, it is unable to capture the more severe range of food insecurity with hunger (severe) where children's hunger and an increased level of adult hunger occurs (Bickel et al. 2000).

The short form was developed using items that were chosen from the 18-item CFSM. Four subsets of the 18-item CFSM were evaluated using data collected from the 44,647 households that completed the 1995 CPS Food Security supplement. All four subsets correctly identified the level of food insecurity for 97.1% of the households. Food security estimates fell within 2 percentage points of the estimates from the full 18-item scale for all four subsets. Estimates of food insecurity with hunger fell within 0.7 percentage points of the 18-item scale for all four subsets. When the magnitude of the bias for the estimates of overall food insecurity and food insecurity with hunger were averaged for each subset it was found that one subset with 6 items had the smallest average bias and the largest concordance. This subset, now known as the 6-item subset, was chosen to be the best short form of the 18-item CFSM. The 6-item subset correctly identified the level of food insecurity for 97.7% of all households, 95.6% of households with children, and 99.0% of households without children (Blumberg et al. 1999).

Limitations of the Core Food Security Module

The USDA CFSM possesses limitations within it as to the amount and type of information that it can provide. Examples of some of these limitations are provided below. The USDA CFSM is unable to measure food safety, nutritional status, the availability of food through socially acceptable channels or the nature or sources of the available food supply. In addition, the CFSM only reflects household food security situation for the 12 months prior to the interview (although for research purposes this can be changed to reflect other time periods). Households that are classified as food insecure are classified as such because they experienced food insecurity at some point during the past 12 months (or other period) and may actually be food secure at the time of the interview. Furthermore the CFSM is unable to differentiate as to which or how many adults or children experienced food insecurity in households where one or more adult or child is present. Finally, the CFSM is comprised of questions that measure the households reported behavior or condition based on household financial restraints and does not take into account other possible sources of food insecurity such as lack of mobility or function for elderly or ill persons (Bickel et al. 2000).

Prevalence of Food Insecurity

In 2002, 88.9% of U.S households were food secure (Nord et al. 2002). The remaining 11.1% were food insecure at some point during the year with 3.5% food insecure with hunger. This was an increase from 10.7% being food insecure and 3.3%

being food insecure with hunger in 2001 (Nord et al. 2002). Between the years of 2000-2002 Oklahoma on average fell within the top five states in the nation with the highest level of food insecurity with or without hunger with 14.3% of households being food insecure at some point during the previous year. During this same time period, Oklahoma was number one in the nation with the highest level of food insecurity with hunger at 5.1% of households (Nord et al. 2002). Surrounding states food insecurity levels during this same period varied. Arkansas and Texas had a higher prevalence of food insecurity with or without hunger with Arkansas at 14.6% and Texas at 14.8%, and had a lower prevalence of food insecurity with hunger with Arkansas at 4.4% and Texas at 4.1% (Nord et al. 2002).

Nord et al. (2002) used food security data from the August 1998 CFSM in the CPS to examine the frequency and duration of food insecurity and hunger in U.S. households throughout the past year and previous 30 days prior to the CPS. Results of the study found that the prevalence of frequent or chronic food insecurity occurred at one-fifth the rate of overall food insecurity occurring at any time during the previous year. Two-thirds of households who were food insecure with hunger experienced the condition 3 or more months during the year with nearly one-quarter experiencing the condition every month. The prevalence of hunger related conditions occurred from 54-63% during the previous 30 days of the corresponding yearly prevalence. For example, of the 6.6% of adults who cut or skipped meals during the 12 months prior to the survey, 3.9% of them cut or skipped meals during the 30 days prior to the survey. Most households who affirmed the presence of hunger related conditions during the previous 30 days reported that the behavior or experience occurred 1-7 days of the month with a

small proportion of households reporting that the experience or behavior occurred for more than 14 days of the month. This occurred in around 20% of households with hunger and 10% of households with more severe hunger reported.

Characteristics of Food Insecure Households

Numerous studies have determined characteristics of food insecure/insufficient households. Research has found that rates of food insecurity/insufficiency were higher in low-income households (Ribar and Hamrick 2003, Nord et al. 2002, Rose et al. 1999, Rose et al. 1998). Rose et al. (1998) found that income was one of the strongest predictors of food insufficiency. As household income increased there was a decrease in the percentage of food insufficient households. Nord et al. (2002) found that food insecurity with hunger was highest in households that fell below the poverty income ratio of 1.0.

Households with children have higher prevalence rates of food insufficiency (Ribar and Hamrick 2003; Nord et al. 2002; Alaimo et al. 1998). Alaimo et al. (1998) found that a higher percentage of children aged 2 months to 5 years lived in families reporting food insufficiency. Nord et al. (2002) found that food insecurity was reported in nearly twice as many households with children than households without children.

A greater percentage of food insufficient individuals than food sufficient individuals lived in single female headed households with children (Ribar and Hamrick 2003; Rose et al. 1998; Alaimo et al. 1998). Nord et al. (2002) found that food insecurity with hunger was highest among households headed by single women. Households with

children headed by a married couple had the lowest rates of food insecurity with and without hunger (Ribar and Hamrick 2003; Nord et al. 2002).

Rates of Food insecurity/insufficiency vary by race/ethnic group and by study. Several studies found that whites have the lowest rates of food insufficiency (Ribar and Hamrick 2003; Rose et al. 1998; Alaimo et al. 1998). Rose et al. (1998) found that non-Hispanic Blacks had higher rates of food insufficiency than Hispanics in the 1989-1991 Continuing Survey of Food Intake by Individuals (CSFII) and lower rates of food insufficiency than Hispanics in the 1992 Survey of Income and Program Participation (SIPP). Alaimo et al. (1998) found that Mexican Americans had higher rates of food insufficiency than non-Hispanic Blacks.

Household size can affect the presence of food insecurity (Nord et al. 2002; Rose et al. 1998; Alaimo et al. 1998). Among low-income households, food insufficiency rates were lowest in one person households. Food insufficiency rates increased as household size increased (Rose et al. 1998). Alaimo et al. (1998) found that more food insufficient individuals lived in larger households compared to their food sufficient counterparts. Nord et al. (2002) found that multiple adult households with no children had the lowest rates of food insecurity with hunger. Households with elderly persons ages 60 and older had the lowest rates of food insecurity with and without hunger (Nord et al. 2002; Alaimo et al. 1998).

Food insecurity rates differed by residence and region of the U.S. in which the household was located. Nord et al. (2002) found that households located in central cities and non-metropolitan areas had higher rates of food insecurity than households located in suburbs and other metropolitan areas outside central cities. Regional food insecurity

rates were higher in the South and West than the Northeast and Midwest (Nord et al. 2002). Hunger was more common in central city households and those located in the South and West (Nord et al. 2002). Holben et al. (2004) found rates of food insecurity and food insecurity with hunger were higher than state and regional averages in Head Start participant households in rural Appalachian county Ohio.

Several researchers have found that lower rates of food insufficiency occur with increased levels of education of the household head (Ribar and Hamrick 2003; Rose et al. 1998; Alaimo et al. 1998). Rose et al. (1998) found that food insufficiency rates were lower in households headed by a high school graduate than households where the household head had not graduated from high school. Alaimo et al. (1998) found that family heads of food insufficient households were less likely than the heads of food sufficient households to be high school graduates.

Current research indicates that poor food security status is associated with participation in a greater number of food assistance programs (Holben et al; 2004; Nord et al. 2002; Tarasuk and Beaton 1999 A; Alaimo et al. 1998). Nord et al. (2002) found that more than half of food insecure households in the U.S. in 2002 received assistance from either food stamps, free or reduced price school lunches or the supplemental nutrition program for women, infants, and children (WIC). Alaimo et al. (1998) analyzed NHANES III data and found that within the low-income population a greater percentage of food insufficient individuals than food sufficient individuals participated in food stamps. Tarasuk and Beaton (1999 A) found that among a group of women food bank users, those who reported moderate or severe hunger in the past 30 days had received emergency food assistance during that time. Additionally, the number of times a

household sought food assistance was positively associated with expressed concerns of food sufficiency among children. Perez-Escamilla et al. (2000) examined the association of the food stamp program with food security of low-income WIC Hispanic children. Households that reported that food stamps lasted the entire month had higher rates of food security and lower rates of food insecurity compared to households in which food stamps lasted less than a month.

Consequences of Food Insecurity

Various research studies have indicated that households who experience food insecurity have a greater risk of experiencing a variety of physical, psychological and behavioral consequences (Alaimo et al. 2001; Tarasuk 2001; Hamelin et al. 1999). Hamelin et al. (1999) derived a conceptual framework of household and social implications of food insecurity from a study of 98 heterogeneous low-income households from Quebec City and its rural surroundings. Of the 98 low-income households that participated, 77 households were found to be food insecure. Content analysis of respondent's statements identified three areas of consequences of food insecurity at the household level. The three areas include physical, psychosocial, and sociofamilial consequences. Physical manifestations reported by respondents included hunger pangs among adults or children, fatigue and or illness. Psychological manifestations related to the lack of access to food was reported by respondents to have created stress in the household illustrated by a decreased interest in food and nourishment, to fear expressed by several respondents of losing custody of their child. Sociofamilial consequences

reported by respondents included modified eating patterns due to consuming meals that were incomplete or unbalanced from the respondent's perspective. Respondents also indicated that the meal ritual had changed because the family gathering for meals was no longer a happy occasion. Additional sociofamilial consequences reported by respondents included disrupted parent child relations with irritability, anger and less time spent with children because of increased time needed to buy food. Some of the broader social implications reported by respondents included loss of productivity and reduced learning in children and adults due to the physical impairment of lack of food to an increased need for health care due to not buying medication to save money for food and general depression (Hamelin et al. 1999).

Alaimo et al. (2001) studied the associations between family income, food insufficiency and health among preschool children aged 1-5 years and school aged children aged 6-16 years using data from NHANES III. More than 15% of children from low-income families were food insufficient during the survey period of 1988-1994. Food insufficient children were more likely to live in low-income households, to be without health insurance or a regular source of health care. Low-income preschool children were significantly more likely than high-income preschool children to have fair or poor health including always having stomachaches or having the presence of an impairment that kept the child from usual activities. Low-income school aged children were more likely to have reported having fair or poor health including always having headaches and to be iron deficient. Overall, non-Hispanic Black children, English speaking Mexican American children and Spanish speaking Mexican American children had a higher prevalence rate of fair or poor health compared to non-Hispanic white children.

Additionally food insufficient preschool children had a higher rate of colds reported throughout the previous year (Alaimo et al. 2001).

Tarasuk (2001) investigated factors related to household food insecurity with hunger within a sample of 153 women in households seeking food assistance in metropolitan Toronto. Forty percent of the total sample reported having a longstanding health condition, illness or disability with 26% describing the condition as activity limiting. Women who reported longstanding health conditions and activity limitations were 2 to 3 times more likely to report household food insecurity with hunger over the previous 30 days and 12 months when compared with women who did not report having a health condition or activity limitations. When asked about circumstances that led to household food shortages around 42% of the women reported just not having enough money to meet their needs (Tarasuk 2001).

Food Resource Management Behaviors of Low-Income Households

Research has found that households with limited resources often use a variety of food management practices to ensure their food supply lasts longer (Kempson et al. 2002; Tarasuk 2001; Hamelin et al. 1999). All food insecure households within the Hamelin et al. (1999) study resorted to food acquisition and management strategies that were unsustainable such as relying on credit card or others to eat, regular use of food pantries, borrowing money for food, selling personal items, stealing, poaching animals, and parents depriving themselves of food to feed their children. In a study by Kempson et al. (2002), semi structured interviews with 51 EFNEP and Food Stamp Nutrition Education

Program (FSNEP) educators were conducted in an effort to better understand food management practices being utilized by people with limited resources to ensure food sufficiency. Educators reported that EFNEP and FSNEP participants made their food supply last longer by using practices such as preparing meals with inexpensive foods such as packaged meal mixes, rice, tuna, pasta, and other dry foods. In some instances, rotten foods were eaten after removing mold from cheese and breads, washing slime off of lunchmeat, removing rotten portions from fruits and vegetables, and removing insects from cereals. Foods such as soups, stews, juices, and milk were reported being diluted. One educator reported that infant formula was diluted. Educators also reported EFNEP and FSNEP participants who had assigned food per household member or per unit of time and locked up and hid food so it could not be eaten by family or friends. Meal sizes and second helpings were limited, as well as saving leftovers from churches, soup kitchens, and senior sites for later consumption. Parents reported to educators skipping meals so that their children, spouses, or significant others could eat while teenagers skipped meals so that younger siblings could eat. When food did become available educators reported that many participants reported eating as much as possible due to the uncertainty of their next meal. In extreme cases of food insufficiency, nonfood items such as paper were reported being consumed and pet food was used instead of real meat. Randomly occurring situations such as free food samples at grocery stores, eating food left behind by others at soup kitchens, and the use of road kill was also reported as being used as food sources. EFNEP and FSNEP participants were also reported purchasing excessive amounts of expensive food as well as eating out more often when food stamps and public

assistance checks were distributed. This left participants with tighter finances, a limited variety of food, and increased use of emergency food supplies at the end of the month.

Tarasuk (2001) found similar strategies were used by food insecure women in Canada. Food insecure participants delayed payment of bills, gave up services such as cable or telephone, sold or pawned possessions, and sent children to relatives and friends homes for meals.

24-Hour Food Recall

The 24-hour food recall is the most widely used assessment method for large surveys in the United States having been used by the USDA and the U.S. Department of Health and Human Services as a tool for assessing dietary intake of groups (Novotny et al. 2003). The 24-hour food recall asks participants to recall everything consumed within the past or previous 24 hours and if this represents their typical diet (Seaman 1995). In a multiple-pass 24-hour food recall the interviewer asks respondents several times (referred to as passes through the day) to search his or her memory about foods consumed over the 24 hour period in order to increase the accuracy of the recall (Jonnalagadda et al. 2000) Advantages of the 24-hour recall are that it requires less time to administer and less training is needed for person's administering the recall as well as it being a valuable method in establishing the average intake levels of groups of individuals (Block 1982). Twenty-four hour food recalls provide a quick and economical way of monitoring food intake for large populations groups (Del Tredici et al. 1988). However, one 24-hour food recall is not an appropriate tool for assessing an individuals diet

because it does not take into account day to day variations in eating patterns (Block 1982; Seaman 1995).

The 24-hour food recall is a method based on self reporting of food intake that possesses its own limitations. Errors caused by poor memory and estimation and a tendency to impress the interviewer with what "should have" been eaten can occur (Del Tredici et al. 1988). The 24-hour food recall also underestimates intake when it is compared to energy expenditures measures by the doubly labeled water technique (Tran et al. 2000). In a study examining the accuracy of a multiple pass 24-hour food recall for estimating energy intakes of men and women, Jonnalagadda et al. (2000) found that during the portion of the study where participants self selected their diet, men underestimated energy intake by 11% and women by 13%. During the diet controlled portion of the study women overestimated their intake by 1.3% while men underestimated their intake by 13%.

Kubena (2000) reported that dietary intake reported by subjects who are obese, have little to no formal education, who are from lower socioeconomic groups, who smoke, and who are white non-Hispanic women are highly suspect. Participants possessing these characteristics often result in underreported intake. In a study by Novotny et al. (2003) to identify characteristics connected with the misreporting of energy intake on 24-hour food recalls, women were more likely to underreport energy intake than men. Eighty-five percent of women underreported their intake an average of -621 kcal/day while 15% overreported their intake an average of +304 kcal/day. Sixty-one percent of men underreported their energy intake an average -581 kcal/day, while 39% overreported their intake an average of +683 kcal/day. For both males and females,

a higher percent body fat was significantly associated with a greater likelihood to underreport energy intake. Additional predictors of energy underreporting were response to the question "would you like to weigh more, less or stay the same?" and the difference between current weight and self reported ideal weight. Participants who reported that they desired to weigh less underreported their energy intake by 338 kcal. Differences between current weight and self reported ideal weight was associated with 15.6 kcal for each kilogram above ideal weight being underreported (Novotny et al. 2003).

In a study by Madden et al. (1976), a "flat slope syndrome" or a tendency to overestimate actual intake when consumption is low and to underestimate when consumption is high was found in subjects aged sixty years or older participating in a congregate meal program (Madden et al. 1976). Carter et al. (1981) also found the "flat slope syndrome", with regards to calories and protein, in children with type 1 diabetes, cystic fibrosis, and asthma.

Nutrient Intake and Food Group Servings of Low Income Populations with Regards to Food Security Status

Numerous studies have found that food insecure low-income women have lower nutrient intakes than their food secure counterparts (Tarasuk 2001; Dixon et al. 2001; Tarasuk and Beaton 1999 B; Rose and Oliveira 1997). Upon examining NHANES III data Dixon et al. (2001) found that the dietary intakes of adults in food insufficient households differ from those in food sufficient households. Younger adults in the study ages 20-59 years and older adults ages greater than 60 years from food insufficient

households had significantly lower nutrient intakes than their food sufficient counterparts. Food insufficient younger adults had significantly lower intakes of calcium, vitamin A, and three carotenoids as well as having intakes below 50% the RDA for vitamin E and below 50% of the AI for calcium. Older adults from food insufficient households had significantly lower intakes of energy, vitamin B6, magnesium, iron, and zinc. Additionally, food insufficient older adults consumed less than 50% of the RDA for iron and zinc.

In a study examining the diets of adult women and the elderly using data from the 1989-1991 CSFII, Rose and Oliveira (1997) were able to estimate the nutrient intakes of food insufficient individuals. For adult women aged 19-50 years of age, food insufficiency was significantly associated with lower intakes of energy, magnesium, vitamins A, E, C, and B6. Food insufficient women had mean intakes that were below two-thirds of the RDA for energy, calcium, iron, vitamin E, magnesium, and zinc. Individuals aged 65 years and older, were more likely to have lower intakes of protein, and vitamins A. Mean intakes of energy were 58% of the RDA for the elderly and calcium, vitamin E, B6, magnesium, and zinc intakes were below two-thirds of the RDA.

In a study to examine women's dietary intakes in the context of household food insecurity, Tarasuk and Beaton (1999 B) found that among a sample of 153 women in households receiving emergency food assistance in Toronto Canada women who reported hunger in their households in the previous 30 days also reported lower intakes of energy and certain nutrients. Households in which hunger was reported in the 30 days prior to the interview had significantly ($p \leq .05$) lower intakes of energy, protein, carbohydrate, folate, vitamin A, iron, magnesium, and zinc. These intakes remained lower even when

economic, socio-cultural, and behavioral influences on reported dietary intake were taken into consideration. Tarasuk and Beaton (1999 B) concluded that women's dietary intakes are compromised in the context of household food insecurity and that these women may be at increased risk of suffering from nutrient deficiencies. In examining the association of the food stamp program with dietary intake Perez-Escamilla et al. (2000) determined that preschoolers participating in food stamps had significantly higher estimated energy adjusted intakes of thiamin ($p \leq .015$), niacin ($p \leq .046$), vitamin B6 ($p \leq .051$), and iron ($p \leq .022$).

Kendall et al. (1996) found a significant decrease in the frequency and consumption of fruits and vegetables with worsening food security status in a study of 193 white women with children living at home sampled from a rural county health census in New York State. The frequency of consumption of fruit, salad, carrots, vegetables, and all six fruit and vegetable categories including fruit juice, fruit, salad, potatoes, carrots, and vegetables significantly declined from food secure to insecure with hunger status. A decrease in food was also associated with worsening food security status in that the amount of household food for all five food groups declined as food security status worsened from food secure to food insecure with hunger. In a study by Dixon et al. (2001), food insufficient younger adults reported consuming significantly fewer milk and milk products, fruits and fruit juices, (especially citrus fruits and juices), and fewer vegetables (particularly dark green leafy vegetables), salty snacks, desserts and sweets than their food sufficient counterparts, measured by number of times food was consumed during a one month period. Older adults from food insufficient households reported

significantly fewer cereals, salty snacks, and nonalcoholic beverages than their food sufficient counterparts (Dixon et al. 2001).

Tarasuk (2001) investigated food intake patterns and factors related to household food insecurity with hunger within a sample of 153 women in households seeking food assistance in metropolitan Toronto. In the 30 days prior to the administration of the food security measure, 35% of the households were food insecure with moderate hunger and 22% were food insecure with sever hunger. Women in households in which no hunger was evident had higher group mean and median intakes of grain products, dairy products, fruits, vegetables including and excluding potatoes, meat and meat alternatives than women in households with moderate or severe hunger ($p \leq .05$) for all food groups except food categorized as other foods.

The Healthy Eating Index

Another way to study dietary patterns and diet quality other than food servings is the Healthy Eating Index (HEI). The HEI was designed as a single summary measure of diet quality that can be used to observe changes in consumption patterns. The HEI reflects the intricacy of individual dietary patterns with no one single component driving the index. Scoring high or well on one component it does not necessarily guarantee a high overall HEI score or high diet quality (Kennedy et al. 1995). More detailed information concerning the HEI and how to measure diet quality can be found in Chapter III.

The HEI is composed of 10 components with each component representing different aspects of a healthful diet (Basiotis et al. 2002). Components one through five measure how closely a persons food intake matches the serving recommendations of the five major food groups of the food guide pyramid, grain, vegetables, fruits, milk, and meat. Component six measure a person's total fat consumption as a percentage of their total calorie (energy) intake. Component seven measures a person's saturated fat consumption as a percentage of their total calories intake. Component eight measures a persons total cholesterol intake, component nine measures a person's total sodium intake, and component ten examines the variety in a person's diet (Kennedy et al. 1995). Each component within the index is scored from 0-10 with the overall score of the index being 100. The higher the score the closer an individual is to meeting recommendations. An HEI score above 80 implies a "good" diet, an HEI score of 51-80 implies a diet that "needs improvement", and a score below 51 implies a "poor" diet (Basiotis et al. 2002).

Basiotis et al. (2002) used the 24-hour food recall data from the 1999-2000 NHANES to calculate the HEI for all individuals 2 years and older. Pregnant and lactating women were excluded (Basiotis et al. 2002). During 1999-2000, the mean HEI score was 63.8, within this time period 74% of the U.S. had a diet that "needed improvement". Approximately 16% of the population had a "poor" diet and 10% of the population had a "good" diet (Basiotis et al. 2002). The two highest mean component scores for the U.S. population during 1999-2000 were for cholesterol and variety both averaging scores of 7.7. The two lowest mean component scores for the U.S, population during 1999-2000 were in the fruit and milk components scoring 3.8 and 5.9, respectively (Basiotis et al. 2002).

HEI scores differed by sociodemographic characteristics. All differences discussed in this section are statistically significant (Basiotis et al. 2002). Females had slightly higher scores than males with an overall mean score of 64.5 vs. 63.2 respectively, from 1999-2000. Males and females aged 51 and older had higher HEI scores than other adults with scores ranging from 61-67 (Basiotis et al. 2002). Mexican Americans had the highest average HEI score by race/ethnicity with a score of 64.5. Non-Hispanic whites had a higher average overall HEI score (64.2) than did non-Hispanic blacks (61.1) (Basiotis et al. 2002). Households with above 184% of the federal poverty line had a mean HEI score of 65 while those with incomes below the poverty line had a mean HEI score of 61.7. Individuals in higher income households scored higher on the HEI particularly in the grains, vegetables, fruits, milk, meat, and variety components than individuals in lower income households (Basiotis et al. 2002). Education level was positively associated with increased HEI scores. Individuals with a high school diploma or less had a mean HEI score of 61.1. Individuals with more than a high school diploma had a mean HEI score of 65.3 (Basiotis et al. 2002).

HEI results from the 1994-1996 CSFII data were similar to the 1999-2000 NHANES data with regards to total and component HEI scores of the U.S. population as well as differences in scores between gender, and education. One difference between the two sets of data were that within the 1994-1996 CSFII data Asian and Pacific Islanders had the highest mean HEI score (67) among race/ethnicity groups (Bowman et al. 1998) versus in the 1999-2000 NHANES data Mexican Americans had the highest mean HEI score (64.5) by race/ethnicity (Basiotis et al. 2002). In the 1999-2000 NHANES data non-Hispanic white subjects had slightly lower total HEI scores than did Mexican

Americans and non-Hispanics whites had a higher average total HEI score (64.2) than did non-Hispanic Blacks (61.1) (Basiotis et al. 2002). Based on results from the 1999-2000 NHANES data Basiotis et al. (2002) came to the same conclusions as Bowman et al. (1998) and Lino et al. (1999) that certain segments of the U.S. population have a poorer diet quality than other groups.

Basiotis et al. (1998) examined how diet quality, as measured by the HEI, of individuals in low-income households was affected by participation in the Food Stamp Program (FSP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) using data from the 1989-1991 CSFII. Low-income household in the U.S. whose annual income was 130% or less of the poverty threshold had a household level HEI of 62.2. Households participating in Food stamps had lower average household HEI scores at 60.7. Households not participating in Food stamps had slightly higher average household HEI scores at 62.7. Approximately 53% of all low-income households were female headed with 71% participating in food stamps. At the average weekly food stamp value of $34.22, HEI scores of households participating in Food Stamps increased on average by 3.7 points. A break-even point was estimated at $17.54 per week. When weekly households food stamp benefits were at the minimum of $17.54 per week, food stamp participants demonstrated a higher level of diet quality than similarly situated nonprogram participants. When food stamp values fell below $17.54 per week food stamp participants had a lower diet quality than nonparticipants. The positive nutritional effect of Food Stamp participation was greater in households that received higher levels of Food Stamps and was lower for households who received lower levels of Food Stamps.

WIC participation by one or more members of the household had a strong positive effect on household diet quality. When controlling for household size, participation in the WIC program alone contributed 23.5 points to the total household HEI score (Basiotis et al. 1998). This overall increase was distributed evenly in all diet quality components except for vegetables and saturated fat. Using regression analysis, Basiotis et al. (1998) found that years of education had a statistically significant positive effect on total diet quality. With every additional grade completed, a .81 point increase in household HEI occurred. African American households had lower mean household HEI scores by 5.16 points than similar white households. Hispanic households had higher HEI scores than non-Hispanic households by 4.11 points. Basiotis et al. (1998) concluded that the Food Stamp program and the WIC program were effective in meeting the nutritional needs of low-income households. The estimated effect on the overall diet of households participating in the Food Stamp Program is positive and that the effect increases with increased values of food stamps received. The Food Stamp Program has a statistically significant positive effect on the amount of vegetables, dairy and meat products consumed as well as the component score for sodium. Households that participated in WIC had considerably improved household level HEI scores as well as improved component scores for all HEI components except for saturated fat (Basiotis et al. 1998).

To investigate the possible contribution of food shopping practices to dietary quality, Hersey et al. (2001) analyzed self reported household food shopping practices from the 1996 National Food Stamp Program Survey (NFSPS) and 1998-1999 participant data from the EFNEP Evaluation Reporting System (ERS). Analysis of the 1996 NFSPS data estimated whether the nutrient availability of a household during the observation

week met 100% of the RDA for eight different nutrients: vitamin B6, folate, protein, vitamin A, vitamin C, calcium, iron, and zinc. Additionally for the 1996 NFSPS data, six commonly encouraged food shopping practices of Food Stamp participants were examined: (1) look for grocery specials, (2) use a shopping list, (3) stock up on bargains, (4) comparison shop, (5) use coupons, and (6) shop in different stores for specials. Hersey et al. (2001) used an odds ratio in the multiple logistic regression analysis to estimate the strength of association between meeting 100% of the RDA and the degree in which households engage in careful shopping practices, adjusting for the size of the household and household income. This ratio reflects the probability of a household meeting 100% of the RDA when practicing three to six careful shopping practices compared to the probability of a household meeting 100% of the RDA when only practicing zero to two careful shopping practices. When there is not difference in the probabilities of meeting 100% of the RDA between the two levels of careful shopping practices, the odds ratio is 1.0. Food stamp households, in which the primary food shopper used three or more of the above mentioned careful shopping practices "pretty much every time" were significantly more likely to have met each of the eight different RDAs than households in which the primary food shopper engaged in fewer than three careful shopping practices.

In the EFNEP dataset of the Hersey et al. (2001) study, the focus was on entry data for six items of the food behavior checklist related to food shopping practices and food resource management. The six items included: "How often do you…(1) think about healthy food choices, (2) plan meals ahead, (3) shop with a grocery list, (4) compare prices before buying food, (5) use Nutrition Facts on the food label to make food choices,

and (6) run out of food before the end of the month?" Only 25% of EFNEP participants reported that they almost always shopped with a grocery list, 18% reported that they almost always thought about healthy food choices, and 12% reported planning meals ahead. Only 25% reported that they never ran out of food by the end of the month. Women who reported that they almost always "think about healthy food choices" were significantly more likely to meet 100% of the RDA for vitamin C ($p \leq .01$), vitamin A ($p \leq .01$), vitamin B6 ($p \leq .01$) and iron ($p \leq .05$) when compared to women who reported that they "think about healthy food choices" less often. Women who reported that they almost always planned meals ahead were significantly more likely to meet the RDA for vitamin A than women who reported that they planned meals ahead less often ($p \leq .01$). Additionally women who reported that they almost always used the Nutrition Facts on food labels to make food choices had significantly ($p \leq .01$) lower fat gram consumption than women who did not use or seldom used the Nutrition Facts label. Both the 1996 NFSPS and the ERS datasets demonstrated a statistically significant ($p < .05$) positive relationship between careful food shopping practices and nutrient availability (Hersey et al. 2001).

Chapter III

METHODOLOGY

Research Overview

The purpose of the present study was to determine if reasons for not having enough food, food resource management behaviors, nutrient intakes, and diet quality of Community Nutrition Education Program (CNEP) participants differed by food security status. Program participants completed a Community Nutrition Education Program (CNEP) enrollment form, the 6- item CFSM, a modified food security questionnaire, a 24-hour food recall, and a CNEP survey. Diet quality was determined using 24-hour food recalls and the USDA Interactive Healthy Eating Index (HEI).

Research Design

The research design for this study was a non-experimental correlational design. The research was descriptive of the level of food security/insecurity and diet quality of food assistance program participants. The time dimension for this study was a cross sectional design describing program events, activities, or behaviors at one point in time.

The research procedures were reviewed and approved by the Institutional Review Board (IRB) at Oklahoma State University (Appendix C and D).

Selection of Participants

The target population was low-income food assistance program participants enrolled in the Expanded Food and Nutrition Program (EFNEP) or Oklahoma Nutrition Education Program (ONE) in the state of Oklahoma. This was a convenience sample where participants were recruited from seven county extension units in the state of Oklahoma. The Pittsburg unit located in McAlester Oklahoma includes Haskell, Latimer, Leflore and Pittsburg counties. The Pontotoc unit located in Ada Oklahoma includes Bryan, Carter, Johnston, Marshall, Murray, Pontotoc, and Pottawatomie counties. The Comanche unit includes Comanche, Tillman, and Cado counties. The Jackson unit located in Altus Oklahoma includes Beckham, Greer, Harmon, Jackson, Kiowa, and Washita counties. The Oklahoma unit located in Oklahoma City includes Canadian, Grady and Oklahoma counties. The Tulsa unit includes Creek, Tulsa and Wagoner counties. The Okmulgee unit includes Muskogee, Okmulgee and Okfuskee counties. Unit Nutrition Education Assistants (NEA) were instructed on how to obtain consent from participants from their coordinating unit advisors. Participants were not compensated for participation in any way. Participants were able to participate at any point of enrollment in either program. Participants' names and personal information were removed from all forms after participants were assigned subject numbers and data were entered and verified. Subject numbers were used on all data forms and files. All

completed data forms were kept secured in a locked file cabinet to ensure confidentiality and only study team members had access to the files.

Research Instruments

CNEP Enrollment Form

All participants completed a CNEP enrollment form (Appendix E) which included demographic questions about age, sex, race, residence, monthly income, education, number of children and adults living in household, and whether the participant was pregnant or nursing. Participants were also asked about any previous food assistance programs used and current food assistance programs in which they are enrolled.

24-Hour Food Recall

A one time 24-hour food recall (Appendix F) was used to estimate participants food and nutrient intake. The 24-hour food recalls were recorded by unit NEAs or were completed by the participant if conducted in a group setting. Each participant was asked to recall all foods and beverages consumed the previous day. Information such as amount eaten and meal types were recorded. Meal types included ranged from morning, midmorning, noon, afternoon, evening and late evening. The foods and beverages recorded were assigned a food identification number from the EFNEP Reporting System (ERS) food dictionary and amount eaten was recorded in food dictionary units.

CNEP Survey

Each participant completed a Community Nutrition Education Program (CNEP) survey (Appendix G) with questions ranging from recent past and current ways participants planned and fixed foods for their family, food safety, and food choices and habits. These questions were used to help determine participants' behaviors when dealing with food for themselves and their families.

Modified Food Security Measure and Other Questions

The modified food security questionnaire used in this study was derived from the United States Department of Agriculture (USDA) Core Food Security Module (CFSM) 6- item questionnaire (Appendix B) and the 18-item questionnaire (Appendix A)(Bickel et al. 2000). Some other questions were added to the modified food security measure used in the present study (Appendix H). Questions were reworded based on NEA input and Dr Stephany Parkers research experience with this population. This rewording was done to make the questions appropriate for Oklahoma.

Data Collection and Procedures

Data collection began in the fall of 2002 and proceeded until the spring of 2003. NEAs recorded the 24-hour food recall and assisted participants in completing the CNEP survey, enrollment form, and modified food security measure (either form B, H, or N).

An attempt was made to complete enrollment forms and to have the CFSM completed relatively close to enrollment time. If both enrollment and exit forms were provided, the enrollment form was used. The researchers reviewed the returned forms for missing or incomplete information. Returned forms were considered incomplete if they were missing several pieces of information or were not readable. These forms were excluded from analysis.

Analysis of Dietary Data

Each participant's 24-hour recall was entered into Food Processor (version 8 ESHA, Salem, OR). Recalls were checked for completeness and errors in food entry. Twenty–four hour recalls were excluded if the majority of food recorded was incomplete, had vague descriptions of food items or no portion size was listed. Recalls that had nutrient values greater than two standard deviations from the group mean were also excluded from further analysis. All twenty-four hour food recall data were exported as delimited files into Excel version 10 (Microsoft Corporation, Redmond, WA). The delimited files were converted into Excel files and exported into SPSS (version 8 SPSS Inc., Chicago, IL) for further analysis.

Nutrients generated by Food Processor and analyzed included total kilocalories, total fat grams, percent of kcal from fat, saturated fat grams, grams of protein, grams of carbohydrates, percent of kcal from carbohydrates, grams of dietary fiber, folate, calcium, iron, zinc, cholesterol, and sodium. Nutrient values of foods not available in the Food Processor database were compiled from the United States Department of Agriculture

(USDA) nutrient database for standard reference release 15. The Dietary Reference Intakes (DRIs) were used to evaluate the adequacy of folate, iron, zinc, and calcium intake (Table 3.1).

Table 3.1. Dietary Reference Intakes for calcium, folate, iron, and zinc

	EAR (iron)	**EAR (zinc)**	**EAR (folate)**	**AI (calcium)**
Females (Ages)				
14-18y	7.9 (mg/d)	7.3(mg/d)	330 (µg/d)	1300 (mg/d)
19-30y	8.1 (mg/d)	6.8 (mg/d)	320 (µg/d)	1000 (mg/d)
31-50y	8.1 (mg/d)	6.8 (mg/d)	320 (µg/d)	1000 (mg/d)
51-70y	5.0 (mg/d)	6.8 (mg/d)	320 (µg/d)	1200 (mg/d)
> 70y	5.0 (mg/d)	6.8 (mg/d)	320 (µg/d)	1200 (mg/d)
Pregnancy (Ages)				
14-18y	23.0 (mg/d)	10.0 (mg/d)	520 (µg/d)	1300 (mg/d)
19-30y	22.0 (mg/d)	9.5 (mg/d)	520 (µg/d)	1000 (mg/d)
31-50y	22.0 (mg/d)	9.5 (mg/d)	520 (µg/d)	1000 (mg/d)

Diet Quality

Participants' diet quality was assessed using the Interactive Healthy Eating Index (HEI) developed by the U.S. Department of Agriculture (USDA). The Interactive Healthy Eating Index can be found by following links at http://www.usda.gov/ or directly at http://147.208.9.133/Default.asp. To assess diet quality participants 24-hour food recall generated by Food Processor (version 8 ESHA, Salem, OR) were entered into the Interactive Healthy Eating Website. The website generated the participants overall HEI score between 0-100, a component score ranging from 0-10 for each HEI component, number of food guide pyramid servings eaten and nutrient intakes. The nutrient intake section includes food energy (kcal), protein (gm), carbohydrate (gm),

dietary fiber (gm), total fat (gm), saturated fat (gm) monounsaturated fat (gm), polyunsaturated fat (gm), cholesterol (mg), vitamin A (RE), vitamin E (α-TE), vitamin C (mg), thiamin (mg), riboflavin (mg), niacin (mg), folate (mcg), vitamin B-6 (mg), vitamin B-12 (mcg), calcium (mg), iron (mg), magnesium (mg), phosphorus (mg), zinc (mg), potassium (mg) and sodium (mg). These values were not used to estimate nutrient intakes.

The HEI has 10 components; each component is comprised of different areas of a healthful diet. Scores within each component range from 0 to 10, and the overall index ranges from 0 to 100 (Tables 2 and 3). The first 5 components measure how closely a person's diet matches the serving recommendations of the USDA Food Guide Pyramid for the five major food groups: grains, vegetables, fruits, milk, and meat. Component 6 measures the person's overall fat consumption as a percentage of their total food intake. Component 7 measures the person's saturated fat consumption as a percentage of their total food intake. Component 8 measures the persons total cholesterol intake. Component 9 measures the persons total sodium intake. Component 10 measure the amount of variety in the person diet.

Within each component of the HEI, a score from 0 to 10 was possible. The exact score that a subject received in any food group category for one day was determined by the appropriate number of servings for a given energy intake level and age group. For components 1 – 5, a score of 10 on any group would mean that the subject consumed the recommended number of servings for that particular group while a score of 0 would mean that a subject consumed no servings from the particular food group. Scores falling between 0 and 10 were calculated proportionately; for example, a subject would receive a

score of 5 if three servings of grain were eaten but six were recommended or would receive a score of 6.6 if four were eaten and six were recommended:

# of servings consumed / maximum servings x 10 = HEI score

In each food group, subjects did not receive any additional points for being beyond their recommended number of servings.

Components 6 – 10 were scored differently. For component 6, a score of 10 was received if the participant's total fat intake was 30% or less of their total energy intake for one day. If the total fat intake exceeded 45% a score of 0 was received. Scores were calculated proportionally for intakes that fell between 30 and 45%. The percentage of fat consumed from subtracted from the range maximum, 45%. The result was divided by the range, 15, and multiplied by 10:

(Maximum of range – amount consumed) / range x 10 = HEI

Component 7 was scored using a similar fashion as component 6. Participants received a score of 10 if saturated fat intake was less than 10% total energy intake. A score of 0 was assigned when saturated fat intake was greater than 15% total energy intake. Intake amounts falling between 10 and 15% were scored proportionately with a range of 10.

Component 8 was scored based on amount of cholesterol consumed in milligrams in a one day period. A score of 10 was assigned if total daily cholesterol intake was 300 mg or less. If daily intake was 450 mg or greater a score of 0 was assigned. Intakes that fell between 300 and 450 mg were scored proportionately.

The score for component 9 was based on the amount of sodium consumed in milligrams in a one day period. A daily intake of 2400 mg or less was assigned a score of

10. A score of 0 was assigned for an intake of 4800 mg or greater. Intakes between 2400 and 4800mg were scored proportionately.

In component 10, the variety of the participants' diet was assigned a score of 10 if in a one day period they consumed 8 or more different food items. A score of 0 was assigned if 3 or fewer food items were consumed in a one day period.

Table 3.2. Components of the Healthy Eating Index and scoring system

	Score Ranges	Criteria for Maximum Score of 10	Criteria for Minimum Score of 0
Grain Consumption	0 to 10	6 – 11 servings	0 servings
Vegetable Consumption	0 to 10	3 – 5 servings	0 servings
Fruit Consumption	0 to 10	2 – 4 servings	0 servings
Milk Consumption	0 to 10	2 – 3 servings	0 servings
Meat Consumption	0 to 10	2 – 3 servings	0 servings
Total fat intake	0 to 10	30% or less energy from fat	45% or more energy from fat
Saturated fat intake	0 to 10	Less than 10% energy from saturated fat	15% or more energy from saturated fat
Cholesterol Intake	0 to 10	300 mg or less	450 mg or more
Sodium Intake	0 to 10	2400 mg or less	4800 mg or more
Food Variety	0 to 10	8 or more different items in a day	3 or fewer different items in a day

Table 3.3 Recommended number of USDA Food Guide Pyramid servings per day, by age/gender categories

	Criteria for Maximum Score of 10			Criteria for a Minimum score of 0
Age/ Gender category	Females 14-18	Females 25-50	Females 51+	
Energy	2200	2200	1900	
Grains	9	9	7.4	0 servings
Vegetables	4	4	3.5	0 servings
Fruits	3	3	2.5	0 servings
Milk	2	2	2	0 servings
Meat	2.4	2.4	2.2	0 servings
Total Fat Intake	≤ 30% kcal from fat	≤ 30% kcal from fat	≤ 30% kcal from fat	45% or more kcal from fat
Sat Fat Intake	≤ 10% kcal from saturated fat	≤ 10% kcal from saturated fat	≤ 10% kcal from saturated fat	15% or more kcal from saturated fat
Cholesterol Intake	300 mg or less	300 mg or less	300 mg or less	450 mg or more
Sodium Intake	2400 mg or less	2400 mg or less	2400 mg or less	4800 mg or more
Food Variety	8.0 or more different items in a day	8.0 or more different items in a day	8.0 or more different items in a day	3.0 or fewer different items in a day

Objectives and Hypotheses

Below are the objectives and hypotheses that were used to evaluate the diet quality of CNEP participants by food security status.

Objective 1. To determine if reasons for not enough food vary by food security status.

Hypotheses:

1.1. A greater % of participants who report not having enough money for food will be in food insecure households.

1.2. A greater % of participants who report that they do not have enough time for shopping or cooking will be in food insecure households.

1.3. A greater % of participants who report that it is too hard to get to the store will be in food insecure households.

1.4. A greater % of participants who report that they are not able to prepare food because of a health problem will be in food insecure households.

1.5. A greater % of participants who report that they have no way to cook their food will be in food insecure households.

Objective 2. To determine if food resource management practices differ by food security status.

Hypotheses:

2.1. A greater % of participants who report that they do not compare prices before they buy food will be in food insecure households.

2.2. A greater % of participants who report that they do not shop with a grocery list will be in food insecure households.

2.3 A greater % of participants who report that they practice gleaning will be in food insecure households.

Objective 3. To determine if nutrient intakes differ by food security status.

Hypotheses:

3.1. Participants from food insecure households will have a lower total kcal intake than participants from food secure households.

3.2. Participants from food insecure households will have a higher percent kcal from fat than participants from food secure households.

3.3. Participants from food insecure households will have a higher percent kcal from saturated fat than participants from food secure households.

3.4. Participants from food insecure households will have a lower percent kcal from protein than participants from food secure households.

3.5. Participants from food secure households will have a higher percent kcal from carbohydrates than participants from food insecure households.

3.6. Participants from food insecure households will have a lower intake of total dietary fiber than participants from food secure households.

3.7. Participants from food insecure households will consume below the EAR for folate than participants from food secure households.

3.8. Participants from food insecure households will consume below the AI for calcium than participants from food secure households.

3.9. Participants from food insecure households will consume below the EAR for iron than participants from food secure households.

3.10. Participants from food insecure households will consume below the EAR for zinc than participants from food secure households.

Objective 4. To determine if diet quality differs by food security status

Hypotheses

4.1. Participants in food insecure households will have lower diet quality as measured by HEI score than participants in food secure households.

4.2. Participants in food insecure households will have a lower dietary variety score as measured by HEI score than participants in food secure households.

Statistical Analysis

Statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS, version 11, Chicago Ill, 2002). Chi-square analyses was used to test associations of categorical data for food resource management practices, food preparation behaviors, and if participants met or did not meet the Estimated Average Requirement (EAR) for folate, zinc, and iron and the Adequate Intake (AI) for calcium. One-way analysis of variance (ANOVA) was used to look at the relation between the independent variable of food security status and kcal consumed, and percent kcal from fat, saturated fat, protein, and carbohydrate. One-way ANOVA was also used to look at the relation between the independent variable of food security status and participants intake of total fiber, fiber per 1000 kcals, diet quality and diet variety. Significance of all analyses was equal to $p \leq .05$.

Chapter IV

OKLAHOMA COMMUNITY NUTRITION EDUCATION PROGRAM PARTICIPANTS DIET QUALITY DOES NOT DIFFER BY FOOD SECURITY STATUS

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ABSTRACT

Objective: The objectives of the present study were to determine if reasons for not having enough food, food resource management behaviors, nutrient intakes, and diet quality of Community Nutrition Education Program (CNEP) participants differed by food security status.

Design: A cross-sectional correlational survey.

Setting: Seven county cooperative extension CNEP units.

Participants: Low-income CNEP participants.

Variables Measured: Food security status, reasons for not having enough food, food resource management behaviors, estimated nutrient intake, and diet quality.

Analysis: Chi-square analyses were performed on categorical variables and ANOVA was performed on continuous variables using SPSS for windows (SPSS, version 11, Chicago Ill, 2002). Significance of all analyses was equal to $p \leq .05$.

Results: Forty-two percent of participants were food secure, 35% were food insecure and 23% were food insecure with hunger. Reasons reported by participants for not

having enough food included not having enough money for food, too hard to get to the store, not able to prepare food because of a health problem, and no way to cook their food ($p \leq .05$). Only the food resource management behavior of gleaning was significant by food security status with 61% of food insecure with hunger and 43% of food insecure participants practicing gleaning ($p \leq .05$). Estimated nutrient intakes were not significantly different by food security status. However, more than half of the total sample did not meet the Estimated Average Requirement (EAR) for folate and zinc, or the Adequate Intake (AI) for calcium, while over one-third did not meet the EAR for iron. A mean total HEI score of 58.1 indicated that the diets of CNEP participants "needed improvement". Diet quality as measured by HEI was not significantly different by food security status.

Conclusions and Implications: In a low-income sample of CNEP participants, several reasons for not having enough food and the food resource management behavior of gleaning were significant by food security status. Nutrient intake and diet quality was not associated with food security status.

INTRODUCTION

Currently food security status is measured using the United States Department of Agricultures (USDA) 18-item Core Food Security Module (CFSM) at the national level using the U.S Census Bureau's Current Population Survey (CPS). While the information provided by the CPS is helpful in determining the state and national levels of food security status, it does not provide food security status for individual counties or areas within a state. Food insecurity is more prevalent in households with lower household

income and where the head of the household has lower levels of education and thus they experience the physical, psychological and sociofamilial consequences of being food insecure (Rose et al. 1997, Alaimo et al. 1998, Hamelin et al. 1999).

Research indicates that individuals from food insecure households have lower nutrient intakes than individuals from food secure households (Tarasuk 2001, Dixon et al. 2001, Tarasuk and Beaton 1999, Rose 1997). Previous research indicates that reasons for not having enough food and food resource management practices differ by food security status (Tarasuk 2001, Hamelin et al. 1999). Currently there is little research regarding the relation of food security status and diet quality. Diet quality provides information on food consumption patterns (Kennedy et al. 1995).

The Community Nutrition Education Programs (CNEP) in Oklahoma includes the Expanded Food and Nutrition Education Program (EFNEP) and the Oklahoma Nutrition Education (ONE) program which offer nutrition education on a regular basis to its low-income participants. By determining food security status and diet quality in a low-income sample of CNEP participants, CNEP educators will be better able to tailor nutrition education to the needs of program participants. The purpose of the present study was to determine if reasons for not having enough food, food resource management behaviors, nutrient intakes, and diet quality of CNEP participants differed by food security status.

METHODS

Study design and population

The research design for this study was a non-experimental cross-sectional correlational design. The descriptive research measured food security status and diet quality of CNEP

participants. The research procedures were reviewed and approved by the Institutional Review Board (IRB) at Oklahoma State University (Appendix I and J). The target population was low-income participants enrolled in the Expanded Food and Nutrition Program (EFNEP) and the Oklahoma Nutrition Education Program (ONE) which are parts of CNEP in Oklahoma. This was a convenience sample where participants were recruited from seven county extension units in the state of Oklahoma. Participants were not compensated for participation.

Research Instruments

All participants completed a CNEP enrollment form (Appendix C) which included demographic questions about age, sex, race, residence, monthly income, education, number of children and adults living in household, and whether the participant was pregnant or nursing. Participants were also asked about current food assistant program participation.

The United States Department of Agriculture (USDA) 6-item food security questionnaire used in this study was derived from the USDA Core Food Security Module (CFSM) 18-item questionnaire (Appendix A) and was used to decrease respondent burden.

A one time 24-hour food recall (Appendix D) was used to estimate participants food and nutrient intake. The 24-hour food recalls were recorded by trained unit NEAs or were completed by the participant if conducted in a group setting. Each participant was asked to recall all foods and beverages consumed the previous day. Information such as amount eaten, preparation techniques, and brand names were recorded.

Each participant completed a Community Nutrition Education Program (CNEP) survey (Appendix E) with questions ranging from recent past and current ways participants planned and fixed foods for their family, food safety, and food choices and habits. These questions were used to help determine participants' behaviors when dealing with food for themselves and their families.

Data collection and procedures

NEAs recorded the twenty-four hour food recall and assisted participants in completing the CNEP survey, enrollment form, and modified food security measure. An attempt was made to have data collected relatively close to enrollment time. The researchers reviewed the returned forms for missing or incomplete information. Returned forms were considered incomplete if they were missing several pieces of information or were not readable. These forms were excluded from analysis.

Analysis of dietary data

Each participant's 24-hour recall was entered into Food Processor (version 8 ESHA, Salem, OR). Recalls were checked for completeness and errors in food entry. Twenty-four hour recalls were excluded if the majority of the food record was incomplete, had vague descriptions of food items or no portion size was listed. Recalls that had nutrient values greater than two standard deviations from the group mean were also excluded from further analysis. Nutrient values of foods not available in the Food Processor database were compiled from the United States Department of Agriculture (USDA) nutrient database for standard reference release 15 (http://www.nal.usda.gov/fnic/foodcomp/index.html).

Nutrients analyzed included total kilocalories, total fat grams, percent of kcal from fat, grams of saturated fat, protein, carbohydrates, fiber, percent of kcal from carbohydrates, folate, calcium, iron, zinc, cholesterol, and sodium. The Estimated Average Requirement (EAR) and Adequate Intake (AI) were used to evaluate the adequacy of folate, iron, zinc, and calcium intake. Participants' diet quality was assessed using the Interactive Healthy Eating Index (HEI) developed by the U.S. Department of Agriculture (USDA). Participant's 24-hour food recall was entered into the Interactive Healthy Eating Website (http://147.208.9.133/Default.asp). The website generated the participants overall HEI score between 0-100, and component scores ranging from 0-10 for each of the 10 HEI components.

Statistical Analyses

Data were analyzed using SPSS for windows (SPSS, version 11, Chicago Ill, 2002). The data were analyzed using Chi-square tests for categorical variables, and analysis of variance (ANOVA) was used for continuous variables. The level of significance for all tests was set at $p \leq .05$. Data was reported as mean ± the standard deviation.

RESULTS

Sociodemographic characteristics

An initial sample of 395 male and female CNEP participants records were collected. In the final sample, male participants were excluded due to their small sample size (n=20). An additional 12 participants were excluded due to missing information, leaving a final sample of 366 female participants. The majority of participants were non--Hispanic white with the second highest percentage being non-Hispanic Black (Table 4.1). Few participants were pregnant or nursing. Equal percentages of participants lived in suburbs

and towns with population above 10,000 and rural towns under 10,000. Almost 90% of participants had a high school education or less. The three food assistance/income assistance programs with the highest participation rates were Food Stamps, Special Supplemental Nutrition Program for Women Infants and Children (WIC), and Temporary Assistance for Needy Families (TANF). A little over 60% of participants reported having no other adults living in the household. Participants ranged in age from 18-90 years. Last months household income ranged from $0-$2000.00 and monthly dollars spent on food ranged from $0-$1000.00.

Food security status

In this sample of low-income women, the majority of women were food insecure (34.7%) or food insecure with hunger (23.8%) households (food secure 41.8%). A full description of sociodemographic characteristics by food security status are in Table 4.2. Ethnicity, education, age, and food assistance program participation were not significantly associated with food security status. Place of residence was significantly associated with food security status ($p \leq .05$). TANF, an income assistance program, was significantly ($p \leq .05$) associated with food security status with approximately half of food secure participants reporting that they participated in TANF. The number of adults in the household was significantly associated ($p \leq .05$) with food security status. Food secure households' mean monthly income was significantly lower than food insecure with hunger households income ($p \leq .05$). Food insecure with hunger households monthly dollars spent on food was significantly lower than food secure and food insecure households ($p \leq .05$).

Reasons reported by participants for not having enough food

Reasons reported by CNEP participants for not having enough food was associated with food security status (Table 4.3). A higher percentage of food insecure participants reported not having enough money for food, that it was too hard to get to the store, that they were not able to prepare food because of a health problem, and they had no way to cook the food compared with food secure participants.

Food resource management behaviors

Although not associated by food security status, 73.9% of participants reported that they "more often" did not compare prices before they bought food and 51% of participants reported that they "more often" did not shop with a grocery list. Gleaning however was found to be significantly associated ($p \leq .05$) with food security status. A total of 42.6% (n=118) of participants gleaned. Sixty-one percent of food insecure with hunger and 43% of food insecure participants gleaned ($p \leq .05$) (data not shown).

Estimated nutrient intakes

Estimated nutrient intakes were not significantly different by food security status (Table 4.4). The estimated mean fiber intake was about half of the lower end of the recommended daily intake of 20-35 grams. The percent of CNEP participants who did not meet the EAR for folate, iron, and zinc or the AI for calcium was not significantly different by food security status (Table 4.5). Although not significant by food security status, approximately three-fourths of the participants did not meet the EAR for folate, approximately one-third did not meet the EAR for iron, approximately half did not meet the EAR for zinc, and over 80% did not meet the AI for calcium.

Healthy Eating Index scores

HEI scores of CNEP participants are in Table 4.6. For the total sample the mean total HEI score was 58.1 indicating that all of the participants' diets "need improvement". Within the total sample, cholesterol had the highest mean component score , and the fruit and milk component scores were the lowest.

DISCUSSION

Within the current study 35% of the participants were food insecure and 23% were food insecure with hunger. These rates are greater than the national rates of food insecurity (10.8%) and food insecurity with hunger (3.3%) and the Oklahoma state rate of food insecurity (14.3%) and food insecurity with hunger (5.1%) (Nord et al. 2002). These results may differ from state and national rates because the current study examined only a low-income population compared to the national data and state data which includes all income levels.

When examining sociodemographic characteristics of the sample place of residence was found to be a significant factor in determining food security status. Participants who lived in suburbs and towns with population greater the 10,000 were significantly more likely to be food insecure. This disagrees with previous research by Nord et al. (2002) who found that the prevalence rates for food insecurity for central city households and non-metropolitan areas substantially exceeded suburban households.

In the present study participation in TANF resulted in a higher percentage of food secure households. This author could not find research regarding TANF and food security status. Within the current research, the number of adults in the household significantly affected food security status. As number of adults in the household

increased the percentage of food insecure households increased. Within the current study, a single female headed household had lower rates of food insecurity and disagrees with previous research that found that single female headed households have higher rates of food insecurity (Ribar and Hamrick 2003, Nord et al. 2002, Rose et al. 1998). Data in the present study were difficult to interpret because marital status was not known.

Food secure households compared to food insecure with hunger households had significantly lower monthly household income but spent higher amounts on food per month than food insecure with hunger households. Monthly dollars spent on food was difficult to interpret because it was not determined in the present study if the food dollars included personal income or food stamps value or both. Food insecure with hunger households had higher monthly income but spent less on food. Possible causes for this could be that food insecure with hunger households budget their money poorly, have higher monthly debts for services such healthcare, transportation repairs, credit card bills or child care.

Reasons reported by participants for running out of food

In the present study, CNEP participants reported various reasons for not having enough food. Forty-four percent of food insecure participants and 42% of food insecure with hunger participants reported that they did not have enough money for food. This agrees with research by Tarasuk (2001) who found that when asked about circumstances that lead to household food shortages found 42% of 104 low-income women reported not having enough money to meet their needs.

Reporting that it was too hard to get to the store was significant by food security status with 43% of food insecure participants and 29% of food insecure with hunger

participants reporting this. Although participants in the present study were not asked to specify the specific reason it was too hard to get to the store this result maybe due to lack of transportation as found by Holben et al. (2004).

Forty-seven percent of food insecure and 31% of food insecure with hunger participants reported not being able to prepare food because of a health problem. This agrees with Tarasuk (2001) who found that low-income women who reported longstanding health conditions and activity limitations were 2-3 times more likely to be in a food insecure household compared to women who reported not having a longstanding health condition.

Fifty percent of food insecure participants and 43% of food insecure with hunger participants reported that they had no way to cook their food. At the present time there is no other reported research available regarding food security status and participants ability to cook their food.

Food resource management behaviors

Previous research has found numerous food resource management behaviors used by food insecure households to ensure that their families had enough food. These reasons ranged from purchasing foods with credit cards (Hamelin et al. 1999), selling personal items (Hamelin 1999, Tarasuk 2001), eating rotten foods, and parents skipping meals to feed their children (Kempson et al. 2002). The present study found few resource management behaviors that differed by food security status. Participants who gleaned had higher percentages that were food insecure. This may indicate that instead of using gleaning as a way to prevent becoming food insecure, households wait until food

insecurity is more severe before gleaning. At the present time there is no other reported research available with regards to gleaning and food security status.

Estimated nutrient intakes of sample

Previous research on the nutrient intake has found that food insecure low-income women have lower nutrient intakes than their food secure counterparts (Tarasuk 2001, Dixon et al. 2001, Tarasuk and Beaton 1999, Rose and Oliveira 1997). The present study found that although not significant by food security status the majority of CNEP participants did not meet the EAR for folate, iron, and zinc, or the AI for calcium. These findings indicate that within this population regardless of food security status nutrient intakes were less than adequate. This could be caused by participants consuming empty calories from less nutrient dense foods instead of good sources of folate, iron, zinc or calcium.

Healthy Eating Index scores

CNEP participants' diet quality did not differ by food security status in the present study, but does closely resemble the diet quality of the U.S population (Basiotis et al. 2002, Basiotis et al. 1998, Bowman et al. 1998). The current study found that the average HEI score of 58.1 means "diet needs improvement". The results of the present study support previous research using HEI scores to assess diet quality of low-income participants in the 1989-1991 CSFII. The mean total HEI score for low-income participants in the 1989-1991 CSFII was 62.2 indicating that the "diet needs improvement" (Basiotis et al. 1998). The top mean component HEI score of the current study was cholesterol (8.2). This agrees with previous findings in the 1989-1991 CSFII where the cholesterol component had the top mean score of 8.3 (Basiotis et al. 1998). In the current study, the fruit

component had the lowest mean HEI score (2.7) and agrees with findings from the 1989-1991 CSFII where the fruit component had the lowest score of 3.6 (Basiotis et al. 1998).

In a low-income sample of CNEP participants, several reasons for not having enough food were significant by food security status. These results indicated that although all of the participants were low-income, food insecure and food insecure with hunger households had greater difficulty than food secure households keeping food in their households because of these reasons. The food resource management practice of gleaning was significant by food security status. Results indicated that as food security status became more severe participants resorted to gleaning to get food in the house. Nutrient intake and diet quality were not associated with food security status. Nutrient intake and diet quality were inadequate in a low income sample regardless of food security status.

IMPLICATIONS FOR RESEARCH AND PRACTICE

Future research should measure food security status and diet quality as measured by HEI upon entrance and exit of the CNEP program. Only then will we have a better understanding of the effectiveness of the CNEP program and where changes need to be made with regards to participant education. Additionally the discrepancy between household income of food insecure with hunger participants and the money spent on food needs to be examined closely to find out why so little money was spent on food. Future research should include height and weight of the participants so that BMI can be calculated to assess appropriateness of calories consumed.

Reasons provided by CNEP participants for not having enough food provide CNEP educators with important information about CNEP participants which can aid in

program referral and educational content. CNEP educators can teach participants additional ways to budget their income so that money will be available for food or appliances needed to cook food. Educators can look within the community to find transportation services to get participants to the store. Learning what health problems are preventing CNEP participants from cooking their food can help educators determine if participants need further food preparation training or need referral to a dietitian or healthcare provider.

The poor diet quality of CNEP participants as measured by nutrient intake and HEI indicate that CNEP educators should focus on ways to help increase participants fruit and milk consumption as well as educating participants on good sources of folate, iron, zinc, and calcium. Educators should concentrate on ways participants can incorporate these nutrients into their current diet and food budget.

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Table 4.1. Sociodemographic characteristics of women CNEP participants. (n=366)

Demographic characteristics	Total Sample n=366	
	n	**%**
Ethnic Group		
White (non-Hispanic)	208	57.3
Black (non-Hispanic)	87	24.0
American Indian	40	11.0
Hispanic	24	6.6
Other	4	1.1
Pregnant	22	6.1
Nursing	8	2.2
Place of Residence		
Rural and Town under 10,000	112	30.9
Suburb and town over 10,000	147	40.5
Central city over 50,000	104	28.7
Education		
Less than High School	140	45.5
High School	131	42.5
Beyond High School	37	12.0
Food Assistance/Income Assistance Programs		
Food Stamps	301	82.2
WIC [a]	121	33.1
TANF [b]	99	27.0
Child Nutrition	81	22.1
Head Start	30	8.2
FDPIR [c]	14	3.8
TEFAP [d]	10	2.7
Number of Other Adults in the Household		
No Other Adults	224	61.2
One or More Adults	142	38.8
	Mean	**SD**
Age	40.0	19.5
Household income last month (dollars)	608.60	376.47
Monthly Dollars Spent on Food	237.94	147.97

[a] Special Supplemental Nutrition Program for Women Infants and Children (WIC)
[b] Temporary Assistance for Needy Families (TANF)
[c] Food Distribution Program on Indian Reservations (FDPIR)
[d] The Emergency Food Assistance Program (TEFAP)

Table 4.2. Sociodemographic characteristics of women CNEP participants by food security status. (n=366)[1]

Demographic characteristics	Food Security Status						
	Food Secure n=153		Food Insecure n=127		Food Insecure with Hunger n=86		P Value
	n	%	n	%	n	%	
Ethnic group							
White (non-Hispanic) (n=208)	76	36.5	77	37.0	55	26.4	
Black (non-Hispanic) (n=87)	43	49.4	28	32.2	16	18.4	
American Indian (n=40)	22	55.0	12	30.0	6	15.0	.287
Hispanic (n=24)	9	37.5	8	33.3	7	29.2	
Other (n=4)	2	50.0	2	50.0		0.0	
Place of Residence							
Rural and Town under 10,000 (n=112)	56	50.0	27	24.1	29	25.9	
Suburb and town over 10,000 (n=147)	48	32.7	61	41.5	38	25.9	.010
Central city over 50,000 (n=104)	48	46.2	38	36.5	18	17.3	
Education							
Less than High School (n=140)	53	37.9	50	35.7	37	26.4	
High School (n-131)	51	38.9	50	38.2	30	22.9	.268
Beyond High School (n=37)	19	51.4	7	18.9	11	29.7	
Food Assistance/Income Assistance Programs							
Food Stamps (n=301)	125	41.5	102	33.9	74	24.6	.547
WIC [a] (n=121)	49	40.5	49	40.5	23	19.0	.185
TANF [b] (n=99)	53	53.5	36	36.4	10	10.1	.001
Child Nutrition (n=81)	30	37.0	34	42.0	81	22.1	.297
Head Start (n=30)	15	50.0	8	26.7	7	23.3	.567
FDPIR [c] (n=14)	7	50.0	5	35.7	2	14.3	.683
TEFAP [d] (n=10)	6	60.0	3	30.0	1	10.0	.432

Table 4.2. Continued.

Demographic characteristics	Food Secure n=153		Food Insecure n=127		Food Insecure with Hunger n=86		P Value
	n	%	n	%	n	%	
Number of Other Adults in the Household							
No Other Adults (n=224)	105	46.9	67	29.9	52	23.2	.025
One or More Adults (n=142)	48	33.8	60	42.3	34	23.9	
			Mean ± SD				
Age	42.0 ± 21.6		36.9 ± 17.4		41.2 ± 18.5		.085
Household Income Last Month (dollars)	548.00 ± 353.10 [e]		611.69 ± 397.07 [e,f]		707.84 ± 368.73 [f]		.011
Monthly Dollars Spent on Food (dollars)	243.48 ± 144.15 [e]		261.17 ± 163.67 [e]		193.94 ± 119.87 [f]		.004

[1]Chi-square analysis compares categorical data with ANOVA and Scheffe post hoc being performed on continuous data. All comparisons are by food security status. Statistically significant at $p \leq .05$

[a] Special Supplemental Nutrition Program for Women Infants and Children (WIC)

[b] Temporary Assistance for Needy Families (TANF)

[c] Food Distribution Program on Indian Reservations (FDPIR)

[d] The Emergency Food Assistance Program (TEFAP)

[e] Means with different superscripts are significantly different using ANOVA and Scheffe post hoc test.

Table 4.3. Reasons CNEP participants reported for not having enough food.

Reported "Yes" or "More Often" to the following:	Total Sample		Food Security Status						P value
			Food Secure		Food Insecure		Food Insecure with Hunger		
	n	%	n	%	n	%	n	%	
Not having enough money for food (Yes)	196	53.7	27	13.8	87	44.4	82	41.8	.000
Do not have enough time for shopping and cooking (Yes)	75	20.6	25	33.3	33	44.0	17	22.7	.323
Too hard to get to the store (Yes)	134	36.7	37	27.6	58	43.3	39	29.1	.001
Not able to prepare food because of a health problem (Yes)	45	12.4	10	22.2	21	46.7	14	31.1	.045
No way to cook their food (Yes)	14	3.8	1	7.1	7	50.0	6	42.9	.050

[1] Don't know respondents not included in this table.

Table 4.4. Estimated nutrient intakes of CNEP participants by food security status. (n=362)

Nutrients	Food Security Status				P Value
	Total Sample n=362	Food Secure n=150	Food Insecure n=126	Food Insecure with Hunger n=86	
Calories (kcal)	1694.5 ± 863.8	1703.3 ± 876.6	1732.6 ± 843.0	1623.2 ± 877.3	.656
Protein (g)	63.6 ± 36.4	65.4 ± 35.5	65.3 ± 39.7	57.9 ± 32.6	.255
Carbohydrates (g)	220.6 ± 114.1	218.5 ± 108.9	226.7 ± 122.8	215.2 ± 110.5	.741
Fiber (g)	11.8 ± 9.0	12.0 ± 8.4	12.7 ± 10.2	10.1 ± 7.9	.106
Fat (g)	64.3 ± 44.0	65.1 ± 46.6	65.2 ± 39.5	61.6 ± 45.9	.808
Saturated Fat (g)	23.2 ± 17.1	23.6 ± 18.9	23.6 ± 15.6	21.8 ± 16.0	.684
Polyunsaturated fat (g)	8.0 ± 6.8	7.9 ± 6.5	8.5 ± 7.4	7.4 ± 6.4	.481
Cholesterol (g)	231.1 ± 211.9	231.3 ± 205.5	237.4 ± 218.2	221.8 ± 217.1	.871
Folate (mcg)	263.8 ± 259.1	241.1 ± 206.5	290.3 ± 313.8	264.8 ± 252.0	.292
Calcium (mg)	632.1 ± 449.3	654.1 ± 455.7	625.8 ± 450.6	603.2 ± 435.0	.691
Iron (mg)	12.5 ± 9.6	12.7 ± 9.5	12.9 ± 9.5	11.6 ± 10.1	.613
Zinc (mg)	7.1 ± 5.0	7.0 ± 4.7	7.4 ± 5.5	6.9 ± 4.9	.679
Sodium (mg)	2813.0 ± 1726.2	2868.2 ± 1840.0	2826.7 ± 1609.1	2699.5 ± 1693.5	.767
% Kcál fat	32.8 ± 10.2	32.6 ± 10.1	33.1 ± 9.7	32.7 ± 11.0	.907
% Kcal saturated fat	11.8 ± 4.6	11.8 ± 4.4	11.8 ± 4.6	11.7 ± 4.8	.966
% Kcal protein	15.6 ± 5.9	15.8 ± 5.7	15.6 ± 6.0	15.1 ± 6.2	.677
% Kcal carbohydrates	52.9 ± 12.9	52.8 ± 13.0	52.5 ± 12.1	53.7 ± 13.8	.800

Note: Estimated mean nutrient intakes were not significantly different using one-way ANOVA by food security status and Scheffe post hóc test at $p \leq .05$

Table 4.5. CNEP participants who did not meet EAR for folate, iron, zinc and who did not meet AI for calcium by food security status. (n=342-351)[1]

	Total Sample		Food Secure		Food Insecure		Food Insecure with Hunger		P Value
	n	%	n	%	n	%	n	%	
Did not meet EAR for folate	255	74.6	108	76.6	86	71.7	61	75.3	.650
Did not meet EAR for Fe	125	36.4	52	36.9	46	38.0	27	33.3	.787
Did not meet EAR for Zn	198	57.6	83	58.0	66	54.5	49	61.3	.635
Did not meet AI for Ca	294	83.8	117	81.3	104	83.9	73	88.0	.419

[1] Chi square analysis ran across food security status and is statistically significant at $p \leq .05$

Table 4.6. Healthy Eating Index (HEI) scores of CNEP participants by food security status. (n=366)

		Food Security Status			
Healthy Eating Index Category	**Total Sample n= 348**	**Food Secure n= 143**	**Food Insecure n= 123**	**Food Insecure with Hunger n= 82**	**P Value F Statistic**
Grain	6.0 ± 2.9	6.2 ± 3.1	5.9 ± 2.8	5.8 ± 2.8	.464
Vegetable	5.3 ± 3.5	5.1 ± 3.6	5.8 ± 3.4	4.8 ± 3.6	.123
Fruit	2.7 ± 3.8	3.0 ± 3.9	2.7 ± 3.8	2.4 ± 3.5	.511
Milk	4.5 ± 3.7	4.8 ± 3.7	4.5 ± 3.8	4.1 ± 3.4	.346
Meat	6.1 ± 3.1	6.2 ± 3.2	6.3 ± 3.0	5.8 ± 3.2	.586
Fat	6.1 ± 3.7	6.2 ± 3.6	5.9 ± 3.7	6.1 ± 3.8	.813
Saturated fat	5.8 ± 4.0	5.8 ± 4.1	5.8 ± 4.0	5.7 ± 4.1	.961
Cholesterol	8.2 ± 3.6	8.3 ± 3.5	7.9 ± 3.8	8.5 ± 3.3	.552
Sodium	7.2 ± 3.6	6.9 ± 3.7	6.8 ± 3.8	8.1 ± 2.9	.033[1]
Variety	6.2 ± 3.7	6.4 ± 3.6	6.3 ± 3.6	5.8 ± 3.9	.483
Total HEI Score	58.1 ± 13.0	58.9 ± 12.7	58.0 ± 13.1	57.0 ± 13.1	.565

Note: Analysis of HEI scores was done by one-way ANOVA across food security status and is statistically significant at $p \leq .05$.
[1] Not significant on Scheffe post hoc test.

Chapter V

SUMMARY AND CONCLUSIONS

The objectives of this study were to determine if reasons reported for not having enough food vary by food security status, if food resource management practices differ by food security status, if estimated nutrient intakes differ by food security status, and if diet quality differs by food security status.

In a low-income sample of CNEP participants, several reasons for not having enough food were significant by food security status. These results indicated that although all of the participants were low-income, food insecure and food insecure with hunger households had greater difficulty than food secure households keeping food in their households because of these reasons. The food resource management practice of gleaning was significant by food security status. Results indicated that as food security status became more severe participants resorted to gleaning to get food in the house. Nutrient intake and diet quality were not associated with food security status. Nutrient intake and diet quality were inadequate in a low income sample regardless of food security status.

Limitations

Baseline or entry information was sought for this study. However, for some participants information other than entry was provided. This could lead to a potential because women who were exiting the program may have already participated in CNEP nutrition education classes. This could have potentially changed participants' food resource management behaviors from program entry.

Although the NEAs were trained on how to record 24-hour food recalls, we do not know the accuracy of the information provided.

The marital status of the participants was not known. This made it impossible to determine if household size included spouses.

In order to analyze the 24-hour recalls, data was taken from the original recall recorded by NEAS and entered into Food Processor (version 8 ESHA, Salem, OR) to generate estimated nutrient information and then into the Interactive Healthy Eating website to generate HEI scores. Accuracy of the original 24-hour recall may have been lost in the process of switching between analysis software.

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APPENDIX A

18-ITEM CORE FOOD SECURITY MODULE

U.S. HOUSEHOLD FOOD-SECURITY/HUNGER SURVEY MODULE: 3-STAGE DESIGN (2 INTERNAL SCREENERS)

Questionnaire transition into module--administer to all households: These next questions are about the food eaten in your household in the last 12 months, since (current month) of last year, and whether you were able to afford the food you need.

General food sufficiency question/screener: Questions 1, 1a, 1b (OPTIONAL: These questions are NOT used in calculating the food-security/hunger scale.) Question 1 may be used as a screener: (a) in conjunction with income as a *preliminary* screen to reduce respondent burden for *higher income households only;* and/or (b) in conjunction with the 1st-stage internal screen to make that screen "more open"--i.e., provide another route through it.

1. [IF ONE PERSON IN HOUSEHOLD, USE "I" IN PARENTHETICALS, OTHERWISE, USE "WE."]

   Which of these statements best describes the food eaten in your household in the last 12 months: --enough of the kinds of food (I/we) want to eat; --enough, but not always the kinds of food (I/we) want; --sometimes not enough to eat; or, --often not enough to eat?

   [1] Enough of the kinds of food we want to eat [SKIP 1a and 1b]
   [2] Enough but not always the kinds of food we want [SKIP 1a; ask 1b]
   [3] Sometimes not enough to eat [Ask 1a; SKIP 1b]
   [4] Often not enough [Ask 1a; SKIP 1b]
   [ ] DK or Refused (SKIP 1a and 1b)

1a. [IF OPTION 3 OR 4 SELECTED, ASK] Here are some reasons why people don't always have enough to eat. For each one, please tell me if that is a reason why YOU don't always have enough to eat. [READ LIST. MARK ALL THAT APPLY.]

YES	NO	DK	
[ ]	[ ]	[ ]	Not enough money for food
[ ]	[ ]	[ ]	Not enough time for shopping or cooking
[ ]	[ ]	[ ]	Too hard to get to the store
[ ]	[ ]	[ ]	On a diet
[ ]	[ ]	[ ]	No working stove available
[ ]	[ ]	[ ]	Not able to cook or eat because of health problems

1b. [IF OPTION 2 SELECTED, ASK] Here are some reasons why people don't always have the quality or variety of food they want. For each one, please tell me if that is a reason why YOU don't always have the kinds of food you want to eat. [READ LIST. MARK ALL THAT APPLY.]

YES	NO	DK	
[ ]	[ ]	[ ]	Not enough money for food
[ ]	[ ]	[ ]	Kinds of food (I/we) want not available
[ ]	[ ]	[ ]	Not enough time for shopping or cooking
[ ]	[ ]	[ ]	Too hard to get to the store
[ ]	[ ]	[ ]	On a special diet

BEGIN FOOD-SECURITY CORE MODULE (i.e., SCALE ITEMS)

Stage 1: Questions 2-6 --ask all households:

[IF SINGLE ADULT IN HOUSEHOLD, USE "I," "MY," AND "YOU" IN PARENTHETICALS; OTHERWISE, USE "WE," "OUR," AND "YOUR HOUSEHOLD;" IF UNKNOWN OR AMBIGUOUS, USE PLURAL FORMS.]

2. Now I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months, that is, since last (name of current month).

   The first statement is "(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more." Was that often true, sometimes true, or never true for (you/your household) in the last 12 months?

   [ ] Often true
   [ ] Sometimes true
   [ ] Never true
   [ ] DK or Refused

3. "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

   [ ] Often true
   [ ] Sometimes true
   [ ] Never true
   [ ] DK or Refused

4. "(I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

   [ ] Often true
   [ ] Sometimes true
   [ ] Never true
   [ ] DK or Refused

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q5 - 6; OTHERWISE SKIP TO 1st-Level Screen.]

5. "(I/we) relied on only a few kinds of low-cost food to feed (my/our) child/the children) because (I was/we were) running out of money to buy food." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

   [ ] Often true
   [ ] Sometimes true
   [ ] Never true
   [ ] DK or Refused

6. "(I/We) couldn't feed (my/our) child/the children) a balanced meal, because (I/we) couldn't afford that." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

[ ] Often true
[ ] Sometimes true
[ ] Never true
[ ] DK or Refused

1st-level Screen (screener for Stage 2): If AFFIRMATIVE RESPONSE to ANY ONE of Questions 2-6 (i.e., "often true" or "sometimes true") OR response [3] or [4] to Question 1 (if administered), then continue to Stage 2; otherwise, skip to end.

Stage 2: Questions 7-11 --ask households passing the 1st-level Screen: (estimated 40% of hh's ≤ 185% Poverty; 5.5% of hh's > 185% Poverty; 19% of all households).

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK Q7; OTHERWISE SKIP TO Q8]

7. "(My/Our child was/The children were) not eating enough because (I/we) just couldn't afford enough food." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

[ ] Often true
[ ] Sometimes true
[ ] Never true
[ ] DK or R

8. In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

[ ] Yes
[ ] No (SKIP 8a)
[ ] DK or R (SKIP 8a)

8a. [IF YES ABOVE, ASK] How often did this happen---almost every month, some months but not every month, or in only 1 or 2 months?

[ ] Almost every month
[ ] Some months but not every month
[ ] Only 1 or 2 months
[ ] DK or R

9. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?

[ ] Yes
[ ] No
[ ] DK or R

10. In the last 12 months, were you every hungry but didn't eat because you couldn't afford enough food?

[ ] Yes
[ ] No
[ ] DK or R

11. In the last 12 months, did you lose weight because you didn't have enough money for food?

[ ] Yes
[ ] No
[ ] DK or R

2nd-level Screen (screener for Stage 3): If AFFIRMATIVE RESPONSE to ANY ONE of Questions 7 through 11, then continue to Stage 3; otherwise, skip to end.

Stage 3: Questions 12-16 --ask households passing the 2nd-level Screen: (estimated 7-8% of hh's < 185% Poverty; 1-1.5% of hh's > 185% Poverty; 3-4% of all hh's).

12. In the last 12 months, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?

[ ] Yes
[ ] No (SKIP 12a)
[ ] DK or R (SKIP 12a)

12a. [IF YES ABOVE, ASK] How often did this happen---almost every month, some months but not every month, or in only 1 or 2 months?

[ ] Almost every month
[ ] Some months but not every month
[ ] Only 1 or 2 months
[ ] DK or R

[IF CHILDREN UNDER 18 IN HOUSEHOLD, ASK 13-16; OTHERWISE SKIP TO END.]

13. The next questions are about children living in the household who are under 18 years old. In the last 12 months, since (current month) of last year, did you ever cut the size of (your child's/any of the children's) meals because there wasn't enough money for food?

[ ] Yes
[ ] No
[ ] DK or R

14. In the last 12 months, did (CHILD'S NAME/any of the children) ever skip meals because there wasn't enough money for food?

[ ] Yes
[ ] No (SKIP 14a)
[ ] DK or R (SKIP 14a)

14a. [IF YES ABOVE ASK] How often did this happen---almost every month, some months but not every month, or in only 1 or 2 months?

[ ] Almost every month
[ ] Some months but not every month
[ ] Only 1 or 2 months
[ ] DK or R

15. In the last 12 months, (was your child/ were the children) ever hungry but you just couldn't afford more food?

[ ] Yes
[ ] No
[ ] DK or R

16. In the last 12 months, did (your child/any of the children) ever not eat for a whole day because there wasn't enough money for food?

[ ] Yes
[ ] No
[ ] DK or R

APPENDIX B

6-ITEM SUBSET CORE FOOD SECURITY MODULE

6-Item Subset (Short Form) of the 12-month Food Security Scale – Questionnaire

[LEAD] These next questions are about the food eaten in your household in the last 12 months and whether you were able to afford the food you need.

Q3 I'm going to read you two statements that people have made about their food situation. Please tell me whether the statement was OFTEN, SOMETIMES, or NEVER true for (you/you and the other members of your household) in the last 12 months.

The first statement is, "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

[1] Often true
[2] Sometimes true
[3] Never true
[Don't know, Refused]

Q4 "(I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

[1] Often true
[2] Sometimes true
[3] Never true
[DK, R]

Q8 In the last 12 months, since (date 12 months ago) did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

[1] Yes
[2] No (GO TO 5)
[DK, R] (GO TO 5)

Optional Screener: If any of the first 3 questions are answered affirmatively (i.e., if either Q2 or Q3 are "often true" or "sometimes true" or Q8 is "yes"), proceed to the next question. Otherwise, skip to end.

Q8a **[Ask only if Q8 = YES]** How often did this happen --almost every month, some months but not every month, or in only 1 or 2 months?

[1] Almost every month
[2] Some months but not every month
[3] Only 1 or 2 months
[DK, R] [or X (i.e., Question not asked because of negative or missing response to Q8).]

Q9 In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?

[1] Yes
[2] No
[DK, R]

Q10 In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?

[1] Yes
[2] No
[DK, R]

END

APPENDIX C

IRB APPROVAL FORM

Oklahoma State University
Institutional Review Board

Protocol Expires: 9/24/02

Date: Tuesday, September 25, 2001 IRB Application No HE024

Proposal Title: ONE PROGRAM EVALUATION USING THE CORE FOOD SECURITY MODULE

Principal Investigator(s):

Kathryn Keim
421 HES
Stillwater, OK 74078

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Dear PI :

Your IRB application referenced above has been approved for one calendar year. Please make note of the expiration date indicated above. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved projects are subject to monitoring by the IRB. If you have questions about the IRB procedures or need any assistance from the Board, please contact Sharon Bacher, the Executive Secretary to the IRB, in 203 Whitehurst (phone: 405-744-5700, sbacher@okstate.edu).

Sincerely,

Carol Olson, Chair
Institutional Review Board

APPENDIX D

IRB CONTINUATION FORM

Oklahoma State University
Institutional Review Board

Protocol Expires: 7/17/2003

Date : Thursday, July 18, 2002 IRB Application No HE024

Proposal Title: ONE PROGRAM EVALUATION USING THE CORE FOOD SECURITY MODULE

Principal
Investigator(s) :

Kathryn Keim
421 HES
Stillwater, OK 74078

Reviewed and
Processed as: Exempt **Continuation**

Approval Status Recommended by Reviewer(s) : Approved

Signature : Carol Olson

Carol Olson, Director of University Research Complian

Thursday, July 18, 2002
Date

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modifications to the research project approved by the IRB must be submitted for approval with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

APPENDIX E

CNEP ENROLLMENT FORM

CNEP ADULT ENROLLMENT FORM

ENTRY
(Reverse for EXIT)

Date Entered Into ERS

Family ID:

NEA NAME:

1. Have you previously been enrolled in: EFNEP? **Yes** **No** ONE? **Yes** **No**
If yes: did you receive a Certificate of Completion? **Yes** **No**
Where/When?

2. Name:
3. Street:
4. City
5. State **OK** **6.** Zip
7. Phone ( )
8. Age **9.** Sex **F** **M**
10. Pregnant? **Yes** **No**
11. Breastfeeding? **Yes** **No**

12. Race Code: Check One
_____ White
_____ Black
_____ American Indian
_____ Hispanic
_____ Asian or Pac. Islander

13. Residence: Check One
_____ 1 Farm
_____ 2 Town under 10,000 & rural non-farm
_____ 3 Town/City 10,000 to 50,000
_____ 4 Suburb of City over 50,000
_____ 5 Central City over 50,000

14. Total Monthly Income
$

15. High Grade

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

17. Total Number of Lessons _____

18. Household Members: List youngest to oldest
(Children (through age 19)

First Name	Age(yrs)	First Name	Age(yrs)
1)		5)	
2)		6)	
3)		7)	
4)		8)	

19. Number of Other Adults in Household: (don't count Participant) _____

20. Enrollment Date:

21. SubGroup:
A = EFNEP **B = ONE Program**

21.(a)
Gleaning **Yes** **No**

22. Public Assistance Family Participates in at ENTRY. Check *all* that apply.
WIC/CSFP _____
Food Stamps _____
FDPIR (Commodities on Indian Reservations) _____
TEFAP (The Emergency Food Assistance Program) _____
Head Start _____
Child Nutrition
(Reduced/Free School lunch/breakfast) _____
TANF _____
Other (Specify: _____

Revised 11/03

EXIT

(Reverse for Entry)

COMPLETE EXIT INFORMATION ONLY WHEN LEAVING CNEP PROGRAM

NEA NAME:

1. Family ID:	**NAME:**
17. Total Number of Lessons:	**24. Exit Date:**

23. Exit Reason: (Check)

_____ 1 Educational Objective Met (Graduation)
_____ 2 Returned to School
_____ 3 Took Job
_____ 4 Family Concerns
_____ 5 Staff Vacancy
_____ 6 Moved
_____ 7 Lost Interest
_____ 8 Other (Specify) _____
_____ 9 Other Obligations
_____ A Lost Contact with Client

25. Did family receive assistance as the result of a referral or suggestion from CNEP personnel? **Y N**

If yes, check *all* that apply.

_____ WIC/CSFP
_____ Food Stamps
_____ FDPIR (Commodities on Indian Reservation)
_____ TEFAP (The Emergency Food Assistance Program)
_____ Head Start
_____ Child Nutrition
_____ TANF
_____ Other (Specify)_____

APPENDIX F

24-HOUR FOOD RECALL FORM

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

1. ID #:	2. Date Taken:
3. HM Name:	4. NEA Name:
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 G

CNEP SURVEY

NEA's NAME: _____

CNEP SURVEY

Participant's Name:	ID #:
Date	Check if Interview (NEA completed form) ☐ Entry ☐ Intermediate ☐ Exit ☐

This is a survey about ways to plan and fix foods for your family. As you read each question, think about the recent past. This is not a test. There are not any wrong answers. If you do not have children, just answer the questions for yourself.

For these questions, think about how you usually do things. Please put a check in the box that best answers each question.	Do Not Do	Seldom	Some-times	Most of the time	Almost Always
(1) How often do you plan meals ahead of time?					
(2) How often do you compare prices before you buy food?					
(3) How often do you run out of food before the end of the month?					
(4) How often do you shop with a grocery list?					
(5) This question is about meat and dairy foods. How often do you let these foods sit out for more than two hours?					
(6) How often do you thaw frozen foods at room temperature?					
(7) When deciding what to feed your family, how often do you think about healthy food choices?					
(8) How often have you prepared foods without adding salt?					
(9) How often do you use the "Nutrition Facts" on the food label to make food choices?					
(10) How often do your children eat something in the morning within 2 hours of waking up?					

2/6/98

APPENDIX H

MODIFIED FOOD SECURITY MEASURE

Food and Your Household – Form B

Nutrition Education Assistant (NEA) reads all of the questions to the participant and reads the following text to the participant. "I'm going to ask you about your food situation. For these statements please tell me whether the statement was often, sometimes or never true for your household in the past 12 months. To some questions or statements you will answer yes or no". **NEA: Please circle the response given by the participant answers. Use the word "I" if a single person household or "we" if a multiple person household.**

Statement				
1. The food that I/we bought just didn't last, and I didn't have money to get more.	Often	Sometimes	Never	Don't Know or Refuse
2. I/we couldn't afford to eat balanced meals.	Often	Sometimes	Never	Don't Know or Refuse
3. I/we relied on only a few kinds of low-cost food to feed my children because I was running out of money to buy food.	Often	Sometimes	Never	Don't Know or Refuse
4. I/we couldn't feed my children a balanced meal, because I couldn't afford that.	Often	Sometimes	Never	Don't Know or Refuse
5. In the last 12 months, since (date 12 months ago) did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money to buy food?		Yes	No	Don't know or Refuse
6. If you answered yes to question 5 – how often did this happen?	Almost every month	Some months but not every month	Only 1 or 2 months	Don't know or Refuse
7. In the last 12 months, did you or other adults in the household ever eat less than you felt you should because there wasn't enough money to buy food?		Yes	No	Don't know or Refuse
8. In the last 12 months, were you or other adults in the household ever hungry but didn't eat because you couldn't afford enough food?		Yes	No	Don't know or Refuse

Continued on back

To learn more about participants in the Fresh Start: Nutrition and You program and help us with lesson content, we would like you to answer the following questions.

How often does the following happen or how often do you do the following?				
9. I/we worry food will run out.	Often	Sometimes	Never	Don't Know or Refuse
10. I/we had to eat the same food for several days because I couldn't afford to buy different foods.	Often	Sometimes	Never	Don't Know or Refuse
11. I/we couldn't afford to eat meals with a variety of food groups in the meal.	Often	Sometimes	Never	Don't Know or Refuse
12. I/we couldn't afford to eat a meal with enough fruits and vegetables.	Often	Sometimes	Never	Don't Know or Refuse
13. I/we couldn't afford to eat a meal with meat, potatoes, and vegetables.	Often	Sometimes	Never	Don't Know or Refuse
14. I/we couldn't afford to eat a meal with all of the foods groups.	Often	Sometimes	Never	Don't Know or Refuse

Here are some reasons why people don't always have enough to eat. For each one, please tell me if that is a reason why YOU may not have enough to eat.				
15. Not enough money for food		Yes	No	Don't know or Refuse
16. Not enough time for shopping or cooking		Yes	No	Don't know or Refuse
17. Too hard to get to the store		Yes	No	Don't know or Refuse
18. No way to cook the food		Yes	No	Don't know or Refuse
19. Not able to prepare the food because of health problems		Yes	No	Don't know or Refuse
20. Not able to eat because of need to be on a special diet		Yes	No	Don't know or Refuse

21. Describe or name the special diet you are eating (If answer yes to question 20).

THANK YOU for answering these questions. I certainly appreciate your willingness to share this information with me today.

This study has been approved by the Institutional Review Board for Protection of Human Subjects at Oklahoma State University. If there are any questions, please contact Kathy Keim at 405-744-8293. If there are any questions about the rights of research participants, contact Sharon Bacher at 405-744-5700.

Participant Number: _____

Participant Name: _____

Food and Your Household – Form H

Nutrition Education Assistant (NEA) reads all of the questions to the participant and reads the following text to the participant. "I'm going to ask you about your food situation. For these statements please tell me whether the statement was often, sometimes or never true for your household in the past 12 months. To some questions or statements you will answer yes or no". **NEA: Please circle the response given by the participant answers. Use the word "I" if a single person household or "we" if a multiple person household.**

Statement				
1. The food that I/we bought just didn't last, and I didn't have money to get more.	Often	Sometimes	Never	Don't Know or Refuse
2. I/we couldn't afford to eat healthy meals.	Often	Sometimes	Never	Don't Know or Refuse
3. I/we relied on only a few kinds of low-cost food to feed my children because I was running out of money to buy food.	Often	Sometimes	Never	Don't Know or Refuse
4. I/we couldn't feed my children a balanced meal, because I couldn't afford that.	Often	Sometimes	Never	Don't Know or Refuse
5. In the last 12 months, since (date 12 months ago) did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money to buy food?		Yes	No	Don't know or Refuse
6. If you answered yes to question 5 – how often did this happen?	Almost every month	Some months but not every month	Only 1 or 2 months	Don't know or Refuse
7. In the last 12 months, did you or other adults in the household ever eat less than you felt you should because there wasn't enough money to buy food?		Yes	No	Don't know or Refuse
8. In the last 12 months, were you or other adults in the household ever hungry but didn't eat because you couldn't afford enough food?		Yes	No	Don't know or Refuse

Continued on back

To learn more about participants in the Fresh Start: Nutrition and You program and help us with lesson content, we would like you to answer the following questions.

How often does the following happen or how often do you do the following?				
9. I/we worry food will run out.	Often	Sometimes	Never	Don't Know or Refuse
10. I/we had to eat the same food for several days because I couldn't afford to buy different foods.	Often	Sometimes	Never	Don't Know or Refuse
11. I/we couldn't afford to eat meals with a variety of food groups in the meal.	Often	Sometimes	Never	Don't Know or Refuse
12. I/we couldn't afford to eat a meal with enough fruits and vegetables.	Often	Sometimes	Never	Don't Know or Refuse
13. I/we couldn't afford to eat a meal with meat, potatoes, and vegetables.	Often	Sometimes	Never	Don't Know or Refuse
14. I/we couldn't afford to eat a meal with all of the foods groups.	Often	Sometimes	Never	Don't Know or Refuse

Here are some reasons why people don't always have enough to eat. For each one, please tell me if that is a reason why YOU may not have enough to eat.				
15. Not enough money for food		Yes	No	Don't know or Refuse
16. Not enough time for shopping or cooking		Yes	No	Don't know or Refuse
17. Too hard to get to the store		Yes	No	Don't know or Refuse
18. No way to cook the food		Yes	No	Don't know or Refuse
19. Not able to prepare the food because of health problems		Yes	No	Don't know or Refuse
20. Not able to eat because of need to be on a special diet		Yes	No	Don't know or Refuse

21. Describe or name the special diet you are eating (If answer yes to question 20).

THANK YOU for answering these questions. I certainly appreciate your willingness to share this information with me today.

This study has been approved by the Institutional Review Board for Protection of Human Subjects at Oklahoma State University. If there are any questions, please contact Kathy Keim at 405-744-8293. If there are any questions about the rights of research participants, contact Sharon Bacher at 405-744-5700.

Participant Number: _____

Participant Name: _____

Food and Your Household – Form N

Nutrition Education Assistant (NEA) reads all of the questions to the participant and reads the following text to the participant. "I'm going to ask you about your food situation. For these statements please tell me whether the statement was often, sometimes or never true for your household in the past 12 months. To some questions or statements you will answer yes or no". **NEA: Please circle the response given by the participant answers. Use the word "I" if a single person household or "we" if a multiple person household.**

Statement				
1. The food that I/we bought just didn't last, and I didn't have money to get more.	Often	Sometimes	Never	Don't Know or Refuse
2. I/we couldn't afford to eat nutritious meals.	Often	Sometimes	Never	Don't Know or Refuse
3. I/we relied on only a few kinds of low-cost food to feed my children because I was running out of money to buy food.	Often	Sometimes	Never	Don't Know or Refuse
4. I/we couldn't feed my children a balanced meal, because I couldn't afford that.	Often	Sometimes	Never	Don't Know or Refuse
5. In the last 12 months, since (date 12 months ago) did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money to buy food?		Yes	No	Don't know or Refuse
6. If you answered yes to question 5 – how often did this happen?	Almost every month	Some months but not every month	Only 1 or 2 months	Don't know or Refuse
7. In the last 12 months, did you or other adults in the household ever eat less than you felt you should because there wasn't enough money to buy food?		Yes	No	Don't know or Refuse
8. In the last 12 months, were you or other adults in the household ever hungry but didn't eat because you couldn't afford enough food?		Yes	No	Don't know or Refuse

Continued on back

To learn more about participants in the Fresh Start: Nutrition and You program and help us with lesson content, we would like you to answer the following questions.

How often does the following happen or how often do you do the following?				
9. I/we worry food will run out.	Often	Sometimes	Never	Don't Know or Refuse
10. I/we had to eat the same food for several days because I couldn't afford to buy different foods.	Often	Sometimes	Never	Don't Know or Refuse
11. I/we couldn't afford to eat meals with a variety of food groups in the meal.	Often	Sometimes	Never	Don't Know or Refuse
12. I/we couldn't afford to eat a meal with enough fruits and vegetables.	Often	Sometimes	Never	Don't Know or Refuse
13. I/we couldn't afford to eat a meal with meat, potatoes, and vegetables.	Often	Sometimes	Never	Don't Know or Refuse
14. I/we couldn't afford to eat a meal with all of the foods groups.	Often	Sometimes	Never	Don't Know or Refuse

Here are some reasons why people don't always have enough to eat. For each one, please tell me if that is a reason why YOU may not have enough to eat.				
15. Not enough money for food		Yes	No	Don't know or Refuse
16. Not enough time for shopping or cooking		Yes	No	Don't know or Refuse
17. Too hard to get to the store		Yes	No	Don't know or Refuse
18. No way to cook the food		Yes	No	Don't know or Refuse
19. Not able to prepare the food because of health problems		Yes	No	Don't know or Refuse
20. Not able to eat because of need to be on a special diet		Yes	No	Don't know or Refuse

21. Describe or name the special diet you are eating (If answer yes to question 20).

THANK YOU for answering these questions. I certainly appreciate your willingness to share this information with me today.

This study has been approved by the Institutional Review Board for Protection of Human Subjects at Oklahoma State University. If there are any questions, please contact Kathy Keim at 405-744-8293. If there are any questions about the rights of research participants, contact Sharon Bacher at 405-744-5700.

Participant Number: _____

Participant Name: _____

VITA

Nicole Kathleen Dill

Candidate for the Degree of

Master of Science

Thesis: OKLAHOMA CNEP PARTICIPANTS DIET QUALITY DOES NOT DIFFER BY FOOD SECURITY STATUS

Major Field: Human Environmental Sciences

Biographical:

Personal Data: Born in Phoenix, Arizona in April, 1977 to Michael, and Nancy Dill.

Education: Graduate from Bellevue Community College of Bellevue Washington in 1998, received Associates degree in Arts and Sciences. Graduated from Oklahoma State University of Stillwater Oklahoma in 2002; received Bachelor of Science degree in nutrition, option in Dietetics. Completed the Dietetic internship at Oklahoma State University during the fall 2003. Completed the requirements for the Master of Science degree with a major in Nutritional Sciences at Oklahoma State University in July, 2004.

Experience: Employed by Oklahoma State University, Department of Nutritional Sciences as a graduate research assistant from January 2003 to present.

Professional Memberships:
American Dietetic Association
Oklahoma Dietetic Association