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COMPARISON OF THE KENTUCKY NUTRITION EDUCATION PROGRAM HEALTHY EATING INDEX PRE- AND POST- TEST DATA FOR 2012-2013

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COMPARISON OF THE KENTUCKY NUTRITION
EDUCATION PROGRAM HEALTHY EATING INDEX
PRE- AND POST- TEST DATA FOR 2012-2013

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in the
College of Agriculture, Food and Environment at the
University of Kentucky

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ABSTRACT OF THESIS

COMPARISON OF THE KENTUCKY NUTRITION EDUCATION PROGRAM

HEALTHY EATING INDEX PRE- AND POST- TEST DATA FOR 2012-2013

Nutrition education has become a topic of significant concern in today's society. An area prominent in the interest of nutrition is the battle against food security. Programs like the Supplemental Nutrition Assistance Program – Education (SNAP-Ed) is helping to improve its participants' food security by providing nutrition education. Kentucky SNAP-Ed participants were asked to complete a survey and a 24-hour food recall to evaluate their knowledge in the following areas: Healthy Eating Index (HEI) scores, food resource management and nutrition practices. Each participant completed an average of 7-12 nutrition education lessons throughout the year. To graduate from the program participants were required to complete the same survey and food recall, applying knowledge gained from the program. Responses from 2,868 participants were analyzed to assess the impact of the SNAP-Ed program. Results demonstrated an improvement of average post-mean responses in all three areas (p -value < 0.001). In conclusion, this research supports that those who participated in the 2012 – 2013 SNAP-Ed program graduated with an overall positive change in nutrition behavior, promoting enhanced food security in low-income families.

KEYWORDS: Kentucky, SNAP-Ed, HEI, Food Resource Management, Nutrition Practices

Corey Joe Shepherd, RD, LD

April 18, 2019

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Chapter One

Introduction

Background

Nutrition education has become a topic of significant concern in today's society. An area prominent in the interest of nutrition is the battle against food insecurity. Programs like the Supplemental Nutrition Assistance Program – Education (SNAP-Ed) are helping improve participant food security through nutrition education. In 2014, the United States Census Bureau reported 14.8% of all American homes were in poverty, which equates to 46.7 million Americans (US Census Bureau. 2018). Furthermore, approximately 21.1 percent of children under the age of eighteen are within the poverty guidelines (US Census Bureau. 2018). Although there are many other factors that are incorporated into having access to nutrient dense foods, poverty can be highlighted as one of the largest contributors to food insecurity. Statistics show one-in-five US children combat hunger (Feeding America, 2016.) Additional statistics from Feeding America lists 65% of all Feeding America households reported having Supplemental Nutrition Assistance Program (formally called Food Stamps) benefits, and 93% of children participate in the national school lunch program (SLP) (Hunger in Kentucky, 2014).

While food assistance programs have been a great benefit to those who participate in the programs, many programs lack the time and resources to teach extensive nutrition education to clients. The country was experiencing severe hunger and federal budget cuts. As a result, the Food Stamps Act was amended and allowed states to apply for additional funding. The additional funding provided the development of the SNAP-Ed program, allowing participants to not only receive nutritional benefits but nutrition education as

well. These constraints gave rise to the Supplemental Nutrition Assistance Program – Education (SNAP-Ed) and the Expanded Food Nutrition Education Program (EFNEP). The SNAP-Ed program was founded in 1988 by the Wisconsin cooperative extension. By 2004, all 50 states had adopted the SNAP-Ed program and began educating those at or below the 185 percent federal poverty level (Dunn, 2013; National Institute of Food and Agriculture, n.d.).

Both SNAP-Ed and EFNEP use a state and/or federally approved curriculum to teach a wide range of lessons to qualified participants. Both offer core lessons and supplemental lessons to address education gaps of participants. Please see Appendix A for a list of definitions helpful in the better understanding of the program. Core components include but are not limited to food resource management, nutrition practices, food safety, meal planning and financial management. Please see Appendix E and F for the list of questions asked to participants. As participants enter the program, individuals responsible for offering the training for participants, often referred to as nutrition education program (NEP) Paraprofessionals, conduct a needs assessment to determine which lessons will most benefit each participant (koszewski et al., 2011). According to Kentucky data, the average participant completes nine lessons to graduate with the necessary skills to improve their lifestyle.

Purpose

The purpose of this research is to determine if nutrition education lessons provide positive behavior changes in practices of food resource management and nutrition, as well as an overall increase in HEI scores. By evaluating these areas, the effectiveness of the Kentucky SNAP-Ed program will be determined.

Ultimately, this research will determine if participants experienced a positive dietary behavior change during their involvement in the Kentucky Snap-Ed program. The significance of this research indicates the importance of nutrition education within the state of Kentucky but could be inferred beyond with additional data collection. Furthermore, this research will contribute to individual communities by providing Snap-Ed Paraprofessionals an insight into the efficacy of their lessons.

Lastly, the results of this thesis will prove the desired need for the Kentucky SNAP-Ed programming. While the federal program implementation, has not improved the hunger and food insecurity issue, this research will support the need for Snap-Ed in facilitating lasting changes through nutrition education.

Problem

Low-income, Kentucky families typically have fair or poor nutrition, which leads to a downward tailspin of health-related problems. According to the 2012 Kentucky-Behavioral Risk Factor Survey, 24% of the citizens of the state of Kentucky reported their general health as being fair or poor, compared to the 17% national average. This number has increased from the 22.4% that was reported in the previous year. No significant differences among the demographics of gender or race were reported concerning fair or poor health status (KyBRFS, 2012).

In the state of Kentucky, health issues of concern include, but are not limited to, obesity, diabetes, coronary heart disease and stroke. Forty percent (40%) of those who reported their health as being fair or poor, indicate that their income is \$25,000 or less. These statistics further indicate the importance of programs like SNAP-Ed and EFNEP within the state of Kentucky (KyBRFS, 2012).

Nutrition impacts the overall wellbeing of an individual and relates to the reduction in risk of diseases, such as diabetes and obesity. Government funded nutrition education programs have the potential to help reduce the risks of diseases. These nutrition education programs are designed to provide nutrition education in order to reduce nutrition-related education gaps. However, the question still remains; are the lessons sustaining a permanent behavior change within those who participate in the SNAP-Ed program? This thesis will seek to determine how effective the Kentucky SNAP-Ed program is in changing nutrition behavior patterns.

Research Objectives

The objectives of this thesis are:

1. To determine if the Kentucky SNAP-Ed program improved the Healthy Eating Index (HEI) scores of participants, inferring a positive nutrition behavior change.
2. To determine if the Kentucky SNAP-Ed program provided the participants with a better understanding in food resource management practices.
3. To determine if the Kentucky SNAP-Ed program provided the participants with a better understanding of nutrition practices.

Justification

Although SNAP-Ed has been in existence since 1981, no study has been conducted in the state of Kentucky comparing both the baseline and post-test data in relation to the HEI scores of those who participated in the program. The conclusion of this study will determine the Kentucky SNAP-Ed program's effectiveness in facilitating behavior change. Furthermore, this thesis will show the importance of public assistance

programs and their educational counterparts, to help combat hunger and promote the consumption of nutrient dense foods.

Assumptions

It is assumed the data collected by the SNAP and EFNEP Paraprofessionals in the state of Kentucky is accurate. It is also assumed the participants did not falsify their answers on the forms and gave reliable information – both accurate and precise. Additionally, the measured data is assumed to not have skewed the statistics within this study.

Chapter Two

Review of Related Literature

This literature review will examine and expand on the background of SNAP-Ed, past successes the program has experienced and how the program addresses the needs of its participants.

Background

Research has associated poor health and food quality with limited resources in low-income populations, having an income cutoff at the 130 percent poverty level (Lin, 2005). According to the 2008 report in the *Centers for Disease Control and Prevention*, \$147 billion was spent on medical costs related to obesity (Finkelstein et. al, 2009). It was also reported that no data suggested a difference in obesity rates among men who had higher education. However, women who had a college education tended to be less obese than those women who held no college education (Ogden et. al, 2010). Although SNAP-Ed and EFNEP do not specifically focus on obesity, it does inform its clients on the importance of mindful eating. The education lessons taught by SNAP-Ed are specific to the demographics of the participants of the program. Moreover, educating participants on the importance of nutrition may give rise to mindful eating and increase quality of life.

The required components to complete the Kentucky SNAP-Ed program are set by the institution itself. This is done because there are no official USDA requirements to meet in order for a participant to complete or graduate from the program. The USDA does however, set particular core objectives that must be met for completion of the program. Teaching the first six lessons and an additional supplemental lesson allows the participant to become familiar with core components. These guidelines help to ensure the

participants have an understanding of the many nutritional components within completion of the program. The first few lessons that are taught to the participants encompass the following components: MyPlate, Fruits, Vegetables, Dairy, Protein and Whole Grains (SNAP-Ed Strategies and Interventions, 2016)

Using core and supplemental components, the SNAP-Ed Program attempts to change knowledge and behaviors related to diet. The current measurement tools used for individual behavior changes are the 24-hour recall and behavior checklists. Each of these tools are adopted and modified at the state level. After the data is collected it is logged into the web-based Nutrition Education Evaluation and Reporting System or Web-NEERS for short (Chipman, 2013; National Institute of Food and Agriculture). Once the data is collected, it is examined and categorized by the answers provided on the checklist and food provided. Recently NEERS has been updated from a paper format to an internet-based system, called Web-NEERS. The new Internet database decreases the amount of time required to input the data. The database also optimizes the availability of statistical data.

Effectiveness of Nutrition Education Programs

SNAP-Ed and EFNEP use a national curriculum that is adopted by the state and then implemented by individual county SNAP-Ed Paraprofessional. The curriculum promotes the USDA MyPlate (previously MyPyramid) and recommendations for eating balanced meals, weight-loss and increased fruits, vegetables and dairy intake. Behavior changes are determined by using a behavioral checklist. These checklists are administered at the beginning of the first SNAP-Ed and EFNEP lesson and again after the participants have graduated from the program. A participant can graduate with a

minimum of six completed EFNEP and SNAP-Ed lessons. However, twelve lessons are preferred and recommended for graduation (Koszewski, et. al, 2011).

The research conducted by Koszewski and partners (2011) examined the 2007-2009 SNAP-Ed and EFNEP data to determine if the participants maintained their dietary behavior changes six-months after graduation. This data was collected by asking the participants at the beginning and end of their six core lessons to complete a ten-fifteen question survey. Upon graduating the program the paraprofessionals asked the participants for their contact information for a follow-up questionnaire. Six months after the participants graduated the Nutrition Education Program(s) (NEP) the paraprofessionals sent out the follow up questionnaire. The researcher's data consisted of 4,400 graduated participants. The NEP paraprofessionals were able to obtain about 25% of those 4,400 to a follow up questionnaire; n=1,100 participants. The participants were then asked to complete a follow up questionnaire and return it to the paraprofessional in a prepaid return letter, which was provided (Koszewski, et. al, 2011).

The results of their findings proved the effectiveness of both programs, SNAP-Ed and EFNEP, resulting in lasting positive behavior changes. Longitudinal studies in both SNAP-Ed and EFNEP are important to show the effectiveness of programming. Since this study had a similar research design with similar research questions and methodologies, it can serve as the model study for this thesis. Furthermore, the data collected in this thesis found similar results, aiding in the validation of Koszewski and researchers' results.

In a separate study, researchers from the Department of Nutritional Sciences at Oklahoma State University wanted to determine how to hire the best paraprofessionals.

The researchers developed a study using a three-round Delphi methodology to conduct their study. The sample size consisted of 20 county and 14 state professionals. The professionals were then asked to rank a series of questions on a scale ranging from 1 to 5, representing being not important to very important. These questions were asked in three separate rounds and contributed to the following categories: job attributes, job competencies prior to hire and job competencies after training (Wakou, 2003).

The results of this study determined that professionals from the county tend to report personal attributes and job competencies higher than the state professionals. The thought behind this is due to the professionals from the county wanting to hire paraprofessionals faster than those at the state level. The implication of this can be used as a guide when hiring paraprofessionals. Although SNAP-Ed and EFNEP uses an excellent curriculum to educate its participants, it truly depends on the person delivering the message. The ability of the paraprofessional to convey the lessons greatly impacts the success of the program (Wakou, 2003).

Another study examined the benefits of SNAP-Ed and EFNEP participants, as well as the educators. Auld and researchers (2013) examined if the lessons impacted the quality of life for both the participants and the educator. The researchers used ANOVA and ANCOVA to determine the statistical significance of their findings. Using a longitudinal design, the researchers sampled 128 participants and 16 educators from eight different states. Each of the participants was given a \$10 or \$15 gift card for participating in the program. The researchers measured the Quality of Life (QOL) of the participants for up to one year after the classes.

The findings of this research were significant enough to make the assumption that both programs did in fact increase the quality of life scores. It was noted in this study that the QOL of both the participants and the educators were positively impacted up to a year after the lessons. This leads to the view that SNAP-Ed and EFNEP's is effective in other methods of utilization. Moreover, this research study broadens the impression of SNAP-Ed and EFNEP lessons, impacting the quality of life of the participants and those who are giving the educational lessons. This is a vital piece of evidence when evaluating SNAP-Ed and EFNEP data, because many of the paraprofessionals are from the same area as the participants being educated. So while changing the behaviors of the participants, the lives of the paraprofessionals are also being enriched as well. (Auld, 2013).

SNAP-Ed and EFNEP paraprofessionals are those who are responsible for delivering the educational lessons to program participants. Paraprofessionals with an interest in nutrition and local to the area they will be teaching in, seem to have more successful families (Dollahite et al., 2003). This aids the paraprofessionals in relating to the same individuals who they are educating. Additionally, by residing in the community the paraprofessional would potentially have a greater impact in setting an example within that population (Wakou, 2003).

According to the April 2003 issue of the Journal of Extension, Nutrition Education Programs began to change from one-on-one education style to a group delivery system. This method allows the participant and clients to approach the topic of nutrition as a team, rather than individually. Additionally, the change to a group setting is safer for the paraprofessionals and adds to the cost-effectiveness of the program.

Cornell researchers Dollahite, Olson and Michelle Scott-Pierce wanted to determine what appropriate methods and strategies are needed to amplify the participants' nutrition education while in a group setting. The researchers used a pre- and post- test checklist to evaluate behavior changes between two separate sample sizes of EFNEP participants. Dollahite and others then examined statewide data collected from the past 3 years, consisting of approximately 17,000 participants. The researchers subdivided the total participants into two categories, one for the entire state of New York, and the other consisting of only 14 counties, n=9,523 and n=924 respectively. They then compared the information to those who reported using either an individual or group method of delivery for the nutrition education lessons. The researchers concluded, for both state and selected counties, those who had reported to receive individual rather than group instruction resulted in having a more significant increase in behavior change (Dollahite et al., 2003).

Program Challenges

As in many other programs there is always room for improvements in curricula, which is what researchers Cunningham-Sabo and others investigated in their 2016 Food and Nutrition Conference and Expo (FNCE) poster project. The researchers examined EFNEP/SNAP-Ed curricula used for 3rd – 5th grade students. They asked two questions. 1. What were the extent of student cooking experiences? 2. What barriers and support did students have for being included in EFNEP/SNAP-Ed cooking activities? The in-depth review of curricula which included nutrition, food safety, food resource management and cooking/food preparation was conducted. After a review of commonly used curricula (n=6), researchers determined few participants had experiences with actual cooking

and/or safe food handling. Program leaders were also interviewed to evaluate their understandings with current curricula. A total of 54 surveys, having a 74% response rate, showed that program leaders wanted 6-8 lessons that addressed grade specific standards, had evaluation goals and encompassed cooking and tasting activities. (Cunningham-Sabo, 2016). By incorporating the previously mentioned items in a nutrition curricula no curricula gap for those who are of low-income status occurs (Cunningham-Sabo, 2016).

Determining how various components are incorporated into a curriculum can help close the gaps to educational barriers. Because participants in SNAP-Ed lessons are of low-income households and have different resources available to them, insight into the needs of curricula target audiences are important. The University of Kentucky's SNAP-Ed program has examined other programs allowing for expansion of their own curricula by integrating cooking and food handling skills.

Food Resource Management

In an article published by the USDA, food insecurity is described as the inability to afford foods for their family due to not having enough resources (Rabbitt et al., 2017). Food insecurity accounts for approximately 14.9% (2011) of all US households who have an income less than the federal poverty level and is associated with inadequate nutrient intake, poor mental health, increased risk of chronic disease and obesity to name a few (Hartline-Grafton, 2015; Coleman-Jensen et al., 2016). Some of the issues associated with US households being food insecure are attributed to poverty levels, having poor access to education and conflicts with reliable transportation. The Supplemental Nutrition Assistance Program is one of a few agencies that strive to meet the nutritional needs of low-income populations by providing monthly monetary benefits for its participants to use at

Researches from the University of California at Davis examined the California SNAP-Ed program called Plan, Shop Save and Cook (PSSC). The closes were created to educate its participants in resource management. Kaiser and others then studied the pre and post-evaluation from the year 2011 – 2013 and determined the average food resource management scores (RMS), and running out of food (ROM) indicators. The four categories of the RMS were planning meals, using a list, comparing prices, reading labels, thinking about healthy choices, and eating varied meals. The RMS was evaluated by asking participants to complete a frequency ranging from never to always, having a range from “0” to “4”. Kaiser and others used Pearson’s chi square to evaluate the differences between both years the program was piloted, financial years (FY) 2011 – 2012 and 2012 – 2013. The total of participants were $n = 1,371$ and $n = 2,371$ respectively. Once the researches compiled their results a chi square test was conducted (Kaiser, et. al, 2015).

SNAP participants experienced an improvement in the mean RMS and ROF scores compared to non-SNAP participants, $P < 0.001$. The authors additionally noted it can be difficult measuring the long-term application on the PSSC program and other programs alike. Lastly, the PSSC and SNAP-Ed programs did demonstrated a positive correlation between purchasing more nutritious foods before and after nutrition lessons were offered. The results from Kaiser and others will be used to further defend the positive correlation found in this thesis (Kaiser, et. al, 2015). This shows the importance of not only access to food, but the knowledge of what to do with it (Leung et al., 2013).

Nutrition Practices

In 2014, researchers from the University of Georgia examined the relationship of SNAP-Ed participants who reported having a high weight status, weight perception and weight management practices. The researchers used a convenience sample of Georgia SNAP-Ed *Food Talk* participants who underwent six lessons. All six lessons were taught by paraprofessionals in urban areas of Georgia. The *Food Talk* participants were asked to complete a pre and post – evaluation. They were asked to record their height and weight, and report any attempts at weight loss. Researchers then calculated the participants' BMI for comparison and found the difference in means of BMI and percentage of weight loss methods, respectively.

Approximately 31% of the participants had recorded being overweight and 42% as obese. Bailey and Lee noted 60% of all participants exactly recorded their perceived weight, while only 39% of overweight participants correctly perceived themselves as being overweight. Nearly 76% of overweight participants reported using both exercise and diet in their past weight loss attempts, which differs from the 53% of obese participants who also used both strategies. The researchers determined those who were overweight and accurately represented themselves were three-times likely to use both diet and exercise to lose weight ($P = 0.04$). It was also noted those who accurately perceived themselves as being overweight/obese were significantly more likely to combine both methods to achieve weight loss ($P < 0.001$).

The insight this study provides to those working in a community setting is exceedingly valuable. Bailey and Lee's research explains the correlation between self-perception of body awareness and the willingness to lose weight. This information can

be applied to this research paper by relating the findings to some of the barriers a SNAP-Ed paraprofessional may experience while working with participants. Ultimately, the success of weight loss might not exclusively depend on the quality of the lessons and teaching styles, but how a person psychologically perceives their body image. Furthermore, it may benefit the SNAP-Ed program to incorporate these findings into its curricula to increase its effectiveness.

Researchers in 2016 Molitor and others conducted a study examining low-income mothers living in areas in-range of a SNAP-Ed program, and how it relates to the consumption of fruits, vegetables and fat, and the intake of sugar-sweetened beverages. An automated self-administered telephone survey was conducted to gather participants' 24 – hour food recall (ASA24). The participants were also mailed reinforcement items and a booklet on serving sizes; future phone calls referenced these materials during the conducting of this study. The ASA24 did not include any identifying participant information, however the participants could provide their information if desired. The participants were sent nutrition education and reinforcement items through the mail (Molitor et. al, 2016). The SNAP-Ed intervention was determined by using a census tract among all 6,355 low-income mothers. The total number of participants ranged between the ages of 6 – 65, n = 2,907. The participant data was then separated into no/low, moderate and high reach groups (Molitor et. al, 2016).

The results published by Dr. Molitor and others suggested a positive correlation between of low-income mothers who consumed fruits, vegetables and fat, and the intake of sugar-sweetened beverages and who lived near SNAP-Ed programs. A 1-way ANOVA

was preformed and these were the following p-values for fruits and vegetables, high fat foods and sugar-sweetened beverages, $P < 0.1$, $P < 0.1$, $P < 0.5$ respectively.

It was noted in the article that a positive behavior change did occur between the Dietary Behavior categories – fruits, vegetables, high-fat and sugar-sweetened beverages. However, it was noted in the study there was no true correlation between living in proximity to a SNAP-Ed program and having an overall increase in HEI scores (Molitor et. al, 2016). This study is an excellent representation of how individual sections of diets are influents by the SNAP-Ed program, even if their HEI scores were not completely effected by the SNAP-Ed program.

In a study lead by researchers Cullen and others, the impact of goal setting amount low-income women who participated in Texas EFNEP classes were examined. A total of six classes were taught, and after each class the participants were asked to complete weekly goal sheets. Researchers were interested in measuring the participant's autonomous behavior changes through their own goal setting (Cullen, 2010). The researchers used past research collected by Cullen and others to compare previous intervention information to use in the follow-up data collection. The researchers determined those how had a higher goal attainment also had a greater improvement in fiber consumption and low fat/fat free milk intake, and had a lower consumption of fruit juice and water, lastly the regular intake of vegetables stayed constant (Cullen, 2010).

Although researchers Cullen and others were only examining the participant's goal attainment, the data does elude to participants having an overall positive correlation with food intake post EFNEP lessons. Participants showed having a 39.2% achievable goal to increase fiber intake, and a 59.8% achievable goal in shopping smart (Cullen,

2010). While this thesis uses HEI scores to compare the nutrition practices of pre- and post- test data of SNAP-Ed participants, the research conducted by many of these scholars contains very similar methodologies and have relatable findings.

Chapter Three

Research Methodology

The purpose of this study is to determine if those who participated in the Kentucky SNAP-Ed programs showed signs of behavior change upon completion of the program. By using the previously collected (2012 – 2013) data, a series of statistical tests was used to determine the efficacy of the program. This thesis uses a cross-sectional, retrospective format for the design of this study. Baseline and post-test results, along with the computed HEI scores, were examined in order to determine the effectiveness of the Kentucky SNAP-Ed program.

Questions from the pre and post - evaluation checklist were used to determine meal planning and nutrition practices. The behavior checklists measure the change in HEI scores. Using the HEI method to evaluate food consumption make computing the diet recalls more effective.

Determining the HEI scores of those who participated in the NEP lessons will prove the effectiveness of nutrition education within the state of Kentucky. Moreover, it can be determined if NEP lessons are effective in facilitating dietary behavior changes. This information will be useful in determining the success of the SNAP-Ed program within the state of Kentucky and lay the groundwork for future lessons.

Research Design

The University of Kentucky's Institutional Review Board gave its permission to use the 2012 – 2013 SNAP-Ed data for the use of this thesis. This thesis used quantitative data with a pre-and post-test design. The research design allowed the investigator to compare data sets to evaluate the research objectives. The baseline

questionnaires were administered by the SNAP-Ed paraprofessional to each of the participants in the SNAP-Ed class. This was done during the first SNAP-Ed class. Once the participant(s) met the minimum core competencies, on average this was by the ninth class, a second questionnaire was administered. If the participant then decided to leave the class at that time, the paraprofessional would then have enough data to graduate the participant from the program. A total of 2,868 pre-and post-test questionnaires were collected and examined. The data used in this thesis contains no identifying markers and is therefore protective of personal information.

Research Questions

The following questions were formulated in order to meet the previously stated research objectives. Please see Appendix B through F for an exact copy of the demographics, pre and post survey, and 24 – hour food recall used within this study.

1. Does SNAP-Ed lessons improve the participant’s HEI scores after participation?
 - a. Determined by the use of HEI scores, acquired from baseline and post-intervention dietary recalls
2. Did the lessons provide the participants with a better understanding in food resource management practices?
 - a. Determined by using baseline and post-intervention checklists (Questions 1, 2, 3, 4)
3. Did the lessons provide the participants with a better understanding of nutrition practices?
 - a. Determined by using baseline and post-intervention checklist (Questions 7, 8, 9, 10)

Participants

The sample populations are those who participated in NEP classes and who have completed both the pre- and post- test diet recalls as well as the pre- and post- test checklist. The sample population is from the state of Kentucky and contains no identifying markers. Each participant must complete all core requirements, on average nine classes, before they can complete the program. The complete data set included 4,982 participants, however not all participants answered both the entry and exit questions. After all exclusions were made, there were 2,868 participants who participated in this study.

Healthy Eating Index

According to the United States Department of Agriculture, the HEI is defined as “a measure of diet quality that assesses conformance to federal dietary guidance” (Healthy Eating Index, 2015). The practical use of the HEI system in this thesis is to determine the quality of the foods being consumed by those of low-income populations (Guenther, 2012). The HEI system is conducted every five years by the USDA and the US Department of Health and Human Services (DHHS) and was last updated in 2005. This updated HEI score is now used in the Healthy People 2010. (New NCCOR, 2013)

The total HEI score is comprised of twelve different dietary components, totaling to 100 in value. Each component is assigned a value that contributes to the overall HEI score. These averaged values are a weighted mean, thus the reasoning behind some variables given a “5” “10” or “20” in value. Fruits, vegetables, and protein is given a value of 5, whereas dairy and whole grain consumption is given a value of 10 (Guenther

et al., 2005; Basiotis, 2002). Once the data is computed for the sample population, a percentage can then be calculated. For example, in 2002 the USDA published a report card on the quality of American's diet and examined the diet quality for children between the ages two and seventeen; one of the HEI scores determined in that study was a 4.0 for "Total Fruits". After taking the "obtained" HEI score and dividing by the "given" HEI score, a total of 80% is obtained (Report Card on the Quality of Americans' Diets, 2002). Researchers Guenther and others describe the following ranges as having a good diet, needs improvement or poor diet; 80% - 100%, 51% - 80%, 0% - 51% respectively (Guenther et al., 2005; Basiotis, 2002).

Procedures

The procedures used in this research include using a demographics-evaluation sheet, a diet summary and a questionnaire, in the form of a checklist. Each of these items are currently being used by, both, SNAP-Ed and NEP. The data is entered into a web-based reporting systems known as Nutrition Education Evaluation and Reporting System (NEERS). This reporting system assures the diet recalls and checklists are accurate, and effective, in monitoring nutrition behavior within those participants. Demographic information was collected by the paraprofessionals, but the data received to conduct this study had no identifying markers. Please see Appendix B for an exact copy of the demographics questions used within this study.

Questionnaire

The questionnaire includes two sections. The first sets of questions asked on the checklist are based on a national evaluation system. These questions are twelve in total, and inquire the following: meal planning, food safety and nutrition practices. The second

sets of questions are five in total, and are supplementary, statewide inquiries. The questionnaire uses a Likert scale to measure participant answers. This scale ranges from zero to five consisting of six distinctive answers to select from. These ranges are from Non Applicable (N/A) to Almost Always. The following questions represent the participants' understanding in food resource management: "How often do you plan meals ahead of time?" "How often do you compare prices before you buy food?" "How often do you run out of food before the end of the month?" "How often do you shop with a grocery list?" Please see Appendix E and F for the exact copy of the questionnaire used in this study.

24-Hour Food Recall

In addition to the checklist, a 24-hour food recall is used in order to monitor behavior change. The 24-hour food recall helps determine the HEI scores based from the food previously reported. The food recall inquires all of the food consumed in a 24-hour period of time: from breakfast to dinner, including snacks. Please see Appendix C and D for the exact copy of the diet recall used in this study.

Chapter Four

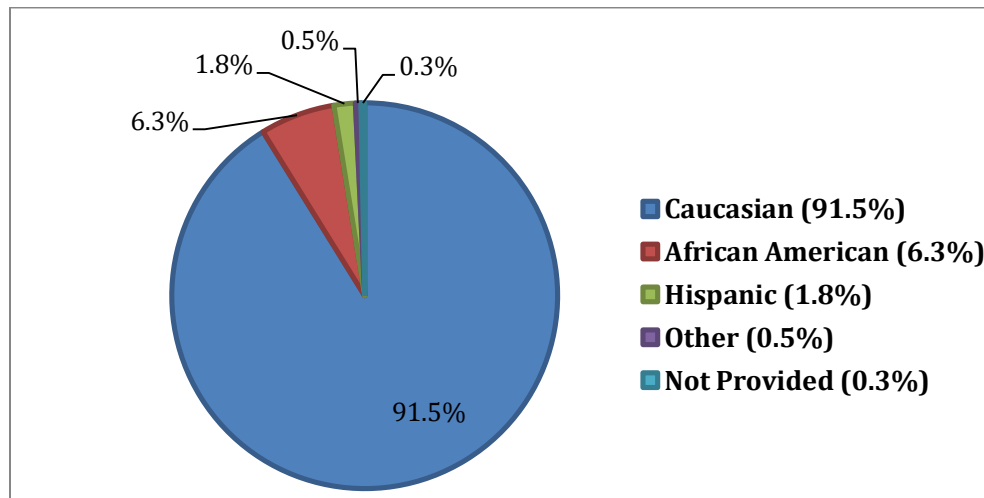
Results

This thesis used the software *R-Studio* and *STATA*, and *Microsoft Office: Excel* to conduct the statistical analysis for this project (RStudio Team, 2016; StataCorp, 2017). It is assumed all information within this section uses accurate data to base its findings.

After refining the number of participants within this study, the sample size consisted of SNAP-Ed participants (n=2,868) for the state of Kentucky, between the years of 2012 and 2013. Out of the 2,868 participants, 2,232 were female and 634 were male and had an average age of 43.5, ranging between the ages of 28 and 60. A mean of nine lessons were conducted, ranging from 7 – 12 lessons per individual. The average monthly household-income was between the ranges of \$500 and \$1,050 and had a mean of \$822.80 per month. A total of 64 women reported being pregnant during the time of the lessons and eight reported breastfeeding.

The following pie chart depicts the ethnic demographics of the sample population.

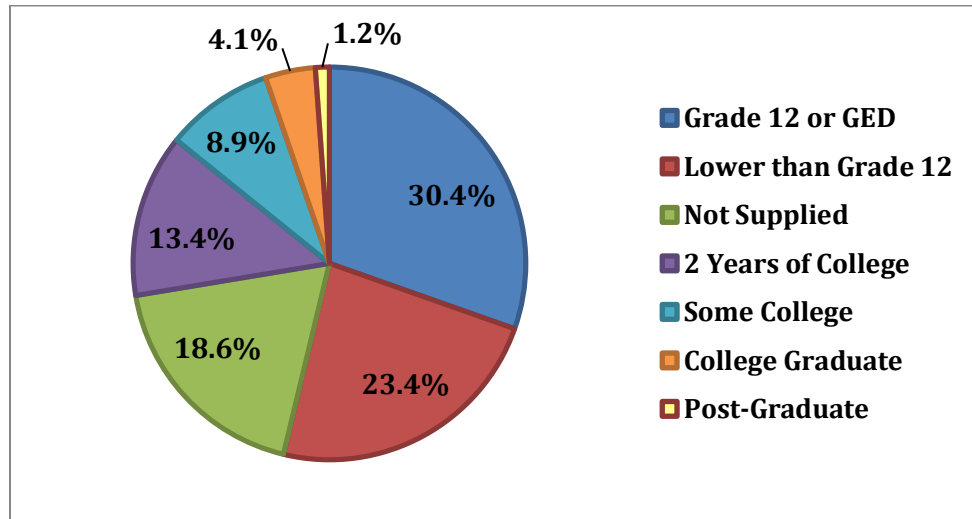
Figure 4.1 – Cultural Background



As shown in the above chart, most of the participants were comprised of Caucasian and African American, 91.5% and 6.3%, respectively. These statistics match that of national data for the state of Kentucky. According to the US 2010 Census, approximately 88% of Kentucky’s population reported being Caucasian and 8% reported being African American (U.S. Census Bureau QuickFacts: Kentucky (2010)).

The following chart depicts the educational demographics for the 2,868 participants.

Figure 4.2 - Educational Statistics



As depicted in Figure 4.2, 1,542 (53.8%) of the participants had either a high school education or lower. This demographical statistic, paired with the household income, is an accurate reflection of the SNAP-Ed’s target audience. Furthermore, it can be assumed those 256 (8.9%) participants who reported having “Some College” were either currently in college or had dropped out at some point. Lastly, approximately 536 (18.7%) participants had actually completed a college degree. Although college educated participants are not the SNAP-Ed program’s target population, it does not mean they are not financially stable. These participants may have similar needs as those of lower-educational status.

HEI Scores

This section examines the data collected from the participant’s mean HEI scores in the following areas: Total Fruits, Total Vegetables, Dairy, Protein and Whole Grains. These HEI scores were selected for measurement because they fall within the first six core lessons taught by the SNAP-Ed classes. These six classes encompass the following constituents: Overview of USDA MyPlate, Fruits, Vegetables, Dairy, Protein and Whole

Grains. The baseline mean score was compared to the post-intervention mean score, resulting in either an increase or decrease in an overall HEI Score for that category. Again, a mean of nine lessons were conducted, ranging between seven and twelve lessons.

The following statistics were calculated using the following variables, fruits, vegetables, dairy, protein, and whole grains. Pearson’s Chi Square test was conducted to determine if the data was statistically significant in improving HEI scores within the 2013-2014 SNAP-Ed participants. Pearson’s Chi Square was used to for two reasons; the first being due to multiple environmental factors at play between the beginning and end lesson; second was stratifying the data to more evenly distribute. A paired t-test was then used to determine if the change in pre- and post- test means were significant in their changes. The following tables and figures depicts those changes.

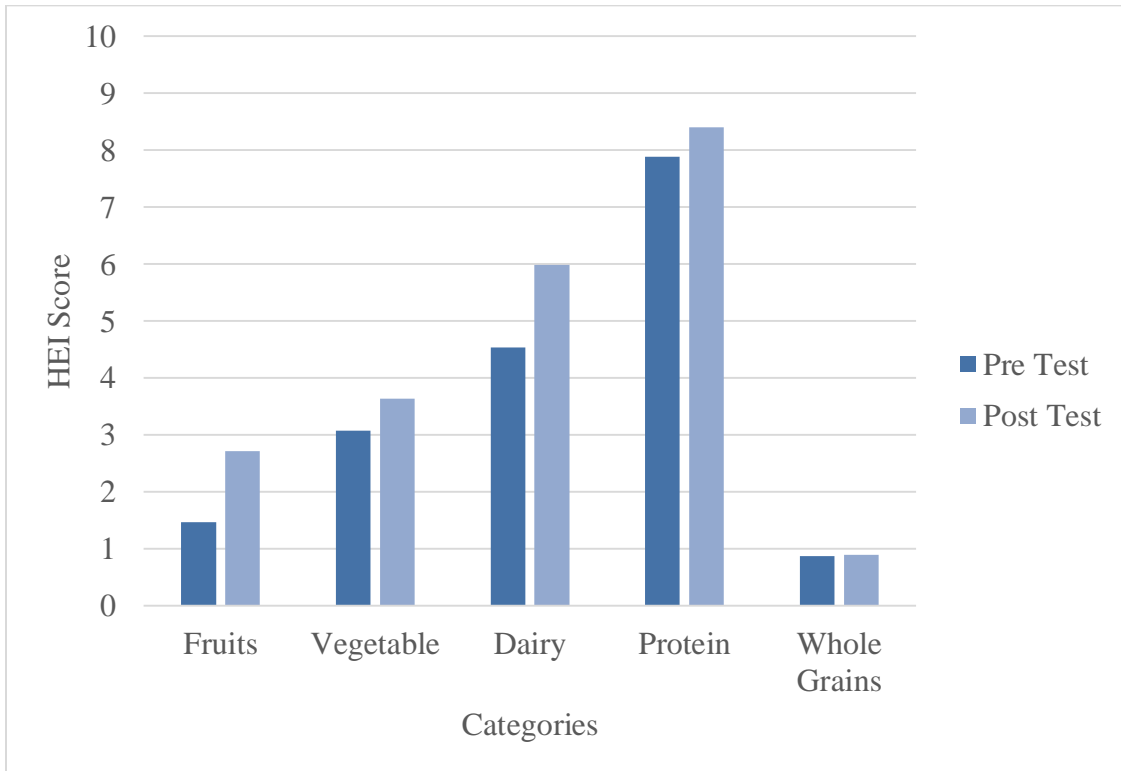
Table 4.1 – Change in HEI Specific Categories

Mean HEI Scores				
Category	Pre Test (SE)	Post Test (SE)	Difference (SE)	X² p-value
Fruits	1.46 (1.39, 1.53)	2.71 (2.63, 2.79)	1.24 (1.15, 1.34)	< 0.0001
Vegetables	3.07 (3.01, 3.14)	3.64 (3.59, 3.71)	0.57 (0.49, 0.65)	< 0.0001
Dairy	4.54 (4.14, 4.68)	5.98 (5.85, 6.12)	1.44 (1.26, 1.61)	< 0.0001
Protein	7.88 (7.77, 7.99)	8.40 (8.30, 8.5)	0.52 (0.37, 0.66)	< 0.0001
Whole Grains	0.87 (0.82, 0.93)	.89 (0.84, 0.94)	0.01 (-0.05, 0.08)	< 0.72

As shown in Table 4.1, the mean entry and mean exit data points were all statistically significant for the exception of whole grains. The standard deviations can be seen in the parenthesis to the right of the average means. For most variables there was a noticeable difference in average mean values with having an χ^2 p-value < 0.0001 , for the exceptions of the whole grains category.

Figure 4.3 illustrates these changes in average mean scores.

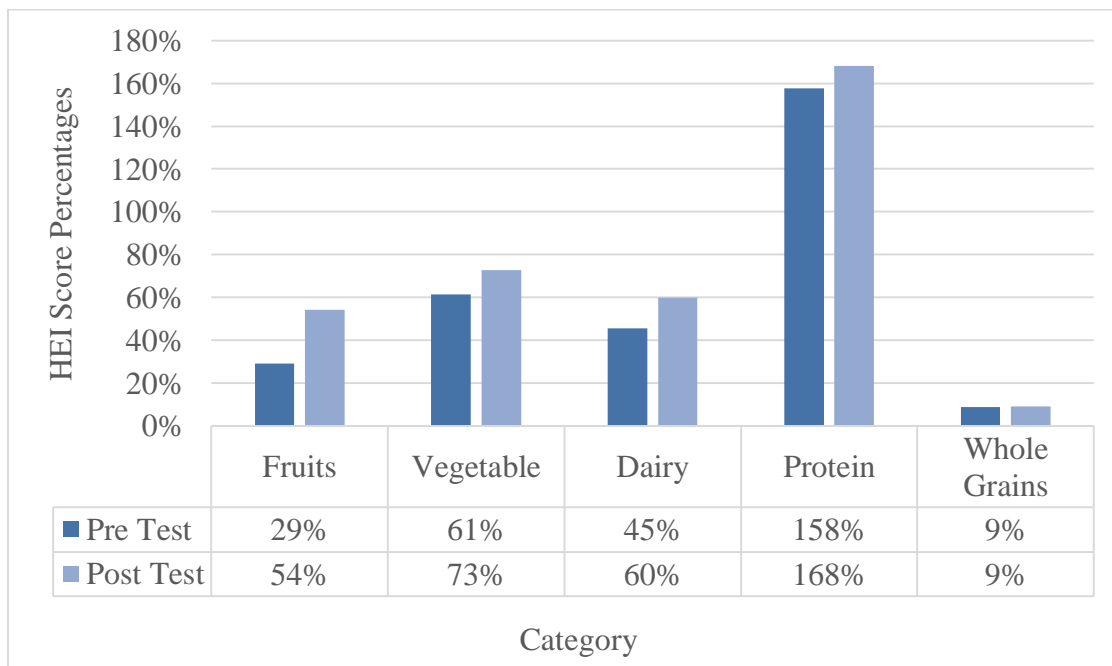
Figure 4.3 - Changes in Mean HEI Scores



The above graph illustrates the comparison of pre- and post-test mean HEI scores. A paired t-test was used in comparing the mean values, t-test p-value < 0.001 . The pre- and post- test mean values are depicted in the above graph. The following changes in the pre- and-post-test, mean HEI scores were determined: Fruit Intake (1.46 to 2.71), Vegetable Intake (3.07 to 3.64), Dairy Intake (4.54 to 5.98), Protein Intake (7.88 to 8.4),

Whole Grain Intake (0.87 to 0.89). These numbers represent an overall increase in diet quality for the represented variables. A paired t-test was used to determine if the variation in mean values was statistically significant, t-test p-value < 0.001. To further explain the significance of these values, they must first be divided by the total points possible. A percentage is then given to each category. The following math was used to determine these percentiles; mean value divided by HEI upper range multiplied by 100. For example, pre-test mean for fruits was 1.46 divided by an HEI score of 5, then multiplied by 100, 29.2% meaning that section of the diet is in the poor diet range. The same calculations were done for the all HEI datasets and is represented in Figure 4.4.

Figure 4.4 - Percentage Changes in Mean HEI Scores



The total HEI score is calculated from all twelve categories and ranked from the following ranges: 80% or greater represents a high quality diet, 51% - 80% represents improvement, and below 50% represents poor diet quality. Although each of the HEI

categories is not calculated in this study, a similar approach can be taken to calculate the average in each category.

The Fruit Intake section of this chart shows an increase from 29% to 54%, meaning before the participant had undergone the program their diet was of poor quality and later advanced to the *needs improvement* classification. Similar outcomes occurred in the vegetable and dairy categories, increasing from 61% to 73%, and 45% to 60% respectively. These changes kept the vegetable category in the *needs improvement* classification, but raised dairy from *poor diet* to *needs improvement* classification. The percentage of the protein category was about 1.5 times that of recommended percentages, but also increased in number, from 158% to 168%. Lastly, the whole grains diet section did not change in percentages and staying in the *poor diet* category. While these values are not statistically proven to be an exact representation of the participant's quality of diet, they still prove to show increases in diet quality within those particular variables.

Pre- and Post- Test Questions

This section will examine the pre- and post-test questions given to the participants prior to receiving the nutrition education intervention and upon completion of the program. The questions given to the participants were scored on a scale of 0 – 5, representing the following answers: *N/A*, *Never*, *Seldom*, *Sometimes*, *Most of the Time*, and *Almost Always*.

The following questions represent the participant's understanding in food resource management: "How often do you plan meals ahead of time?" "How often do you compare prices before you buy food?" "How often do you run out of food before the end of the month?" "How often do you shop with a grocery list?" Again, the average

number of lessons taught to the participants was nine in total.

Each of the variables in the pre- and post- test surveys were set to evenly distribute and given a *High, Medium, Low* range. These were acquired by giving the *N/A* and *Never* a value of “0” and “1” respectively and calling that a *Low* range. The same was done for *Seldom* and *Sometimes*, “2” and “3”, and *Most of the Time* and *Almost Always*, “4” and “5”. Once evenly distributed, the data could then have a Pearson’s Chi Square test performed to generate a frequency table to show how many participant’s responses improved, stayed the same or decreased.

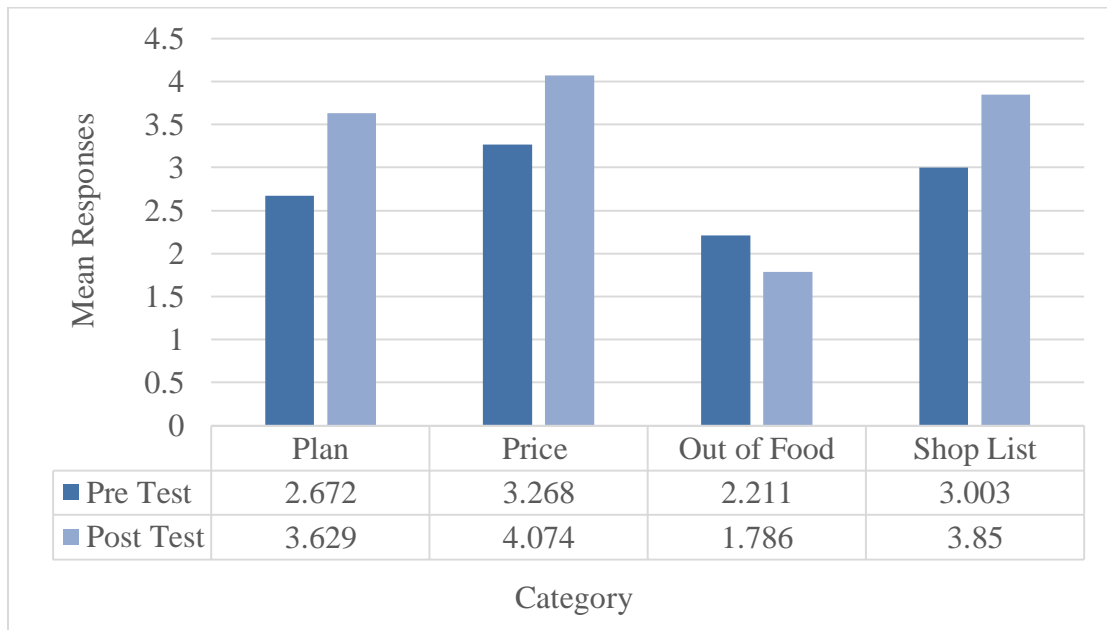
Again, Pearson’s Chi Square test was conducted to determine if the data was statistically significant in improving food resource management and nutrition practices within the 2013-2014 SNAP-Ed participants. Similarly, Pearson’s Chi Square was used to for two reasons; the first being due to multiple environmental factors at play between the beginning and end lesson; second was stratifying the data to more evenly distribute. A paired t-test was then used to determine if the change in pre- and post- test means were significant in their changes. The following tables and figures depicts those changes.

Table 4.2 – Chi Square Difference between Meal Planning, Price, Running out of Food and Shopping, Pre-and Post-Test Data

Question		Post-Test, n				x ² p-value
		Low	Medium	High		
How often do you plan meals ahead of time?	Pre-Test, n	Low	65	316	200	< 0.001
		Medium	43	651	879	
		High	6	86	622	
How often do you compare prices before you buy food?	Pre-Test, n	Low	50	192	193	< 0.001
		Medium	20	295	702	
		High	18	104	1294	
How often do you run out of food before the end of the month?	Pre-Test, n	Low	920	137	23	< 0.001
		Medium	471	784	77	
		High	101	238	117	
How often do you shop with a grocery list?	Pre-Test, n	Low	92	210	235	< 0.001
		Medium	42	419	753	
		High	28	108	981	

As depicted in Table 4.2, participants in the Low-Low, Medium-Medium, and High-High category fell into the same group from both pre- and post- test results. Reading from the left of the table those participants either improved, decreased or stayed the same. Similarly, reading from the top of the chart downwards participants could improve, decrease or stay the same. For example, in the question “How often do you plan meals ahead of time?” the pre-test participants in the Low-Low (n = 65) categories improved their results to the Low-High (n=200), χ^2 p-value < 0.001. When conducting a paired t-test there is an observed increase in overall mean values. Figure 4.2 illustrates the difference in average means of questions in the Food Resource Management section of the questionnaire.

Figure 4.5 – Difference in Means, Food Resource Management Questions



As represented in Figure 4.5, the pre-test mean value are shown in the dark-blue columns and the post-test mean values are depicted by the light-blue columns. A paired t-test was used in comparing the mean values. Upon completion of the SNAP-Ed

program, participants showed an increase in the following: meal planning (2.672 to 3.629), comparing food prices (3.268 to 4.074) and using a list prior to shopping (3.003 to 3.85), paired t-test p-value < 0.001. Additionally, all of the participants showed a decrease in running out of food at the end of the month (2.211 to 1.786), paired t-test p-value < 0.001. The interpretation of this data shows an improvement in all areas of the food resource management area, rejecting the null hypothesis and accepting the proposed research question.

The following questions represent the participant's understanding of nutritional practices: "When deciding what to feed your family, how often do you think about healthy food choices?" "How often have you prepared foods without adding salt?" "How often do you use the Nutrition Facts on the food label to make food choices?" and "How often do your children eat something in the morning within two hours of waking up?" Table 4.3 illustrates these findings.

Again, each of the variables in the pre- and post- test surveys were set to evenly distribute and given a *High, Medium, Low* range. These were acquired by giving the *N/A* and *Never* a value of "0" and "1" respectively and calling that a *Low* range. The same was done for *Seldom* and *Sometimes*, "2" and "3", and *Most of the Time* and *Almost Always*, "4" and "5". Once evenly distributed, the data could then have a Pearson's Chi Square test performed to ensure the data's variables reflected a true p-value of statistically significant value.

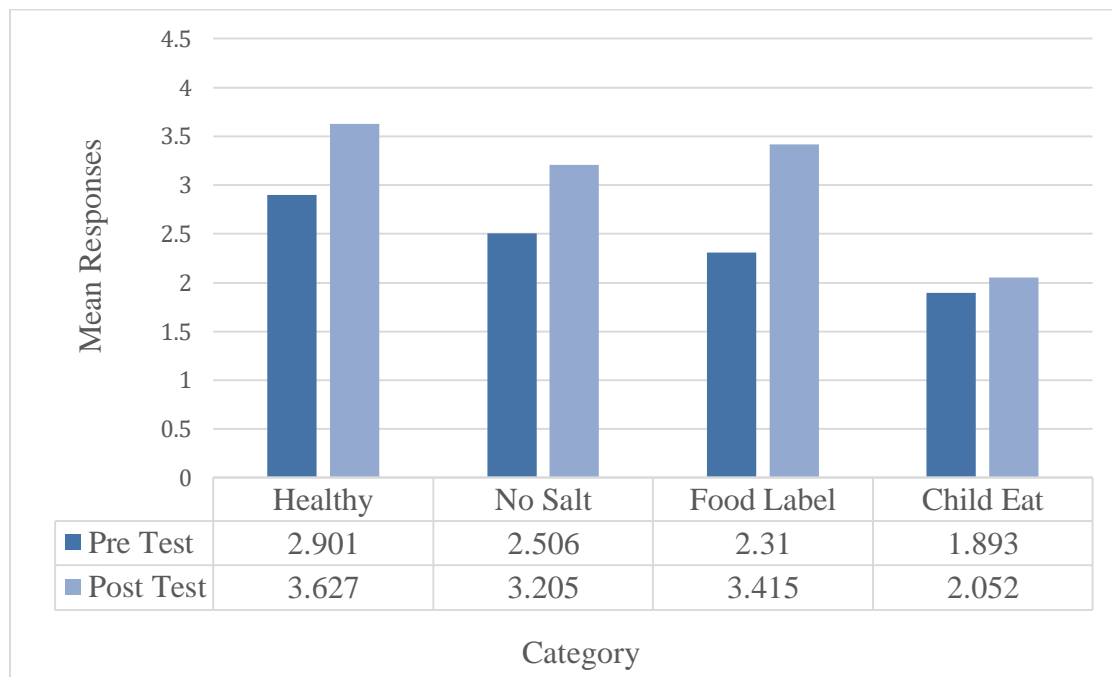
Table 4.3 – Chi Square Difference between Healthy Food, No Salt, Nutrition Facts and Child Breakfast, Pre-and Post-Test Data

Question		Post-Test, n				x ² p-value
		Low	Medium	High		
When deciding what to feed your family, how often do you think about healthy food choices?	Pre-Test, n	Low	144	152	174	<0.001
		Medium	45	524	854	
		High	27	122	826	
How often have you prepared foods without adding salt?	Pre-Test, n	Low	190	436	194	<0.001
		Medium	70	781	526	
		High	35	149	487	
How often do you use the “Nutrition Facts” on the food label to make food choices?	Pre-Test, n	Low	120	514	289	<0.001
		Medium	42	688	785	
		High	13	88	329	

How often do your	Low	1424	34	140	
children eat something	Pre-Test, n	Medium	66	41	215
in the morning within	High	122	35	791	
2 hours of waking up?					<0.001

As previously discussed, Table 4.3 depicts participants in the Low-Low, Medium-Medium, and High-High category fell into the same group from both pre- and post- test results. Reading from the left of the table those participants either improved, decreased or stayed the same. Similarly, reading from the top of the chart downwards participants could improve, decrease or stay the same. For example, in the question “When deciding what to feed your family, how often do you think about healthy food choices?” many of the pre-test participants who were Medium-Medium (n = 524) categories improved their results to the Medium-High (n=854), χ^2 p-value < 0.001. When conducting a paired t-test there is an observed increase in overall mean values. Figure 4.6 illustrates the difference in average means of questions in the Food Resource Management section of the questionnaire.

Figure 4.6 – Difference in Means, Understanding Nutritional Practices Questions



The pre-test mean value is shown in dark blue and the post-test mean value is represented by the light blue columns. Upon completion of the SNAP-Ed program, participants showed an increase in the following: healthy food choices (2.901 to 3.627), avoidance of adding salt (2.506 to 3.205), use of nutrition facts label (2.31 to 3.415), and children eating in the morning (1.893 to 2.052). Again, a paired t-test was used in the comparison of the baseline and post-intervention average mean values showing statistical significance, have a p-value < 0.001. The interpretation of this data shows an improvement in all areas of the participant’s understanding of nutritional practices, rejecting the null hypothesis.

Chapter Five

Discussion

This study was designed to determine if the Kentucky SNAP-Education classes resulted in positive behavior changes. The changes in behavior were measured by the use of three objectives. The first objective that will be covered is increase in the participant's post-intervention HEI scores. As depicted in the data, it was determined that the participants had a statistically significant increase in the following HEI categories; Fruits, Vegetables, Dairy, Protein. This was shown by having an overall increase in their HEI scores χ^2 p-value > 0.0001. However, the Whole Grains category did not experience an improvement χ^2 p-value > 0.72. Although an overall increase in the participant's HEI score was expected, it was not expected that all categories would increase.

The second objective looked at questions one through four on the questionnaire and asked if SNAP-Ed lessons provided the participants with a better understanding in food resource management practices. Please see Appendix F and G for a list of those questions. Each question was directed toward shopping on a budget, determining if the nutrition education lessons impacted the participant's ability to make their food dollars last throughout the month. The importance of this question is reflective of the population as a whole and impacts communities at large. Although programs like SNAP give participants funds to buy food, many of those participants do not fully understand the type of preparation required to properly use their food dollars. Which is why this objective is a vital piece of this study.

Skills in food resource management not only impact the individual participant but

the community as a whole. It begins at home, making food dollars last longer so the participant can feed their family more cost effectively. However, this principle can also be applied to the entire community. If the family is no longer spending excessive amounts of money on food, they can then apply those funds to other things like education, transportation and other needs. This will potentially better the participant's prosperity and ultimately the community.

The third and final objective asked, if the lessons provided the participants with a better understanding of nutrition practices. This objective looks at questions seven through ten of the questionnaire and exclusively focuses on the participant's nutrition knowledge and practices. Three of the four questions ask what types of nutrition decisions the participants are making, and the last question is in regards to a child feeding practice. The importance behind these questions signifies how well the participants truly understand nutrition practices.

The SNAP-Ed program is designed to teach the participants how to properly use the food that is provided by other supplemental nutrition agencies. Other agencies supply participants with food but provide them with very little nutrition education. Although SNAP-Ed is not the issuing agency of the benefits, they do provided many nutritional lessons for the participants.

HEI Findings

1. Positive Changes in HEI Scores

The first research question asked in this study was, "Do SNAP-Ed lessons improve the participant's HEI scores during, and after participation?" This question is important in understanding the relationship between the participants and their nutrition

and if the participants are putting their knowledge into practice. After reviewing the data, it was determined that the participants had a statistically significant increase in the following categories, Fruits, Vegetables, Dairy, Protein, and Whole Grains.

In the Fruits category, participants had an 85.6% increase in diet quality post – intervention, $P < 0001$. This percentage was a significant increase in the consumption of fruits and is important due to the benefits fruits provide in the prevention of chronic disease (Boeing et. al., 2012). Before the participant had undergone the program their diet was of *poor* quality and later advanced to the *needs improvement* classification. In regards to the Vegetables category, participants experienced 18.6% increase in vegetable consumption. Although this percentage increase does not appear to be plentiful in difference, it is statistically significant, $P < 0.001$. Because many Americans do not eat enough fruits and vegetables in their diet (Molitor et al., 2016), there is a great need to encourage their intake. Both increases in the fruits and vegetable categories are representative of the effectiveness of the Kentucky SNAP-Ed program. These increased percentages might not have occurred if the 2012 - 2013 KY SNAP-Ed program did not facilitate the foundational classes to its participants.

The Protein, Dairy and Whole Grains sections experienced similar results. Participants experienced a 6.6% increase in protein consumption, giving participants more protein than needed. The amount of protein being consumed was higher than the required daily amount prior to the SNAP lessons. However, the increase in total protein consumption could be linked to the received nutrition classes. The core classes often teach to consume protein with every meal and with each snack. It is possible that the participants applied this information to their current eating habits, thus increasing the

amount of protein within their current diet. It anticipated if the lessons progressed with the comparisons of additional diet recalls, this percentage would decrease to within a normal range. The Dairy and Whole grains section were examined. Dairy consumption faced a 31.7% increase in average mean values, elevating the mean participant HEI score from the *poor diet* to the *needs improvement* categories. Lastly, the whole grains section increased by only 2.3%, and was not statistically significant $x^2 < 0.72$.

The data collected and analyzed from the 2012 – 2013 Kentucky SNAP-Education program, proves the program is effective in producing behavior changes in the following HEI score categories: fruits, vegetables, protein, whole grains and dairy. SNAP-Ed makes excellent teaching points in their lessons and also provides reinforcement items to help encourage behavior changes. Some of the reinforcement items include vegetable peelers and scrubbers, calendars, recipe books with examples, just to name a few. The program also offers food demonstrations, grocery store tours, cooking classes and group food preparations. The participants can then use each of these items and demonstrations to assist in their daily operations. For example, SNAP-Ed may teach a lesson on vegetables that incorporates cooking a soup with fresh vegetables and requires the participants to clean and peel the vegetables. By providing the participants with a vegetable peeler, and the accompanied visual of using one, they can now mimic this behavior at home.

Pre- and Post- Test Findings

The baseline data was compared to the collected post-test data. These questions were all taken from the 2012 – 2013 KY SNAP-Ed and KY EFNEP Web NEERS questionnaires. The questionnaires serve as a means to not only collect data, but help to

better access the participants. Each paraprofessional is able to read the questionnaires and focus on areas that are lower in value. For example, if the majority of the participants reported having never used a shopping list for groceries, then the paraprofessional may want to emphasize more on that topic. As shown in the results section of this thesis, a positive behavior change did occur. The impact of these findings was another testament to the effectiveness of this program. When paralleled to the changes that were shown in the HEI scores, an overall picture can begin to come into existence of the effectiveness of this program.

2. Participants' Understanding in Food Resource Management

The first question asked to participants was “How often do you plan meals ahead of time?” This question was looking to determine if the participants actually did plan ahead, and if they did, how often were meal preparations made. It is understood by the researcher this questions is trying to determine how effective the participants are using their current food products to help make the most of their food-money. Furthermore, this question is only one of four associated with meal planning, which the other questions will later be discussed.

Not only does the SNAP-Ed program teach general nutrition education, but also has many fundamental and supplemental lessons that focus on meal planning. These educational classes and tips teach its participants how to make shopping lists, taking inventory of current food that is in stock and food that is needed for purchase. The lessons also describe ways to plan out meals in advance to aid in reducing time spent in the kitchen. Lastly, these classes emphasize the importance of food waste, food storage, and accidentally buying duplicated products. Participants went from *Average* meal

planning (2.672) to having reported *Sometimes* planning for meals (3.629) $P < 0.001$. Meaning, on average those who participated in the SNAP-Ed program experienced an entire category change in how they plan for meals.

Question number two asked “How often do you compare prices before you buy food?” Because companies often times change box sizes, net weight and packaging, shopping can be very difficult for those who do not examine prices and compare them to net weight. The SNAP-Ed program teaches its participants to not fall into such marketing traps, educating on how to compare prices between store and name brand items. Moreover, the program encourages the use of coupons, store discounts, buying in bulk and using whole proteins to save on costs. Not only do these lessons help establish guidelines for the participants to follow, but allow for long-lasting nutrition education practices that can be used time-and-time again. After comparison of the pre- and-post-test data the mean participants’ scores went from *sometimes* (3.268) to *most of the time* (4.074). Although the increase was only by about a half a point, it was still a statistically significant increase in behavioral practices, $P > 0.001$.

Questions three and four inquired, “How often do you run out of food at the end of the month” and “How often do you shop with a grocery list”? Again, these two questions help to better understand how SNAP-Ed participants are practicing food resource management. Shopping with a grocery list is an excellent way to monitor and track the exact foods needed for the house. Furthermore, lists can help prevent a family from running out of food each month. The purpose of question number three is to determine how the SNAP-Ed lessons can be tailored to better assist the participants from becoming at risk for a limited diet. The SNAP-Ed program also encourages those who

shop to not do it on an empty stomach; this helps prevent the shoppers from buying foods that look and sound appealing.

As reported in the results section of this paper, the participants' "How often do you run out of food" decreased from *seldom* (2.211) running out of food to *never* (1.786) running out, $P < 0.001$. Those who reported having experienced a decrease in running out of food at the end of the month is a great testimony to the effectiveness of the program. Although the change was only a slight drop it still holds enough statistical significance to be considered a change in behavior. Besides, having a decrease in the mean number of those who reported having run out of food by the end of the month is great acknowledgment to the strength of this program.

The last contributing question to establishing a behavior change in meal planning skills has to do with grocery shopping with a list. As previously discussed, shopping with a grocery list can make shopping for food easier and place less of a financial burden on patrons. Furthermore, it gives consumers time to conduct research on products prior to the shopping excursion. SNAP-Ed takes this information into account and provides many reinforcement items to help encourage good shopping practices. Some of these incentive items include shopping lists, vegetable peelers, meat thermometers, insulated grocery bags and colanders, just to name a few. To attest to the programs' successfulness in establishing the use of a grocery list when shopping, the program experienced an increase in the mean participant response. When first asked how often a grocery list was used when shopping the participants reported only *sometimes* having used one (3.003), but after they completed the program that response increased to using one *most of the time* (3.850), $P < 0.001$.

Overall, the participants of the 2012 – 2013 SNAP-Ed program did experience a positive behavior change in every aspect in food resource management, rejecting the null hypothesis. Although having a concrete knowledge of nutrition is a goal of the SNAP-Ed program, but without applying that knowledge it becomes irrelevant. The information provided within this section of this thesis proves that those participants not only had a great knowledge of nutrition information, but also was able to apply it in their daily lives. This is just one example of how the SNAP-Ed program allows its participants to truly experience behavior changes, demonstrating it through meal preparation and food resource management.

3. Participants' Understanding of Nutritional Practices

It all starts with having a solid understanding in proper nutrition, which is the primary goal of the SNAP-Ed program. Nutritional practices are comprised of four questions, all of which accessing the different aspects in the participants nutritional habits. These questions include feeding your family, preparing foods without salt, using the nutritional facts label, and how often their children eat within two hours of waking. They represent questions seven through ten on the questionnaire checklist. Each of the four questions is asked in a way to determine if the participants are actually applying nutritional knowledge.

Inquiry number seven asked participants “When deciding what to feed your family, how often do you think about healthy food choices?” Healthy food choices should be the first type of foods that come to mind when deciding on what to feed a family, but that is not always the case. The SNAP-Ed program offers many classes to help participants to better understand why eating nutrient dense foods are superior to those of

empty calories. Many of the nutrition lessons follow cohesive and thorough guidelines which are based on the *Dietary Guidelines for Americans* (SNAP-Ed Strategies...2015). By keeping the classes consistent and concise, the information does not become scattered and confused. This also allows the participants to build on the information that was learned in the previous lessons.

According to the pre-test results the mean participant score for deciding on what to feed their family was a *sometimes* (2.901). By the completion of the program the participants' mean answer increased to the *almost always* (3.627) category, $P < 0.001$. The gravity of this increase is just another demonstration to in how the SNAP-Ed program helps improve the quality of peoples' diet. A change in behavior can only occur by changing the way individuals think about their relationship to food (Maccroy, 1999).

Question number eight asked participants "How often have you prepared foods without adding salt?" Salt is often times over used as a flavoring agent, and should be discouraged because of its effects on high blood pressure, myocardial infarctions, strokes and even heart failure (Health Risks..., 2016). Furthermore, salt can potentially mask the many different flavors of food and therefore should not be overly used. There are many other ways to flavor food instead of the use of salt. The SNAP-Ed program encourages other flavoring agents be used instead of salt and pepper, and teaches its participants about herbs, garlic and other seasonings.

Once the participants completed the program their mean answers to question number eight increased from *seldom* (2.506) to *sometimes* (3.205), $P < 0.001$. Although slight, this increase was enough to take the average answer to a higher category. The increased mean score helped prove that most of the participants now only occasionally

use salt as a means to season their foods. This slight change in behavior may potentially lead to a reduction in heart-related diseases.

The ninth question asked participants “How often do you use the Nutrition Facts on the food label to make food choices?” Using the *Nutrition Facts Label* to help decide what foods to consume is an extremely measurable question to ask SNAP-Ed participants. Obviously, participants should always use the *Nutrition Facts Label* when deciding on what to feed their family, but that does not always happen. The curriculum that is used in the SNAP-Ed program uses the *Nutrition Facts Label* on many of the lessons to encourage its use for food purchasing. This single question might hold the most insight in determining if the program was successful in establishing a nutritional behavior changes. To determine if participants had more success with using the *Nutrition Facts Label* while shopping, the researcher compared the pre- and-post-test test scores.

The results of the data showed the participants’ mean responses experienced a 1.105 growth in categories; increasing from *seldom* using the facts (2.31) to *sometimes* (3.415) using the *Nutrition Facts Label* when deciding on what to purchase, $P < 0.001$. This standalone questions is a great achievement for the KY SNAP-Ed program, because it truly encompasses the nutrition practices section of the questionnaire. Not only does this question evaluate the participant’s understanding of nutrition knowledge, but it also describes the understanding in food resource management. The answer to this question is proof that the participants are now thinking about what they are eating, and not making purchases on a whim.

The last question in the *Nutrition Practices* category asked participants “How often do your children eat something in the morning within 2 hours of waking up?” This

question is important when establishing proper parenting behaviors from the participants. Because the SNAP-Ed program targets providers of families, teaching nutritional food preparation skills is an important subject to cover. The SNAP-Ed program teaches material that can be applied in the home setting; proper child feeding habits are one of these teachings. This question also assesses the parent's knowledge of the importance of breakfast. Although the SNAP-Ed program does not thoroughly cover how soon a child should eat breakfast within waking up, it does however touch upon the subject.

After comparing the pre- and post-test results of this question, there was only a slight increase in means participant response. At the beginning of the program the participants reported having *never-seldom* (1.893) fed their children within two hours of waking. Once completed the program, the means response increased to *seldom* (2.052) feeding their children breakfast, $P < 0.001$. This answer could have been only marginally increased for various reasons. The first cause that could be associated with the slight variation in the increase could have to do with the reporting system. Each participant has an option to select a value from "0" to "5". These results were then computed to determine the mean participant answer; unfortunately when averaging all of the responses the "0" value is also averaged. For example, if a participant does not have any children, but is pregnant, she could have selected *N/A* (0) on the checklist. Of course all answers in this thesis are subject to this averaging, but it is possible this question was effected the most. This will be covered in more depth in the *Limitations* section of this paper.

Naturally, all of these lessons are not always taught at an individual level but in combination with other lessons, encompassing the importance of proper nutrition. For example, using the *Nutrition Facts Label* might be taught alongside meal prep and using

a grocery list to shop for foods. Moreover, these lessons are often times mentioned throughout the course of the program to help reinforce these themes. It is apparent the 2012 – 2013 Kentucky SNAP-Ed program was effective in establishing a better understanding in nutritional practices among its participants.

Overall, the participants who were a part of the 2012 – 2013 SNAP-Ed program all experienced behavior changes in the *Understanding Nutritional Practices* research question. Even though some of the improvements between the pre- and post-test data were slight in changes, they were all statistically significant in their values. At this time the null hypothesis can be rejected, proving this program is effective in establishing positive behavior changes among its participants in the *Understanding Nutritional Practices* category.

Strengths, Limitations and Future Research

This thesis has numerous strengths and successes. One of the greatest achievements in this research paper is the support from the results in the successfulness of the proposed hypotheses. Each of the hypotheses were supported by the results, ultimately confirming the 2012-2013 KYSNAP-Ed participants did facilitate behavior changes while participating in the program. The p-value obtained from all statistical analysis suggests a positive correlation does exist among the 2012 – 2013 SNAP-Ed lessons and behavior changes ($P < 0.001$). Another success this thesis offers is the awareness and necessity of the KYSNAP-Ed program. The results reported within this thesis are evidence that without the program the potential participants would have much lower nutritional knowledge and application.

This research study is subject to various limitations that may limit the accuracy of the results. The largest limitation in this study can be associated with the data. Within this study the value “0” was given to those who answered *N/A* on the questionnaire. When factored into the data set the “0” will lower the total mean score, ultimately slightly screwing the answers. Although each participant may have chosen not to answer that particular question, it does not guarantee the impact of all questions within the study. As previously mentioned, some questions might be affected at a greater impact than others. There was no way to eliminate the data sets that included a “0” in the response. Furthermore, the pre- and post- test may have included a “0” but did not reflect that in other results, thus diminishing the possibility of excluding that data set.

Another possible limitation includes response bias of the questionnaire, and the reading level of the participants. For example, if the questions were too long, the participants may have circled the answers without thoroughly reading the questions. Another limitation is some participants may have had the feeling of peer pressure. Because most of the classes are taught in a group setting some participants may have felt pressured to answer the questions as quickly as their peers, causing them to miss out on some of the information. Another strength and limitation was the denoted sample size (Kentucky) is not a full representation of the population within the United States. However, the sample size was large enough and statistically significant to assume that the 2012 – 2013 KYSNAP-Ed lessons are associated with positive behavior changes, making this a success within this paper.

The last notable limitation found within this study is the time in which it took participants to complete the SNAP-Ed program. It was determined from the given data

each participant completed, on average, between seven and twelve lessons. However, it is not clear as to how long each participant was enrolled in the program upon completion. Future research could examine this variable, but it would require further data coding. Future researchers could examine the differences between the participants' responses to the questionnaire and food recall and compare it to the findings of those who were enrolled in the program for longer periods of time. It would be assumed those who participated in the program the longest would have the greatest improvements in nutritional behavior changes.

Additional future research might include an increase in the average number of lessons completed by the participants was only nine in total. It would have been interesting to measure these same variables with more lessons completed. Similar results would be expected to those found in the article published by Koszewski and others. Koszewski and researchers conducted follow contact hours with their population, and proved that 10 – 15 nutrition questions showed improvement. If a similar study were to be conducted with the data set used in this study, researchers should also include the questions about Solid Fats and Added Sugars (SoFAs) to depict a better representation of the participants' diets (Koszewski et al., 2011).

As previously stated, other future research should examine the amount of SoFAs that were consumed to determine if those who participated in the program lessened their consumption of empty calories. This could also aid the state and local staff in how to better address what issues, concerning SoFAs, the KY SNAP-Ed participants is struggling with. Furthermore, this would be helpful in establishing future nutrition education classes and materials to assist in reducing the amount of SoFAs consumed.

Conclusions

After examining the results, it can be determined that the Kentucky SNAP-Ed program did establish an improvement in behavior changes in all of the following areas: having an overall increase in HEI scores, having an increase in the participants understanding in food resource management, and experiencing an increase in the participants understanding of nutritional practices. Those who participated in the lessons showed an increase in nutritional understanding in all measured areas. All null hypotheses can be rejected, accepting all hypotheses as evidence the program is effective in establishing nutritional behavior changes among its participants. Although the increase in whole grains was too little to have a significant χ^2 p-value, it can still be stated that the overall HEI scores this thesis measured had a positive outcome.

These findings are not only a great testament to the successfulness of the 2012 – 2013 SNAP-Ed program, but also to those who worked at the state and federal level, and the paraprofessionals who taught the classes. Countless hours and thought was placed into the KY SNAP-Ed program, and this thesis is proof the program is working in the community and helping all those who participate. Both participants, educators and law makers can now find reassurance of their time, funding and efforts are not going to waste. After completing the KY SNAP-Ed classes, the participants can now rely on their own knowledge and skills to prepare food for themselves and their family. Furthermore, the participants will have an enriched understanding in the three domains measured within this thesis. Having this comprehension can then help to eliminated food insecurity and promote wellbeing among the low-income population with the state of Kentucky.

Appendix A

Definitions

Expanded Food Nutrition Education Program (EFNEP) – EFNEP was developed in 1969 by the United States Department of Agriculture. EFNEP’s objective is to provide nutrition information for those of limited resources and low-income status (Dunn, 2013; National Institute of Food and Agriculture).

Kentucky Behavioral Risk Factor Survey (KyBRFS) – is an ongoing, yearly survey illustrating the collective behavioral information of those who are citizens for the state of Kentucky (KyBRFS, 2017).

Nutrition Education Paraprofessionals (Assistants) – those who are hired by SNAP-Ed and EFNEP for the sole purpose of teaching nutrition education lessons to program participants. These paraprofessionals are typically hired from the county where they are educating families (Koszewski, et. al, 2011).

Supplemental Nutrition Assistance Program (SNAP) – SNAP, formally titled Food Stamp Program, is a countrywide program designed to instruct families, of low-income status, the skills necessary to provide more nutrient dense foods (Dunn, 2013).

Supplemental Nutrition Assistance Program Education (SNAP-Ed) – The objective of SNAP-Ed is to provide nutrition information for those of limited resources and low-income status. SNAP-Ed uses the same curriculum as EFNEP, however their target population is slightly different. SNAP-ED and EFNEP both focuses on those of limited resources, but SNAP-Ed can reach out to those of Pre-School age and above the age of retirement (Dunn, 2013; National Institute of Food and Agriculture).

Web-based Nutrition Education Evaluation Reporting System (Web-NEERS) – web-based computing program used to collect and report data for the local and federal agencies (Chipman, 2013).

Appendix B

Demographics Worksheet

COOPERATIVE EXTENSION SERVICE - UNIVERSITY OF KENTUCKY - COLLEGE OF AGRICULTURE - LEXINGTON, KY 40546



Expanded Food and Nutrition Education Program Adult Entry Form

1. Educator's Name: _____
2. Today's Date: _____
3. Your Name: _____
4. Address: _____
City State Zip: _____
5. Phone: _____
6. Email: _____
7. Age: _____
8. Gender: MALE FEMALE
9. Are you pregnant? YES NO
10. Are you breastfeeding? YES NO
11. Are you Hispanic or Latino? YES NO
12. Race: Check ALL of the races that apply to you.
 White
 Black or African American
 American Indian or Alaskan Native
 Asian
 Hawaiian or Pacific Islander
13. Other description/subcategory (such as nationality): _____
14. Highest Grade Completed: _____

5/2013

15. Residence:

- Farm
- Towns under 10,000 & rural non-farm
- Towns and Cities 10,000 to 50,000
- Suburbs of Cities over 50,000
- Central Cities over 50,000

16. What Public Assistance do you currently receive? Check all that apply:

- | | |
|--|--|
| <input type="checkbox"/> Child Nutrition | <input type="checkbox"/> Other |
| <input type="checkbox"/> FDPIR | <input type="checkbox"/> TANF |
| <input type="checkbox"/> SNAP | <input type="checkbox"/> TEFAP – Commodity |
| <input type="checkbox"/> Head Start | <input type="checkbox"/> WIC/CSPF |

17. What is your household income per month? \$500 or less \$801 - \$1,200
 \$501 - \$800 above \$1,200

18. Please write the first name and age of your children.

_____	Age: _____
_____	Age: _____
_____	Age: _____
_____	Age: _____
_____	Age: _____

19. Number of other adults in the house (don't count yourself): _____

Official Use Only				
Lesson Type:	<input type="checkbox"/> Group	<input type="checkbox"/> Individual	<input type="checkbox"/> Both	
Subgroups:	<input type="checkbox"/> EFNEP	<input type="checkbox"/> ESWIC	<input type="checkbox"/> SNAP-Ed	<input type="checkbox"/> Team Nutrition <input type="checkbox"/> Sample
Other Subgroups:	_____			
County/Unit:	_____		Family ID:	_____
Notes:				

Appendix E

Nutrition Education Program ENTRY Level Behavior Checklist



Nutrition Education Program ENTRY Level Behavior Checklist

This is not a test. There are no wrong answers. These are questions about the ways you plan and fix food.

Name: _____ Today's Date: _____

Circle the response that best describes how you usually do things.

	0	1	2	3	4	5
1) How often do you plan meals ahead of time?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
2) How often do you compare prices before you buy food?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
3) How often do you run out of food before the end of the month?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
4) How often do you shop with a grocery list?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
5) This question is about meat and dairy foods. How often do you let these foods sit out for more than two hours?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
6) How often do you thaw frozen foods at room temperature?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
7) When deciding what to feed your family, how often do you think about healthy food choices?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
8) How often have you prepared foods without adding salt?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
9) How often do you use the "Nutrition Facts" on the food label to make food choices?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
10) How often do your children eat something in the morning within 2 hours of waking up?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always

Educational programs of Kentucky Cooperative Extension serve all people regardless of race, color, age, sex, religion, disability or national origin.

Appendix F

Nutrition Education Program EXIT Level Behavior Checklist



Nutrition Education Program EXIT Level Behavior Checklist

This is not a test. There are no wrong answers. These are questions about the ways you plan and fix food.

Name: _____ Today's Date: _____

Circle the response that best describes how you usually do things.

	0	1	2	3	4	5
1) How often do you plan meals ahead of time?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
2) How often do you compare prices before you buy food?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
3) How often do you run out of food before the end of the month?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
4) How often do you shop with a grocery list?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
5) This question is about meat and dairy foods. How often do you let these foods sit out for more than two hours?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
6) How often do you thaw frozen foods at room temperature?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
7) When deciding what to feed your family, how often do you think about healthy food choices?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
8) How often have you prepared foods without adding salt?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
9) How often do you use the "Nutrition Facts" on the food label to make food choices?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always
10) How often do your children eat something in the morning within 2 hours of waking up?	N/A	Never	Seldom	Sometimes	Most of the time	Almost always

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