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Nutritional and Behavioral Repercussions of Food Insecurity and the Impact of Nutrition Education

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NUTRITIONAL AND BEHAVIORAL REPERCUSSIONS OF FOOD INSECURITY
AND THE IMPACT OF NUTRITION EDUCATION

A Capstone Project Presented in Partial Fulfillment
of the Requirements for the Degree of Bachelor of Science in Nutrition
with Honors College Graduate Distinction at
Western Kentucky University

By
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May 2017

*****

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DEDICATION

I dedicate this thesis to Beth Carroll and Rhondell Miller, who wholeheartedly work to serve the least of these without special recognition or acknowledgment. They have hearts for helping provide for physical and spiritual needs by empowering and restoring dignity.

This is a rare and beautiful attitude of heart that I will remember and treasure always.
ACKNOWLEDGMENTS

Thank you to my loving parents, Keith and Beth Burgess, for encouraging and supporting me in all of my adventures and endeavors. Thank you for teaching me to consider the needs of others over myself and to always stay strong in faith.

Thank you to my wonderful friends who have supported me through all of the joyful, exciting and challenging moments of working on this project. Thank you for being shoulders to cry on, ears that listen, and breaths of light and life.

Thank you to Dr. Mason for your wisdom, knowledge, and guidance through the entire duration of this project. You challenged me from the beginning to be bold, brave, and follow my passion even when I felt inadequate. Also, thank you Dr. Payne-Emerson for teaching the course that sparked my interest in community nutrition and the earliest ideas of pursuing this kind of work.

Thank you to the Faculty Undergraduate Student Engagement Grant, which allowed this project to be possible. Also, thank you to the Honors College for providing this opportunity to apply knowledge that I have learned in the classroom to a place that is meaningful to me.

“For I was hungry, and you gave me food, I was thirsty and you gave me drink, I was a stranger and you welcomed me.” Matthew 25:35
ABSTRACT

Food insecurity occurs when an individual does not have consistent access to fresh, nutritious food in safe, socially acceptable, and affordable ways. This is a significant challenge facing Kentuckians, with one in six adults and one in four children experiencing some degree of food insecurity. The present study examines the effectiveness of customized nutrition education in improving 1) nutrition-related behaviors associated with food insecurity and 2) management of household food supply in food-insecure individuals with and without children.

Participants were recruited through HOTEL INC, and one was from a household without children and one with children. A pre-assessment survey evaluated food insecurity levels, coping behaviors, and basic nutrition status. Customized nutrition education was given to each participant through an interactive grocery store tour. The post-assessment survey was similar to the pre-assessment, but directly assessed the effectiveness of the nutrition education as well as reassessed coping behaviors and dietary intake.

The results indicate that even after only one session, customized nutrition education led to a positive behavioral and dietary change in the household without children. In the same household, utilization of frozen/pre-prepared meals decreased from 1-2 times per week to zero times in the six weeks between education and post-assessment. There was also a decrease in the frequency of consumption of fried foods. If these changes are sustainable, positive effects on health and budget could result. A direct comparison between the two participants was not performed due to the Participant 2’s inability to complete the post-assessment. However, further insight into the nature of the
strains of food insecurity with children was gained. Although the study is small in scope, the results show that customized nutrition interventions are at least moderately effective in changing behaviors associated with food insecurity and improving some areas of dietary intake.
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Food Insecurity: Definition and Prevalence

Food insecurity is defined as not having consistent access to fresh, nutritious food in safe, socially acceptable, and affordable ways (Olson & Holben, 2002). Food insecurity may arise from a variety of causes, but one of the most common is the occurrence of an event that places a sudden strain on a household budget (Olson & Holben, 2002). An event like this will often place the household in a position where a decision must be made between paying for the unexpected expense or food. Examples may include an expensive medical bill, necessary auto repair, or sudden loss of a job.

All of these scenarios could suddenly cause a household to become food insecure, which is occasionally coupled with hunger or malnutrition. Although a food insecure household may receive government assistance for food, it may be insufficient to last the entire month. Other barriers impede the full utilization of food assistance benefits. For example, recipients may lack transportation to a grocery store or live in an area where convenience or fast foods are the only options available. Considering the diverse manifestations of food insecurity, 15.4% of US households were food insecure in 2014. In Kentucky, the rates were even higher, with one in six adults, and one in four children experiencing some degree of food insecurity (Feeding America, 2014). Figure 1 (p. 2) shows a map of food insecurity levels in Kentucky counties. The most food insecure counties are concentrated in the eastern/Appalachian portion of the state, but there are also counties in western Kentucky which experience food insecurity to the same degree. According to the Academy of Nutrition and Dietetics, there are important differences
between hunger, food insecurity, and food insufficiency, but all are interrelated, frequently coexist, and are studied as a cohesive set of issues (Olson & Holben, 2002).

Figure 1: Food Insecurity Rates: Kentucky

**Risk Factors for Food Insecurity**

Several factors have been identified that put households at risk for becoming food insecure. A Cornell University study identified single parent homes with female head of house, large household size, lack of savings, spending at least $50 in addition to monthly food stamp allowance, low education level, and experiencing unexpected expenses as risk factors for food insecurity (Olson, Rauschenbach, Frongillo, & Kendall, 1997). Lombe, Nebbitt, Sinha, and Reynolds (2016) identified some of the same risk factors, and added additional factors that put families at risk; female head of household, presence of children, minority, and immigrant households. While some risk factors are universal, there are additional factors present in rural areas that increase the risk for food insecurity even more. For example, lack of access to grocery stores selling nutritious foods, lack of
diversity of food items available, and relatively higher cost of “economical” food items recommended by the USDA’s Thrifty Food Plan are additional factors that are more relative to rural areas (Olson et al., 1997).

Another study relating to the impact of the Expanded Food and Nutrition Education Program (EFNEP) on low-income participants cites Olson et al.’s 1997 work as well. Dollahite, Olsen, and Scott-Pierce (2003) suggest that part of the reason that EFNEP participation is effective in reducing food insecurity is due to the reduction of the risk factors presented by Olson et al. (1997). Learning to effectively manage food insecurity and eventually reduce the prevalence of this problem will require understanding the risk factors associated with this condition. The risk factors are important to consider as they are the root cause of households becoming food insecure; food insecurity is merely a manifestation of a larger condition.

Coping Mechanisms

Just as there are common factors associated with increased prevalence of food insecurity, there are also common strategies household members use to “cope” with the issue. In Kempson, Keenan, Sadani, Ridlen, & Rosato’s (2002) study, members of the extension staff who provide EFNEP and the Food Stamp Nutrition Education Program (FSNEP) were interviewed to gather information about common practices they see among the limited resource population with whom they work. Information from the interviews was categorized and led to the development of two major themes: management of food supply and regulation of eating patterns. Examples of managing food supply include strategizing food preparation, rationing, and conserving food. Examples of regulating eating patterns are restricting personal food intake, cyclical
monthly eating patterns, and overeating when food is available. Items within each theme were also analyzed to determine if there was a consequential food safety or nutritional risk. Many of the food preparation methods posed a food safety risk, and the regulation of eating patterns correlated mostly with nutritional risks (Kempson et al., 2002). Though the study used a convenience sample and secondary information, the practices identified are still valid.

Maternal buffering is a coping strategy limited to households with children present. Stevens (2010) studied young single mothers, ages 15-24 in Washington state to learn about the coping strategies utilized by that specific population for dealing with food insecurity. Though this is a special population, it is representative of a large proportion of the population of food-insecure individuals overall. Through interviews, the study discovered one goal common to every participant: ensuring that the child/children had enough to eat. The mothers prioritized meeting the child’s nutritional needs over her own, and that is the essence of maternal buffering as a coping strategy for food insecurity.

Another study by Maxwell (1995) used a focus group to identify and rank coping mechanisms as a method for determining the severity of food insecurity. These practices included eating less preferable foods, limiting portions, borrowing food or money for food, maternal buffering, skipping meals, and not eating for entire days (Maxwell, 1995). Analyzing the frequency of these behaviors, relative to the ranking of their severity can help professionals determine the level of food insecurity of a household. It is important to note that these strategies are more accurate for representing short-term food insecurity, or how a household is coping at a given time; in essence, it is a snapshot of a potentially
larger-scale or more persistent issue. However, the prevalence and continuity of these strategies over time can indicate long-term food security status. Also, food insecurity is often an issue of ebb and flow; in other words, a household may not be in a constant state of food insecurity, but may cycle through the condition several times each year.

**Long-Term Outcomes**

Finding ways to fight food insecurity is important not only for the temporary quality of life for individuals and households, but because there are long-term outcomes as well. Hamm and Bellows (2003) argue that food insecurity on the community level leads to increased need for emergency food supplies and programs and the perpetuation of social and economic injustices. Hunger in communities is temporarily eased by emergency food supplies, but will not be eliminated long-term without community engagement, policy, and programs that support sustainability and empowerment of the community.

Several studies confirm long-term consequences of food insecurity on individuals as well. West Virginia is an example of a region impacted by long term and highly prevalent food insecurity and its consequences. Tessaro Rye, Parker, Mangone, and McCrone (2007) examined the effectiveness of a nutrition intervention in women in rural West Virginia. This population was selected specifically because they have been impacted by the perpetuation of food insecurity for a lifetime. This area does not support a healthy economy, as higher than average percentages of residents are unemployed and lack advanced education. The conditions, risk factors for food insecurity, have resulted in exceptionally high rates of cardiovascular disease, especially for female residents (Tessaro et al., 2007). Wolfe, Olson, Kendall, & Frongillo (1996) found high prevalence
of chronic disease in low-income, elderly populations in central New York. Ninety percent of the older adults studied experienced a chronic disease (hypertension, diabetes, atherosclerosis) that is treated with nutrition. This finding is cyclical in nature; poor diet quality because of food insecurity is associated with the development of chronic disease, and is then perpetuated by its presence.

Kempson et al. (2002) mentions the cognitive consequences of food insecurity, such as impaired concentration, inability to achieve higher-level thinking, and a smaller work capacity. The Academy of Nutrition and Dietetics supports and expands on these consequences by explaining the unique consequences for each age group. Adults are more vulnerable to become overweight or obese, which could contribute to the development of chronic diseases. Children often have impaired cognitive development, which affects performance in school. Johnson and Markowitz (2017) found that the timing (roughly age 9 months, 2 years, and 4 years) and number of episodes of food insecurity a child experiences before age five is correlated with decreased cognitive and social development, and poorer outcomes in kindergarten. The elderly are more likely to have a lower BMI and be deficient in essential nutrients (Olson & Holben, 2002). Individuals of all ages experience consequences of food insecurity, and therefore, the entire community is affected.

**Existing Intervention Programs and Research**

There are two prominent programs that are widely available to food-insecure and low-income groups across the United States. The first is EFNEP, Expanded Food and Nutrition Education Program, which is supported by the government and operated through each state’s land grant university’s cooperative extension service. EFNEP
targets families with children, and anyone is allowed to participate. The second is SNAP-Ed, which is the Supplemental Nutrition Assistance Program-education. SNAP-Ed is also operated through extension, but focuses on adults rather than children, and only serves the population receiving food benefits (United States Department of Agriculture, 2016).

Dollahite et al. (2003) examined the impact of nutrition education on low-income participants in EFNEP in counties in New York State. Dollahite et al.’s study used a three-step methodology; pre-assessment, education, post-assessment to assess changes in food insecurity status. Those who graduated the program experienced a decrease in food insecurity score significantly greater than terminated participants (.20 points on the scale, $p < .001$). Results showed that with each additional lesson provided, food insecurity score decreased by .015 points. The results indicated that rural life, race, and age were the main barriers to the success of the education. Despite that, the skills taught through EFNEP regarding budgeting, food management, and pre-planning meals were shown to be effective strategies for reducing food insecurity.

Rivera, Maulding, Abbott, Craig, & Eicher-Miller (2016) assessed the long-term effectiveness of SNAP-Ed on households with children in Indiana. The short-term effectiveness of SNAP-Ed has been demonstrated, but the long-term results were unknown prior to this study. In the investigation, four SNAP-Ed sessions were followed by a post-intervention and a one-year follow up. At the one-year follow up, household food security had increased by 25%, suggesting that SNAP-Ed benefits did persist long-term. In addition, food security status improved by one category along the food
insecurity continuum, which was a major accomplishment. This study serves to effectively “support the practical importance of SNAP-Ed,” (Rivera et al., 2016).

The investigation by Tessaro et al. (2007) evaluated the effectiveness of an interactive computer-based nutrition education program, “Cookin’ up Health” on rural low-income women in West Virginia. This population shares several demographic characteristics with the participants in the present study including gender, food insecurity status, and part time employment. The methods and education topics directed the present study; a pre-assessment, education, post-assessment model, with education topics including meal preparation and label reading. Tessaro et al. assessed their readiness to make dietary changes based on the knowledge gained through nutrition education, rather than retention of the knowledge itself.

Various programs and interventions have been shown to decrease the prevalence and outcomes of food insecurity, but more professionals need to be aware of and engaged with the issue in order to reduce food insecurity rates on a large scale.

**Customized Nutrition Education:**

This study assesses the effectiveness of a customized nutrition education intervention on reducing household food insecurity by improving coping mechanisms for household food management and food consumption practices, as well as quality of dietary intake. The presence of children in the household is a variable taken into account when evaluating responses to nutrition education. Though one education session may not be enough to show significant differences in behaviors and dietary intake, I predict that a portion of the knowledge shared with participants will be retained and utilized, and that
subtle changes in food management and consumption will begin to occur, especially those not requiring increased financial resources to implement.

Registered Dietitians have an ideal knowledge base and skill set for providing nutrition education to food insecure individuals and households. A variety of programs have been proven to effectively reduce food insecurity, and this study may prove another, more innovative and personalized method as well.
METHODOLOGY

Participants and Recruitment

Partnership with local ministry, Helping Others Through Extending Love In the Name of Christ (HOTEL INC), that works with homeless, low-income, and at risk populations, was crucial in the recruitment of participants for this study. Participants were clients of HOTEL INC’s food pantry, the Manna Mart, ensuring the most important quality for participation, living in a food insecure household. When HOTEL INC clients came to shop at the Manna Mart, the researcher spoke with them individually before they shopped to explain the project and gauge interest, as well as collect contact information on potential participants. Recruitment took place on several dates during normal hours when the Manna Mart was open (Tuesday, Thursday, Friday 10am-1pm). Participants were selected from interested clients based on willingness to participate and likelihood to follow through based on staff experiences. Interested clients were contacted by phone to confirm participation and schedule appointments.

Two individuals were recruited for full participation, one from a household without children, and one with a child at home. Participants signed WKU IRB-approved informed consent documents before beginning participation in the study. Each aspect of the study was approved by the IRB, including the research process, pre-assessment survey, educational tools, and post-assessment survey.

Research Design

This study required participants to complete three phases. Participants completed a pre-assessment phase, consisting of a questionnaire measuring food insecurity level, types of coping mechanisms, and actual dietary intake (see Appendix I p. 33). Food
insecurity level was assessed using the “US Household Food Security Module: Three Stage Design, with Screeners” (Appendix I p. 33), a resource co-developed by the United States Department of Agriculture and the Food and Nutrition Service. This tool is considered a reliable measure of food security status, and has been revised, updated and utilized as parts of other national surveys in the US and in Canada (Carlson, Andrews, & Bickel, 1999). The indicator classifies individuals into “High”, “Marginal”, “Low”, and “Very Low” food security categories. High and Marginal results are considered “food secure”, and low or very low results are considered “food insecure”. This portion of the assessment was read verbally to participants, and the researcher recorded the responses each gave.

The second portion of the pre-assessment examined coping behaviors that are commonly seen among food-insecure individuals. This portion of the survey was modified from Maxwell’s indicator for food insecurity using coping behaviors (Maxwell, 1995). Maxwell’s indicator ranks the coping mechanism from least to most severe: eating less preferred food, limiting portion size, borrowing food or money for food, maternal buffering, skipping meals, and skipping eating for whole days. Additional questions were added to this section for the unique purpose of this study. Participants completed responses for this portion by reading and responding to questions independently.

The final portion measured dietary intake using a modified Food Frequency Questionnaire. Based on the NHANES (National Health and Nutrition Examination Survey), the questionnaire used in this study was more brief, focusing on overall consumption of each food group, and the quality of those foods, rather than individual
foods within each group. Participants received a mixing bowl set as an incentive for completing the pre-assessment.

The results from the pre-assessment were analyzed for nutritional and behavioral areas of risk that could be addressed in an education session. A customized nutrition education plan was developed for each participant based on the results of their initial assessment (see Appendix II and III, p. 45, 48, respectively). Education topics for Participant 1 included the economic and nutritional disadvantages of convenience foods, how to pre-prepare healthy meals at home, and the components of healthy snacking. Topics for Participant 2 included pre-preparing healthy meals at home, including making a well-balanced breakfast, utilizing recommendations from the USDA Thrifty Food Plan, and the parts of a healthy snack, especially for children at school.

The education portion of the study was designed to be an interactive shopping and learning experience and took place in a Meijer store. A lesson plan was developed prior to the session date and was followed during the appointment. Educational handouts and materials developed by the researcher and given to participants are available in Appendix IV (p. 52). Participants received $55 of groceries as an incentive to complete the education session. The grocery items purchased were ingredients for sample recipes, staple foods, and snack items.

The post-assessment portion took place 4-6 weeks after the education session was completed (see Appendix V p. 55). The post assessment closely resembled the pre-assessment, with minor alterations. A demographic information section was added for participant characteristics. The coping behavior portion was identical to that of the original survey. A new section was added to directly assess the effectiveness of the
intervention. This portion consisted of open-ended questions that provided assessment of participants’ nutrition education experience. The final section, modified Food Frequency Questionnaire, was identical to the original. The participant completed the entirety of the post-assessment on paper independently. The incentive for completion of the post-assessment was a new crockpot, which will allow participants to put knowledge and skills learned during the education into practice.
RESULTS

Pre-Assessment

Participant 1

The pre-assessment survey revealed that this household and individual fall into the “Very Low Food Security” category, based on the US Household Food Security Indicator. The household barely fell into this lowest category, scoring a 6 on the indicator (6-10 qualify for very low food security, the lower the number, the more food secure).

The most common coping strategies were eating food that was not the first preference, limiting portion size, and skipping meals. The participant utilized all of these behaviors “Sometimes”, or 2-5 times per week. These coping behaviors are displayed in Figure 2 (p. 16). The participant does have access to fresh fruits and vegetables when in season. However, the participant does not receive any government assistance or utilize other community resources, such as public events with free meals, etc. The participant reports visiting a food pantry about once each month.

The most notable characteristics of the participant’s dietary intake are high consumption of frozen/pre-prepared meals (1-2x/week), fast foods (1-2x/week), plain bread (5-6x/week, whole grain 50% of the time), and potatoes (3-4x/week). Other dietary intake categories were more moderate, including consumption of raw or cooked vegetables (3-4x/week), greens (1-2x/week), and and fresh fruit (3-4x/week). Little to no consumption of cold or hot cereals was reported, except for the participant’s mother, who consumes oatmeal nearly every day. Canned fruits were consumed in moderation (1-2x/week), and canned or dried vegetables were hardly ever consumed (2-3x/month).
Other information about the participant includes health history, usual eating patterns, and household dynamics. The participant mentioned having gastric bypass surgery in the past, which now prevents her from eating certain foods such as cold cereals. She admits to not cooking frequently at home, and struggling to consume well-balanced meals. The participant lives with her mother, but the two do not usually eat the same foods. She explained that it is difficult cooking for only two people, and even more difficult to prepare different meals on top of that.

Participant 2

The pre-assessment revealed that this household, individual, and child all fall into the “Low Food Security” category according to the US Household Food Security Indicator. The household scored 7 on the indicator (3-7 is low food security), adults scored 5 (3-5 is low food security), and the child scored 2 (2-4 is low food security).

Most frequent coping strategies included eating less preferable foods, borrowing food or money for food, and maternal buffering (“Sometimes” 2-5x/week). The participant reports rarely (1 or fewer x/week) limiting portion sizes and skipping meals. The participant visits a food pantry once per month, and attends community events/free opportunity meals as much as possible (utilizing a church meal at least once/week). The participant does have access to fresh fruits and vegetables when in season, and receives government food stamp benefits. Coping strategy frequency is compared with Participant 1 in Figure 2 (p. 16).

The participant reported moderate household consumption of cold cereals (1-2x/week) and plain bread (3-4x/week). The participant reports these grain options were the whole grain variety 75% of the time. Fresh fruit was consumed 5-6x/week, potatoes
were consumed 1-2x/week, and raw or cooked vegetables 3-4x/week. Fast foods and frozen/pre-prepped meals were both consumed 1-2x/week. The participant reports relatively low consumption of fried foods (2-3x/month). When grocery shopping, the participant reported making purchasing decisions based on which food item was the least expensive.

Other relevant notes related to participant lifestyle include household membership, health history, and work life. The participant’s household includes the participant, spouse, daughter, and both in-laws. The participant shared a history of gestational diabetes when pregnant with the child, and explained that she still considers and utilizes nutrition habits she developed then to support a generally healthier lifestyle. The participant also shared that sometimes preparing meals at home is a challenge because of the timing when work shifts end (sometimes as late as 9:00pm).

![Coping Behaviors](image)

**Figure 2: Coping Behaviors**

**Education**

Participant 1

---

**Figure 2 Key:**
- 0- Never- 0 times per week
- 1- Rare- 1 or fewer times per week
- 2- Sometimes- 2-5 times per week
- 3- Frequently- almost every day
The lesson plan utilized during this education may be viewed in Appendix II (p. 45). The following observations were denoted based on the education session with the participant. The participant seemed surprised at the high levels of carbohydrate and sodium present in pre-made or frozen meals. Upon learning about portion sizes, which are often misleading based on item packaging, the participant was surprised. After the education, the participant was able to successfully find “Low Sodium” or “No Salt Added” canned items, as well as healthier granola bar options using criteria covered in the education. Plans to begin using new techniques for pre-prepping meals at home as a healthy but easy alternative to buying prepared meals were indicated.

Participant 2

The lesson plan utilized during this intervention is available in Appendix III (p. 48). Primary topics included pre-preparing meals for the family, including breakfast, utilizing recommendations from the USDA Thrifty Food Plan, and putting together well-balanced snacks, especially for the child. The participant shared that main challenges related to food were keeping the child excited about different and “fun” foods, as well as offering healthy breakfast options. She also explained that the child gets bored of the same foods if consumed too frequently. The components of a healthy and well-balanced breakfast (protein, grains, fruit) were of peak interest to her, and she mentioned that her daughter usually gets hungry during the morning at school. The participant also seemed interested in learning the economical and nutritional differences in pre-prepared or pre-flavored food items compared with plain options with seasonings added while cooking.

Post-Assessment

Participant 1
The post-assessment showed no change in utilization of coping strategies, other than slightly less frequent visits to a food pantry. Following the education, utilization of a food pantry decreased to less than once per month.

Learning outcomes showed that following the education, the participant prepares meals at home 3-5x/week (reportedly more often than before the education), and feels capable of preparing an inexpensive, yet still nutritious meal. She sees taste and cost as the main difference in pre-made and homemade meals. An obstacle to preparing meals at home is that her mother (other household member) does not eat the meals she prepares. The participant reported using shopping ads, using coupons, and making a list as grocery shopping strategies. Notably, food cost was the deciding factor when purchasing food items before and after the education. She shopped at the same stores (Kroger, Aldi, and Meijer) before and after the education, but reported purchasing different types of foods. When asked, the participant mentioned considering fruit a “good snack”, and usually eats cheese, fruit, or granola bars when snacking.

Post-assessment dietary intake values are compared with pre-assessment values in Figure 3 (p. 20). Dietary intake remained relatively the same, with a few major differences. Potato consumption increased to 5-6x/week. Consumption of plain bread decreased to only 2-3x/month (now the whole grain variety 100% of the time), fried foods decreased to only 1x/month, and no frozen or premade meals were used. Fast food consumption remained the same, as well as consumption of other vegetables and hot cereal (for participant’s mother).

Dietary Intake Comparison
Dietary intake was relatively similar for both participants, with the frequency of many foods being the same for both in the pre-assessment. One person in each household consumed hot cereal (participants specified oatmeal) on a regular basis; Participant 1’s mother consumed it almost daily, and Participant 2’s daughter consumed it weekly. Other types of food that were consumed at the same frequency for both participants at pre-assessment were canned fruits (1-2x/week), fresh vegetables (3-4x/week), cooked grains (1-2x/week), convenience/snack foods (3-4x/week), fast foods, and frozen meals (both 1-2x/week). Other primary differences between the participants are the fresh fruit and green vegetable consumption. Participant 2 consumed fresh fruits 5-6x/week, while Participant 1 consumed fresh fruits only 3-4x/week, and reported her mother only doing so 2-3x/month. Participant 2 also reported higher consumption of green vegetables, 3-4x/week compared with Participant 1, who reported 1-2x/week. Participant 1 reported higher consumption of potatoes (3-4x/week), breads (eaten alone or as a sandwich) (5-6x/week), and fried foods (1-2x/week). For these foods, Participant 2 reported consuming potatoes 1-2x/week, breads 3-4x/week, and fried foods 2-3x/month. Dietary intake values are compared between participants and Participant 1 pre and post assessment in Figure 3 (p. 20).
Participant 2

This portion was not completed due to the participant’s inability to schedule and keep a follow-up appointment. The researcher attempted to contact the participant by phone on four separate occasions. First, the participant answered and explained that she would return the call to schedule a follow up appointment after she obtained her work schedule for the following week. However, she never returned the call, even after the researcher called back three more times and left two voicemails requesting a call back.
DISCUSSION

This study examined the effectiveness of a customized nutrition education intervention on improving 1) nutrition-related behaviors associated with food insecurity and 2) management of household food supply in food insecure individuals with and without children present.

Nutrition-Related Behaviors

Pre-assessment data revealed differences in coping strategies between the two households. Three of the same coping strategies were common to both participants. Eating less preferred food, limiting portion size, and skipping meals were reported by both. The household with children reported also utilizing maternal buffering and borrowing food or money for food as coping strategies. Though three of the strategies were common to both participants, they were used at different frequencies. The household without children used only three coping strategies, but all were utilized “Sometimes” (2-5 times per week). The household with children reported using five coping strategies, but different amounts. Eating less preferred foods, borrowing food or money for food, and maternal buffering were utilized “Sometimes” (2-5 times per week), while limiting portions and skipping meals were only utilized “Rarely” (one or fewer times per week). The primary coping strategies for both participants are compared in Figure 2 (p. 16). Based on Maxwell’s coping strategy indicator, both participants utilized two of the less severe coping strategies (eating less preferred food and limiting portion size) and one of the more severe strategies (skipping meals).

A few differing elements of dietary intake between participants are noteworthy. Participant 2’s household consumed more fresh fruit, greens, and canned/dried
vegetables, and Participant 1 consumed more potatoes, bread, and fried food. One major difference between the participants is whether or not they receive government benefits. Participant 2 receives food stamps, while Participant 1 does not receive any government assistance for food. Participant 1 did not provide reasoning for not receiving government assistance for food. Participants in Stevens’s (2010) study emphasized the high cost of fresh fruits and vegetables as a major barrier to consumption when asked in personal interviews. Though participants in the forementioned study were a special population, young single mothers, this barrier to consumption of fresh fruits and vegetables is common. This could possibly be a reason for Participant 1 consuming less of these food items and more inexpensive options instead.

**Participant 1 Outcomes**

Participant 1 (no children) displayed significant improvements related to areas of household food management and dietary intake. The participant went from using a premade or frozen meal 1-2 times per week to zero times in the six weeks following the education intervention. Another finding was the decrease in consumption of fried foods (from 1-2 times per week to only about once per month). This is interesting given that cooking techniques, such as the benefits of baking, broiling, or sautéing rather than deep-frying foods, were not a focal point of the education. Also related to dietary intake, a change was noteworthy regarding consumption of whole grains, from 50% of the time to 75% of the time. The participant explained in an open-ended question that the same stores were still used for grocery shopping, but that different types of foods were purchased after the intervention. The participant mentioned in the pre-assessment that affordability of food items was the most important factor when making food selections,
but expanded in the post-assessment saying that shopping by affordability was achieved through using sale ads and coupons.

Another outcome showing effectiveness of the education is the participant’s perception of the differences in pre-made and home made food. In the post-assessment, the participant perceived the main differences as cost and taste. Understanding cost differences was a major objective of the lesson plan, and this shows continuity with the behavior modification (no longer consuming pre-made meals).

When asked about snacks, the participant mentioned usually eating cheese, fruit, or a granola bar, and that a “good snack” would be fruit. The education included information about including protein or healthy fat in snacks to promote satiety and balance in the diet, but no change occurred based on the post-assessment results. The partial effectiveness of the education is not, however, a discrediting factor. Usually in a nutrition education intervention, one topic is the main focus or goal, and although other topics may be covered, the participant following through with one of the objectives is considered a success. This finding supports Tessaro et al.’s (2007) research, which concluded that a single education may be enough to change intentions, but not necessarily change all behaviors.

**Participant 2 Outcomes**

Although one of the objectives of this study was to compare the effectiveness of the nutrition education in the household with children and the household without children, that objective did not come completely to fruition. Participant 2 (household with children) was more difficult to schedule and maintain appointments than Participant
1. Although Participant 2 kept appointments for the pre-assessment and education components, she did not schedule or complete a post-assessment appointment.

   The participant was phoned as an attempt to try to schedule the post-assessment. The participant indicated that she would call to schedule after receiving her work schedule. However, the participant did not follow up, and even after three other phone calls from the researcher and a voice message, a response from the participant was never received. Touch and Berg (2016) investigated what causes parents to not follow up with scheduled appointments. Using parents at an ambulatory outpatient pediatric clinic as the sample, they found that there are two types of factors that impact appointment nonattendance: Child/Family System Factors, and Provider/Healthcare System Factors. Most relevant to explaining Participant 2’s incompletion of follow up are likely the Child/Family System Factors. Parents in Touch and Berg’s study expressed the need to attend other appointments, parent work needs, and transportation as reasons why appointments were often not attended. Parent forgetfulness was also a factor Touch and Berg found to impact this population. However, they also mentioned that other studies have found forgetfulness to impact adults as well. For food insecure households, the issue of parent work schedules and transportation may be especially noteworthy when exploring reasoning behind appointment nonattendance, given the additional strains of the lifestyle associated with food insecurity.

   Touch and Berg’s investigation of the concept of nonattendance to appointments is similar to Tessaro et al.’s (2007) experience with participants not completing all phases of the research study. Tessaro et al.’s study began with 395 participants at baseline, but finished with 262 who completed the follow up. Notably, Tessaro et al.
gave participants the option to complete follow up by phone or mail. The present study relied on meeting with participants in person, which is even more challenging for participants. The increased demand on participants could further explain the impaired ability of Participant 2 to follow up.

Even though post-assessment quantitative data about dietary intake and learning outcomes were not obtained, this investigation reveals unexpected information about living with children in a food insecure household. Primarily, recruiting a participant from a household with children was exceedingly more difficult than recruiting a participant from a household without children. Several individuals living in households with children expressed interest in participating in the study and provided contact information to schedule pre-assessment appointments. However, disconnected phone lines, unanswered calls, or missed appointments were all challenges faced with these individuals. Being able to meet with the recruited participant twice was an improvement from other attempts at initial recruitment that never resulted in a pre-assessment appointment. It is also noteworthy that the participant in this study only had one child at home, which may have contributed to her ability to participate to the level that she did.

**Related Findings**

Of the research that has previously been undertaken to investigate the impact of nutrition education on food insecurity, Tessaro et al.’s (2007) study with low-income women in West Virginia most closely resembled the design of the present study. Tessaro et al.’s is similar in that it evaluates the effectiveness of a nutrition education intervention on a low-income population to change behavior, and consequentially, health and nutrition outcomes. However, there are key differences that set the present research
study apart. Primarily, the delivery method of education is more similar to that of an EFNEP or SNAP-Ed session. The education sessions are individual and interactive, rather than computer based. Additionally, the content of the session is customized to the individual’s needs based on an assessment of their food insecurity status, coping behaviors, and usual food intake.

Dollahite et al. (2003) also found a significant difference in program delivery method related to EFNEP and decrease in food security score. Those receiving education as individuals showed greater improvements rather than those taught in group settings. This previous finding supports the results of this study; individual, customized nutrition education is an effective method for decreasing behaviors associated with food insecurity.

Difficulties with recruitment of participants may be revealing of the overall strains of the lifestyle associated with food insecurity. Inconsistent access to phone service or only using month-to-month service as money allows parallels with the inconsistent access to food that individuals experience. Often forgetting about appointments could be evidence of the mental strains of living at or near the poverty line. Even offering incentives for successful completion of each step in the research process was often not enough for participants to consistently make and keep appointments.

The cumulative outcomes of this study show that customized nutrition education can be effective for changing food management practices and dietary intake for individuals experiencing food insecurity. Though one education session may not be enough to reduce the utilization of coping mechanisms, this study does show that some lifestyle changes can be made with one education customized to the individual. Possible
barriers to education effectiveness include financial and social difficulties associated with food insecurity, the education itself, and session length.
CONCLUSION

In conclusion, this study shows that customized nutrition education can have an impact on the behavioral patterns (meal preparation), and dietary patterns (consumption of fried foods) of an individual from a food insecure household. The objective of this study was to use customized nutrition education as a method for improving behaviors and dietary patterns associated with food insecurity. Additionally, the goal was to compare results between a household without children and a household with children. Although the household with children did not complete the post-assessment, data revealed information about the strains of living in a food-insecure household with children.

Coping behaviors that individuals employ as an economical result of food insecurity do not go without health consequences. Learning about how to best cope with food insecurity in economical and healthy ways is a major step in decreasing the long-term outcomes of this issue.

It is important to recognize that this study’s results are not universal. A small sample size was used to obtain in-depth data about two individuals rather than numerical data about a larger group. Participants were the same gender, from relatively the same geographic area, and both were recruited from the same site. These similarities impose limitations, but also control for some confounding variables. Additional challenges included recruitment and communication with participants. The ability to easily communicate was not anticipated as a challenge, but revealed itself to be so. Due to the economic conditions that accompany food insecurity, something as simple as the inability to pay a phone bill becomes a legitimate challenge that impairs the accomplishment of this type of study, which requires communication over a period of months.
Although this study is small in scope, the future possibilities are exciting. Similar studies could examine education effectiveness with distinct age groups, geographic areas, or the presence or absence of government assistance. The scope of the study could be broadened across several communities and living environments. Also, different types of education could be compared to determine which is most effective: individual, group, or computer-based.

Successful education, even on a small scale is enough to show the importance of Registered Dietitians working with the food-insecure population. It takes time and willingness to work to develop customized education interventions, but they are effective in creating healthier behavior and dietary patterns. Registered Dietitians can make a difference, and education is key.
REFERENCES


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APPENDIX I

Pre-Assessment Survey

Pre-Assessment Section 1
Evaluation of Level of Food Insecurity

U.S. HOUSEHOLD FOOD SECURITY SURVEY MODULE

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.

Household Stage 1: Questions HH2-HH4

HH2. 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 your household in the last 12 months—that is, since last (name of current month).

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

   a. Often true
   b. Sometimes true
   c. Never true
   d. DK or Refused

HH3. “The food that I bought just didn’t last, and I didn’t have money to get more.” Was that often, sometimes, or never true for your household in the last 12 months?

   a. Often true
   b. Sometimes true
   c. Never true
   d. DK or Refused

HH4. “I couldn’t afford to eat balanced meals.” Was that often, sometimes, or never true for your household in the last 12 months?

   a. Often true
   b. Sometimes true
   c. Never true
   d. DK or Refused

Screener for Stage 2 Adult-Referenced Questions: If affirmative response (i.e., "often true" or "sometimes true") to one or more of Questions HH2-HH4, then continue to Adult Stage 2; otherwise, if children under age 18 are present in the household, skip to Child Stage 1, otherwise skip to End of Food Security Module.
Adult Stage 2: Questions AD1-AD4

AD1. In the last 12 months, since last (name of current month), did 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?
   a. Yes
   b. No (Skip AD1a)
   c. DK (Skip AD1a)

AD1a. [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?
   a. Almost every month
   b. Some months but not every month
   c. Only 1 or 2 months
   d. DK

AD2. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?
   a. Yes
   b. No
   c. DK

AD3. In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?
   a. Yes
   b. No
   c. DK

AD4. In the last 12 months, did you lose weight because there wasn't enough money for food?
   a. Yes
   b. No
   c. DK

Screener for Stage 3 Adult-Referenced Questions: If affirmative response to one or more of questions AD1 through AD4, then continue to Adult Stage 3; otherwise, if children under age 18 are present in the household, skip to Child Stage 1, otherwise skip to End of Food Security Module.

Adult Stage 3: Questions AD5-AD5a

AD5. In the last 12 months, did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?
   a. Yes
   b. No (Skip AD5a)
c. DK (Skip AD5a)

AD5a. [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?

   a. Almost every month
   b. Some months but not every month
   c. Only 1 or 2 months
   d. DK

**Child Stage 1: Questions CH1-CH3**
Households with no child under age 18, skip to End of Food Security Module.

Now I’m going to read you several statements that people have made about the food situation of their children. For these statements, please tell me whether the statement was OFTEN true, SOMETIMES true, or NEVER true in the last 12 months for your child/children living in the household who are under 18 years old.

CH1. “We relied on only a few kinds of low-cost food to feed our child/children because we were running out of money to buy food.” Was that often, sometimes, or never true for your household in the last 12 months?

   a. Often true
   b. Sometimes true
   c. Never true
   d. DK or Refused

CH2. “We couldn’t feed our child/children a balanced meal, because we couldn’t afford that.” Was that often, sometimes, or never true for your household in the last 12 months?

   a. Often true
   b. Sometimes true
   c. Never true
   d. DK or Refused

CH3. "My children were not eating enough because we just couldn't afford enough food." Was that often, sometimes, or never true for (you/your household) in the last 12 months?

   a. Often true
   b. Sometimes true
   c. Never true
   d. DK or Refused

**Screener for Stage 2 Child Referenced Questions:** If affirmative response (i.e., "often true" or "sometimes true") to one or more of questions CH1-CH3, then continue to Child Stage 2; otherwise skip to End of Food Security Module.
**Child Stage 2: Questions CH4-CH7**

**CH4.** In the last 12 months, since (current month) of last year, did you ever cut the size of your children's meals because there wasn't enough money for food?
- a. Yes
- b. No
- c. DK

**CH5.** In the last 12 months, did any of the children ever skip meals because there wasn't enough money for food?
- a. Yes
- b. No (Skip CH5a)
- c. DK (Skip CH5a)

**CH5a.** [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?
- a. Almost every month
- b. Some months but not every month
- c. Only 1 or 2 months
- d. DK

**CH6.** In the last 12 months, were the children ever hungry but you just couldn't afford more food?
- a. Yes
- b. No
- c. DK

**CH7.** In the last 12 months, did any of the children ever not eat for a whole day because there wasn't enough money for food?
- a. Yes
- b. No
- c. DK
(1) **Coding Responses and Assessing Household Food Security Status:**

Following is a brief overview of how to code responses and assess household food security status based on various standard scales.

Responses of “yes,” “often,” “sometimes,” “almost every month,” and “some months but not every month” are coded as affirmative. The sum of affirmative responses to a specified set of items is referred to as the household’s raw score on the scale comprising those items.

- Questions HH2 through CH7 comprise the U.S. Household Food Security Scale (questions HH2 through AD5a for households with no child present). Specification of food security status depends on raw score and whether there are children in the household.
  - For households with one or more children:
    - Raw score zero—High food security
    - Raw score 1-2—Marginal food security
    - Raw score 3-7—Low food security
    - Raw score 8-18—Very low food security
  - For households with no child present:
    - Raw score zero—High food security
    - Raw score 1-2—Marginal food security
    - Raw score 3-5—Low food security
    - Raw score 6-10—Very low food security

- Questions HH2 through AD5a comprise the U.S. Adult Food Security Scale.
  - Raw score zero—High food security among adults
  - Raw score 1-2—Marginal food security among adults
  - Raw score 3-5—Low food security among adults
  - Raw score 6-10—Very low food security among adults

- Questions CH1 through CH7 comprise the U.S. Children’s Food Security Scale.
  - Raw score 0-1—High or marginal food security among children (raw score 1 may be considered marginal food security, but it is not certain that all households with raw score zero have high food security among children because the scale does not include an assessment of the anxiety component of food insecurity)
  - Raw score 2-4—Low food security among children
  - Raw score 5-8—Very low food security among children

(2) **Response Options:** For interviewer-administered surveys, DK (“don’t know”) and “Refused” are blind responses—that is, they are not presented as response options, but marked if volunteered. For self-administered surveys, “don’t know” is presented as a response option.
This is a modified version of the U.S. HOUSEHOLD FOOD SECURITY SURVEY
MODULE:
THREE-STAGE DESIGN, WITH SCREENERS.

*Pre-Assessment Section 2*
Evaluation of Coping Behaviors

This survey lists six behaviors and asks how often you participate in the listed behavior. Circle the answer that most accurately describes your actions. Please answer as honestly and accurately as possible, guessing if you need.

**Part 1:** How often do you . . .

1. Eat food that is not your first preference?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day

2. Limit your portion size at meals?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day

3. Borrow food or borrow money to buy food?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day

4. Reduce your personal food intake to ensure that children in the household have enough to eat?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day
   e. Does not apply to me

5. Skip meals?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day

6. Skip eating for whole days?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day
Part 2: The following questions are open-ended; please write in an answer that most closely identifies you.

7. How often do you visit a food pantry?
   a. ______________________________________________________________________

8. How often do you attend events with free meals provided by an organization in the community?
   a. ______________________________________________________________________

9. Do you have access to or eat fresh vegetables or fruits during the seasons they are harvested?
   a. ______________________________________________________________________

10. Do you receive government assistance to cover food expenses?
    a. ______________________________________________________________________

11. Are you aware that there is a Farmer’s Market in Bowling Green that will double your SNAP and WIC benefits?
    a. Yes
    b. No

12. Do you use community resources (e.g. weekly church meals, other food pantries, etc.) to help provide food for your household?
    a. ______________________________________________________________________

Part 1 of this survey was modified from Measuring Food Insecurity: The Frequency and Severity of “Coping Strategies”, a study by Daniel G. Maxwell

Pre-Assessment Section 3
Modified Food Frequency Questionnaire

Answer each question to your best ability. If you are not sure or cannot remember, make a guess- an estimate is better than a blank answer.

Each statement begins with, “Over the past 12 months. . . .”

1. How often did you drink fruit or vegetable juice?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

2. How often was the juice 100% fruit juice, 100% vegetable juice, or 100% juice mixtures?
3. How often did you eat oatmeal, grits, cream of wheat, or other cooked cereal?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day
4. How often did you eat cold cereal?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day
5. How often was the cold cereal a whole grain type (such as shredded wheat, Wheaties, Cheerios, Raisin Bran or other bran, oat, or whole wheat cereal)?
   a. Never
   b. 25% of the time
   c. 50% of the time
   d. 75% of the time
   e. Always
6. How often did you eat fresh fruit (apples, bananas, pineapple, grapes, peaches, berries, oranges, melons, etc.)?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day
7. How often did you eat canned/packaged fruit (applesauce, fruit cocktail, fruit cups, cranberries, pumpkin)?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

8. How often did you eat greens: raw, cooked, or in a salad?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

9. How often did you eat other vegetables: fresh, steamed, or pan-fried (corn, peppers, cucumbers, tomatoes, carrots, onions, squash)?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

10. How often did you eat canned or dried vegetables or beans?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day
11. How often did you eat potatoes- white, sweet, fried?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

12. How often did you eat rice or other cooked grains (bulgar, cracked wheat, millet, pasta)?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

13. How often were the cooked grains the whole grain variety (brown rice, whole grain pasta, etc.)?
   a. Never
   b. 25% of the time
   c. 50% of the time
   d. 75% of the time
   e. Always

14. How often did you eat bread- by itself, as a sandwich, toast?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

15. How often was the bread you ate a whole grain type?
   a. Never
   b. 25% of the time
   c. 50% of the time
   d. 75% of the time
16. How often did you eat deep-fried foods- meats, vegetables, etc.?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

17. How often did you eat convenience/snack foods (potato chips, snack mixes, etc.)?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

18. How often did you eat fast food?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

19. How often did you eat frozen/packaged meals?
   a. Never
   b. One time per month or less
   c. 2-3 times per month
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

20. When grocery shopping, how do you generally make product selections?
a. Least expensive option
b. Low sodium or low fat varieties
c. Most nutritious option
d. Option most pleasing to entire household
e. Other

This survey has been modified from the NHANES Food Frequency Questionnaire for this study.
APPENDIX II

Participant 1 Lesson Plan

*Prepare for Economical Eating*

Participant 1: Middle aged woman, interactive nutrition education at Meijer

Duration: 1 hour

*Lesson Objectives:*

- Participant will learn to plan and pre-prep nutritionally balanced meals suitable for one-two people.
- Participant will demonstrate understanding of the economics of convenience and fast foods.
- Participant will describe the health and financial benefits of healthy snacking, and list options feasible for her.

*Materials Used:*

- Activity: Price-Matching Seek and Find: $ per Serving
- Nutrient Content Comparison
- Handout: Sample Recipes for Freezy Meals
- Handout: Easy-Freezy Meals
- Handout: Grab-a-Snack Craving

*Procedure:*

- Introduction:
  - Activity: Price-Matching Seek and Find: $ per Serving
    - Using the Price-Matching tool as a guide, participant will tour the store, noting prices of pre-made freezer meals per serving.
Instructor will explain that it can be economical to buy ingredients for preparing home-made meals.

- Nutrient Content Comparison: Instructor will also ask participant to notice key components of a nutrition label on packaged foods, including sodium, vitamin/mineral, and fat content.
- Instructor will explain how using fresh items or putting together home-made meals offers more control over nutritional content.

- Body:
  - Handout: Easy-Freezy Meals
    - Instructor will go over the steps to pre-prepping a meal with the participant.
    - Instructor will utilize participant eating habits, likes, and dislikes in order to make this relevant to her personal situation
    - Make sure you include: Protein, colors, fiber
  - Instructor will explain grocery shopping techniques for nutritious meal components, utilizing the “Grocery Game Plan” sheet.
  - Handout: Grab-a-Snack Craving
    - Affordable snack ideas
    - Can be just as easy as convenience foods
    - Add protein for satiety
  - Using the “Sample Recipes for Freezy Meals” and “Grab a Snack Craving” handouts, instructor will guide the participant through a budget-
friendly, healthy shopping experience, purchasing items that are 
ingredients in sample recipes, healthy snack, and staple food items.

◆ Conclusion:
  o Review concepts:
    ▪ Convenience/fast foods are misleading in price and rob you of 
      nutrients your body needs
    ▪ Pre-prepping meals can be easy, affordable, and beneficial to 
      health
    ▪ Smart snacking can keep you full throughout the day and save 
      money and calories from energy-dense foods
  o Questions/Concerns?
    Make follow-up appointment!
Family Friendly Fuel-Up

Participant 2: mother of one, interactive nutrition education at Meijer

Duration: 1 hour

Lesson Objectives:

- Participant will learn to plan and pre-prep nutritionally balanced breakfast and dinner options suitable for a small family.
- Participant will be able to explain practical techniques for utilizing SNAP benefits based on the USDA’s Thrifty Food Plan.
- Participant will describe the health and financial benefits of healthy snacking, and list options feasible for her family.

Materials Used:

- Handout: Sample Recipes for Freezy Meals
- Handout: Easy-Freezy Meals
- Handout: Thrifty Table Tips
- Handout: Healthy Breakfast
- Handout: Grab-a-Snack Craving-School

Procedure:

- Introduction:
  - Activity: Price-Comparison Tour
• Participant will tour the store, exploring the price differences between pre-prepared frozen and/or boxed meals versus individual recipe ingredients.

• Instructor will explain that it can be economical to buy ingredients for preparing home-made meals.

  o Nutrient Content Comparison: Instructor will also ask participant to notice key components of a nutrition label on packaged foods, including sodium, vitamin/mineral, and fat content.

  • Instructor will explain how using fresh items or putting together home-made meals offers more control over nutritional content.

• Body:

  o Handout: Easy-Freezy Meals

    • Instructor will go over the steps to pre-prepping a meal with the participant, and emphasize how this is helpful for a busy and working lifestyle.

    • Instructor will utilize participant eating habits, likes, and dislikes in order to make this relevant to her personal situation

    • Make sure you include: Protein, colors, fiber

  o Instructor will explain how to put together home-made meals economically using the “Thrifty Table Tips” handout.

  o Handout: Healthy Breakfast

    • Instructor will explain why breakfast is an extremely important meal. Eating breakfast jump-starts the body’s metabolism for the
day, give the brain energy, and encourages healthier eating habits throughout the day.

- Handout: Grab-a-Snack Craving- School
  - Affordable snack ideas suitable for packing for school.
  - Add protein for satiety and blood sugar control and consistency for daughter

- Using the “Sample Recipes for Freezy Meals”, “Healthy Breakfast”, and “Grab a Snack Craving- School” handouts, instructor will guide the participant through a budget-friendly, healthy shopping experience, purchasing items that are ingredients in sample recipes, healthy snack, and staple food items.

- Conclusion:
  - Review concepts:
    - Convenience/fast foods are misleading in price and rob you of nutrients your body needs. Using Thrifty Food Plan techniques, it is possible to eat well and utilize government assistance to its maximum potential.
    - Pre-prepping meals can be easy, affordable, and beneficial to health.
    - Eating a well-balanced breakfast is key to starting each day in a healthy way.
    - Smart snacking can keep you full throughout the day and save money and calories from energy-dense foods
• Questions/Concerns?
• Make follow-up appointment!
APPENDIX IV

Education Materials

Easy-Freezy Meals

Shop Smart!
- Make a realistic grocery list at home.
- Combine your list for efficiency.
- Shop the store when you know you won’t be hungry.
- Buy different store brands.
- Keep a separate shopping list for groceries.
- Pair each item with a meal plan.

Pre-Prep!
- But the ingredients to large-portioned dishes a day in advance.
- Keep vegetables simple—choose 1 vegetable that is in season.
- Shell by procuring all.
- Use fresh fruit and vegetables in meals.
- Select frozen foods instead of fresh.
- Dried beans are great for fiber.
- Whole grains add whole grain protein.

Healthy Meal Essentials

Variety, Balance, Moderation
- Be sure to include:
  - Fruits and vegetables for fiber.
  - Whole grains and legumes for protein.
  - Protein sources—meats, nuts.
- Make your plate colorful.

Grab a Snack!

Thrift Table Tips

Plain Grains
Buy unflavored rice, oats, pasta, and flavor it yourself!

Beans
Healthy, cost-effective meat substitute: Good protein and fiber

Frozen Veggies
Sides to steam and convenient ingredients

Eat Seasonally
Find best deals on fruits in season!

Adapted from: https://www.cnpp.ucda.gov/sites/default/files/nda_food_plans_cost_of_food/FoodPlansRecipeBook.pdf
Crockpot Tomato Beef Veggie Soup

Ingredients:
- 1 small onion, diced
- 1 lb. baby carrots, cut into bite-size pieces
- 1 bag frozen chopped green beans
- 1 can white kidney beans, rinsed and drained
- 24 oz jar of pasta sauce
- 1 lb ground beef
- 4 c chicken broth

YIELD: 6 servings

MATERIALS
- 1 gallon-sized plastic freezer bag

PREPARATION
- 1. Label freezer bag with recipe name and date.
- 2. To your freezer bag, add all ingredients. Add ground beef to the bottom of the freezer bag so as to avoid ingredient pourers into your crockpot.
- 3. Squeeze air out of the freezer bag, and lay it flat in the freezer.

COOK
- 1. The night before cooking, move freezer bag to refrigerator to thaw.
- 2. The morning you cook, pour bag contents into the crockpot along with 4 cups chicken broth.
- 3. Cook on low for 8 hours, or until beef is cooked and carrots are soft.
- 4. Break up the beef, and serve.


Crockpot Pear, Apple, and Pork Deliciousness

Ingredients:
- 3 pears, sliced
- 2 pears, sliced
- 3 lb. pork, 1 inch cubes
- 1 onion, diced
- 1 c brown sugar
- 1 c apple juice
- 1 c wine
- 1 c whole wheat mustard

YIELD: 6 servings

MATERIALS
- 1 gallon-sized plastic freezer bag

PREPARATION
- 1. Label bag with recipe name and date.
- 2. Cut up meat, fruit, onions, and place in freezer bag.
- 3. Mix together brown sugar, apple juice, mustard and pour into the bag.
- 4. Lay flat in freezer.

COOKING
- 1. When ready to prepare, thaw overnight in the fridge.
- 2. Pour contents of bag into the CROCKPOT.
- 3. Cook on low for 6-8 hours, or high for 3-4 hours.


Impossibly Easy Vegetable Pie

Ingredients:
- 2 cups (10 oz bag) frozen broccoli and cauliflower (rinsed and thawed)
- 1/3 cup chopped onion
- 1 cup shredded cheddar
- 1/2 cup chopped (can use gluten-free)
- 1 tbsp milk
- 1/3 cup flour
- 1/2 tsp salt
- 1/4 tsp pepper
- 2 eggs

YIELD: 6 servings

COOKING INSTRUCTIONS
- 1. Preheat oven to 400 degrees and grease 9" pie plate.
- 2. Combine broccoli/pear/ciflower, onions, and cheese in the pie plate.
- 3. Stir together Everything, milk, eggs, salt, and pepper.
- 4. Pour liquid mixture into the pie plate over vegetables.
- 5. Bake 35 to 45 minutes, or until golden brown and knife inserted comes out clean. Cool 5 minutes.

*Copied from: http://www.thenextfood.com/2010/03/impossibly-easy-vegetable-pie.html

Crockpot Cranberry Chicken

Ingredients:
- 1 small onion, diced
- 14 oz can whole cranberry sauce
- 2 cloves of garlic, minced
- 2 TBSP honey
- 2 TBSP soy sauce
- 1 tsp crushed red pepper flakes
- 1/2 tsp ground black pepper
- 2 boneless, skinless chicken breasts

YIELD: 6 servings

MATERIALS
- 1 gallon-sized plastic freezer bag

PREPARATION
- 1. Label the freezer bag with recipe name and date.
- 2. Add all ingredients to the freezer bag, making sure to add chicken last.
- 3. Squeeze as much air out of the bag as possible, and store flat in freezer.

COOK
- 1. The night before cooking, move baggie to refrigerator to thaw.
- 2. Pour contents of freezer bag into the CROCKPOT.
- 3. Cook on low for 4-6 hours, or until the chicken is completely cooked.

Healthy Breakfast

Mix and Match for new combinations

Include: Protein Healthy Fat Carbohydrate
APPENDIX V

Participant 1 Post-Assessment Survey

Post Assessment: Section 1

Demographic Data

Please answer the following questions to the best of your ability. If you are unsure or uncomfortable answering any of the questions, simply leave it blank.

1. Age: ______________

2. Gender: ____________

3. Ethnicity: ______________

4. Number of people in your household: _________
   
a. Please list the ages and relationships of your household members:
   
   i. ______________
   
   ii. ______________
   
   iii. ______________
   
   iv. ______________
   
   v. ______________

5. Highest level of education completed: ___________________

6. Estimated annual household income:
   
a. $0-10,000
b. $10,000-$20,000
c. $20,00-$30,000
d. $30,000-$40,000
e. $40,000-$50,000
f. $50,000-$60-000
g. $60,000-$70,000
h. $70,000-$80,000
i. $80,000-$90,000
j. $90,000-$100,000
Post-Assessment: Section 2

Re-Evaluation of Coping Behaviors

This survey lists six behaviors and asks how often you participate in the listed behavior. Circle the answer that most accurately describes your actions. Please answer as honestly and accurately as possible, guessing if you need.

Part 1: How often do you . . .

13. Eat food that is not your first preference?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day

14. Limit your portion size at meals?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day

15. Borrow food or borrow money to buy food?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day

16. Reduce your personal food intake to ensure that children in the household have enough to eat?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day
   e. Does not apply to me

17. Skip meals?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day

18. Skip eating for whole days?
   a. Never: 0 times per week
   b. Rarely: 1 or fewer times per week
   c. Sometimes: 2-5 times per week
   d. Frequently: almost every day

Part 2: The following questions are open-ended; please write in an answer that most closely identifies you.

19. How often do you visit a food pantry?
   a. _____________________________
20. Do you ever visit a Farmer’s Market? (please circle one)
   a. Yes  No  Seasonally
   b. If so, how often? ___________________

21. Do you use community resources (e.g. weekly church meals, other food pantries, etc.) to help provide food for your household?
   a. __________________________________________

Part 1 of this survey was modified from *Measuring Food Insecurity: The Frequency and Severity of “Coping Strategies”*, a study by Daniel G. Maxwell

Post Assessment: Section 3

Learning Outcomes

The following questions relate to your nutrition education experience. Please answer to the best of your ability.

1. Do you prepare meals at home, and if so, how often? Why or why not?

2. Has how often you prepare meals at home changed since our last education?

3. Do you feel that you are able to prepare an inexpensive and nutritious meal?
   a. Yes  No  Not sure
   b. Why or why not?

4. If you do prepare meals at home, are you most likely to use:
   a. Fresh ingredients
   b. Canned ingredients
   c. Frozen ingredients
d. Whichever is most affordable at the time

5. What do you see as the main differences in pre-prepared/convenience foods versus home-prepared foods?

6. Please describe your grocery-shopping habits, including any shopping preparation, the shopping process, and where you generally shop.

7. How do you make purchasing decisions for food items at the grocery store?

8. Have your grocery habits, including shopping preparation, the shopping process, and where you usually shop changed since our education?

9. Do you snack between meals? If so, please describe what you would generally eat for a snack.

10. What do you see as parts of a “good” snack?

Post Assessment: Section 4
Modified Food Frequency Questionnaire

Answer each question to your best ability. If you are not sure or cannot remember, make a guess- an estimate is better than a blank answer.

Each statement begins with, “In the past month. . .”,

21. How often did you drink fruit or vegetable juice?
   a. Never
b. Once
c. 2-3 times
d. 1-2 times per week
e. 3-4 times per week
f. 5-6 times per week
g. 1 time per day
h. 2-3 times per day
i. 4-5 times per day
j. 6 or more times per day
22. How often was the juice 100% fruit juice, 100% vegetable juice, or 100% juice mixtures?
   a. Never
   b. 25% of the time
c. 50% of the time
d. 75% of the time
e. Always
23. How often did you eat oatmeal, grits, cream of wheat, or other cooked cereal?
   a. Never
   b. Once
c. 2-3 times
d. 1-2 times per week
e. 3-4 times per week
f. 5-6 times per week
g. 1 time per day
h. 2-3 times per day
i. 4-5 times per day
j. 6 or more times per day
24. How often did you eat cold cereal?
   a. Never
   b. Once
c. 2-3 times
d. 1-2 times per week
e. 3-4 times per week
f. 5-6 times per week
g. 1 time per day
h. 2-3 times per day
i. 4-5 times per day
j. 6 or more times per day
25. How often was the cold cereal a whole grain type (such as shredded wheat, Wheaties, Cheerios, Raisin Bran or other bran, oat, or whole wheat cereal)?
   a. Never
   b. 25% of the time
c. 50% of the time
d. 75% of the time
e. Always
26. How often did you eat fresh fruit (apples, bananas, pineapple, grapes, peaches, berries, oranges, melons, etc.)?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

27. How often did you eat canned/packaged fruit (applesauce, fruit cocktail, fruit cups, cranberries, pumpkin)?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

28. How often did you eat greens: raw, cooked, or in a salad?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

29. How often did you eat other vegetables: fresh, steamed, or pan-fried (corn, peppers, cucumbers, tomatoes, carrots, onions, squash)?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
30. How often did you eat canned or dried vegetables or beans?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

31. How often did you eat potatoes- white, sweet, fried?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

32. How often did you eat rice or other cooked grains (bulgar, cracked wheat, millet, pasta)?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

33. How often were the cooked grains the whole grain variety (brown rice, whole grain pasta, etc.)?
   a. Never
   b. 25% of the time
   c. 50% of the time
   d. 75% of the time
   e. Always

34. How often did you eat bread- by itself, as a sandwich, toast?
   a. Never
   b. Once
   c. 2-3 times
35. How often was the bread you ate a whole grain type?
   a. Never
   b. 25% of the time
   c. 50% of the time
   d. 75% of the time
   e. Always

36. How often did you eat deep-fried foods—meats, vegetables, etc.?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

37. How often did you eat convenience/snack foods (potato chips, snack mixes, etc.)?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

38. How often did you eat fast food?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day
39. How often did you eat frozen/packaged meals?
   a. Never
   b. Once
   c. 2-3 times
   d. 1-2 times per week
   e. 3-4 times per week
   f. 5-6 times per week
   g. 1 time per day
   h. 2-3 times per day
   i. 4-5 times per day
   j. 6 or more times per day

This survey has been modified from the NHANES Food Frequency Questionnaire for this study.