# EFFECT OF MYPLATE EDUCATION ON OVERALL NUTRITIONAL KNOWLEDGE AT A LOCAL FOOD PANTRY AND RESOURCE CENTER IN WATAUGA COUNTY, NORTH CAROLINA

A Thesis
by
CARMEN L. KONING

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**Abstract**

EFFECT OF MYPLATE EDUCATION ON OVERALL NUTRITIONAL KNOWLEDGE AT A LOCAL FOOD PANTRY AND RESOURCE CENTER IN WATAUGA COUNTY, NORTH CAROLINA

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Rural populations are characterized by a high prevalence of diet-related chronic diseases and lack of access to disease case management and nutrient-dense foods. Food pantries are observing more clients who suffer from obesity and diet-related diseases. Recognizing and meeting the nutritional needs of a food pantry's clientele may have a positive influence on overall diet and health outcomes. A mixed-methods approach was used to design, implement, and evaluate a six-week waiting room education series focused on prevention and management of chronic conditions at a rural food pantry. Education was based on the *Eating Right is Basic-Enhanced Curriculum* with incorporation of qualitative feedback from staff regarding nutritional needs of food pantry participants. Participant perceptions of nutrition and health were evaluated at pre-test. Nutritional knowledge of clients was assessed at pre-test and post-test using a 5-item survey based on basic MyPlate nutrition principles. Ninety-four participants completed the pre-test survey (n=94), while only 22 were retained at post-test. At pre-test, participants indicated an average number of 1.59 health conditions; most commonly hypertension (24 mentions), diabetes mellitus (12 mentions), and cardiovascular disease (12 mentions). Self-perceived health was assessed as very good to excellent (n= 14), fair to good (n= 67), or poor (n=12). At pre-test, 31.3% (n=30) of participants answered three out of five knowledge questions correctly and 31.3% (n=30) answered four out of five questions

correctly. At post-test, 36.4% answered all five questions correctly, 27.3% answered four out of five questions correctly, and 27.3% answered three out of five questions correctly (n=22). Post-tests indicated that all participants were made more aware of the importance of nutrition and diet on health, most (n=21) thought the material was valuable and helpful, and roughly half (n=10) utilized a recipe provided through the education series. Change from pre-to post-test knowledge was statistically significant with a correlation of 0.623 (p=0.002). The mean score for the pre-test was 2.94 out of 5 (59%), and the mean score for the post-test was 3.81 out of 5 (76%). The current study resulted in a significant increase of nutrition knowledge following nutrition education, as well as insights to the beliefs and attitudes about self- perceived health and nutrition of the rural Appalachian population. A major challenge was maintaining consistent participation to reach a transient population. Future research should examine how to encourage participation through use of incentives and how to increase intervention duration to examine effects on health outcomes.

**Acknowledgements**

A sincere appreciation also goes to the Hunger and Health Coalition, especially Elizabeth Young, Executive Director, and Ben Loomis, Grant Writer and Garden Manager, for the collaboration and for allowing this education program to proceed. A special thank you to my chairperson, Melissa Gutschall, PhD for her guidance and mentorship during the past two years, as well as to the other members of my committee, Kyle Thompson PhD, and Lanae Ball PhD for their support and encouragement towards this project. I would also like to express my gratitude to the University Office of Student Research for the grant monies and financial support of this research as well as Ms. Lynn Van Ess for assisting in all of the ordering, spending and filing of the grant money. Additionally, I would like to thank Calli Deltgen, fellow classmate, for helping with the design, structure, and implementation of the education. I would also like to thank the local grocery stores of Boone: Ingles, Lowe's Foods, Food Lion, Harris Teeter, and Earth Fare for their food and monetary donations to the project.

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## Foreword

Chapter 2 of this thesis will be submitted to the *Journal of Hunger and Environmental Nutrition*, a peer-reviewed journal published by Taylor & Francis Group; it has been formatted according to the style guide for that journal.

## Chapter 1: Introduction

Rural areas are characterized by populations with a high prevalence of diet-linked chronic diseases and lack of access to both disease case management and healthy food. Currently, there is a recognized paradox between food insecurity and obesity, which then transcends into chronic illnesses. The 2015 Community Health Assessment of Watauga County reports that The Hunger and Health Coalition and the Community Care Clinic of Boone, NC, have a client base of 23% with diabetes, 43% with hypertension, 32% with high cholesterol, and 16% with both diabetes and hypertension[1].

Food insecurity, an issue that plagues roughly 48.1 million, or 1 in 6, Americans, is an ongoing public health concern in need of continuous interventions.[2] Every county in the United States experiences food insecurity to some degree, with half of all very food insecure counties categorized in a rural setting.[3] Specifically, rural Appalachia has a plethora of diet related disparities including access to health care, food insecurity and chronic disease.[1] The National Institute on Minority Health and Health Disparities promotes the implementation of individual and micro-level strategies that include education designed to reduce diet-related disparities in underserved populations.[4,5]

In past analyses, any type of food insecurity is associated with chronic disease and a lower Healthy Eating Index compared to those with full food security.[6-8] In a review published in Advances in Nutrition, researchers uncovered associations between food insecurity and type 2 diabetes, higher BMI and obesity in rural Appalachia.[6] The same review found numerous associations between food insecurity and type 2 diabetes, poor glycemic control, gestational diabetes, poor self rated health, and higher BMI.[6] Nguyen et al. discovered that in persons with food insecurity, 38.4% of the sample was obese compared to 33.7 % of the sample that had full food security.[7] What emerges from this association is a paradox between hunger and obesity and chronic disease.

In comparison, researchers completed a meta-analysis of diet quality scores and health

outcomes.[9] They discovered that a higher diet quality as measured by the Healthy Eating Index (HEI), the Alternate Healthy Eating Index (AHEI), and the Dietary Approaches to Stop Hypertension (DASH) has significantly reduced risk for a number of clinical outcomes. These included risk reductions for all-cause mortality (RR 0.78, 95% CI 0.76 to 0.80; P<0.00001), type 2 diabetes (RR 0.78, 95% CI 0.72 to 0.85; P<0.00001), cardiovascular disease and mortality (RR 0.78, 95% CI 0.75 to 0.81; P<0.00001), and cancer (RR 0.85, 95% CI 0.82 to 0.88; P<0.00001). [9] Higher diet quality scores were also associated with a reduced risk for colorectal, esophageal, pancreatic, and prostate cancer.[9]

Food insecure individuals report to utilizing a number of coping mechanisms and request education covering resource management and general nutrition.[10,11] In a study comparing coping mechanisms of food insecure people to the thoughts of their nutrition educators, the study participants listed strategies such as seeking out assistance from government programs, emergency food from food pantries, shopping strategies, and paying the minimum due on bills to still have enough money for purchasing of food.[10] A focus group led study among emergency food users in Washington State identified a number of coping strategies utilized by those classified as food insecure. Some of these strategies included making food in bulk, freezing leftovers, going to multiple grocery stores to use different coupons, and buying in bulk. Another common strategy was food substitutions such as powdered milk instead of fresh milk.[11] For the more food insecure, it was common to have to choose between buying food and other expenses such as rent, or medical bills.[11] Although some of the food was homemade, many participants described the major portion of their diet to be highly processed and inexpensive convenience foods that were easy to prepare.[11] When asked about education the participants were interested in, the responses included how to stretch food dollars, how to portion, and how to cook “better” foods given recipes.[11] It is in these strategies of coping where research needs to be directed to better assist the food insecure.

One of the most common practices of the food insecure, using emergency food from food pantries, has been reported to have low nutritional quality. [12-14] Although hard to analyze because of

the short duration the food is in the warehouse, results from a study from the Oregon Food Bank indicate that foods purchased were low in dairy and fruits compared to meat, beans and vegetables.[13] Foods were categorized according to the previous American Food Pyramid. Among the foods not able to be classified, one-third were condiments, non-caloric drinks like tea and coffee, convenience meals, and discretionary foods like chips and donuts.[13] Another food pantry analysis conducted on the east coast, in Massachusetts, found similar results.[14] Here they analyzed that the food pantry items were low in dairy and fruit products, which resulted in deficits in vitamins A and C, and calcium.[14]

Recent surges of food banks in the United States have created nutrition policies that address concerns about the nutrition composition of the food they distribute. One study lists some examples of such policies to include eliminating specific products such as candy, and soda.[15] In an attempt to address food insecurity in the United States, food banks also have a number of barriers to implementing a successful nutrition policy.[15] A concern of eliminating certain food products from distribution raises the question that if not available in the food bank, would the client spend the money elsewhere to purchase the banned product?[15] Some food banks reported that fear of losing donors was the biggest concern along with cost of perishable produce.[15]

A number of strategies for best practices to addressing the education needs of food insecure populations have been completed and have taken into consideration literacy level, culture of population of interest, resource management and general nutrition guidelines. [4,16,17] A study utilizing the *Eating Right is Basic- Enhanced* curriculum, reported positive outcomes in participants from pre- to post- education.[16] These outcomes included increased behavior scores in dietary quality, food resource management, food safety, and food security.[16] The Supplemental Nutrition Assistance Program education, geared towards those individuals eligible for the assistance that addresses nutrition education and health promotion, has reported successful outcomes for graduates of the education.[18-20] In a study of SNAP participants receiving food resource management education, after graduation, over half of the participants reported using the nutrition facts label to purchase groceries.[19] Also, more than one-third of graduates reported a decrease in running out of food at the

end of the month.[19] Another study assessing the effect of nutrition education on food insecurity reported that nutrition education is an effective strategy at reducing the degree of food insecurity.[20] The Expanded Food and Nutrition Education Program, a Federal Extension community outreach program that addresses diet quality, food insecurity and food resources management, has also resulted in successful outcomes from participants. [21,22] One of the first studies published involving the Expanded Food and Nutrition Education Program reported that three quarters of participants maintained the positive dietary changes approximately 20 months after completion of the intervention.[21] A more modern study assessing an education intervention on obesity reported that the intervention group had a reduction in BMI, and that ultimately, the Expanded Food and Nutrition Education Programs in communities could impact family eating behaviors for populations at risk of obesity.[22]

Forming a community organization and academic institution partnership is a way to address public health disparities in a local population. [23] Community Based Participatory Research has proven to be effective for collaborating with community organizations resulting in positive outcomes. For example, in a study involving a church-academic partnership with University of North Carolina, participants noted that the regular attendance of the UNC staff increased trust and respect, which ultimately resulted in a common understanding about the goals of the research.[23]

Thus, this study will explore a community-academic partnership and the feasibility of creating and running a pilot test of a MyPlate and resource management nutrition education series offered at a local food pantry in rural Northwestern North Carolina. This project has the potential to bridge the gap between food insecurity and chronic illness in the rural population of Watauga County through multiple layers of education.

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# Chapter 2: Article

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**Abstract:** Recognizing and meeting the nutritional needs of a food pantry's clientele may have a positive influence on overall diet and health outcomes. The purpose of this study was to assess the interests and needs for nutrition education and to create a sustainable nutrition education program that will increase nutritional knowledge of clients from the Hunger and Health Coalition in Boone, North Carolina. This study used a qualitative approach to creating an education series and examining beliefs and attitudes about self perceived health and nutrition of the rural Appalachian population. There was a statistically significant change ($p=0.002$) from pre-education knowledge to post-education knowledge using a paired samples t-test, as well as insights to the beliefs and attitudes about self-perceived health and nutrition of the rural Appalachian population. Future research should examine how to encourage participation through use of incentives and how to increase intervention duration to examine effects on health outcomes.

Key words: *Appalachian, rural, food-pantry, nutrition education*

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**Introductory note:** Carmen Koning attended Michigan State University where she received a Bachelor of Science in Dietetics and a Bachelor of Science in Nutritional Sciences in 2015. Currently, she is scheduled to receive her Master's of Science in Nutrition and Dietetics from Appalachian State University in May 2017.

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# Introduction

## Purpose of Research

### *Problem*

Rural areas are characterized by populations with a high prevalence of diet-linked chronic diseases and lack of access to both disease case management and healthy food. Currently, there is a recognized paradox between food insecurity and obesity, which then transcends into chronic illnesses. The 2015 Community Health Assessment of Watauga County reports that The Hunger and Health Coalition and the Community Care Clinic of Boone, NC, have a client base of 23% with diabetes, 43% with hypertension, 32% with high cholesterol, and 16% with both diabetes and hypertension[1].

### *Justification*

Food insecurity, an issue that plagues roughly 48.1 million, or 1 in 6, Americans, is an ongoing public health concern in need of continuous interventions.[2] Every county in the United States experiences food insecurity to some degree, with half of all very food insecure counties categorized in a rural setting.[3] Specifically, rural Appalachia has a plethora of diet related disparities including access to health care, food insecurity and chronic disease.[1] The National Institute on Minority Health and Health Disparities promotes the implementation of individual and micro-level strategies that include education designed to reduce diet-related disparities in underserved populations.[4,5]

### *Objective*

The purpose of this study was to 1) assess the interest in and need for nutrition education at a local food pantry, 2) use the findings to create a sustainable nutrition education program, and 3) pilot test the effectiveness of that education to clients.

## Literature Review

In past analyses, any type of food insecurity is associated with chronic disease and a lower Healthy Eating Index compared to those with full food security.[6-8] In a review published in Advances in Nutrition, researchers uncovered associations between food insecurity and type 2 diabetes, higher

BMI and obesity in rural Appalachia.[6] The same review found numerous associations between food insecurity and type 2 diabetes, poor glycemic control, gestational diabetes, poor self rated health, and higher BMI.[6] Nguyen et al. discovered that in persons with food insecurity, 38.4% of the sample was obese compared to 33.7 % of the sample that had full food security.[7] What emerges from this association is a paradox between hunger and obesity and chronic disease.

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Thus, this study will explore a community-academic partnership and the feasibility of creating and running a pilot test of a MyPlate and resource management nutrition education series offered at a local food pantry in rural Northwestern North Carolina. This project has the potential to

bridge the gap between food insecurity and chronic illness in the rural population of Watauga County through multiple layers of education.

## Methods

This study was designed to qualitatively assess the beliefs and attitudes about food pantry nutrition services and the feasibility and effectiveness of a nutrition education series highlighting MyPlate and resource management. The education series was modeled after *Eating Right is Basic-Enhanced Curriculum,* which is used in the Expanded Food and Nutrition Education Program by the US Department of Agriculture that targets low-income families with children.[16] This project focused on the creation and pilot test of a six-week waiting room education series at a local food pantry, The Hunger and Health Coalition, in Boone, NC. The evaluation consisted of a qualitative assessment of client satisfaction and receptivity as well as strategies to modify and expand the program. All study procedures were reviewed and approved by the Appalachian State University IRB to protect client confidentiality.

Research questions we hoped to answer from this research included:

- What are the interests and needs of the staff and clients regarding nutrition education?
- Will this type of nutrition education increase the nutritional knowledge of low-income, food insecure adults?
- Will resource management nutrition education reduce food insecurity in low-income, food insecure adults receiving emergency food?

The target population was the clients served by Hunger and Health Coalition located in Boone, NC. Eligibility criteria to participate in the Food Pantry program include being a resident of Watauga County, NC with an income at or below 200% of the Federal Poverty Level. Clients can receive a food box twice per month using this program. Use of the on-site Food Market goes by the same criteria guidelines. The Food Market provides fresh produce, bread and deli items to families,

and is available on a daily basis. The food pantry program is able to feed roughly 2,500 people every month.

The first phase of the research involved gaining field experience at the Hunger and Health Coalition by volunteering to directly observe the organization and policies surrounding food distribution. After taking field notes and getting to know a few of the staff members, the investigator asked to administer a survey to staff and volunteers regarding beliefs and attitudes about the nutrition policy currently in place, potential for changes to the current nutrition policy, and barriers the clients experience related to nutritious foods. These preliminary actions provided exposure to the population to help complete a needs assessment of the facility and the clients served. For staff survey, please see Appendix A.

The second phase of the research involved designing and implementing a six-week education series showcased in the waiting room of the Hunger and Health Coalition. The education content was modeled after *Eating Right is Basic- Enhanced Curriculum.* [16] The topics of each session were as follows: 1) MyPlate Overview; 2) Grains; 3) Fruit and Vegetables 4) Protein: the building blocks; 5) Dairy; 6) Stretching your food dollars. The weekly education sessions had a topic tagline, accompanying education handouts, and a food sample with recipe handout. For expanded topic details of education, please see Appendix B.

Recruitment for the education was completed by setting up a table in the waiting room with education materials, food samples, and incentives on display. The education took place on Tuesdays from 9 am to 2 pm. Tuesday was chosen because the pharmacy is open and the food shipment from Second Harvest Food Bank was received on that day, bringing more clients in than any other day of the week.

Each week, an undergraduate nutrition intern served participants by answering questions, distributing accompanying handouts, and administering the pre-education survey when they stop at the information table situated in the main lobby of the facility. The survey was maintained below a fifth grade reading level. The survey given to clients consisted of 4 subsections: attitudes and beliefs

about nutrition, questions required for the Hunger and Health Coalition such as last hospital admittance, nutrition knowledge based questions, and three food insecurity questions adapted from the USDA U.S. Household Food Security Survey Module: Six-Item Short Form.[24] Three questions from the Household Food Security Survey were chosen based on feedback from staff members to truncate the survey for clients' ability to answer all the questions. Three experienced researchers reviewed the survey and selected the best three questions for analysis. The pre-education survey given to participants can be found in Appendix C.

The educational handouts were either found online, created, or purchased. In addition to the educational handouts, a recipe related to each week's topic was prepared and distributed to participants, as listed in Appendix B. Four out of the six recipes were taken from the USDA Healthy Eating on a Budget Cookbook.[25] Money to purchase the ingredients for the samples distributed came from donated food from local grocery retailers. Incentives to participate included the food samples, reusable grocery bags, cooking supplies such as measuring cups, and rubber spatulas. A drawing for donated gift cards from Harris Teeter, Food Lion, and Lowe's Food was held at the end of the sessions. All new participants were asked to complete the pre-education survey at any point of attending the nutrition education table in order to provide descriptive information about the population served; the post-education survey was only completed by returning participants during weeks 5 and 6. The post-education survey is provided in Appendix D.

***Outcomes***

HHC staff and volunteers completed an open-ended survey to determine the willingness of the organization to participate in education sessions, and to complete a needs assessment of target population. Clients participating in nutrition education completed a pre-test and post-test including qualitative open-ended questions regarding self-perceived health and ideas of healthy foods, feedback regarding offerings of the food pantry, and attitudes regarding the education sessions and content. Five multiple choice questions mirroring MyPlate categories was used to assess nutritional knowledge at pre-education and post-education. Post-education surveys were included in analysis if

the participant had previously attended at least one lesson and had already taken the pre-education survey.

***Data Analysis***

Data was initially collected by direct observations, pictures, and field notes. Initial observations in the organization helped to identify top needs to help education formation by collaborating with members of staff and volunteers that are exposed to the target population on a regular basis. Data from the first survey given to staff and volunteers at the Hunger and Health Coalition was put into table form, with themes selected based on frequency of mention. Significant trends in responses were identified as 3 or more mentions of a similar idea by participants. Open-ended questions from participant pre- and post-education surveys were also analyzed by frequency of mention. Knowledge-based questions from surveys were analyzed using descriptive statistics and t-tests to compare pre- and post-education knowledge (SPSS, version 20, 2012). Subthemes from open-ended questions were categorized into the top three mentions.

## Results

***Survey from Staff and Volunteers***

Eleven staff and volunteers complete the survey (Appendix A). The average number of years the respondents had been helping or working at the clinic was 8.61 years (+/- 9.99). All respondents believed that the nutritional needs of the clients were important. There was a unanimous yes response (n=11). The staff and volunteers reported a mean response of 5.95 (+/- 2.85) on a scale of 1 to 10; 10 being very comfortable, 1 being not at all comfortable from staff and volunteers being comfortable with nutritional knowledge towards their clients. The top three mentions of healthy foods were 1) vegetables (n=8), 2) meat/protein (n=7), and 3) fruit (n=4) and dairy (n=4). The staff and volunteers reported the top three mentions of clients' barriers to acquiring healthy foods were 1) cost (n=8), 2) knowledge/education (n=3), and 3) palate/taste and availability (n=2). On a scale of 1 to 10 (1 being the worst and 10 being the best) regarding the quality of food being provided to clients , the mean

response was 5.91 (+/- 1.32). When asked what areas of change staff would like to see, the top three responses were 1) more fresh/quality of produce (n=6), 2) education (n=2), and 3) special needs (vegetarian, vegan, gluten free) (n=2). When asked what areas of change would be possible to achieve, the top three responses were 1) healthier options/produce (n=4), 2) special needs (n=2), and 3) education (n=1). The top three responses to barriers of proposed changes were 1) cost (n=7), 2) knowledge (n=4), and 3) time (n=2). All respondents believed that the facility would be willing to change the nutrition policy at the Hunger and Health Coalition. Open-ended responses surrounding the proposed support that the food donors would have for a new nutrition policy varied from doubt to certainty. One participant felt, "We get what we are able to get as long as people are fed- that is most important." Another stated, "Yes- better health for parents and their children possible. No- Want to have food readily available without the risk of going bad quickly after receiving it." On the other hand, "Individual donors I think will be very receptive to this idea and may help us sort beforehand/get higher quality non-perishables. Supermarkets donate whatever they have already, so probably won't be able to do anything there."

***Pre-Education Survey for clients***

For the pre-education survey, there were a total of 94 completed surveys. Participants reported an average number of medical conditions to be 1.59 (+/- 1.997). The most prevalent answer was 0 (n=29) or 1 condition (n=28). The most commonly stated chronic conditions in descending order were hypertension (n=24), diabetes (n=12), cardiovascular disease related conditions/high cholesterol (n=13), and cancer (n=4). The top three answers to what participants believe healthy foods were vegetables (n=58), fruit (n=50), and meat (n=19). Other common mentions included grains, salad, and dairy products. The top three foods the participants would like to see more of at the food pantry were vegetables (n=36), fruit (n=28), and meat (n=18). Other frequently written responses were milk, eggs, and dairy. For vegetables and fruit responses, participants also wrote identifiers such as "fresh," "fresher," "more," and "better."

Of all the services offered by HHC, food had the greatest number of mentions (85). When asked about new programs desired at the facility, nutrition classes received 36 mentions**.** Participants self-rated their health as excellent (n=3), very good (n=11), good (n=34), fair (n=33), and poor (n=12). Most participants perceived their health as fair (34.4%) to good (35.4%).

***Pre-test***

At pre-test, the mean number of correct knowledge questions was 2.86//5 +/-1.424. Percentages correct ranged from 30.2% to 77.1% (see questions in Appendix C), regarding calcium rich foods and grain-based nutrition respectively. Regarding food security, the majority of participants (35.4%+44.8%) felt that at least some of the time, they could not afford to eat balanced meals. Over half (55.2%) of participants reported eating less than they felt they should because there wasn't enough money for food in the last 12 months, while 39.6% of participants were hungry but did not eat because there wasn't enough money for food in the last 12 months.

***Post-test***

Twenty-two participants complete the post-education survey (see questions in Appendix D). The total number of education sessions attended was 96, with an average of 1.39 (+/- 0.90) for total sessions attended by each participant (n=96), and 2.36 (+/- 1.43) for those completing pre- and post-surveys (n=22). Attendance at each weekly session was: What is MyPlate? n=25; Grains: Make half of them whole! N= 31; Fruits and vegetables: Half your plate! n=18; Protein: the building blocks n=20; Discover Dairy n=17; Stretching your food dollars n=20.

Almost half of participants (45.5%) had used the recipe provided with the lesson. Survey responses related to the recipes included, "I learned a lot and was given some great recipes that encourage my grandchildren to eat better," "Everything offered was delicious," "Easy to prepare and very satisfying." All participants felt that the education series made them more aware of the importance of nutrition and diet on their health. Responses included "Yes, I have three young grandchildren and it helps us to give them healthy food," and "Yes and no- honestly, already knew but was a great refresher course for me." All participants felt that the material taught was valuable

and helpful. Responses included "It was reinforcing and encouraging," and "it was valuable A+ due to the information being read and reviewed."

Nutrition knowledge (Appendix E) increased following the education series. Almost all participants (95.5%) could identify a whole grain. The majority (63.6%) knew that half of their plate should be fruits and vegetables. About half (45.5%) knew how many servings of calcium rich foods they should be consuming each day. Most ( 90.9%) participants could identify a lean protein source from a list of options. A majority of participants (86.4%) could also identify options to help them get the most out of their food dollars.

At pre-test, 38.6% of participants answered 4 or 5 questions correctly, with the average score for the pre-test being 2.94 +/- 1.290 (n=96). At the post-test, 63.7% answered 4 or 5 questions correctly on the knowledge items with the average score for the post-test being 3.82 (+/- 1.259) (Table 2). There was a statistically significant change from pre-education knowledge to post- education knowledge. Paired sample t-test comparison of pre-test to post-test scores showed a difference in knowledge score with a significance of 0.002.

At post-test, participants rated food security over the last 30 days. Most participants still felt they could not afford to eat balanced meals, "sometimes" (41%) or "often" (27.3%). However, most respondents answered no when asked if they ate less than they felt they should because there wasn't enough money for food (63.6%). Most respondents (72.7%) also answered no to being hungry but not eating because there wasn't enough money for food.

## Discussion

Food pantries have observed a growing number of clients with diet-related diseases. Nutrition education may help meet the individual needs of clients receiving food assistance[4,16-22]. While multiple studies suggest that resource management nutrition education is effective, this type of education in a waiting room has not yet been conducted.[16,17,19] It has been reported, however, that community-academic partnerships have resulted in positive outcomes because of the common

understanding of the goals of the research being conducted.[23] Published research is also limited for such a small venue as well as for a program like this one that tried to promote voluntary participation.

The current study indicated a significant increase in nutrition knowledge following nutrition education. Strengths of this study included the willingness of the facility to allow researchers to gain field experience with the participants to better gauge needs of this population, which provided more detailed information to explain the issue of food insecurity and chronic disease. This, in turn, provided a positive collaboration between a community agency and academic institution with sustainable relationship possibilities. This also gave researchers the chance of meeting the population where they are. There is little known about this novel population, giving this research the opportunity to gain important insight. While there was a small response rate for post-surveys, there was a positive reach and impact on those participants that did want help. In addition, the design and data collection of this study were cost effective. Lastly, the student benefit of this study should not be understated; the experience provided an opportunity to gain tremendous insights in cultural competence and sensitivity to an underserved population, as well as management of a non-profit organization. Based on the results of this study, the community organization wishes to continue the program with ongoing revisions for their clients, moving toward a formalized and sustainable academic- public partnership.

A limitation of this study included the small sample size, which limits the ability to generalize to entire rural or food insecure population. Recruitment was a challenge, as evidenced by the follow up rate of only a 23% of participants completing both the pre- and post-education surveys, despite incentives at the table each week. Participants were recruited during a designated timeframe on only one day each week. The population served is transient and may be somewhat irregular in their visits to the food pantry. Another limitation included lack of follow up subsequent to the end of the education series to determine knowledge retained, as well as the effects of intervention on health outcomes in the longer term. A further limitation included the grant monies could not be spent on food for incentives due to the State of North Carolina laws. A possible accepted incentive could be to provide participants with a grocery bag of all food items to make that week's recipe. A limitation of

the food insecurity portion of the survey included a difference in time frame going from "in the past 12 months," to "in the last 30 days", which precluded direct comparisons of food insecurity ratings from pre- to post-tests. While the sample size was also small to truly compare food insecurity ratings, the answers trended toward improvement in food insecurity in the post-survey.

Future research should examine strategies for increasing access to fruits and vegetable offerings in food pantry programs. From the survey responses, it was evident that clients have interest in nutrition information and would like to see more fruits and vegetables available. Strategies to increase participation through use of incentives or other creative measures to maintain consistency in measuring outcomes should also be explored. Replication of nutrition education at multiple food pantries or similar organizations with low-income, food insecure adults would also build the available evidence in support of effectiveness, and ultimately, the effects of longer-term intervention on health outcomes of this population.

## Conclusions

Food pantries have observed a growing number of clients with diet-related diseases. Nutrition education may help meet the individual needs of clients. While multiple studies suggest that resource management nutrition education is effective, this type of education in a waiting room has not yet been conducted. The current study indicated a significant increase in nutrition knowledge following nutrition education for those who completed the intervention. From the survey responses, it was also evident that clients have interest in nutrition information from stating they would like to see more fruits and vegetables. Future research should examine strategies for increasing access to fruits and vegetables, participation through use of incentives or other creative strategies to maintain consistency, and the effects of longer-term intervention on health outcomes. Benefits of future research would include reaching an underserved population, increasing opportunities for students to gain cultural competence and sensitivity, and to sustain an academic-community partnership.

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**Appendix A**

Interview for Staff

1. How long have you been with the Community Care Clinic and/or The Hunger and Health Coalition?

2. Do you think the nutritional needs of your clients are important?

3. On a scale of 1-10 what is your comfort level of knowledge for the nutritional needs with the clients you serve? (0 being not comfortable and 10 being extremely comfortable)

4. To you, what are healthy foods?

5. What do you think are barriers your clients face involving acquisition of healthy foods?

6. On a scale of 1-10 (0 being the worst and 10 being the best), how would you rate the quality of food provided to the clients?

7. What areas of change would you like to see?

8. What areas of change do you think are possible to achieve?

9. What do you think are the barriers to these changes?

10. Would you be willing to change the nutrition policy at the Hunger and Health Coalition?

11. Do you think the food donors would be supportive of a new nutrition policy at the Hunger and Health Coalition? Why or Why not?

**Appendix B: Table 1**

Weekly Education Outline

| Week | Date | Topic/Title | Main Points | Recipe |
|---|---|---|---|---|
| 1 | 3/15/16 | What is MyPlate? | What is MyPlate?<br>What are the food groups?<br>How can I use it? | Crunchy Chicken Salad |
| 2 | 3/22/16 | Grains: Make Half of them Whole! | What are grains?<br>The difference between refined and whole grains<br>Why do I need grains? | Easy Red Beans and Brown Rice |
| 3 | 4/5/16 | Fruits and Vegetables: Half your plate! | What are fruits?<br>What are vegetables?<br>Why do I need them? How can I eat more? | Carrot Apple Salad |
| 4 | 4/12/16 | Protein: The Building Blocks | What are proteins?<br>Why do I need proteins?<br>Choosing the most beneficial protein/tips | White Chili |
| 5 | 4/19/16 | Discover Dairy | What is Dairy?<br>Why do I need dairy?<br>Non-dairy sources of calcium<br>Ways to get more dairy | Parfaits with granola and canned fruit |
| 6 | 4/26/16 | Stretching your food Dollars: Spend Smart. Eat Smart. | Planning<br>Shopping<br>Eating out and eating at home | Couscous with Peas and Onions |

**Appendix C**

Pre Education Survey

1. **Do you have any medical conditions? (Diabetes, hypertension)**

2. **To you, what are healthy foods?**

3. **What kinds of foods would you want to see more of at the Hunger and Health Coalition?**

4. **When was your last hospital visit for yourself? What was the reason?**

5. **Is the Hunger and Health Coalition doing a good job? Give us a rating 1-10 (1= lowest) to let us know. (It's okay to be honest, we just want to know what you think)**

6. **What services do you use at the Hunger and Health Coalition? (Food, Pharmacy, Clothes Closet, Woodlot, Sharing Tree, Other)**

**If the following programs were offered, would you take part?**

__Yoga Classes

__Massage Therapy

__Suicide Prevention/Support Group

__Nutrition Classes

__Art Therapy

__Wood Delivery

**7. In general, would you say your health is:**

A. Excellent
B. Very Good
C. Good
D. Fair
E. Poor

**8. Which of the following foods is a grain?**

A. wheat
B. oatmeal
C. rice
D. cereal
E. All of the above

**9. About how much of your plate should be fruits and vegetables?**

A. one quarter
B. one half
C. three quarters
D. all of it

**10. How many servings of calcium rich foods should you consume each day?**

A. None
B. 1 serving
C. 2 servings
D. 3 servings

**11. Which of the following foods is a source of protein?**

A. Meat, poultry, and seafood
B. Nuts and seeds
C. Beans
D. Eggs
E. All of the above

**12. Which of the following will help to get the most out of your food dollars?**

A. Plan before shopping
B. Buy seasonal produce
C. Use coupons
D. Cook in bulk
E. All of the above

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

[ ] Often true
[ ] Sometimes true
[ ] Never true
[ ] Don't know

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

[ ] Yes [ ] No [ ] Don't Know

**15. In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?**

[ ] Yes [ ] No [ ] Don't Know

**Appendix D**

Post Education Survey

1. **What lessons did you attend? Please circle all that apply**
    a. What is MyPlate?
    b. Grains: Make half of them whole!
    c. Fruits and Vegetables: Half your Plate!
    d. Protein: The building blocks
    e. Discover Dairy
    f. Stretching your food dollars
2. **Did you use the recipe included? (Yes or No)**

3. **What are your thoughts on the result? Taste? Easy to cook?**

4. **Did this education series make you more aware of the importance of nutrition and diet on your health?**

5. **Do you think that the material taught was valuable and helpful?**

6. **Which of the following foods is a grain?**
    A. wheat
    B. oatmeal
    C. rice
    D. cereal
    E. All of the above

7. **About how much of your plate should be fruits and vegetables?**
    A. one quarter
    B. one half
    C. three quarters
    D. all of it

**8. How many servings of calcium rich foods should you consume each day?**

A. None C. 2 servings

B. 1 serving D. 3 servings

**9. Which of the following foods is a source of protein?**

A. Meat, poultry, and seafood
B. Nuts and seeds
C. Beans
D. Eggs
E. All of the above

**10. Which of the following will help to get the most out of your food dollars?**

A. Plan before shopping
B. Buy seasonal produce
C. Use coupons
D. Cook in bulk
E. All of the above

**11. "(I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 30 days?**

[ ] Often true [ ] Never true

[ ] Sometimes true [ ] Don't know

**12. In the last 30 days, did you ever eat less than you felt you should because there wasn't enough money for food?**

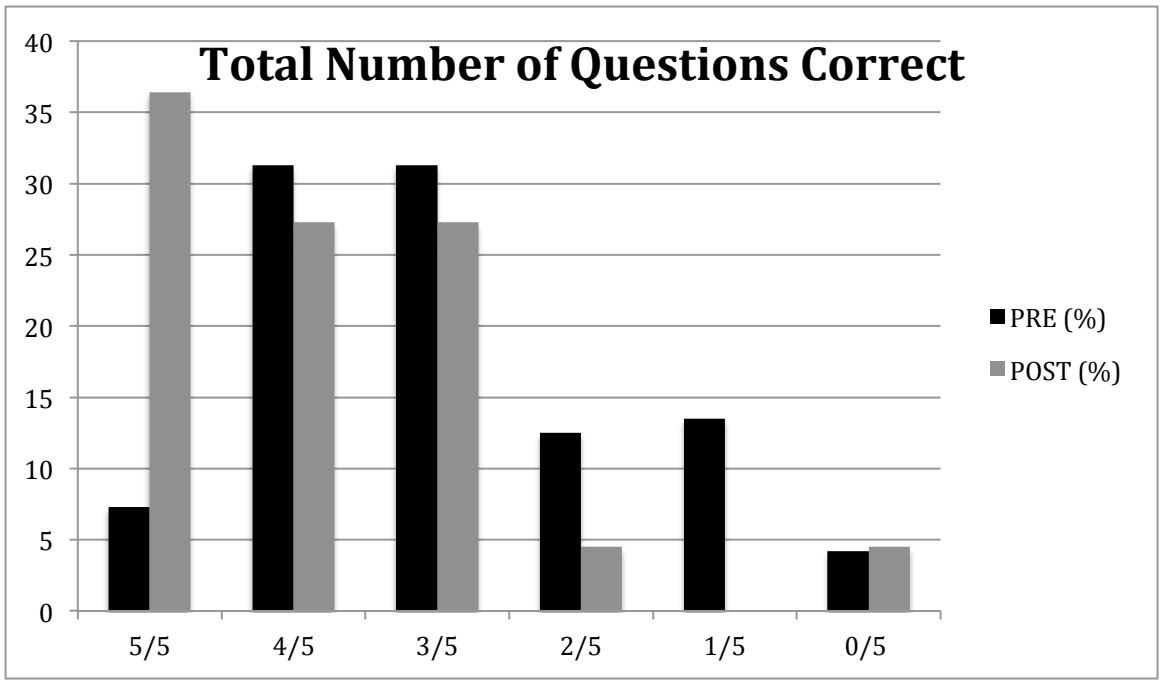
[ ] Yes [ ] No [ ] Don't Know

**13. In the last 30 days, were you every hungry but didn't eat because there wasn't enough money for food?**

[ ] Yes [ ] No [ ] Don't Know

**Appendix E: Table 2**

Average Nutrition Knowledge Scores Comparison Pre-education vs. Post-education




Mean Scores: pre-test: 2.86//5 +/-1.424 (59%); post-test: 3.82/5 +/-1.259 (76%)

**Appendix F: Table 3**

Pre-survey and Post-survey Descriptive Responses

| **Question**<br><br>**Pre-Test (n= 94)** | **Response (Frequency of mention)** |
|---|---|
| **Average number of reported medical conditions**<br><br>**Most common Conditions** | 1.59 +/- 1.997<br>Hypertension (24)<br>Diabetes Mellitus (12)<br>CVD or high cholesterol (12)<br>Cancer (4) |
| **To you, what are healthy foods?** | Vegetables (58)<br>Fruit (50)<br>Meat (19)<br>Grains (11)<br>Salad (6)<br>Dairy (5) |
| **What foods would you like to see more of in food pantry?** | Vegetables (36)<br>Fruit (28)<br>Meat (18)<br>Milk (8)<br>Eggs (5)<br>Dairy (3) |
| **Self perceived health** | Excellent (3)<br>Very Good (11)<br>Good (34)<br>Fair (33) |

| | |
|---|---|
| | Poor (12) |
| **Mean Scores of Nutritional Knowledge Questions** | 2.86//5 +/-1.424 (59%) |
| **Post-Test (n= 22)**<br>**Did you use the recipe included?**<br><br>**Did this education series make you more aware of the importance of nutrition and diet on your health?** | <br>No or not yet (12)<br>Yes (10)<br><br><br>Yes (22) |
| **Do you think that the material taught was valuable and helpful?** | Yes (21) |
| **Mean Scores of Nutritional Knowledge Questions** | 3.82/5 +/-1.259 (76%) |
| **"(I/we couldn't afford to eat balanced meals." Was that <u>often,</u> <u>sometimes,</u> or <u>never</u> true for (you/your household in the last 12 months?** | Often (35.4%; n=34)<br>Sometimes true (44.8%; n=43)<br>Never true (12.5%; n=13)<br>Don't know (4.2%; n=4) |
| **In the last 12 months, did you ever eat less than you felt you should be In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?** | Yes (55.2%; n=53)<br>No (34.4%; n=33)<br>Don't know (9.4%; n=9) |
| **In the last 30 days, were you ever hungry but didn't eat because there wasn't enough money for food?** | Yes (39.6%; n=38)<br>No (50%; n=48)<br>Don't know (9.4%; n=9) |

| | |
|---|---|
| **Avg. Number of Sessions Attended in Total** | 1.39 +/- 0.90 (n=96) |
| **Avg. Number of Sessions Attended for pre & post completions** | 2.36 +/- 1.43 (n=22) |

## Vita

Carmen L. Koning is a native of Lynn, Michigan. She is the daughter of David and Cheri Koning. She graduated from North Branch High School in 2009. Carmen continued her education at Michigan State University, where she received a Bachelor of Science in Dietetics and a Bachelor of Science in Nutritional Sciences in 2015. Carmen earned her Master of Science in Nutrition and Dietetics from Appalachian State University in May 2017. She will pursue a career as a Registered Dietitian.