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## Color Your Plate: A Pilot Nutrition Education Intervention to Increase Fruit and Vegetable Intake Among Older Adults Participating in the Congregate Meal Site Program in Kentucky Senior Centers

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COLOR YOUR PLATE: A PILOT NUTRITION EDUCATION INTERVENTION TO  
INCREASE FRUIT AND VEGETABLE INTAKE AMONG OLDER ADULTS  
PARTICIPATING IN THE CONGREGATE MEAL SITE PROGRAM IN KENTUCKY  
SENIOR CENTERS

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THESIS

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

By

Emily Renee Dickens, RD, LD

Lexington, Kentucky

Director: Dawn Brewer, PhD, RD, LD, Assistant Professor and DPD Director of  
Dietetics and Human Nutrition

Lexington, Kentucky

2016

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## ABSTRACT OF THESIS

### COLOR YOUR PLATE: A PILOT NUTRITION EDUCATION INTERVENTION TO INCREASE FRUIT AND VEGETABLE INTAKE AMONG OLDER ADULTS PARTICIPATING IN THE CONGREGATE MEAL SITE PROGRAM IN KENTUCKY SENIOR CENTERS

The purpose of this study was to determine if the amount and variety of fruit and vegetable intake increased among community-dwelling older adults participating in Kentucky's congregate meal site program following a series of educational nutrition lessons. A convenience sample (n=35) of community-dwelling older adults at two intervention (n=19) and two control (n=16) senior centers in central Kentucky participated in this quasi-experimental pre-post pilot study. Following the intervention there was a trend towards increased self-reported intake in the variety of fruit and vegetables among the intervention group (range:0.03±3.31 to 1.32±2.75 servings per week); a significant increase in the number of days participants incorporated at least 4.5 servings of fruits and vegetables per day intake; significant increases in the incorporation of fruits and vegetables in evening meal, and all meals ( $p \leq 0.05$ ); and phytochemical knowledge ( $p \leq 0.05$ ). Actual fruit and vegetable intake at the congregate meal increased post-intervention among the intervention group only ( $p \leq 0.05$ ) as measured by plate waste. The mean Phytochemical Index score was 25.4, with participants consuming 79% of the phytochemical-rich component to their meal. These results indicate that theory-based educational nutrition lessons among older adults is linked to favorable trends towards increased fruit and vegetable consumption and phytochemical knowledge.

**Keywords:** Fruits and vegetables, nutrition, intervention, older adults, plate waste, phytochemicals

Emily Dickens

April 27, 2016

COLOR YOUR PLATE: A PILOT NUTRITION EDUCATION INTERVENTION TO  
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## Table of Contents

Acknowledgments.....	iii
List of Tables.....	v
Chapter One: Introduction.....	1
Chapter Two: Methods.....	6
Participants and Settings.....	6
Data Collection.....	6
Statistical Analysis.....	13
Chapter Three: Results.....	14
Demographics.....	14
Variety and Quantity of Fruit and Vegetable Consumption.....	15
Self-reported Knowledge and Health Behaviors.....	21
Phytochemical Index Score and Plate Waste Measurements.....	23
Chapter Four: Discussion and Conclusion.....	28
Appendices.....	39
Pre-Survey.....	39
Post-Survey.....	45
References.....	52
Vita.....	56

## LIST OF TABLES

Table 1, Characteristics of Participants.....	16
Table 2, Variety and Quantity of Fruits and Vegetables in Color Categories in Servings/Week between Control and Intervention Groups.....	17
Table 2.1, Variety and Quantity of Fruits, Vegetables, and Produce between Control and Intervention Groups.....	18
Table 2.2, Variety and Quantity of Fruits and Vegetables in Meal Intakes between Control and Intervention Groups.....	20
Table 3, Self-reported Knowledge and Health Behaviors between Control and Intervention.....	22
Table 4, Average Consumption of Congregate Lunch Meal Phytochemical-rich Foods and Meal Components.....	25
Table 5, Meal Satisfaction from Congregate Meal Participants in Control and Intervention Groups.....	26
Table 6, Plate Waste Measurements of Produce, Fruit, and Vegetable Intake from Pre- to Post Intervention between Control and Intervention Groups.....	27

## **CHAPTER ONE: Introduction**

The older adult population is considered one of the fastest growing segments within the United States (US). Adults aged 65 years and older have nearly tripled during the twentieth century (US Census Bureau, 2011). This growing population is projected to increase to approximately 71 million older adults by the year 2030 (CDC, 2015). In 2014, there were approximately 44 million older adults aged 65 years and older making up 14.1% of the US population (USDHHS, 2015). The average life expectancy of persons who have reached age 65 years old has increased by an additional 19.2 years (USDHHS, 2015). With this increasing lifespan comes the increased risk in the development or progression of multiple chronic diseases (Fisher, 2007). An estimated 80% of adults over the age of 65 have at least one chronic disease, while 50% are known to have two or more chronic diseases (Fontana, 2009). With the number of adults aged 65 years or older continuing to grow, there will continue to be an increase in chronic disease diagnosis (Yancik & Maryland, 2005) as well as the healthcare costs associated with their treatment and management. As of 2012, the most frequently documented chronic conditions, include arthritis (49%), all types of heart disease (31%), cancers (25%), diabetes (21%), and hypertension (71%) (USDHHS, 2015).

Research has demonstrated that increasing fruit and vegetable consumption promotes healthy aging, can lead to life-long health benefits among individuals (Nicklett & Kadell, 2013), and is linked to a reduction in chronic diseases (Hendrix, Fischer, Reddy, Lommel, Speer, Stephens, . . . & Johnson, 2008). A diet rich in fruits and vegetables is an important component to a healthy lifestyle (Neville, McKinley, Draffin, Gallagher, Appleton, Young, . . . & Woodside, 2015), as it subsequently leads to an

increased consumption of phytochemicals. Phytochemicals are non-essential (Si & Liu, 2014), non-nutritive compounds derived from various plant-based foods that include fruits, vegetables, legumes, nuts, and whole grains (McCarty, 2002). They are known to be beneficial in protecting against several chronic diseases (Zhang, Gan, Li, Zhou, Li, Xu, & Li, 2015 and Heneman, & Zidenberg-Cherr, 2008) by lowering oxidative stress, inflammation, and incidence of obesity (Vincent, Bourguignon, & Taylor, 2010). Due to the wide variety of phytochemical compounds that have been identified in plant-based foods, it is important to consume a wide variety of fruits and vegetables to receive the most health benefits.

The *2015-2020 Dietary Guidelines for Americans* recommends that adults over the age of 51 consume between 1.5-2 cups of fruit and 2.5-3 cups of vegetables per day. They also place a special emphasis on consuming a variety by eating a number of servings from each color category per week (ODPHP, 2016). However, despite these recommendations, the mean consumption of fruit and vegetables among adults nationwide is only 1.1 and 1.6 servings per day of fruit and vegetables, respectively (CDC, 2013). Reasons for decreased consumption of fruits and vegetables among older adults has been linked to several barriers that can affect their access or consumption, including lack of nutrition knowledge, health issues, and geographic or physical environments (Nicklett & Kadell, 2013).

Other predictors of intake include gender, marital status, household composition, social support, race or ethnicity, and socioeconomic status (Nicklett & Kadell, 2013). Therefore, a need for nutritional guidance among older adults is necessary (Foote et al., 2000) to raise awareness, enhance self-efficacy and improve perception of fruit and

vegetable benefits (Salehi, Eftekhari, Mohammad, Tavafian, Jazayeri, & Montazeri, 2010). One of the most widely used theories in health education and health promotion that encompasses the components listed above is the Health Belief Model (HBM). This particular behavior theory determines a person's perception of developing a condition and the consequences that a condition might bring as motivation to make specific behavior changes through specific constraints of perceived susceptibility, perceived seriousness, perceived barriers, and perceived benefits. Therefore, the Health Belief Model and its constraints is very applicable to older adults with their decline in health from aging (Sahyoun, Pratt, and Anderson, 2004) and prevention for developing chronic disease.

The provision of nutritious meals and social programs to promote healthy aging among older adults is mandated by the Older Americans Act (OAA). More specifically, the Older Americans Act Nutrition Program (OOANP) Title IIIIC authorizes access to healthy meals, nutrition education, and nutrition counseling free of charge to adults 60 years while specifically targeting those with the greatest social and economic need (USDHHS, 2015). The OOANP administers close to 9,000 meals a day throughout communities in America through either the Congregate Nutrition Services or the Home-Delivered Nutrition Services (USDHHS, 2015). Both the Congregate Nutrition and Home-Delivered Nutrition Services must meet specific guidelines. All meals served through the OAA are required to fulfill the current Dietary Guidelines for Americans and provide the minimum of one-third of the Dietary Reference Intakes (DRI) for certain nutrients, as well as meet any state and local food safety and sanitation requirements. In Kentucky, the Cabinet for Health and Family Services administers regulations necessary

to implement such programs mandated by the federal law. All nutrients are monitored and approved by a licensed dietitian, including total calories, protein, carbohydrates, fat, dietary fiber, vitamins A, B6, B12, C, calcium, magnesium, zinc, and sodium. Furthermore, congregate lunch meals are required to offer at least 1 fruit serving, 1 vegetable serving, and 1 whole grain serving without a specific requirement for phytochemicals. However, these three meal components are considered to be phytochemical-rich foods and contribute to the phytochemical index (PI) score. The PI score is a ratio calculation derived from the energy of high phytochemical rich food in kilocalories to the overall daily energy consumed in kilocalories. Several studies have found an association of PI scores ranging from 28.6 to 48.1 with positive health benefits, including promising effects with weight loss, breast cancer, and triglycerides (Golzarand et. al., 2014, Vincent, Bourguigon, & Taylor, 2010; Bahadoran et. al., 2013).

In addition to meeting nutrient and food safety requirements, the meals must be appealing to the older adults (USDHHS, 2015). Past research indicates that 85% of congregate meal participants reported that meals prepared-on site as either good or excellent. Frongillo et. al. reported that 77.1% of individuals receiving the OOA's home-delivered meals were satisfied with taste, variety, and healthiness. However, research on older adult meal satisfaction with congregate site meals is lacking (2010). More research is needed to accurately depict congregate meal participant's satisfaction with meals prepared off-site and delivered to senior centers.

In general, the congregate meal setting gives the opportunity for older adults to participate in various social engagements as well as to receive proper nutrition education that is grounded in theory-based behavior change models, such as the HBM. The

effectiveness of dietary interventions implemented through the Elderly Nutrition Program (ENP), has been studied multiple times. Several studies from both short and long-term interventions have shown moderately consistent increases in fruit and vegetable intake among retirement transition age participants (Lara et al., 2014). Such interventions include programs promoting healthy dietary patterns, including the Mediterranean diet and any of its components, and studies focused on lifestyle interventions with reported independent effects from the diet (Lara et al., 2014). Providing nutrition education at senior centers and congregate meals sites is one avenue of improving nutrition knowledge (Rosenbloom, Kicklighter, Patacca, & Deshpande, 2004) in a manner that promotes increased fruit and vegetable consumption among older adults (Hersey, Cates, Blitstein, Kosa, Rivera, Contreras, . . . & Berman, 2015). Senior centers are also an environment that lends itself to conducting plate waste measurements to assess actual consumption of foods such as, fruits and vegetables and to assess meal quality. The availability of the cycle menus provides the opportunity to assess the average PI score of the lunch menus. Moreover, in combination with the plate waste measurements, the average PI score based on actual consumption of phytochemical-rich foods can also be measured.

To our knowledge a nutrition education intervention has not been offered to older adults that promoted the intake of a variety of fruit and vegetables based on specific phytochemicals and the health benefits. The purpose of the current study was to determine: if the amount and variety of self-reported fruit and vegetable intake increased among community-dwelling older adults participating in Kentucky's congregate meal site program following a series of five nutrition education lessons; if actual fruit and vegetable intake increased as assessed by plate waste measurements following the

nutrition intervention; to assess meal satisfaction of catered lunch meals; to calculate the average PI score of a set of 2014 -2015 congregate lunch menus for a particular Area Agency on Aging; and to determine the average PI score based on participant intake of phytochemical-rich foods as assessed by plate waste measurements.

## **CHAPTER TWO: Materials and Methods**

### ***Participants and setting***

The pilot study took place at four senior centers within the Bluegrass Area Agency on Aging (AAA) located in the Central Kentucky region. In this quasi-experimental study, inclusion was based on a voluntary convenience sample of community-dwelling, non-institutionalized individuals, 60 years and older that attended their local senior center. Participants were recruited through advertisements in the senior center monthly newsletters, flyers and table tents posted in each center, as well as encouragement from each senior center director. Homebound and cognitively impaired older adults, as determined by senior center directors, were excluded. Written informed consent was collected from interested participants, yielding 64 participants.

### ***Data collection***

The University Of Kentucky Office Of Research Integrity Institutional Review Board approved all questionnaires and procedures for this study. Two of the four senior centers were designated as control or intervention sites. The study took place May 2015 through December 2015.

### ***Survey Questionnaires***

The pre- and post-surveys were reviewed by experts in nutrition from the University of Kentucky and edits were made to ensure content validity. Other questions were pulled

from BRFFS and a survey questionnaire used by Hendrix, Fischer, Reddy, Lommel, Speer Stephens, . . . & Johnson for their study, “Fruit and Vegetable Intake and Knowledge Increased Following a Community-based Intervention in Older Adults in Georgia Senior Center.” Study personnel individually read the surveys to all consented participants. Data was collected through one pre-survey and three post-surveys, two months apart. The pre-survey questionnaire included basic demographic information: age, gender, ethnicity, weight, height, education, county, tobacco use, perceived health, and personal health history. Questions pertaining to knowledge of older adult fruit and vegetable consumption and phytochemicals, along with frequency of fruit and vegetable intake were asked to obtain quantity and variety of participant consumption. In addition, the questionnaire inquired about other food habits, motivators and barriers to fruit and vegetable consumption, farmer’s market behaviors, environmental pollution perception, physical activity, and food security. The first post-survey included identical questions from the pre-survey, with an addition to the number of lessons attended or educational materials received during the study intervention, questions about how often they visited, tried samples of recipes given at a farmer’s market, grocery store, or senior center, and if they took the recipe samples with them. Other questions included if they read the recipe and phytochemical health information cards, if these cards motivated them to incorporate a greater number or variety of fruits and vegetables into their daily meals and snacks, and for the control group only, if they participated in the farmer’s market tour and how much they enjoyed recipe samples. The following two-post surveys were formatted like the first-post survey; however, they did not include environmental pollution perception or demographic information.

To assess fruit and vegetable intake and variety a total of 20 individual fruits and 24 individual vegetables were listed within the surveys. These fruits and vegetables were categorized into specific color categories based on their phytochemical content, modeled after Kansas State University's "Color Me Healthy: Enjoying Fruits and Vegetables," and included: orange/yellow, blue/purple, red, green, and white. Seven fruits and vegetables did not fall into a specific category including 100% cranberry, apple, or grape juice; dried fruits; apples; grapes; kiwi mango, or papayas; cabbage; and beans. Serving sizes were explained and frequency for each individual fruit and vegetable was assessed by asking the participant how many times during the past month they consumed each item, categorized into nine choices: 0, 1-3/month, 1/week, 2/week, 3/week, 4/week, 5/week, 1/day, 2/day, or more than 2/day.

To encourage participation, small incentives including bananas and household or personal items, such as lotion, socks, body wash, toothpaste, mints, water bottles, and dish soap were given to each participant who completed a survey. However, due to a high attrition rate following the first post-survey, the current study includes data from the pre- to the first post-survey only. The attrition rate from pre- to post-survey one was 48.6% for the intervention group and 40.7% for the control group, from post-survey one to post-survey two was 31.6% and 37.5% respectively, and from post-survey two to post-survey three the attrition rate was 30.8% and 50% respectively. Reasons participants dropped include: lack of interest in completing the survey, absence from the center the day of the post-survey assessment, hospitalization, or death.

### *Plate Waste Measurement*

In addition to the administered survey questionnaires, anonymous plate waste measurements and lunch quality surveys were implemented at all four centers to evaluate fruit and vegetable intake. Inclusion criteria for the plate waste measurement was the individual had to consume lunch at the senior center as a part of the Congregate Meal Site program. Plate waste measurements were modeled after Hanks, Wansink, and Just's work titled, "Reliability and Accuracy of Real-time Visualization Techniques for Measuring School Cafeteria Tray Waste: Validating the Quarter-Waste Method" (2014).

Measurements were conducted on the same day of the week, at the same time, and with the same population equally at all senior centers. A total of four measurements prior to the intervention and four measurements following the intervention were taken so that each senior center had a total of eight plate waste measurements. The primary changing variable within the plate waste measurements was the menu. Measurements were taken on all required meal components served with the Congregate Meal lunch, which included some form of bread, fruits, vegetables, meat, desserts, and butter as a condiment. These measurements were based on the quarter-visual waste method as 0%, 25%, 50%, or 100% and the digital imaging method, meaning each component of the participant's tray was assessed based on the percentage of the portion consumed while at each center, as well as through digital images six weeks after the original visual plate waste measurement (Hanks, A. S., Wansink, B., & Just, D. R., 2014 and Connors, P., L., & Rozell, S. B., 2004). Each participant's tray was consistently measured from three separate raters. The first rater assessed all participants' meal trays, the second rater assessed a randomized half, and a third rater assessed the digital version of all participants only. An average of

these measurements was determined and the intraclass correlation two-way mixed method (ICC (2)) was conducted to assess reliability (Hallgreen, K., 2012). An ICC(2) score below 0.70 suggests internal inconsistency, between 0.70 and 0.79 the level of clinical significance is fair, between 0.80 and 0.89 is good, and 0.90 or greater is excellent (Cicchetti, 1994).

The lunch quality survey was administered when lunch trays were gathered and measured to serve as a control for all plate waste measurements. These surveys included meal satisfaction questions to assess whether participants were pleased with the food in the meal, the taste, texture, and portion sizes of the meal, as well as if they would eat that particular meal again. Additionally, two questions pertaining to if they usually consumed a particular fruit or vegetable from that day's meal was included to assess if the fruits and vegetables not typically consumed increased following the intervention.

#### *Phytochemical Index Score*

The current study also determined the average phytochemical index (PI) score for the Kentucky Bluegrass Community Congregate Meal Site menu that was based on all meals served over a one-year time period. In addition, an actual PI score was calculated based on the average intake of phytochemical-rich foods as determined by the eight plate waste measurements. The PI score was based on the McCarty equation: (McCarty, 2004).

$$PI = \frac{\text{dietary energy derived from phytochemical rich foods (kcal)}}{\text{total daily energy intake (kcal)}} \times 100$$

However, for the purpose of our study it was modified to determine the score for a particular meal by having the denominator be total energy intake from that meal component. PI rich foods are defined as foods typically high in phytochemicals: fruits, vegetables (not including potatoes, but including tubers), legumes, nuts, seeds, and whole

grains (McCarty, 2004). A registered dietitian reviewed the menus and identified the phytochemical-rich foods. The caloric value of each food was determined using the Nutrition Data Systems for Research software (NDSR) (University of Minnesota, 2014).

### *Intervention*

The “Color Your Plate with Fruits and Vegetables intervention was adapted from the University of Georgia’s Health Belief Model’s theory-based interventions, *Live Well Age Well, Serving Up Fruits, Vegetables, and Physical Activity Everyday, and Nutrition for Older Adults Health* (University of Georgia Live Well Age Well, 2013) and NOAHnet Lesson Plans for Older Adults: Fruit and Vegetable Series (University of Georgia, 2003). Our intervention was similar to these interventions by including fruits and vegetable education lessons, delivering the lessons to participants of the Congregate meal site, recipe cards and samples, and handouts from tips discussed during lessons. Our intervention differed since it was five nutrition lessons, instead of eight to ten, we did not include any physical activity in our lessons, and every lesson was created around educating our population on the health benefits of phytochemicals through color categories. The intervention group received educational tools and a series of five, thirty-minute fruit and vegetable-themed nutrition education lessons and a farmer’s market tour as the sixth lesson. The purpose of the intervention was to increase the number and variety of fruits and vegetables consumed by participants following the delivery of the lesson series. Throughout these lessons participants were taught the basics of which phytochemicals are associated with a particular color category and their health benefits, serving sizes of fruits and vegetables, and shopping techniques and tips that addressed overcoming common barriers typically perceived by older adults to incorporate

a variety of fruits and vegetables within their daily meals (Nicklett, E. J., & Kadell, A. R., 2013).

Educational tools consisted of a phytochemical guide that was given to all participants at the beginning of the study, and nine seasonal recipes. The research group developed phytochemical health information cards that coincided with the recipe cards. The recipe and phytochemical cards were delivered together to all participants throughout the duration of the study. The phytochemical guide categorized fruits and vegetables into the following colors light green, dark green, orange/yellow, red, blue/purple, and white. Within each category specific fruits and vegetables were listed, along with the most common phytochemicals found in each fruit and vegetable and their potential health benefits, such as “may help to improve memory and slow age-related mental decline.” The recipe cards provided were part of the University of Kentucky’s (UK) Family and Consumer Sciences Extension *Plate It Up Kentucky Proud* project, which aims to provide “great tasting recipes using Kentucky Proud products for the people of Kentucky” (UK Family and Consumer Science Extension, 2016). Each recipe was chosen based on season availability of fruits and vegetables as well as the phytochemical composition of the produce.

The phytochemical health information card stated which fruits and vegetables were in the recipe and similar to the phytochemical guide, potential health benefits of the phytochemicals found in the fruits and vegetables were highlighted. Each recipe and phytochemical health information card was laminated and bound together by binder rings, with an additional large binder ring given so that each of the 9 pairs of cards could be placed on one ring and be kept together for personal use. To ensure participants could

prepare the recipes, variations of fruit and vegetable-fresh, frozen, or canned-substitutions were taught to participants. Lastly, the intervention group participated in a local farmer's market tour to engage the study participants in proper fruit and vegetable selection and to educate them on seasonal produce. The tour was voluntary and led by the study personnel.

### *Control*

The control group received educational tools only, in which they were given to participants the same weeks as when the intervention group received their educational tools and lessons.

### *Statistical analysis*

Data was analyzed using the Statistical Analysis System (SAS) version 9.4. Descriptive statistics for demographics, including frequencies, means, and standard deviations were calculated. Chi-square analysis was used to compare pre- and post-survey categorical variables within and between centers. Continuous variables from the pre- and post-surveys were compared within control or intervention centers using the paired T-tests and the unpaired T-tests between centers. The change in the quantity and variety of self-reported fruit and vegetables were the primary outcome variables of interest that were calculated as a score. The self-reported intakes were converted to an average weekly intake (0, 0.5, 1, 2, 3, 4, 5, 7, 14 or  $\geq 21$  servings/week) in which the individual fruit and vegetable weekly intakes were summed per participant to generate overall weekly average intake score for all fruits and vegetables as well as a weekly average score for each respective color category. The average intake scores were compared within and between centers. Plate waste measurement analysis included descriptive statistics

including frequencies, mean, and standard deviations on the participant's consumption of total meal and meal components, including the bread, fruits, vegetables, and meat, as well as the actual phytochemical index score. The actual phytochemical index score was calculated by averaging participant intake of wheat bread, fruits and vegetables as determined by the plate waste measurements. Paired T-tests and unpaired T-tests were used to assess average consumption of participant's fruit and vegetables as a combined variable within and between centers. The actual phytochemical index score was calculated using plate waste measurements from all centers and then compared within and between each center. The general linear model was used to assess change in the intake of the plate waste measurement combined fruit and vegetable variable (dependent variable) within and between centers while including the pre- and post-tray survey questions "is this a fruit or vegetable you usually consume?" as independent variables in the regression model. Changes were considered significant at  $p \leq 0.05$ .

### **CHAPTER THREE: Results**

#### ***Demographics***

The sample was composed of 35 congregate meal participants that completed both the pre- and post-surveys. The mean age was  $75.66 \pm 8.40$  years, of which 82.6% were both white and female. The mean BMI was  $30.38 \pm 7.65 \text{ kg/m}^2$  and 80% had at least a high school education. Only 5.88% of participants reported using tobacco, and overall participants self-reported either excellent (2.86%), very good (28.57%), or good (42.86%) health. In addition, the most prevalent self-reported chronic health conditions included arthritis (74.29%), diabetes (42.86%), cancer (37.15%) and coronary artery disease (14.29%). There were no significant differences between the intervention (n=19)

and control (n=16) groups (Table 1). Furthermore, baseline demographics similar to above were observed among the 64 participants who initially completed the pre-survey (data not shown).

### ***Variety and quantity of fruit and vegetable consumption***

Following the intervention, the consumption of self-reported fruits and vegetables within each color category did not significantly increase from pre- to post-intervention in either group. However, there was a positive trend with mean consumption, as the intervention group (n=19) had a greater increase in blue, red, green, and white fruits and vegetables from pre- to post-intervention (mean difference range of  $0.03 \pm 3.31$  to  $1.32 \pm 2.75$  servings/week) as compared to the control group (n=16) (mean difference range  $0.06 \pm 5.67$  to  $0.88 \pm 3.22$  servings/week) among the orange, blue, red, and white fruits and vegetables (Table 2). Furthermore, there were no significant differences in the mean consumption of a variety of fruits and vegetables between the two study groups in the pre- or post- intervention periods.

The quantity of fruit and vegetable intake did not significantly change from pre- to post-intervention within the intervention or control groups for the all fruit, all vegetable, or all produce (all fruits and vegetables combined) variables (Table 2.1), but the non-significant increases were greater among the intervention group compared to control for the all vegetables (mean difference of  $1.64 \pm 7.92$  and  $1.09 \pm 1.76$  servings/week) and all produce (mean difference of  $0.75 \pm 13.06$  and  $3.47 \pm 2.38$ ) for the control and intervention groups respectively. There were no significant differences found in the quantity of all fruits, vegetables or produce consumed between the intervention and control groups at the pre- or post-intervention time points (Table 2.1).

Table 1: Characteristics of Participants

<b>Variable</b>	<b>Control N= 16 Mean <math>\pm</math> SD or %</b>	<b>Intervention N= 19 Mean <math>\pm</math> SD or %</b>	<b>P-value</b>
Age (years, range 62-93)	77.6 $\pm$ 8.2	74.1 $\pm$ 8.4	NS
Race			
White	81.3	84.2	NS
Black	18.8	15.8	NS
Gender			
Male	12.5	21.1	NS
Female	87.5	79.0	NS
Education			
$\geq$ High School	87.5	73.7	NS
Tobacco Use (Yes)	6.3	5.6	NS
BMI ( $kg/m^2$ )	30.9 $\pm$ 7.8	29.9 $\pm$ 7.7	NS
Perceived Health			
Excellent	6.3	0.0	NS
Very good	18.8	36.8	NS
Good	50	36.8	NS
Fair	25	21.1	NS
Poor	0	5.3	NS
Self-reported health condition (Yes)			
All Types of Cancer	43.8	31.6	NS
Angina or CAD	31.3	31.6	NS
Arthritis	81.3	68.4	NS
Asthma	12.5	21.1	NS
COPD, Emphysema, Chronic Bronchitis	6.3	10.5	NS
Diabetes	56.3	31.6	NS
Heart Attack	18.8	10.5	NS
Kidney Disease	12.5	15.8	NS
Stroke	25.0	10.5	NS

Table 2: Variety and Quantity of Fruits and Vegetables in Color Categories in Servings/Week between Control and Intervention Groups

Variable	Control N=16			Intervention N=19		
	Pre-test Mean±SD	Post-test Mean±SD	Change Mean±SD	Pre-test Mean±SD	Post-test Mean±SD	Change Mean±SD
Orange Fruit &Vegetables	3.38±3.08	4.25±4.36	0.88±3.22	3.97±3.58	3.42±4.16	0.56±2.78
Blue Fruit &Vegetables	0.14±0.32	0.36±1.08	0.15±0.34	0.18±0.32	1.47±2.79	1.32±2.75
Red Fruit &Vegetables	2.16±1.67	2.88±3.11	0.72±2.84	2.11±3.02	2.22±3.01	0.03±3.31
Green Fruit &Vegetables	3.44±2.68	2.47±2.55	0.97±2.90	2.95±2.48	3.56±2.91	0.67±2.35
White Fruit &Vegetables	6.94±4.37	7.00±4.68	0.06±5.67	5.84±4.09	7.18±4.53	1.00±3.36
≥ 4.5 Cups Fruit & Vegetables in 1 Week	2.53±1.96	2.80±2.91	0.64±2.70	2.44±2.09	4.28±1.99	1.82±0.60*

\* Is  $P \leq 0.05$ . The P-value shows significance from pre- to post-intervention within the control and intervention groups. There were no significant differences detected between the intervention and control groups at either time point.

Table 2.1: Variety and Quantity of Fruits, Vegetables, and Produce between Control and Intervention Groups

Variable	Control N=16			Intervention N=19		
	Pre-test Mean+SD	Post-test Mean+SD	Change Mean+SD	Pre-test Mean+SD	Post-test Mean+SD	Change Mean+SD
All Fruit	9.94+5.42	11.78+8.76	1.84+7.30	8.89+8.40	11.03+10.34	1.83+2.13
All Vegetables	9.41+5.85	8.31+7.35	1.09+1.76	9.52+5.76	11.03+8.07	1.64+7.92
All Produce**	19.34+9.21	20.09+15.40	0.75+13.06	18.42+11.73	22.06+14.73	3.47+2.38

\* Is  $P \leq 0.05$ . The P-value shows significance from pre- to post-intervention within the control and intervention groups. There were no significant differences detected between the intervention and control groups at either time point.

\*\* The all produce variable includes the average of all fruits and vegetables combined.

The quantity of fruit and vegetable intake did not significantly change from pre- to post-intervention within the intervention or control groups for the all fruit, all vegetable, or all produce (all fruits and vegetables combined) variables (Table 2.1), but the non-significant increases were greater among the intervention group compared to control for the all vegetables (mean difference of  $1.64 \pm 7.92$  and  $1.09 \pm 1.76$  servings/week) and all produce (mean difference of  $0.75 \pm 13.06$  and  $3.47 \pm 2.38$ ) for the control and intervention groups respectively. There were no significant differences found in the quantity of all fruits, vegetables or produce consumed between the intervention and control groups at the pre- or post-intervention time points (Table 2.1).

For the intervention group, significant increases in the incorporation of fruits and vegetables combined occurred with the evening meal ( $p=0.0035$ ) and all meals combined ( $p=0.002$ ), from pre- to post-intervention. Positive trends were observed with breakfast, lunch, and snacks. The control group demonstrated an increased trend in mean fruit and vegetable consumption with snacks only (Table 2.2). The intervention group consumed more fruits and vegetables in the evening meal compared to control both before ( $p=0.03$ ) and after ( $p=0.03$ ) the intervention.

Following the intervention, participants within the intervention group self-reported significantly increasing the number of days they had eaten at least 4.5 cups of fruit and vegetables throughout one week from  $2.44 \pm 2.09$  days to  $4.28 \pm 1.99$  days

Table 2.2: Variety and Quantity of Fruits and Vegetables in Meal Intakes between Control and Intervention Groups

Variable	Control N=16			Intervention N=19		
	<u>Pre-test Mean+SD</u>	<u>Post-test Mean+SD</u>	<u>Change Mean+SD</u>	<u>Pre-test Mean+SD</u>	<u>Post-test Mean+SD</u>	<u>Change Mean+SD</u>
Breakfast Fruit & Vegetables	1.19±1.22	0.94±0.85	0.25±1.00	0.89±0.88	1.39±1.09	0.44±1.15
Lunch Fruit & Vegetables	2.69±1.08	2.56±0.51	0.13±1.02	2.37±1.11	2.78±0.94	0.39±1.24
Dinner Fruit & Vegetables	2.63±1.09	2.19±0.83	0.44±1.32	1.89±0.88	3.11±1.41	1.17±1.62*
Snack Fruit & Vegetables	1.50±1.41	1.63±1.36	0.13±1.45	1.26±1.05	1.56±1.42	0.22±1.06
Fruit & Vegetables All Meals***	8.00±3.16	7.31±1.85	0.69±2.77	6.42±2.50	8.83±2.96	2.22±2.84*

\* Is  $P \leq 0.05$ . The P-value shows significance from pre- to post-intervention within the control and intervention groups. There were no significant differences detected between the intervention and control groups at either time point.

\*\*\* The all meals variable includes the average of all meals combined, which consists of breakfast, lunch, snacks and evening meals.

( $p=0.004$ ). The control group showed a slight positive trend going from  $2.53\pm 1.96$  to  $2.80\pm 2.91$  days following the intervention (data not shown). There were no changes in self-reported consumption of fresh, frozen, or canned fruits and vegetables between the two study groups following the intervention.

### ***Self-reported knowledge and health behaviors***

Although not shown, there was a significant increase ( $p=0.03$ ) within the intervention group in self-reported knowledge on whether participants had heard of the term “phytochemicals” following the intervention, with the frequency increasing from 36.84% to 52.63%. There was no knowledge change within the intervention or control groups in regards to reporting whether or not phytochemicals are found in plant foods. Significantly more participants in the intervention group compared to control, (84.21% vs 43.75%,  $p=0.04$ ), reported sharing the health benefits of what they had learned about phytochemicals with family, friends, co-workers, or acquaintances (Table 3). Although not significant, the intervention group was more likely to read the phytochemical health information, to be motivated by the information to increase their health habits, share the knowledge they learned, and improved their daily meals with fruit and vegetable consumption following the intervention as compared to the control group. In general, participants in the intervention group attended and received educational tools an average of  $4.16\pm 1.50$  times as compared to the control group average of receiving educational tools  $3.43\pm 1.87$  times (Table 3).

Table 3: Self-reported Knowledge and Health Behaviors between Control and Intervention

<b>Variable</b>	<b>Control N =16 % or Mean + SD</b>	<b>Intervention N=19 % or Mean + SD</b>	<b>P-value</b>
Number of fruit and vegetable lessons attended/educational tools received	3.43+1.87	4.16+1.50	0.11
Shared what health benefits they learned with family, friends, co-workers, or acquaintances	43.75	84.21	0.04*
Shared what they learned what a doctor or health professional	12.50	36.84	0.10
Improve their attitude concerning the consumption of more fruits and vegetables	66.67	84.21	0.23
Tried to follow a healthier diet	93.75	94.74	0.90
Increased their fruit intake	62.50	84.21	0.27
Increased their vegetable intake	81.25	73.68	0.35
Ate more fruits and vegetables with breakfast	43.75	73.68	0.15
Ate more fruits and vegetables with lunch	68.75	84.21	0.40
Ate more fruits and vegetables with their evening meal	68.75	94.74	0.12
Incorporate more fruits & vegetables into daily meals/snacks	50.00	78.95	0.16
Read phytochemical health information cards attached to recipe cards	75.00	78.95	0.43
Phytochemical health information cards helped incorporate more fruits & vegetables into daily meals/snacks	62.50	73.68	0.49
Phytochemical health information cards motivated to incorporate a greater variety of fruits & vegetables into daily meals/snacks	56.25	68.42	0.48

\*The P-value shows significance within the intervention group from pre- to post intervention.

### *Phytochemical index score and plate waste measurements*

The average intraclass correlation two-way mixed method (ICC (2)) for the control group before the intervention was 79.83% and 81.84% following the intervention, whereas it was 85.57% and 78.57% for the intervention group. The average PI score of the particular congregate menu evaluated in this study was calculated to be 32.1, which assumes that the congregate meal site participant eats 100% of the phytochemical-rich foods provided by the lunches served at the senior center. The plate waste measurements from the current study demonstrated that participants from both intervention and control groups and both time points (n=119) consumed an average of 79%±19% of the phytochemical-rich foods; fruits, vegetables, and whole grains. Therefore, with participants consuming 79% of the phytochemical-rich foods, the actual mean PI score would be 25.4 from lunch alone. Study results also demonstrated that participants consumed an average of 84%±11% of their entire meal and at least 75% of each meal component (Table 4).

Overall, the congregate meal site participants were satisfied with the meals served, with at least 80% reporting that they were pleased with the food, taste, texture, and portion size of the meal and would eat the meal again (Table 5). Furthermore, the mean consumption of fruits and vegetables among all participants was 76%±29% pre-intervention and 83%±24% post-intervention depicting a positive trend for increased consumption of phytochemical-rich produce following the intervention (data not shown). The plate waste data also revealed that the intervention group significantly increased their consumption of produce (fruits and vegetables combined) from pre- to post-intervention, 77%±31% to 84.0%±22% (p=0.03) and fruit only, 87.0%±30% to 97%±14% (p=0.04,

Table 6). The control group had a significant increase in vegetable consumption alone, 62%±30% to 82%±33% (p=0.004). After controlling for whether or not participants usually consumed a particular fruit or vegetable served in their congregate meal lunch, the increased intake of produce from pre- to post-intervention remained among

Table 4: Average Consumption of Congregate Lunch Meal Phytochemical-rich Foods and Meal Components.

<b>Variable</b>	<b>N=119*</b> <b>Mean Percentage + SD</b>
Phytochemical-rich foods**	79±0.19
Total meal	84±0.11
Bread	78±0.28
Fruit	88±0.22
Vegetable	75±0.22
Meat	85±0.20
Dessert	85±0.27
Condiments	82±0.22

\* A total of 119 number of plate waste measurements were conducted at the pre- and post-intervention time points in the control and intervention centers, resulting in an N of 119 trays.

\*\* Phytochemical-rich foods included fruits, vegetables, legumes and whole grains.

Table 5: Meal Satisfaction from Congregate Meal Participants in Control and Intervention Groups.

<b>Variable</b>	<b>N=81 % Responding “Yes”</b>
Pleased with food in meal	82.7
Pleased with taste of meal	82.7
Pleased with texture of meal	80.3
Pleased with portion size of meal	93.8
Would you eat this meal again?	81.5

Table 6: Plate Waste Measurements of Produce, Fruit, and Vegetable Intake from Pre- to Post Intervention between Control and Intervention Groups.

Variable	Control N=48				Intervention N=71			
	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Change $\pm$ SD*	P-values	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Change $\pm$ SD	P-values
Produce**	74 $\pm$ 24	80 $\pm$ 26	7 $\pm$ 38	0.12	77 $\pm$ 31	84 $\pm$ 22	8 $\pm$ 36	0.0265*
Vegetables	62 $\pm$ 30	80 $\pm$ 0.28	17 $\pm$ 42	0.0040*	75 $\pm$ 32	79 $\pm$ 27	4 $\pm$ 41	0.22
Fruit	86 $\pm$ 30	82 $\pm$ 0.33	6 $\pm$ 48	0.79	87 $\pm$ 30	97 $\pm$ 14	12 $\pm$ 31	0.0415*

\*  $P \leq 0.05$  = significance.

\* P-value is significance from pre- to post- surveys within the control and intervention groups.

\* Mean change of intake is derived by subtracting post minus pre-values.

\*\* The produce variable includes the average of all fruits and vegetables combined.

intervention group participants ( $p=0.04$ ). The intervention group was found to typically consume the particular produce served in their pre-intervention lunch meals ( $p=0.02$ ). There were no significant differences in the intake of fruits, vegetables, or produce between the intervention and control groups at either time point (data not shown).

#### **CHAPTER FOUR: Discussion and Conclusion**

The current pilot study found that following the implementation of a community-dwelling congregate meal site nutrition-focused intervention, the intervention group self-reported greater knowledge and behaviors associated with consumption of fruits and vegetables over the control group from pre- to post-intervention. Furthermore, pre- to post-intervention plate waste measurements indicated that the intervention group only significantly consumed more fruits and vegetables offered in their congregate meal site lunch. In addition, this is the first study to determine a potential PI score for a particular Area Agency on Aging's 2014 – 2015 cycle menu and an average PI score of lunch meals based on participant intake as assessed by plate waste measurements. These findings show that by using the health-belief model as a theoretical basis, a community-based intervention offering five nutrition lessons focused on phytochemicals to older adults regularly attending nutrition education programs offered at senior centers can improve phytochemical knowledge and increase the amount of fruit and vegetable intake.

Increasing the variety of fruits and vegetables has been shown to provide many favorable health benefits and contributions to potentially improve or manage chronic diseases among older adults (Murphy et. al., 2012). The current study showed positive trends of increased consumption of the variety and quantity of fruit and vegetable self-reported consumption, but also significant increases in actual

fruit and vegetables served in the congregate lunch meal among the intervention group as assessed by plate waste measurements.

The survey results demonstrated that the intervention group showed trends of greater increases in the consumption of several fruit and vegetable color categories from pre- to post-intervention compared to control. The lack of significant findings with the consumption of the variety and quantity of fruits and vegetables may be due to the small sample size within each group as well as the survey being too long to specifically question older adults about their intake of 44 different fruits and vegetables. Moreover, the nonsignificant changes in consumption of a variety of produce could be a result of smaller numbers of fruits and vegetables within each color category when broken up into colors based on phytochemical content.

The health benefits of various phytochemicals were a focus of the current study's intervention that were emphasized by encouraging the consumption of fruit and vegetables by color categories. Phytochemicals are bioactive (Zang, Gan, Li, Zhou, Li, Xu, & Li, 2015) non-nutritive compounds derived from various plant-based foods that include fruits, vegetables, legumes, nuts, and whole grains (McCarty, 2002). They have been found to protect health and have been linked to the reduction and improved management of several chronic diseases (Liu, 2003) through their ability to reduce oxidation and inflammation (Zang, Gan, Li, Zhou, Li, Xu, & Li, 2015).

The concept of "eating the rainbow" and "color your plate" has been a popular phrase when teaching individuals the importance of consuming a wide

variety of fruits and vegetables. Kalina & Arnold found that when providing positive messages about fruits and vegetables on posters throughout an elementary school cafeteria, posters that displayed specific messages with colorful and appealing graphics to increase consumption by choosing “5-a-day” and “the color way”, positively impacted fruit and vegetable intake as compared to traditional posters providing nutrition education about breakfast and healthy snacking (2006). Other studies have found that interventions focused on “5 A Day” to encourage individuals to try fruits and vegetables from the color spectrum each day increased fruit and vegetable servings for adults from 0.1 to 1.4 and for children from 0.3 to 0.99 servings per day (Nanney, Schermbeck, & Haire-Joshu, 2007). Although there are limited studies focusing on this theme within older adults, results from studies mentioned above do resemble results found in the current study. These results included a positive trend in variety and quantity for fruit and vegetable consumption from pre- to post- intervention among both intervention and control groups, however greater increases were observed among the intervention group. In addition to results from our study being in agreement with previous studies, one unique component that showed a favorable outcome was the focus on increasing fruit and vegetable intake through emphasizing the health benefits of the primary phytochemicals found in each color category.

The “Color Your Plate” nutrition education intervention used in this study incorporated teaching, educational tools, motivation, goal setting, and recipe sampling. The phytochemical chart, phytochemical health information cards, seasonal Kentucky Proud recipe cards, recipe samples, and goal-setting with each

nutrition lesson were the cues to action to support each nutrition lesson. Evidence has shown that with these features, there are greater positive nutrition-related or nutrition status outcomes among community-dwelling older adults (Bandayrel & Wong, 2011; Fisher, 2007) compared to control as seen in randomized control trials that did not incorporate these cues to action.

Participants in this study, within the control and intervention groups showed positive outcomes with nutrition knowledge and behaviors, although, the intervention group had more pronounced changes in positive outcomes. These findings differ slightly from another study that found nutrition knowledge to be the most successful outcome in comparison to behavior change following a nutrition intervention (Sahyoun, Pratt, & Anderson, 2004). However, in the current study there were more significant findings associated with self-reported behavior change than knowledge.

In regards to knowledge, both groups showed an increase in their awareness of phytochemicals, but this finding was significant in the intervention group only. The control group only demonstrated an increased trend in being able to correctly identify plant foods as the source of phytochemicals from pre- to post-intervention. As far as nutrition-related behaviors, the intervention group had a greater likelihood of self-reporting positive behavior changes, such as including more fruits and vegetables in meals and meeting the recommended intake of fruits and vegetables more frequently. Additionally, the intervention group demonstrated a greater likelihood of increasing their motivation to consume a healthier diet, which may likely be due to enhanced self-efficacy among these participants following the

intervention. Wunderlich and Piemonte's findings suggest that even short-term interventions, with nutrition education and counseling, can enhance nutrition behaviors of participants and reduce the frequency of chronic diseases, which is consistent with the current study (2010).

The study finding of a significant increase in the consumption of fruits and vegetables with all meals combined (breakfast, lunch, evening meal and snacks) and evening meals are consistent with other successful interventions involving community-dwelling older adults (Hendrix et al., 2008). Furthermore, the intervention group demonstrated increased trends of incorporating more fruits and vegetables in all of the meals from pre- to post-intervention compared to control. A reason why the evening meal was more successful than other daily meals within the intervention group only may be due to larger portion sizes typically consumed with evening meals, allowing for the addition of greater portions of fruit and vegetables. Subsequently, the greater portion sizes of produce added to evening meals synergistically contributed to the increase in all meals combined variable.

The control group however, showed decreased trends of incorporating fruits and vegetables in all meals except for snacks. The positive changes observed among the intervention group is likely due to being exposed to specific lessons that focused on unique ways to incorporate fruits and vegetables into daily meals and snacks. The current intervention did not however observe any significant changes in the form in which fruits and vegetables were consumed. Since the pre- and post-surveys included data from the peak of the growing season participants were able to purchase fresh produce inexpensively or grow their own, which likely influenced

their consumption of fresh, frozen or canned produce and making it difficult to distinguish changes in the form of how produce was consumed.

Another positive and significant change observed among the intervention group was their self-reported increase in the number of days they consumed at least 4.5 cups of fruits and vegetables each day, which is the recommendation for older adults according to the 2010 Dietary Guidelines for Americans (HHS, 2008). This result is consistent with results from (Wunderlich, & Piemonte, 2010) which showed following a nutrition intervention, the consumption of 5 or more servings of fruit and vegetables among congregate participants improved. By increasing variety of fruit and vegetables, a greater variety of phytochemicals also increases, allowing for more potential health benefits (Liu, 2004).

An exciting finding from the plate waste measurement component of the study was that participants from both centers increased their actual fruit and vegetable intake following the intervention, but only significantly in the intervention group. This indicates that the educational tools in the control group and nutrition education intervention and tools in the intervention group were effective with increasing phytochemical-rich foods. The control group's increase in phytochemical knowledge and trend of increasing actual fruit and vegetable intake suggest that the educational tools outside of the lessons alone were effective. Providing community educators, such as Cooperative Extension Family and Consumer Science Agents, with such tools would allow for a broad audience of families, including older adults, to be educated statewide in a simple and inexpensive manner about the health benefits of phytochemicals.

The significant increase in actual consumption of fruit and vegetable intake as assessed by plate waste measurements from pre- to post-intervention, remained in the intervention group after controlling for their usual intake of a fruit or vegetable offered in a particular congregate lunch meal. Furthermore, a significant association between typical consumption of a fruit or vegetable during the pre-intervention and the outcome variable was found detected in the model. Only 42% of intervention group participants reported typically consuming the produce offered in their lunch at the pre-intervention time point. Despite this, 77% of the produce offered in the pre-intervention lunch meals was consumed by the intervention group participants. This further supports our finding of participants reporting high meal satisfaction, as they were willing to consume a fruit or vegetable that they did not typically eat.

In general, the plate waste measurements found that among all participants an average of 84% of their total meals were consumed with at least 75% of all meal components being consumed, signifying a high meal satisfaction among the meal-site congregate participants. Past research has found that 85% of participants who partook in a congregate meal site program said that the food was either good or excellent when prepared on-site (as cited by Harris et al., 1987). There is limited recent studies indicating participant meal satisfaction with congregate meals and is an interesting finding because meals for this particular AAA were prepared offsite and delivered to senior centers. In support of this, the meal satisfaction surveys used in this study revealed that at least 80 of survey respondents reported being pleased with the food offered, the taste, etc. This is an important finding because a

priority of the Older Americans Act Nutrition Program Title III-C is to offer nutritious meals to participants. A nutritious diet is an essential component to successful aging for older adults (Watts, 2005) as it can help them retain their independence, improve quality of life, and delay institutionalization (Bandayrel & Wong, 2011).

The other purpose of the current study was to calculate the potential PI score of the 2014-2015 congregate meal site menu of a particular AAA and the average PI score based on the consumption of the phytochemical-rich foods as assessed by the pre- and post-plate waste measurements for all centers combined. The concept of a PI score is relatively new and was introduced in 2004 by Mark McCarty (Vincent, Bourguignon, & Taylor, 2010) with the purpose of providing the quantity and quality of phytochemical-rich foods to aid in helping epidemiologist and clinical nutritionists determine health consequences of diets containing high amounts of phytochemical-rich plant based foods to improve nutrition among individuals (McCarty, 2004).

This score has not previously been calculated for congregate meal site menus or the PI score based on older adults intake of phytochemical-rich foods. The potential PI score for the particular set of menus used in this study was calculated to be 32.1. This would be the case if participants consumed 100% of the phytochemical-rich foods offered each day in the menu. However, the results of this study demonstrated that participants consumed 79% of the phytochemical-rich foods offered through the congregate lunches, which generated a PI score of 25.4. Literature has shown that greater PI scores have favorable effects with changes in triglycerides, cholesterol, breast cancer, and weight loss with range mean PI scores

of 29.8-41.6 per day (Golzarand et. al., 2014, Vincent, Bourguigon, & Taylor, 2010; Bahadoran et. al., 2013). Considering that participants from our study consumed a mean PI score of 25.4 from only one of the day's meals, there is the potential of reaching the ideal PI range if participants consumed similar nutritious meals throughout the day, as well as seeing the possibility of improving the management of chronic diseases.

In general, the pilot intervention was well received by both the intervention and the control participants. Participants enjoyed receiving nutrition education material and self-reported sharing the health benefits they had learned about phytochemicals and consuming a variety of fruits and vegetables with their doctors or health professionals, with statistically more participants in the intervention group sharing information among family, friends, co-workers, and acquaintances compared to control. There was a greater than 50% satisfaction score on all recipes sampled by participants. Significantly more participants reported being satisfied, 95%, than dissatisfied with recipe samples, depicting how much participants enjoyed the recipes overall. This indicates that the Kentucky Proud Plate It Up recipe samples were an effective tool to expose older adults to a variety of fruits and vegetables increasing the possibility that participants will prepare these recipes.

There are some limitations to this study. A small sample size due to the nature of regular participant involvement within each respective senior center and lengthy pre and post-surveys likely contributed to the lack of significance observed in self-reported intake of specific fruits and vegetables. Extremely small numbers of participants attending the farmer's market tour depicted that this component of the

intervention was not effective. Additionally, the phytochemical index score calculated in this study should be taken into consideration, as it is still fairly new to literature. However, the positive trends of the intervention group consuming a greater variety and quantity of fruits and vegetable from pre- to post-intervention compared to control demonstrated the potential of this pilot intervention. A strength of this study was the plate waste measurements demonstrating the effectiveness of the intervention in that the intervention group consumed significantly more fruits and vegetables from pre- to post-intervention compared to control. In addition, this was the first study to calculate the PI score of a set of congregate meal site menus and to estimate the PI score based on the plate waste measurements. However, only the PI score of only one meal was calculated rather than determining the PI score using participants' daily caloric intake. Furthermore, it was beyond this study to associate PI score with the prevalence or improvement of health conditions. In general, the recipe and phytochemical health information cards were positively received by both the control and intervention groups, and the phytochemical cards and phytochemical chart were effective tools in educating both the control and intervention groups about phytochemicals.

In conclusion, this five nutrition lesson "Color Your Plate" pilot intervention emphasizing the consumption of various phytochemicals among community-dwelling older adults within central Kentucky had several positive outcomes. These outcomes included successfully increasing the intake of fruits and vegetables served in congregate lunches as well as increasing the self-reported intake of fruits and vegetables in total daily meals and evening meal, and increasing the number of

servings consumed each day. Additionally, study results indicated older adults reported high satisfaction with congregate lunch meals. This study contributed to the PI score literature, however future studies are needed to determine an ideal PI score that bestows health benefits to older adults.

**PRE-SURVEY**

How many cups of fruit should an older adult consume each day?														
	0-1	1-2	2-3	3-4	> 5									
		(0)	(1)	(2)	(3)	(4)								
How many cups of vegetables should an older adult consume each day?														
	0-1	1-2	2-3	3-4	> 5									
		(0)	(1)	(2)	(3)	(4)								
<b>Fruit and Vegetable Intake</b>														
Think about the fruits and vegetables you usually eat <u>each day</u> , such as 100% juices; fresh, frozen or canned fruits; fruits for dessert, as well as potatoes, salads, slaws, and other fresh, frozen or canned vegetables. A serving is a piece of fruit or about ½ cup of most fruits and vegetables; ¼ cup of dried fruits (such as raisins); or 1 cup of raw leafy greens used in salads. The next questions are about your usual intake of fruits and vegetables at each meal and for snacks <u>each day</u> .														
How many servings of fruit do you usually have with breakfast?									0	1	2	3	4	5
How many servings of vegetables do you usually have with breakfast?									0	1	2	3	4	5
How many servings of fruit do you usually have with lunch?									0	1	2	3	4	5
How many servings of vegetables do you usually have with lunch?									0	1	2	3	4	5
How many servings of fruit do you usually have with your evening meal?									0	1	2	3	4	5
How many servings of vegetables do you usually have with your evening meal?									0	1	2	3	4	5
How many servings of fruit do you usually have as snacks each day?									0	1	2	3	4	5
How many servings of vegetables do you usually have as snacks each day?									0	1	2	3	4	5
On how many of the last SEVEN DAYS did you eat five or more servings of fruits and vegetables?									0	1	2	3	4	5
									6	7				
<b>In the past month, how often did you consume the following?</b>														
FRESH fruits and vegetables	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
FROZEN fruits and vegetables	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
CANNED fruits and vegetables	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Plain fruit as dessert	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Fruit that is part of a dessert, such as a fruit pie	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
<b>Now think about the fruits and vegetables you ate during the past month. Over the last month, how many times per month, week or day did you eat or drink the following fruits and vegetables? Think about fresh, frozen, or canned fruits and vegetables</b>														
100% orange juice	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
100% cranberry, apple or grape juice	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Dried fruits (raisins, prunes, apricots, etc.)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Blueberries	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Blackberries or black raspberries	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Red raspberries	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Strawberries	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Peaches, or nectarines	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				
Oranges, mandarin oranges, tangerines, or grapefruit	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d				
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)				

Apples (any color)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pears	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bananas	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Plums (Red or black)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Grapes (green or red)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cherries (any color)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Pineapples	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Kiwi, mangoes, papayas	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cantaloupe	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Honeydew melon	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Watermelon	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>VEGETABLES</b>										
Spinach (raw or cooked)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Salad greens (such as, romaine lettuce, arugula or other leafy green lettuce; not iceberg or spinach)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Leafy greens (such as mustard, turnip, or collard greens)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Asparagus	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Broccoli	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Brussel sprouts	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cabbage (any color)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cauliflower	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Corn	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Baked or mashed potatoes (excluding fried potatoes such as French fries)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fresh tomatoes	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cooked or stewed tomatoes (such as in vegetable soup or pasta sauce)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Beets	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Eggplant	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Onions (yellow, red, scallions, leaks)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Peppers (green, red, orange)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Mushrooms	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Summer squash or zucchini	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d

	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Sweet potatoes or yams	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Carrots	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Acorns or butternut squash	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
String beans or green beans	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Green peas	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Baked beans, pintos, black-eyed peas, lima beans, chickpeas, or other legumes (excluding green peas)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
<b>Over the last month, how many times per month, week or day did you eat or drink the following items?</b>											
Whole wheat or whole grain bread (such as 100% whole wheat bread)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
High fat meats (such as regular ground beef, ribeye steak, chicken with the skin on, processed meats such as pepperoni, sausage, bacon)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Organ meats such as liver or kidneys	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Whole milk	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
High fat cheeses (such as regular cheddar, Colby, Monterey Jack, cream cheese)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Walnuts	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Seeds (pumpkin, sesame, sunflower)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Oil (canola, corn, olive, peanut, flax, soybean, safflower, sunflower)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Nuts (excluding walnuts) such as almonds, cashews, peanuts, pecans, pistachios	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Oily fish (herring, mackerel, salmon, trout, tuna)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Green tea	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Calcium supplement	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
<b>How often do you do the following?</b>											
Trim fat from meat and poultry	Often (4)	Sometimes (1)	Rarely (2)	Never (3)	Don't know (0)						
Remove skin from poultry or consume skinless poultry	Often (4)	Sometimes (1)	Rarely (2)	Never (3)	Don't know (0)						
Remove skin from fish	Often (4)	Sometimes (1)	Rarely (2)	Never (3)	Don't know (0)						
Drain, rinse, or remove fats and oils from cooked meats, broths, or soups before eating them	Often (4)	Sometimes (1)	Rarely (2)	Never (3)	Don't know (0)						
Use glass food storage containers instead of plastic storage containers	Often (4)	Sometimes (1)	Rarely (2)	Never (3)	Don't know (0)						
Consume grilled meats	Often (4)	Sometimes (1)	Rarely (2)	Never (3)	Don't know (0)						
<b>Barriers</b>											
<b>What keeps you from eating more fruits and vegetables?</b>											
Don't like the taste							No (0)	Yes (1)			

Grocery store does not have what I like	No (0)	Yes (1)
Lack of storage space	No (0)	Yes (1)
Not in season	No (0)	Yes (1)
Spouse doesn't like them	No (0)	Yes (1)
Takes too much time	No (0)	Yes (1)
Too heavy to carry home from the store	No (0)	Yes (1)
Too many are recommended	No (0)	Yes (1)
Too much trouble	No (0)	Yes (1)
Transportation problems	No (0)	Yes (1)
I already consume lots of fruits and vegetables	No (0)	Yes (1)
Are there any other reasons that keep you from eating more fruits and vegetables?	No (0)	Yes (1)
If yes, please explain:		
<b>Motivators</b>		
<b>If offered, which of the following efforts to increase fruit and vegetable intake would you like the most?</b>		
Nutrition education programs	No (0)	Yes (1)
Transportation to grocery stores	No (0)	Yes (1)
Fruit and vegetable delivery	No (0)	Yes (1)
Fruit and vegetable recipe tasting	No (0)	Yes (1)
Fruit and vegetable gardens	No (0)	Yes (1)
Discounts on fruits and vegetables	No (0)	Yes (1)
Better cooking and meal preparation environment	No (0)	Yes (1)
Support programming from family and friends and peers	No (0)	Yes (1)
<b>Farmers Market</b>		
Do you normally try samples of recipes at the grocery, farmers market, or senior center?	Not Usually (0)	Sometimes (1) Frequently (2)
Do you normally take recipe cards, if provided, from the grocery, farmers market, or senior center?	Not Usually (0)	Sometimes (1) Frequently (2)
How often do you visit the farmers market during the Kentucky growing season?	Weekly (0)	Biweekly (1) Monthly (2) Less than once a month (3) Never (4)
How often do you purchase fruits and vegetables at the farmers market during the Kentucky growing season?	Weekly (0)	Biweekly (1) Monthly (2) Less than once a month (3) Never (4)
<b>Phytochemicals</b>		
<b>The next set of questions is related to phytochemicals, which are substances found in some foods.</b>		
Have you ever heard of phytochemicals, flavonoids, phytonutrients or bioactive compounds before? (if "no" skip to last phytochemical question)	No (0)	Yes (1) Not sure (2)
Do you believe that phytochemicals can improve your health?	No (0)	Yes (1) Not sure (2)
Do you believe that phytochemicals can specifically help to prevent or better manage cancer, heart disease, or other chronic illnesses	No (0)	Yes (1) Not sure (2)
Do you eat certain foods because they contain phytochemicals?	No (0)	Yes (1) Not sure (2)
Phytochemicals are most often found in which types of food?	Meat (4) Dairy (3) Plant foods (2) All Foods (1) Don't know (0)	
<b>Physical Activity</b>		
How many DAYS of the last WEEK (seven days) did you participate in at least 30 minutes of moderate physical activity? Examples of moderate activities are regular walking, housework, yard work, lawn mowing.	0 1 2 3 4 5 6 7	

painting, repairing, light carpentry, ballroom dancing, light sports, golf or bicycling.		
<p><b>Pollution is the introduction of harmful substances or products into the environment. Examples of pollution includes pesticides used on fruits and vegetables, heavy metals, hormones, or antibiotics in foods, lawn chemicals, air pollution or contaminated drinking water.</b> On a scale of 0 to 10, with 0 being of no concern and 10 being very concerned, how concerned are you about being exposed to pollution in the areas where you eat, live, learn, work, play (recreation) or shop?          (no concern) (medium concern) (serious concern) (use these as prompts to help conceptualize if they are struggling with assigning their level of concern)</p>		
0 1 2 3 4 5 6 7 8 9 10 Don't know (11)		
<b>Extent of Concern</b>		
On a scale of 0 to 10 with 10 being very concerned, how concerned are you that your health is being or has been negatively affected by environmental hazards/pollution	0 1 2 3 4 5 6 7 8 9 10	Don't know (11)
On a scale of 0 to 10 with 10 being very concerned, how concerned are you that people may get sick because they don't eat the right foods to protect themselves from pollution.	0 1 2 3 4 5 6 7 8 9 10	Don't know (11)
<b>Knowledge</b>		
People don't need to worry about toxic things, because our bodies can overcome the toxins.	Strongly Agree (0)	Agree (1) Neutral (2) Disagree (3) Strongly Disagree (4)
A healthy diet can be protective against the negative health effects of pollution	Strongly Agree (0)	Agree (1) Neutral (2) Disagree (3) Strongly Disagree (4)
Eating a healthy diet will NOT make a difference in my health if I live near pollution	Strongly Agree (0)	Agree (1) Neutral (2) Disagree (3) Strongly Disagree (4)
<b>Action (stage of change)</b>		
I eat a normal diet and do not spend time worrying about contaminants in my food.	Strongly Agree (0)	Agree (1) Neutral (2) Disagree (3) Strongly Disagree (4)
I eat healthy foods to make up for the effects of pollution	Strongly Agree (0)	Agree (1) Neutral (2) Disagree (3) Strongly Disagree (4)
I wash my fruits and vegetables thoroughly before using them.	Strongly Agree (0)	Agree (1) Neutral (2) Disagree (3) Strongly Disagree (4)
I eat organically grown food as much as I can.	Strongly Agree (0)	Agree (1) Neutral (2) Disagree (3) Strongly Disagree (4)
<b>Food Security</b> (Do not read the "not sure" option. If they say it or seem unsure then circle "not sure")		
Are you always physically able to (answer each of the following)		
Shop?	No (0)	Yes (1) Not sure (2)
Cook?	No (0)	Yes (1) Not sure (2)
Feed yourself?	No (0)	Yes (1) Not sure (2)
Do you always have enough money to buy the <u>amount</u> of fruits and vegetables that is recommended for older adults to eat (approximately 5 servings per day)?	No (0)	Yes (1) Not sure (2)
Do you always have enough money to buy the <u>variety</u> of fruits and vegetables that is recommended for older adults to eat? (dark greens 4x/wk, yellow/orange 5x/wk, red 5x/wk etc, other vegetables 5x/wk)	No (0)	Yes (1) Not sure (2)
Do you always have enough money to buy the food you need?	No (0)	Yes (1) Not sure (2)
In the past month, have you received food from a food pantry or food bank?	No (0)	Yes (1) Not sure (2)
Do you currently receive food stamps?	No (0)	Yes (1) Not sure (2)
<b>Think about the past 30 days. I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for you since last (name of current month).</b>		
The food that you bought just didn't last, and you didn't have money to buy more.	Often (0)	Sometimes (1) Never (2) Not sure (3)

You couldn't choose the right food and meals for your health because you couldn't afford them.	Often (0) Sometimes (1) Never (2) Not sure (3)
Did you ever cut the size of your meals or skip meals because there wasn't enough money for food?	No (0) Yes (1) Not sure (2)
If you answered yes to the previous question, in the last 30 days, how many days did this happen? (interviewer-please write in participant's response)	_____ days Not sure (2)
Did you ever eat less than you felt you should because there wasn't enough money to buy food?	No (0) Yes (1) Not sure (2)
Were you ever hungry but didn't eat because you couldn't afford enough food?	No (0) Yes (1) Not sure (2)
<b>Demographics</b>	
County (circle one): Fayette (0) Jessamine (1) Scott (2) Woodford (3) Date:	
How old are you? _____	
How much do you weigh? _____	
How tall are you? _____	
Gender: Male (0) Female (1)	
Ethnicity: White (0) Black (1) Hispanic/Latino (2) Asian (3) Other (4)	
What is the highest level of school you have completed or the highest degree you have received?	< high school degree High school degree or equivalent Some college but no degree Vocational/Technical degree Associate degree Bachelor degree Graduate or Professional degree
How would you rate your overall health?	Excellent (0) Very good (1) Good (2) Fair (3) Poor (4)
Do you use any tobacco products such as cigarettes, cigars, pipe, or chewing tobacco?	No (0) Yes (1)
<b>Has a doctor, nurse, or other health professional EVER told you that you:</b>	
Had a heart attack (also called a myocardial infarction)?	Yes (0) No (1) Don't know (2) Refused (3)
Have/Had angina or coronary heart disease?	Yes (0) No (1) Don't know (2) Refused (3)
Have/Had a stroke?	Yes (0) No (1) Don't know (2) Refused (3)
Have/Had asthma?	Yes (0) No (1) Don't know (2) Refused (3)
Have/Had skin cancer?	Yes (0) No (1) Don't know (2) Refused (3)
Have/Had any other types of cancer?	Yes (0) No (1) Don't know (2) Refused (3)
Have/Had Chronic Obstructive Pulmonary Disease or COPD, or emphysema or chronic bronchitis?	Yes (0) No (1) Don't know (2) Refused (3)
Have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?	Yes (0) No (1) Don't know (2) Refused (3)
Have/Had kidney disease? (does not include kidney stones or bladder infection)	Yes (0) No (1) Don't know (2) Refused (3)
Have/Had diabetes?	Yes (0) No (1) Don't know (2) Refused (3)

**POST-SURVEY**

How many cups of fruit should an older adult consume each day?												
	0 - 1.0	1.5 - 2.0	2.0 - 2.5	2.5 - 3.0	≥ 5	Don't Know						
	(0)	(1)	(2)	(3)	(4)	(5)						
How many cups of vegetables should an older adult consume each day?												
	0 - 1.0	1.5 - 2.0	2.5 - 3.0	3.5 - 4.0	≥ 5	Don't Know						
	(0)	(1)	(2)	(3)	(4)	(5)						
<b>Fruit and Vegetable Intake</b>												
Think about the fruits and vegetables you usually eat <u>each day</u> , such as 100% juices; fresh, frozen or canned fruits; fruits for dessert, as well as potatoes, salads, slaws, and other fresh, frozen or canned vegetables. A serving is a piece of fruit or about ½ cup of most fruits and vegetables; ¼ cup of dried fruits (such as raisins); or 1 cup of raw leafy greens used in salads. The next questions are about your usual intake of fruits and vegetables at each meal and for snacks <u>each day</u> .												
How many servings of fruit do you usually have with breakfast?							0	1	2	3	4	5
How many servings of vegetables do you usually have with breakfast?							0	1	2	3	4	5
How many servings of fruit do you usually have with lunch?							0	1	2	3	4	5
How many servings of vegetables do you usually have with lunch?							0	1	2	3	4	5
How many servings of fruit do you usually have with your evening meal?							0	1	2	3	4	5
How many servings of vegetables do you usually have with your evening meal?							0	1	2	3	4	5
How many servings of fruit do you usually have as snacks each day?							0	1	2	3	4	5
How many servings of vegetables do you usually have as snacks each day?							0	1	2	3	4	5
On how many of the last SEVEN DAYS did you eat 4.5 cups or more of fruits and vegetables?							0	1	2	3	4	5
							6	7				
<b>In the past month, how often did you consume the following?</b>												
FRESH fruits and vegetables	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
FROZEN fruits and vegetables	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
CANNED fruits and vegetables	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Plain fruit as dessert	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Fruit that is part of a dessert, such as a fruit pie	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
<b>Now think about the fruits and vegetables you ate during the past month. Over the last month, how many times per month, week or day did you eat or drink the following fruits and vegetables? Think about fresh, frozen, or canned fruits and vegetables</b>												
100% orange juice	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
100% cranberry, apple or grape juice	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Dried fruits (raisins, prunes, apricots, etc.)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Blueberries	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Blackberries or black raspberries	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Red raspberries	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Strawberries	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Peaches or nectarines	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		
Oranges, mandarin oranges, tangerines, or grapefruit	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d		
	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)		

	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Sweet potatoes or yams	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Carrots	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Acorns or butternut squash	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
String beans or green beans	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Green peas	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Baked beans, pintos, black-eyed peas, lima beans, chickpeas, or other legumes (excluding green peas)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
<b>Over the last month, how many times per month, week or day did you eat or drink the following items?</b>											
Whole wheat or whole grain bread (such as 100% whole wheat bread)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
High fat meats (such as regular ground beef, ribeye steak, chicken with the skin on, processed meats such as pepperoni, sausage, bacon)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Organ meats such as liver or kidneys	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Whole milk	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
High fat cheeses (such as regular cheddar, Colby, Monterey Jack, cream cheese)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Walnuts	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Seeds (pumpkin, sesame, sunflower)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Oil (canola, corn, olive, peanut, flax, soybean, safflower, sunflower)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Nuts (excluding walnuts) such as almonds, cashews, peanuts, pecans, pistachios	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Oily fish (herring, mackerel, salmon, trout, tuna)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Green tea	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Calcium supplement	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
<b>Barriers</b>											
<b>What keeps you from eating more fruits and vegetables?</b>											
Chewing or dental problems								No (0)	Yes (1)		
Cooking problems								No (0)	Yes (1)		
Cost								No (0)	Yes (1)		
Difficulties with digestion								No (0)	Yes (1)		
Don't like the taste								No (0)	Yes (1)		
Grocery store does not have what I like								No (0)	Yes (1)		
Lack of storage space								No (0)	Yes (1)		
Not in season								No (0)	Yes (1)		
Spouse doesn't like them								No (0)	Yes (1)		
Takes too much time								No (0)	Yes (1)		
Too heavy to carry home from the store								No (0)	Yes (1)		
Too many are recommended								No (0)	Yes (1)		
Too much trouble								No (0)	Yes (1)		
Transportation problems								No (0)	Yes (1)		
I already consume lots of fruits and vegetables								No (0)	Yes (1)		

	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Sweet potatoes or yams	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Carrots	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Acorns or butternut squash	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
String beans or green beans	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Green peas	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
Baked beans, pintos, black-eyed peas, lima beans, chickpeas, or other legumes (excluding green peas)	0	1-3/mo	1/wk	2/wk	3/wk	4/wk	5/wk	1/d	2/d	>2/d	
<b>Over the last month, how many times per month, week or day did you eat or drink the following items?</b>											
Whole wheat or whole grain bread (such as 100% whole wheat bread)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
High fat meats (such as regular ground beef, ribeye steak, chicken with the skin on, processed meats such as pepperoni, sausage, bacon)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Organ meats such as liver or kidneys	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Whole milk	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
High fat cheeses (such as regular cheddar, Colby, Monterey Jack, cream cheese)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Walnuts	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Seeds (pumpkin, sesame, sunflower)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Oil (canola, corn, olive, peanut, flax, soybean, safflower, sunflower)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Nuts (excluding walnuts) such as almonds, cashews, peanuts, pecans, pistachios	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Oily fish (herring, mackerel, salmon, trout, tuna)	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Green tea	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
Calcium supplement	0	1-3/mo	1-2/wk	3-4/wk	5-6/wk	1/d	2/d	3/d	4/d	≥5/d	
<b>Barriers</b>											
<b>What keeps you from eating more fruits and vegetables?</b>											
Chewing or dental problems								No (0)	Yes (1)		
Cooking problems								No (0)	Yes (1)		
Cost								No (0)	Yes (1)		
Difficulties with digestion								No (0)	Yes (1)		
Don't like the taste								No (0)	Yes (1)		
Grocery store does not have what I like								No (0)	Yes (1)		
Lack of storage space								No (0)	Yes (1)		
Not in season								No (0)	Yes (1)		
Spouse doesn't like them								No (0)	Yes (1)		
Takes too much time								No (0)	Yes (1)		
Too heavy to carry home from the store								No (0)	Yes (1)		
Too many are recommended								No (0)	Yes (1)		
Too much trouble								No (0)	Yes (1)		
Transportation problems								No (0)	Yes (1)		
I already consume lots of fruits and vegetables								No (0)	Yes (1)		

Are there any other reasons that keep you from eating more fruits and vegetables?		No (0)	Yes (1)
If yes, please explain:			
<b>Motivators</b>			
<b>If offered, which of the following efforts to increase fruit and vegetable intake would you like the most?</b>			
Nutrition education programs	No (0)	Yes (1)	
Transportation to grocery stores	No (0)	Yes (1)	
Fruit and vegetable delivery	No (0)	Yes (1)	
Fruit and vegetable recipe tasting	No (0)	Yes (1)	
Fruit and vegetable gardens	No (0)	Yes (1)	
Discounts on fruits and vegetables	No (0)	Yes (1)	
Better cooking and meal preparation environment	No (0)	Yes (1)	
Support programming from family and friends and peers	No (0)	Yes (1)	
<b>Farmers Market</b>			
Over the past two months, how often did you try samples of recipes at the grocery, farmers market, or senior center?	Not Usually (0)	Sometimes (1)	Frequently (2)
Over the past two months, how often did you take recipe cards, if provided, from the grocery, farmers market, or senior center?	Not Usually (0)	Sometimes (1)	Frequently (2)
Over the past two months, how often did you prepare any of the recipes that you sampled at the senior center?	_____ (number of times)		
Did the recipe cards help you incorporate more fruits and vegetables into your daily meals and snacks?	No (0)	Yes (1)	Not sure (2)
Did you read the phytochemical health information cards that came with the recipe cards?	No (0)	Yes (1)	Not sure (2)
Did the phytochemical health information cards motivate you to incorporate more fruits and vegetables into your daily meals and snacks?	No (0)	Yes (1)	Not sure (2)
Did the phytochemical health information cards motivate you to incorporate a greater <u>variety</u> of fruits and vegetables into your daily meals and snacks?	No (0)	Yes (1)	Not sure (2)
How often have you visited the farmers market in the past two months?			
Weekly (0)	Biweekly (1)	Monthly (2)	Less than once a month (3)      Never (4)
How often did you purchase fruits and vegetables at the farmers market in the past two months?			
Weekly (0)	Biweekly (1)	Monthly (2)	Less than once a month (3)      Never (4)
How much did you enjoy the <i>Plate It Up! Kentucky Proud</i> recipe sampling?	Did not enjoy (0)	Neutral (1)	Enjoyed lots (2)
Did you attend the Farmers Market tour?	No (0)	Yes (1)	Not sure (2)
If yes, did the Farmers Market tour impact your likelihood of visiting the Farmers Market again over the summer?	No (0)	Yes (1)	Not sure (2)
Would you be interested in attending Farmers Market tours on a more regular basis (e.g. monthly during the growing season)?	No (0)	Yes (1)	Not sure (2)
<b>Phytochemicals</b>			
<b>The next set of questions are related to phytochemicals, which are substances found in some foods.</b>			
Have you ever heard of phytochemicals, flavonoids, phytonutrients or bioactive compounds before? (if "no" skip to last phytochemical question)	No (0)	Yes (1)	Not sure (2)
Do you believe that phytochemicals can improve your health?	No (0)	Yes (1)	Not sure (2)

Do you believe that phytochemicals can specifically help to prevent or better manage cancer, heart disease, or other chronic illnesses	No (0) Yes (1) Not sure (2)
Do you eat certain foods because they contain phytochemicals?	No (0) Yes (1) Not sure (2)
Phytochemicals are most often found in which types of food?	Meat (4) Dairy (3) Plant foods (2) All Foods (1) Don't know (0)
<b>Physical Activity</b>	
How many DAYS of the last WEEK (seven days) did you participate in at least 30 minutes of moderate physical activity? Examples of moderate activities are regular walking, housework, yard work, lawn mowing, painting, repairing, light carpentry, ballroom dancing, light sports, golf or bicycling.	0 1 2 3 4 5 6 7
<p><b>Pollution is the introduction of harmful substances or products into the environment. Examples of pollution includes pesticides used on fruits and vegetables, heavy metals, hormones, or antibiotics in foods, lawn chemicals, air pollution or contaminated drinking water. On a scale of 0 to 10, with 0 being of no concern and 10 being very concerned, how concerned are you about being exposed to pollution in the areas where you eat, live, learn, work, play (recreation) or shop?</b></p> <p>(no concern) (medium concern) (serious concern) (use these as prompts to help conceptualize if they are struggling with assigning their level of concern)</p> <p>0 1 2 3 4 5 6 7 8 9 10 Don't know (11)</p>	
<b>Pollution Sensitivity Scale</b>	
Think about the neighborhood where you live. A 0 means that there is none of this kind of pollution at all in your neighborhood, while a 10 means that there is a very serious problem with this type of pollution.	
Contaminated drinking water.	0 1 2 3 4 5 6 7 8 9 10
Pesticides, hormones, antibiotics in our food.	0 1 2 3 4 5 6 7 8 9 10
Chemicals in food and beverage containers, such as cans and plastic bottles.	0 1 2 3 4 5 6 7 8 9 10
Contaminants such as pesticides in fruits and vegetables.	0 1 2 3 4 5 6 7 8 9 10
Contaminants like mercury, dioxin or PCBs in fish, meat or poultry.	0 1 2 3 4 5 6 7 8 9 10
<b>Pollution-Cause-Illness Scale</b>	
The following are statements about environment and health. Think about how much you agree or disagree with each statement. A 10 means you agree completely. A 0 means you disagree completely.	
The drinking water in my community causes health problems.	0 1 2 3 4 5 6 7 8 9 10
People may get sick because they don't eat the right foods to protect themselves from pollution.	0 1 2 3 4 5 6 7 8 9 10
<b>Pollution Acceptance Scale</b>	
Here are some statements about pollution being normal part of life which can be lived with. Use the same rating approach as above, where 10 means you agree completely and 0 means you disagree completely.	
People don't need to worry about toxic things, because our bodies can overcome the toxins.	0 1 2 3 4 5 6 7 8 9 10
Many people I know don't seem to get sick, even though they don't try to keep contaminants out of their food.	0 1 2 3 4 5 6 7 8 9 10
If you want to eat a normal diet, you can't spend time worrying about contaminants in your food.	0 1 2 3 4 5 6 7 8 9 10
Eating a healthy diet will not make a difference in my health if I live near pollution.	0 1 2 3 4 5 6 7 8 9 10
<b>Personal Environmental Action Scale</b>	

Here are statements about things you might do in your personal life for your health. Use the ratings from 0 to 10 to show how consistently you do each thing. A 10 means you always do this when it makes sense. A 0 means you never do it.											
I drink water that is bottled or filtered - not just from the faucet.	0	1	2	3	4	5	6	7	8	9	10
I limit how much fish I eat because fish might contain toxic chemicals.	0	1	2	3	4	5	6	7	8	9	10
I eat healthy foods to make up for the effects of pollution.	0	1	2	3	4	5	6	7	8	9	10
I eat healthy foods to make up for the effects of pollution	0	1	2	3	4	5	6	7	8	9	10
I wash my fruits and vegetables thoroughly before using them.	0	1	2	3	4	5	6	7	8	9	10
I try to eat 5 or more servings of fruit and vegetables every day.	0	1	2	3	4	5	6	7	8	9	10
I eat organically grown food as much as I can.	0	1	2	3	4	5	6	7	8	9	10
<b>Community Environmental Action</b>											
Here are statements about things you might do with others in the community to help protect health. Use the ratings from 0 to 10 to show how consistently you do each thing. A 10 means you always do this when it makes sense. A 0 means you never do it.											
I talk with my friends and neighbors about how we can get healthier foods in our town.	0	1	2	3	4	5	6	7	8	9	10
I talk with my friends and neighbors about how we can get cleaner water in our town.	0	1	2	3	4	5	6	7	8	9	10
<b>After attending the fruit and vegetable lessons have you:</b>											
Shared what you learned about the health benefits of phytochemicals with your family, friends, co-workers or acquaintances?	No (0)		Yes (1)		Not sure (2)						
Discussed the health benefits of phytochemicals with your doctor/health care professional?	No (0)		Yes (1)		Not sure (2)						
Improved your attitude concerning the consumption of more fruits and vegetables?	No (0)		Yes (1)		Not sure (2)						
Tried to follow a healthier diet?	No (0)		Yes (1)		Not sure (2)						
Increased your intake of fruit?	No (0)		Yes (1)		Not sure (2)						
Increased your intake of vegetables?	No (0)		Yes (1)		Not sure (2)						
Ate more fruits and vegetables with breakfast?	No (0)		Yes (1)		Not sure (2)						
Ate more fruits and vegetables with lunch?	No (0)		Yes (1)		Not sure (2)						
Ate more fruits and vegetables with your evening meal?	No (0)		Yes (1)		Not sure (2)						
How many sessions of the fruit and vegetable nutrition education program did you attend? (not including the farmers market tour)	0	1	2	3	4	5					
<b>Food Security</b> (Do not read the "not sure" option. If they say it or seem unsure then circle "not sure")											
Are you always physically able to (answer <u>each</u> of the following)											
Shop?	No (0)		Yes (1)		Not sure (2)						
Cook?	No (0)		Yes (1)		Not sure (2)						
Feed yourself?	No (0)		Yes (1)		Not sure (2)						
Do you always have enough money to buy the <u>amount</u> of fruits and vegetables that is recommended for older adults to eat (approximately 5 servings per day)?	No (0)		Yes (1)		Not sure (2)						
Do you always have enough money to buy the <u>variety</u> of fruits and vegetables that is recommended for older adults to eat? (dark greens 4x/wk, yellow/orange 5x/wk, red 5x/wk etc, other vegetables 5x/wk)	No (0)		Yes (1)		Not sure (2)						
Do you always have enough money to buy the food you need?	No (0)		Yes (1)		Not sure (2)						
In the past month, have you received food from a food pantry or food bank?	No (0)		Yes (1)		Not sure (2)						
Do you currently receive food stamps?	No (0)		Yes (1)		Not sure (2)						
<b>Think about the past 30 days. 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</b>											

<b>for you since last (name of current month).</b>				
The food that you bought just didn't last, and you didn't have money to buy more.	Often (0) Sometimes (1) Never (2) Not sure (3)			
You couldn't choose the right food and meals for your health because you couldn't afford them.	Often (0) Sometimes (1) Never (2) Not sure (3)			
Did you ever cut the size of your meals or skip meals because there wasn't enough money for food?	No (0) Yes (1) Not sure (2)			
If you answered yes to the previous question, in the last 30 days, how many days did this happen? <i>(interviewer-please write in participant's response)</i>	_____ days Not sure (2)			
Did you ever eat less than you felt you should because there wasn't enough money to buy food?	No (0) Yes (1) Not sure (2)			
Were you ever hungry but didn't eat because you couldn't afford enough food?	No (0) Yes (1) Not sure (2)			
<b>Demographics</b>				
County (circle one): Fayette (0) Jessamine (1) Scott (2) Woodford (3) Date: _____				
How much do you weigh? _____				
How tall are you? _____				
How would you rate your overall health? _____				
Do you use any tobacco products such as cigarettes, cigars, pipe, or chewing tobacco? _____				
_____				
<b>Have there been any changes to your health since May?</b>				
_____				
<b>Has a doctor, nurse, or other health professional EVER told you that you:</b>				
Had a heart attack (also called a myocardial infarction)?	Yes (0)	No (1)	Don't know (2)	Refused (3)
Have/Had angina or coronary heart disease?	Yes (0)	No (1)	Don't know (2)	Refused (3)
Have/Had a stroke?	Yes (0)	No (1)	Don't know (2)	Refused (3)
Have/Had asthma?	Yes (0)	No (1)	Don't know (2)	Refused (3)
Have/Had skin cancer?	Yes (0)	No (1)	Don't know (2)	Refused (3)
Have/Had any other types of cancer?	Yes (0)	No (1)	Don't know (2)	Refused (3)
Have/Had Chronic Obstructive Pulmonary Disease or COPD, or emphysema or chronic bronchitis?	Yes (0)	No (1)	Don't know (2)	Refused (3)
Have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?	Yes (0)	No (1)	Don't know (2)	Refused (3)
Have/Had kidney disease? (does not include kidney stones or bladder infection)	Yes (0)	No (1)	Don't know (2)	Refused (3)
Have/Had diabetes?	Yes (0)	No (1)	Don't know (2)	Refused (3)

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